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Engineering Gods

Renaissance Theurgy and the
Sixteenth-Century Automata of
Francesco I de' Medici
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Preface

“What is the proper definition of science for a historian of science? I would offer this as the simplest, broadest, and most useful: science is a systematic explanation of perceived or imaginary phenomena, or else is based on such an explanation.”

David Pingree, 1992¹

“Religion is involved in an attitude of mind which succeeds in apprehending the existence of an agency superior to man, by whose will and power the course of the world is ordered. Magic is involved in an attitude which attempts to regulate the course of the world by the compulsion of agencies, personal or impersonal, carrying out the mandates of men in occult ways outside the province of human reason. Lasty, Science is involved in the attitude that attempts the discovery and comprehension by force of the human intellect of the system of intelligible relations that govern the phenomena of the universe.”

Joan Evans, 1976²

From our vantage point in the twenty-first century, a history of mechanical objects belongs to a set of accepted, cohesive ideas about science, technology, the material, and the understandable. However, as one historian of Renaissance mechanics has underlined, before the age of Descartes and Gassendi and the advent of a systematic mechanical philosophy in the mid-seventeenth century, mechanical objects were invested with meaning by scholars and poets which were radically different from, and possessed little of the systematization of those of later centuries.³ The many facets of this fascination with mechanical objects in the centuries prior has been highlighted as an area which has not yet been satisfactorily explained by historians of science.⁴ From this age, perpetual motion machines, hydraulic garden machinery, and automata, “failures or oddities” though they may be considered today, are significant not only because, as Jessica Wolfe observes, they tie together the period's most conventional discourses and practices,⁵ but also because they speak to the rarefied heights of humanist knowledge and embodied their patrons aspirations to

¹ David Pingree, “Hellenophilia versus the History of Science,” *Isis*, 83.4 (1992): 559.

² Joan Evans, *Magical Jewels of the Middle Ages and the Renaissance* (New York: Dover Publications, 1976), 9.

³ Jessica Wolfe, *Humanism, Machinery, and Renaissance Literature* (Cambridge: Cambridge University Press, 2003), 1.

⁴ *Idem*, 6.

⁵ *Ibid.*

surpass the ancients' achievements. To separate “humanism” and “science” in this age, or even “magic” and “mechanics,” would be a losing proposition. For sixteenth-century humanists, machinery is “capable of confederacy with a dazzling array of concerns distinctive to the intellectual culture of the period.”⁶ These distinctive concerns revolved primarily around the resurrection of ancient knowledge, comprising astrology, magical philosophy inherited from the Middle Ages, and rediscovered Hermetic and Neoplatonic texts, and they formed their own dazzling confederacy with mechanical technology of the day. In the sixteenth-century, “magic” was intimately linked etymologically with “mechanics.” The Greek *magus* and *magganon* (deceit) can be read in the *manganaria* used by Alessandro Giorgi and Bernardino Baldi's translations of Hero of Alexandria and pseudo-Aristotle or the definition of mechanics as an “ars Manganoriorum instrumentorum” in the 1593 *Institutionem Mathematicarum* of Conrad Dasypodius.⁷ At the same time, “technology” carried the connotation not of mechanical practices but rather rhetorical or philological methods from the time the term was imported from the Greek (τεχνολογία) into Latin by Cicero.⁸

In effect, in spite of the abundance of Renaissance texts which depict mechanical devices, technology as we are familiar with the term did not exist, and little categorical distinction was made between other intellectual disciplines which also required technical skill and the creation of mechanistic devices. In stark contrast to the later systems of mechanical organization and thought, mechanical objects in sixteenth-century compilations could be found under headings for “playful,” “extravagant,” or “chaotic” elements.⁹ In Bernardino Baldi's preface to his vernacular translation of Hero of Alexandria's *De Gli Automi*, mechanics and automaton-manufacture in particular are invested with a nobility superior to that traditionally given to mathematics because they reveal “the most secret and occult mysteries of Philosophy” and possess apparently miraculous movements as the result of hidden counterweights.¹⁰ Jessica Wolfe recognized in Baldi's preface a declaration of Renaissance mechanics' capacity to mediate between not only competing disciplines of knowledge

⁶ Idem, 1.

⁷ Idem, 4; Conrad Dasypodius, *Institutionem Mathematicarum* (Strasbourg: Iosias Rihelius, 1593), 42; *Spirituali di Herone Alessandrino*, tr. Alessandro Giorgi (Urbino: Ragusii, 1592), 3; Bernardino Baldi, *Mechanica Aristotelis Problemata Exercitationes* (Mainz, 1621), preface.

⁸ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 3.

⁹ Idem, 7.

¹⁰ Bernardino Baldi, *De Herone Alessandrino De Gli Automati, overo Machine Semoventi, libri due*, 4v, 6v cited in Wolfe, *Humanism, Machinery, and Renaissance Literature*, 44.

and conceptions of nature and artifice, but competing metaphysical realms.¹¹ This last distinction touches upon the investigation of the overlap between magical philosophy and mechanical manufacture in the Renaissance with which the present study concerns itself.

This study brings together the two elements usually relegated to the margins of surveys of art history and philosophy: Renaissance machinery and a technique of statue animation culled from ancient texts. However, the marginality of the former has been recognized as the quality which allowed it to infuse the age's thought-patterns, and so too must the latter fall into the same model that reveals how the seemingly incidental act as anchors to the age's anxieties and problems.¹² As peripheral as hydraulic automata or ancient theurgic and magical philosophy may seem to the larger currents of this age's history, as defined by nineteenth- and twentieth-century scholarship, both lurked in the interstices of Renaissance consciousness, interacting with one another and compounding their meaning through the philosophical and cultural problems which they posed.

Baldi's preface which exalts the mastery of philosophy's innermost secrets in order to manufacture a "true" automaton begins a work dedicated to Bernardo Buontalenti, the master-engineer of a set of automata realized at the close of the sixteenth century which occasioned comparisons with the magically-animated automata of antiquity. This study takes as its point of departure a text of the sixteenth-century philosopher, university professor, and Medici court chronicler Francesco de' Vieri (1524-1591), also called Verino Secondo. The text itself is unusual for historians of philosophy and intellectual history in that it concerns itself primarily with the features and "wonders" of the now-defunct Medici Villa Pratolino, and consequently it has fallen primarily to historians of art and architecture to analyze its contents. Yet, De' Vieri's two-part text, *Delle Maravigliose Opere di Pratolino, & d'Amore* ("On the Wonderful Works of Pratolino and of Love) is a rich, if overlooked, source for articulations of his eclectic philosophy, which synthesized elements of Aristotelian, Neoplatonic (in the Ficinian mold), Hermetic, and Renaissance philosophers of the fifteenth and sixteenth centuries. Although De' Vieri's text's primary purpose is to describe Pratolino's works, it does so in the philosopher's characteristic style which eagerly sets out to underpin the sixteenth-century works with predecessors and metaphysical rationalizations drawn from antique philosophy. From De' Vieri's brief commentary on the hydraulically- and pneumatically-animated automata installed in the Renaissance villa and parks' grottos, the reader is

¹¹ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 44.

¹² Idem, 7; Patricia Fumerton, *Cultural Aesthetics: Renaissance Literature and the Practice of Social Ornament* (Chicago: University of Chicago Press, 1991), 1-3.

introduced not only to examples of animated statues from antiquity, but to (one of) their methods of operation, which beg the questions to which the present study is dedicated: how was the animation of man-made statues understood in antiquity and subsequently in the Renaissance? By what processes could man “bring life” to his own creations and what were the religious and philosophical ramifications of this realized capacity?

The answers trace an arc of intellectual history which has begun to be charted by other historians but into which there is still much room for art, object, and mechanical history to be inserted. As the present study will illustrate, several ancient civilizations developed theories and practices about how some divine essence could be drawn down on Earth and retained in man-made vessels. These could range from small wax figures or inscribed sheets of metal used in magical operations to the monumental cult statues of Egyptian and Greek temples. Simultaneously, mechanical devices were invented which harnessed the power of wind and water to create statues and objects which moved and appeared alive, and in many cases were based on imitative models of natural life. The stars of the heavens were predominantly the source from which Classical antiquity believed divine or celestial qualities could be attracted or extracted in some sense, but alternative concepts and approaches can be observed in the Jewish tradition, for example, and elsewhere. In the arch of the philosophy of Classical antiquity's metamorphosis into the later stage and ultimately the adaptation of surviving elements in the medieval period, we witness the transmission and transformation of ideas about stars, planetary gods, daimons, and other models into malevolent demons (though no less real) with whom medieval Christians were forbidden by Church authority to interact. Yet, from the heart of the scholastic tradition in the Middle Ages came the seed that would germinate in the Renaissance and become a revolution for the early-modern period: that whatever qualities were transmitted from star-gods, demons, or angels were inherently natural and physical components of a unified and understandable cosmos. Just as the modern conception of our cosmos is moot without the Copernican revolution, so too is the parallel, if under-explored, phenomenon of how we conceive of cosmic radiation (or any radiation for that matter) without the philosophical developments which occurred between the thirteenth and sixteenth centuries. These responses to and rearticulations of antique ideas about the transmission of celestial and divine influences upon the terrestrial sphere and mankind's ability to manufacture images and objects designed to attract and retain these qualities (investing them with “spirit”) belonged at the time to mostly to traditions of learned, astrological, and ritual magic, but from our vantage-point in the present day, we may

recognize these works as primitive essays on the nature of radiation, rooted as they were in religious-magical traditions of astral/demonic manipulations.

The premise of the symbiotic inter-relationships of fields which today are distinct as upon which the present study is founded has been argued eloquently elsewhere, and like other studies on the relationship between “occult” wisdom or magical traditions and Renaissance culture, the present one aims to use this aspect of culture as a gateway to a deeper understanding of moral, philosophical, and social issues of the day to which writers responded.¹³ The intellectual phenomena to which De' Vieri's writings testify belong to the larger narrative of a movement rooted in civic humanism subjected to a “process of radical development in the Hermetic/Cabalist tradition to its culmination in the birth of science.”¹⁴ While the primary aim of the present dissertation remains the illumination of De' Vieri's Pratolino treatise for its valuable insight into how the late-Renaissance viewed the mechanical automata which were beginning to grace princely villas and gardens, the ramification of their mystical or magical connotations nevertheless belong to this larger context of the cultural shift from primarily religious, ritualistic conceptions of the process towards an expanded natural philosophy integrating heaven and earth in a foundationally modern way.

The research of this study consisted primarily of printed and published sources, and when unpublished sources were consulted, the Biblioteca Nazionale Centrale di Firenze for their reproduction of these. Thanks to the availability of the primary text, the 1587 *Delle Maravigliose Opere di Pratolino, & d'Amore* by Francesco de' Vieri, online by the Deutsche Digitale Bibliothek, this study was aided immensely. I would also like to thank my thesis director Prof. Dr. Marco Sgarbi for his patience, guidance, and insight, as well as Ca' Foscari University of Venice for their generous fellowship. I thank as well two cherished professors from my time at Syracuse and Tulane Universities, respectively, Dr. James Bradburne and Dr. Holly Flora, for their unwavering encouragement, motivation, and contributions of sparkling thought throughout the course of the present study. Dr. Katherine Brokaw with the University of California, Merced I thank especially for her enthusiasm for my research topic and her generous willingness to advance a draft version of this dissertation. Dr. Dylan Rogers of the American School of Classical Studies in Athens was kind enough to provide his expertise with the translation and transliteration of the Greek terms which I encountered, and the boundless generosity of Dr. Emiliano Errico made possible much of the

¹³ See John S. Mebane, *Renaissance Magic & the Return of the Golden Age* (Lincoln, NE and London: University of Nebraska Press, 1989), xi-xv.

¹⁴ *Ibid.*

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Engineering Gods:
Theurgy and the Late Sixteenth-Century Automata of Francesco I de' Medici

Introduction

In the late-sixteenth-century, Medici Grand Duke Francesco I (1541-1587) commissioned the construction of Pratolino, a lavish suburban villa and gardens a mere five kilometers to the north of Florence along the road to Bologna. This construction belongs within the larger context of Francesco I's patronage that saw the expansion of Medici holdings to include the villas of Magia, Lapeggi, Marignolle, as well as his personal *studiolo* within the Palazzo Vecchio and *fonderia* at the Casino of San Marco.¹ At Pratolino, what had formerly been a tract of farmland owned first by the Orlandini,² then until 1568 by a superintendent of works for the Medici, Benedetto di Buonaccorso Uguccioni, this “desolate hillside...(that) he used no ghosts of former Medici”³ was transformed into vast and lavish water-gardens dotted with fantastic displays of art and technology realized by large teams of artists and engineers⁴ under the general direction of the architect and polymath Bernardo Buontalenti (*ca.* 1531-1608).

Buontalenti realized not only the lion's share of Pratolino's architecture and virtually all of its many distinctive grottoes (with the prominent exception of Giambologna's Appennine), which can be read as virtuosic variations upon the architectural type visible at other Medici palaces. For example, Buontalenti's transformation of the Grotta Grande in the Boboli Gardens of the Pitti Palace in Florence (1583-93) filled its interior with a riotous profusion of forms which contrasts with the earlier, simple facade design by Vasari (1556-60). A life-long companion to Francesco I, having received his education at the Medici court, Buontalenti worked side by side with young Francesco in the foundries and laboratories, and then having travelled with the prince on his sojourn to Spain (1562-63), Buontalenti's life and career might be analogized as the executive producer and

¹ Daniela Mignani, *The Medicean Villas by Giusto Utens* (Firenze: Arnaud, 1995), 15.

² Filippo Baldinucci, *Notizie de' Professori del Disegno da Cimabue in qua* (Firenze: Per V. Batelli e compagnia, 1845-47), 496-97; see also Claire Brown, *Pratolino and the Transforming Influence of Natural Philosophy* (M.A. Thesis: Birkbeck College, 2005), 6.

³ Jocelyn Godwin, *The Pagan Dream of the Renaissance* (London: Thames and Hudson, 2002), 175.

⁴ Other artisan-engineers who appear in the records are Bonaventura da Orvieto (or da Bagnoregio), Gocerano da Parma, Tommaso Francini, and Maestro Lazzaro delle Fontane; see Luigi Zangheri, *Lo splendore di Pratolino e Francesco I de' Medici in Il Giardino d'Europa: Pratolino come modello nella cultura europea*, ed. by Centro Mostre di Firenze (Firenze: Mozzotta, 1986), 16-17.

collaborator to Francesco I's direction.

The automata and “wonders” of Pratolino are part of a much larger oeuvre of works which spanned the visual arts, architecture, theatre, pageantry, and diverse engineering projects. Automata are a drop in the proverbial bucket of the extensive works accomplished by Francesco I and Bernardo Buontalenti's collaborative relationship. The present study concerns itself primarily with the magical character and identity which these automata would have possessed for Francesco I's court and contemporaries, positing that they drew directly upon ancient theories and methods to animate man-made vessels, particularly statues, with celestial spirits while at the same time grounding itself in Aristotelian natural philosophy. In this respect however, they were not alone in this “magical” distinction. Other “wonders” with apparently magical connotations will be discussed below, in chapter six.

Maravigliose opere, or “wonderful works,” are no mere superlative applied to the art-objects realized for the delight of the Grand Duke and his guests, neither in the reactions which they provoked nor in the technical prowess which their builders demonstrated. An underground network of canals, conduits, and new aqueducts was built to bring water to every part of the villa and parks, bringing flourishing life in profusion to a formerly arid and harsh landscape;⁵ this infrastructure is Pratolino's truly monumental achievement, although there was no shortage of celebrated larger-than-life works above ground: the Appennine colossus of Giambologna, for example, an artificial “Mount Parnassus,” a profusion of artificial grottoes, and numerous pools, fountains, and water jets virtually everywhere that the Renaissance visitor looked. Pratolino belongs to the tradition of opulent villas of the Italian Renaissance which incorporated water in new and novel displays of virtuosity and power: the Villa d'Este at Tivoli, the Villa Lante at Bagnaia, and the Villa Gamberaia, as well as the Medici Villa Castello built by Francesco I's father, belong to this phenomenon of architecture and engineering which first appeared in Europe at the thirteenth-century château and gardens of Hesdin, France. The hallmark of Hesdin's wonders almost three centuries prior were animated wooden automata which were moved by ropes and the current of water; however comparable moving displays were not equalled in number or complexity at the later Italian water-gardens, that is, until the creation of Pratolino.

Dozens of automata, depicting shepherds, gods, nymphs, tritons, satyrs, animals, and even

⁵ This choice of an arid location is speculated by Heikamp to be a conscious display of virtuosity, “making possible the impossible.” See Detlef Heikamp, “Pratolino nei suoi Giorni Splendidi,” *Antichità Viva*, 8.2 (1969): 34; Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 6.

autonomous musical instruments, were “brought to life” at Pratolino by unseen means and can be readily related to known mechanical devices of the day; we have a reasonable idea of their basic hydraulic and pneumatic operations from later plans of Pratolino's pipes, the study of Pratolino's devices by other engineers who included similar models in their writings (for example, Salomon de Caus's *Les raisons des forces mouvants* featured a grotto whose Galatea automaton has been compared to an earlier Galatea at Pratolino), deduction from what was known from Greek texts like Hero of Alexandria's *Pneumatica*, recently translated from the Greek to Latin in 1575 and the vernacular in 1589,⁶ as well as previous works and texts of medieval mechanical-engineers.

In spite of their virtuosity, the mechanical devices which powered Pratolino's automata were not celebrated *per se* in any of the villa's panegyrics: neither in Raffaello Gualterotti's 1569 *Vaghezze sopra Pratolino* (composed before much of Pratolino's construction was completed) nor in the outpouring of dedicated compositions between the years 1586 and 1587 to mark the villa's completion and honor Francesco I; these included Cesare Agolanti's epic work of 400 eight-lined stanzas,⁷ three madrigals composed by Torquato Tasso, and a choral composition for five voices, “Li Pratolini,” by Giovampier Manenti which was dedicated to Bianca Capello and performed in Venice.⁸

To this moment and body of works belongs the *Delle Maravigliose Opere di Pratolino, & d'Amore* by Francesco de' Vieri, also known as Verino Secondo, or simply Verino. The descriptions of Pratolino's “occult automata” in this text forms the basis of this study and which will be a point of departure into the inquiry of the methods of statue animation described in Hermetic and

⁶ Derek J. DeSolla Price, “Automata and the Origin of Mechanism and Mechanistic Philosophy,” *Technology and Culture*, 5 (1964): 22. Giorgio Valla translated fragments of the work into Latin in 1501, including devices operated by water, air, and steam in his *De Rebus Expetendis*. Though it was one of the few printed sources of its time and useful to scientists including Leonardo da Vinci and Copernicus (see Wolfe, *Humanism, Machinery, and Renaissance Literature*, 38), the first full translation of the work was not until 1575 with Commandini's *Pneumatica* (see Silvio A. Bedini, “The Role of Automata in the History of Technology,” *Technology and Culture*, 5 (1964): 25. Cf. Koetsier, who spells the author's name Commandino; Teun Koetsier, “Simon Steven and the Rise of Archimedean Mechanics in the Renaissance,” in *The Genius of Archimedes: 23 Centuries of Influence in Mathematics, Science, and Engineering*, eds. Stephanos A. Paipetis and Marco Ceccarelli (London: Springer, 2010), 87-88.) Another Renaissance work by the same author made Pappus's mechanical devices available to Latin-readers. A summary of Hero's mechanics in Book 8 of the latter work encapsulates the five simple components of all mechanisms for Renaissance scholars: the axle which turns a wheel, the lever, the compound pulley, the wedge, and the “endless screw.” Vernacular versions of the *Pneumatica* were a 1589 edition by Bernardino Baldi printed by Giovanni Battista Aleotti and another from 1592 and 1595 by Alessandro Giorgi da Urbino.

⁷ Cesare Agolanti, *La descrizione di Pratolino*, MS. in Florence, BNC, Fondo Magliabecchiano, Cl. VII, 8, 44v-55, 57; ASF, Guardaroba, 136, 327v; see Webster Smith, “Pratolino,” *Journal of the Society of Architectural Historians*, 20.4 (1961): 166; Edward Wright, *Some Medici Gardens of the Florentine Renaissance: an essay in post-aesthetic interpretation in The Italian Garden: Art, Design, and Culture*, ed. John Dixon Hunt (Cambridge: Cambridge University Press, 1996), 54.

⁸ Smith, “Pratolino,” 165f; the Manenti composition was cited by Torquato Tasso, *Le rime di Torquato Tasso*, IV, 356 n., which credits an Angelo Gardano with its staging in Venice.

Neoplatonic philosophy.

The implications of a magical method of statue animation in not only a text from the late-sixteenth century but also in documented early-modern automata would underline the informing influence a philosophical or “magical” current of thought brought to bear on the creation of material culture and mechanisms at this point in the Renaissance. The present study's starting point is Vezzosi's brief and perhaps over-simplified analysis of the Renaissance text; through its course, it will not only closely examine the original text which Vezzosi cites, but we shall also see that this raises further questions: how widespread was the idea of bringing statues to life with magical means? What were its sources? Are there other instances of this practice in the period preceding the creation of the Pratolino automata? And, on a site equally famed for its mechanical advances in hydraulic engineering, how did magical philosophy interact with concrete technology? As obscure as the Pratolino automata are within the histories of art, technology, and automata, their relevance to other fields such as the history of magic, Neoplatonic, hermetic, and even Aristotelian philosophy in the Renaissance, which this study is arguing for the first time, is uncharted territory. Brown's dissertation on the influence of natural philosophy at Pratolino approaches and indeed overlaps with related aspects to this reading, but whereas the former dedicates itself to botany, metallurgy, and some aspects of alchemy, the present expands the inquiry to include classical philosophy and practices.

The present study proposes to approach these questions in the following order: (1) a multi-vectored examination of the *status quaestionis* not only of the Pratolino automata specifically in contemporary scholarship, but also of similar and related “magical” phenomena in the context of the Italian Renaissance villa; (2) a thorough examination of what the 1587 text says about the Pratolino automata- and how this differs from the previous analysis of Vezzosi; (3) a contextualization of the Pratolino statues within the wider history of animated statues brought to life in antiquity through the early-modern period; (4) the medieval contributions to magical and mechanical themes of statue animation in literature, natural philosophy, as well as texts of ritual magic; (5) the “Ficinian revolution” for Neoplatonic image-magic in the Renaissance and an analysis of the significance of the Renaissance author's citation of Aristotelian authority for these “living” automata- versus, for example, citing alternative traditions- and how this contributes to the studies of Aristotelianism in the early-modern vernacular; (6) the specific role which Pratolino's automata may have played within a larger programme of Medici power-crafting and propaganda, and finally, a conclusion

which re-examines the study's work and presents the Pratolino automata not only as significant material objects but as a class of early-modern instruments whose importance must be re-examined in the fields of art, mechanical, technological, and scientific history. De' Vieri's drawing from and synthesis of these eclectic sources to a certain extent makes strict distinctions between "Aristotelian" and "Neoplatonic" thought futile. From late antiquity through the medieval period, the mark of the accomplished philosopher had been just such a reconciliation between the sometimes-contradictory doctrines, natural and metaphysical, of Aristotle and Plato,⁹ and by the late-Renaissance, as De' Vieri's writings demonstrate, this process was still ongoing.

⁹ See above all Frederick Purnell, Jr., "Jacopo Mazzoni and His Comparison of Plato and Aristotle." PhD diss., Columbia University, 1971; also, Hermann S. Schibli, "Hierocles of Alexandria and the Vehicle of the Soul," *Hermes*, 121 (1993): 117.

1. The State of the Research: Reconciling the Relative Obscurity of the Pratolino Automata

1.1. The Pratolino Automata in the Visual and Archaeological Record

Perhaps the most significant factor contributing to the Pratolino automata's relative obscurity in relevant studies is the simple fact that virtually no part of their numerous examples still exist. The majority of the grottoes in which their most spectacular examples, indeed all of the so-called “occult” automata which we shall examine, were destroyed- along with the villa and virtually every “wonder” of the parks which stretched to either side of the villa's north-south axis. The actual destruction of the villa and the transformation of the park into something resembling more of an English landscape occurred between 1814 and the 1820's,¹ when Pratolino's defunct site- long stripped of anything of value- was considered an embarrassing reminder of a decadent past to more pragmatic Medici successors, Grand Duke Ferdinand III of Lorraine (1769-1824) and his son Leopold II (r. 1824-1870). The subsequent history of the park, its sale to the Russian industrialist Prince Paul Demidoff, later constructions and conversions, and ultimately its transformation into a publicly-accessible site of cultural interest have been amply documented in previous studies of Pratolino. However, although virtually no trace of the automata can be found on the site, some of its original structures and sculpture have survived through the present day, with varying degrees of alterations.

To the north of the villa site, generally off-limits from the public park, the feature known as the “Fountain of Jove” still possesses a sculpture of the god, though it is a later installation dating to after 1886, not the original which we see in Vitale's print situated in a cave (fig. 1),² which once shot water from a golden thunderbolt in the god's hand.³ The original by Baccio Bandinelli (1493-1560), divested of this thunderbolt and restored from a state of decay documented in the eighteenth century, is presently located in the Boboli gardens since 1834 (fig. 2).⁴

From this northernmost fountain, water flowed to the basin of the Appennine colossus and came out from a monster's head which the giant appears to press down upon.⁵ The sculptor

¹ Cf. Godwin who gives the date of destruction as 1822; Godwin, *The Pagan Dream of the Renaissance*, 175.

² Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 15.

³ Francesco De' Vieri, *Delle Maravigliose Opere di Pratolino, & d'Amore* (Firenze: Marescotti, 1587), 25.

⁴ Luigi Zangheri, *Pratolino: il giardino delle meraviglie*, 2 vols. (Firenze: Gonnelli), 143-44. The last informs us that the work was originally created for the Duomo of Florence but was diverted by Francesco I to his villa's park.

⁵ Salvatore Vitale, *Pratolino Magni Ducis Hetruriae* from *Ad Annales Sardiniae* (Florence, 1635); woodcut possibly

Giambologna (1529-1608) created the celebrated colossal sculpture (*ca.* 1580; fig. 3) which still stands in its original position on the north end of a small pond; its interior rooms or “grottoes” in the giant's belly and head are connected by a staircase, but their structure was permanently altered with Giovan Battista Foggini's late-seventeenth-century interventions, in spite of subsequent restoration efforts through the early twentieth-century.⁶ The sixteenth-century automata, fountains- the well know “Fountain of Thetis” on the ground floor as well as another of shells, sponge, jasper, and Red Sea coral on the upper level-,⁷ as well as frescoes which various sources describe in the Appennine colossus's interior have left no trace, but some original rocaille work can still be observed in the lower grotto (fig. 4).

A short distance directly to the south, Pratolino's formerly magnificent villa was razed to the ground, and its site is marked today by a nineteenth-century statue by Lorenzo Bartolini (1777-1850; fig. 5). On the ground-floor of the villa, a massive complex of artificial grottoes (see Giacinto Marmi's early floorplan, fig. 6) decorated in shells, stalactites, pearls, and other materials gave the appearance of an opulent underworld marine caves beneath the Grand Duke's summer residence. These were populated by a profusion of automata and ingenious devices; some of the most fantastic, like the Grotto of the Deluge, appear frequently in the accounts of Montaigne and other notable travellers; others have been reconstructed in studies by Luigi Zangheri and other scholars from archival sources. Six connected grottoes possessed their own unique assortment of automata, devices, and other wonders ranging from the simple (such as the presence of hot and cold taps in the “Grotto of the Stufa” (stove)), and singular (such as the mechanical swans in peripheral niches which dipped their heads to water and appeared to drink), to the elaborate choreographed theatre of automata (such as the tableau of the “Samaritana,” a young girl who descends to a stream to fill her pitcher as a shepherd-automaton plays his pipe). In all the grottoes were named and proceeded through (roughly) as follows: the Grotto of the Deluge opened onto three grottoes: straight ahead, the Grotto of Galatea, to the right, the Grotto of the Stufa, to the left, the Grotto of the Spugna

dating to 1588. Florence, Museo Topografico, inv. 1890, n. 6314; see also Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 15.

⁶ Zangheri attributes the actual appearance more or less to Foggini's renovation, however various steps were taken to restore the Giambolognian appearance Alessandro Galilei in 1729, Giovan Battista Ruggieri in 1747 and 1753, Giuseppe Cacialli, Rinaldo Barbetti in 1877, and finally Guido Mannini in 1932-33. See Zangheri, *Pratolino: il giardino delle meraviglie*, 146-147.

⁷ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 16; see also Alessandro Vezzosi, ed., *L'Appennino del Giambologna: Anatomia e Identità del Gigante* (Firenze: Alinea, 1990), 23; Giambologna's Presentation of the Model of the Fountain of Thetis, in wax, 1585-87, in the same, 24.

(sponge); from the Grotto of the Spugna, the visitor proceeded through the Grotto of Europa to the final Grotto of Food, as it was known in its earliest form, or the Grotto of the Samaritan, as it was called later. The ground-level grottoes were the wonders of Pratolino in their most condensed, concentrated forms- a study in English dedicated solely to descriptions of their contents would be worthy of scholars' attention.

On the south side of the villa, Pratolino's somewhat monotonous tale of total destruction changes its key; empty and ruined architectural shells of a three-grotto complex on a mezzanine level originally between the villa and the south park have survived to the present day (fig. 7). Both alcoves to either side originally possessed tableaux of automata interacting with one another; one of them, the "Grotto of Pan," possessed one of the so-called "occult" automata which this study will examine in some further detail. Although these grottoes' general shape can be imagined from the ruins (it appears that the original benches on their interiors' periphery as well as the central sculpture depicting the river Mugnone have remained largely intact), centuries of decay and predation, which stripped even the pipes for their metals, did not leave much else. The open holes in the end of both alcoves, which are currently barred and locked to prevent unauthorized access, provide glimpses of the crawl-spaces for Pratolino's engineers and *fontanieri* which are potential sources of insight about the automata's workings. Knobs, faucets, and *chiavi* ("keys") feature in Pratolino's maintenance records through the centuries and indicate the technical details of their operation. A comprehensive plan of the underlying hydraulic works emerged in the eighteenth century (fig. 8).

Although the parks to the north and south of the villa Pratolino underwent dramatic transformations in the nineteenth century which erased much of their original sixteenth-century features, some traces did survive to the present day. The modified Fountain of Jove and the Appennine in the north and to the south of the villa, the ruined sunken aviary (the "*voliera*," of Francesco I), as well as the Fountain of the Maschera at the head of a series of fishing-ponds still lie to the immediate west of the site of the former villa. Two structures however survive completely intact and virtually unaltered from their original forms: these are Pratolino's six-sided chapel,⁸ which stands out from its contemporaries by the originality of its design by Bernardo Buontalenti as well as for the extraordinary papal indulgences and forgiveness of sins which were granted to its visitors (fig. 9), and the rustic, mound-shaped, pseudo-stalactite-covered "Grotto of Cupid" (fig.

⁸ See De' Vieri, *Delle Maravigliose Opere di Pratolino*, 30-31; see also Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 17; for a description of its restoration, Belisario, ed., *Pratolino tra Passato e Presente*, pp. 21-22.

10). The former never possessed any automata; its “wonders” were of the more traditionally artistic kind. However for the latter, the mound-grotto that the modern visitor sees today is essentially the same, erosion notwithstanding, which would have been encountered in the Renaissance. Nevertheless, in its present state, the Grotto of Cupid is stripped of its hydraulic effects and rotating statue of Cupid which squirted water from a central vestibule-niche in the grotto's interior and gave it its name. Otherwise, virtually all of the remaining parks' grottoes and features have been demolished. In satellite images, a mound is visible which corresponds to the former location of the Mount Parnassus in historical plans (fig. 11). Unfortunately, this area is off-limits to park visitors, and in a recent study by Costanza Riva, the question of its precise location in the present-day park is left ambiguous.⁹ Nevertheless, virtually no trace is left of these diverse features' automata and sculptures.

A notable exception is a bronze satyr by Giambologna today housed in the Bargello Museum of Florence which was the central feature of an eponymous grotto in Pratolino's south park (fig. 12). The flask the satyr is upending is hollow (fig. 13) and seems to have been its conduit for water; although this would not reclassify the bronze satyr as an automaton (after all, it possesses no discernible moving parts), we might more properly consider this Giambologna bronze a fountain component rather than a sculpture detached from any context as it is presently. Perhaps this life-size satyr would have evoked associations among its Renaissance visitors with the small bronzes in fashion among connoisseurs (such as the early-fifteenth-century series of bronze satyrs with hinged and moving components created by the goldsmith and sculptor Andrea Riccio (*ca.* 1470-1532)¹⁰), and Pratolino's bronze may have come across as not only enlarged but also an hydraulically-embellished variation on the theme.

Also in the Bargello are preserved some of the sculpture from a fountain which originally featured eight figures (fig. 14). According to De' Vieri, these depict: Juno, Iris, who spouted water from her breasts, as well as the allegorical representation of the city of Florence- identified simultaneously as Flora-, the personified Arno leaning on a lion, the personified Spring of Parnassus, leaning on a Pegasus, and a male youth symbolizing Prudence¹¹ are among the group

⁹ Costanza Riva, *Pratolino: Il sogno alchemico di Francesco I de' Medici: miti simboli e allegorie* (Firenze: Sillabe, 2013), 136.

¹⁰ Godwin, *The Pagan Dream of the Renaissance*, 140.

¹¹ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 24.

preserved and arranged roughly as they were at Pratolino.¹² This is from a “Poetic concert,” also called the Fontana dell'Ammanati, which was originally commissioned by Cosimo I in 1555 for the Palazzo Vecchio, but which appears to have moved around Medici properties; De' Vieri describes it at Pratolino, but in 1599, it is pictured on the terrace of the Pitti Palace in a lunette of the same by Giusto Utens (fig. 15). However, by 1639, it reappears in the Vitale illustration of Pratolino.¹³

Other sculpture from Pratolino's grounds found their way to the Boboli gardens: the Perseus sitting on a dragon which spouted water from its mouth (presently near the Porta Romana entrance; fig. 16), an antique-marble Asclepius, suggested to be a Roman copy (fig. 17), which originally spouted water from a serpent in his hand (no longer intact), the Pegasus from atop Pratolino's Mount Parnassus (fig. 18),¹⁴ and two of its muses, believed to be Clio and Calliope. Although the Perseus and Asclepius have been installed in unrelated areas of the Boboli Gardens, at Pratolino, the former was placed on top of a mound-like grotto covered in sponge.¹⁵ Within the vault below, the Asclepius fountain was placed in the far wall of a room painted to represent vases filled with various herbs and flowers.¹⁶ This grotto as well as another minor grotto of the north park (the “Grotto of the She-bear,” named for its fountain of a nursing bear and suckling cubs) have been omitted entirely from Riva's study and the accompanying illustrated reconstruction of Pratolino's villa and parks done by Massimo Tosi in 2003.¹⁷

With so little material left of the automata which form the present subject of study, the relatively few visual documents created in the early years of the seventeenth century assume a central importance and in reality furnish the only clues about their appearance. Whereas plans and

¹² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 48; De' Vieri's identification of this figure as an Iris may be in the same convention as other statues dubbed “dell'Iride,” which produced rainbows, such as the pond still preserved in the early sixteenth-century Valsanzibio gardens outside of Padova. Brown however identifies this figure as a Ceres, connecting the Pratolino statue's form to a similar fountain described in the *Hypnerotomachi Poliphili* (Francesco Colonna, *Hypnerotomachia Poliphili*, tr. Joscelyn Godwin (London: Thames and Hudson, 2002), 90); Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 24. A Kabbalistic reading of the arrangement has also been advanced; see Riva, *Pratolino: Il sogno alchemico di Francesco I de' Medici*, 120-21.

¹³ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 24.

¹⁴ When the Pegasus was removed from Pratolino in the eighteenth century, its advanced state of decay necessitated major reconstruction by Aristodemo Costoli (1803-1871) in the nineteenth century, who is now credited generally for the whole work. However, the original sculpture at Pratolino is believed to have combined antique elements with sixteenth-century interventions, such as gilded wings, of which no trace is left in its present state. Zangheri, *Pratolino: Il giardino delle meraviglie*, 256.

¹⁵ Idem, 150-51.

¹⁶ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 16-17; see also Webster Smith, *Studies of Buontalenti's Villas* (Ph.D. Dissertation: New York University, 1958), 40.

¹⁷ See Riva, *Pratolino: Il sogno alchemico di Francesco I de' Medici*, 77.

distant-perspectives which we have seen already, like the lunette by Giusto Utens (fig. 15), the *ca.* 1588 print *Pratolino Magni Ducis Hetruriae* by Salvatore Vitale (fig. 1),¹⁸ and the later 1742 plan by Bernardo Sansone Sgrilli (1733-1755) which accompanied his *Descrizione della Regia Villa, Fontane, e Fabbriche* (fig. 8) are useful for locating the grottoes and original environs of the Pratolino automata, they do not furnish any information about the appearances and details of the animated figures themselves. Giovanni Guerra (1544-1618) executed a series of sketches of some of Pratolino's "wonders" which provide the earliest and most extensive documents of Pratolino's automata in various corners of the villa and its parks; they are today housed in Vienna's Albertina Museum. These drawings belong within a context of several notable Italian villas, including the Villa d'Este at Tivoli, the Villa Farnese at Caprarola, the Villa Lante at Bagnaia, the Palazzo alle Terme at the Villa Montalto, the Villa Adobrandini at Frascati, and the Villa Giulia in Rome. Guerra's sketches are dated to *ca.* 1601, and they remain for some of the automata they depict the only known visual record, such as the tableau within the Appennine colossus (fig. 19), the rotating and squirting Cupid automaton (fig. 20), and a marble page in the villa's "Grotto of Food," which is depicted in the pose of pouring a pitcher (fig. 21). In the case of the latter, in the absence of its physical survival we can only speculate that this was a kind of automaton rather than a simple statue; if that were the case, it would have continued a convention of artificial servants which was first documented in Europe at the Château Hesdin in the fifteenth century, which will be explored shortly below in Chapter Four,, and which may have a common origin in a similar mechanical servant that poured tea and offered a towel invented by Al-Jazari (1136-1206) and illustrated in the *Book of Knowledge of Ingenious Devices* (fig. 22).

A handful of other illustrations of Pratolino's automata appear in the first years of the seventeenth century, including short-hand sketches by the German architect and engineer to the Duke of Württemberg Heinrich Schickhardt (1558-1635) of the Samaritan automaton's mechanism (whose appearance in its full tableau we have just seen above in the background of the "Grotto of Food"), dated to roughly the same time period as Guerra's (fig. 23).¹⁹ Half a century later, *ca.* 1650, a series of engravings from Stefano della Bella (1610-1664) which make up the plates of Sgrilli's

¹⁸ Salvatore Vitale, *An annales Sardiniae* (Firenze, 1639).

¹⁹ Schickhardt's notes and sketches are preserved in the Landesbibliothek, Stuttgart; see Smith, "Pratolino," 156f. Schickhardt's mechanical drawings of Pratolino's organs have recently been explored in detail as well. See Simone M. Kaiser and Matteo Valleriani, *The Organ of the Villa d'Este in Tivoli and the Standards of Pneumatic Engineering in the Renaissance*, in *Gardens, Knowledge and the Sciences in the Early Modern Period*, eds. Hubertus Fischer, Voler R. Remmert, and Joachim Wolsche-Bulmahn (Basel: Birkhäuser, 2016), 88-90.

1742 *Descrizione* of Pratolino preserve different perspectives of the two alcoves of the mezzanine grottoes, the “Grotto of Pan” and the “Grotto of Fame” (fig. 24),²⁰ than Guerra's earlier illustrations of the same mechanical tableaux (figs. 25 and 26). Della Bella's engravings take into account their architectural setting and convey a greater sense of the automata's size in relation to the human figure included in one view. Although increasingly technical plans developed and further vistas of Pratolino's villa and parks' features exist, we have no further visual documents for the Pratolino automata specifically.

Some scholars however have pointed to an illustration of an hypothetical grotto in Salomon de Caus's 1615 *Les raisons des forces mouvants* and particularly its seated Galatea statue riding on a shell as a likely imitation of Pratolino's “occult” Galatea automaton (fig. 27).²¹ This view elaborates upon Schickhardt's cursory sketch of one of the unseen, or “occult,” mechanisms which powered Pratolino's automata, providing insight into how the automata actually moved. In the following examination of the automata's description in Francesco de' Vieri's 1587 text, we shall encounter this term, “occult,” applied liberally to any mechanism whose operation was either unseen or unknown. Sgrilli on the other hand is transparent in his text about the purely mechanical operations of devices which are still described as “occult” in the mid-eighteenth century.²² It is here which we shall make our first distinction between reading from our modern perspective and prejudices about the word “occult” and as close as we may approach to what the Renaissance author meant to convey to his contemporary audience.

We may permit a brief word on etymology and the evolving meanings of words and language through time; it has been observed that linguistic-shifts function as markers of change in worldviews, “a world's change of meaning may be a clue that the world is also changing.”²³ “Occult” is one such term which is used differently today than it was in the medieval and early-modern ages. Operations which were occult, or hidden by nature, in antiquity and the early-medieval period had little hope to be penetrated, except in cases of divine grace; Augustine's classic

²⁰ Bernardo Sansone Sgrilli, *Descrizione della Regia Villa, Fontane, e Fabbriche di Pratolino* (Firenze, 1742), pl. 4.

²¹ Idem, 13.

²² In the preface, Sgrilli links “occult artifices” with “hidden wheels and infinite turns”; later in the text, it is acknowledged that the fountains are devised with great mastery (of hydraulic principles) and the automata move by mechanical means. For example, a water-trick is operated by a foot-trip, and at the time of Sgrilli's writing, the workings that powered the organ and water tricks of the Mount Parnasus were visible in its interior. Idem, 3-4, 15, 26.

²³ William Eamon, *Science and the Secrets of Nature* (Princeton, N.J.: Princeton University Press, 1994), 5; see also Michael Arbib and Mary Hesse, *The Construction of Reality* (Cambridge: Cambridge University Press, 1986), 156.

formulation that secrets were for God and God alone held strong in orthodox Christianity.²⁴ With the Scholastic school of thought emerged a refinement that answered the questions posed by man's natural world, the *arcana naturae*, could be answered by the same source; nature became a *repository* of occult powers-²⁵ perennial questions but also potential answers. Theological debate continued as to whether man had the right to inquire and advance solutions to nature's invisible mysteries, but medieval minds differed from their antique counterparts in that they believed that man at least possessed the capacity for understanding without the necessity of divine revelation or providence. This “desacralizing of nature”²⁶ possessed but one exception in its conviction that rational, physical explanations could be found for every insensible or idiosyncratic marvel or natural phenomena: that was demonic agency, which in most cases confounded human understanding by its very nature. We shall return to this theme later, but for the moment we are tracing what medieval and early-modern writers meant when they used the word “occult” to describe an object or operation. As the historian Richard Kieckhefer observed, medieval writers applied “occult” to the hidden powers of nature, not necessarily with reference to the special branches of knowledge- magical, mechanical, or philosophical- which dealt with that nature, as sometimes occurs with its usage today.²⁷

In the late seventeenth century, “occult qualities” as conceived by medieval Scholastics were equated to a “Sanctuary of Ignorance” by the English atomist Walter Charleton (1619-1707),²⁸ a term of refuge when the root cause could not be explained. Yet it was not for want of trying, when we consider the precocious efforts of medieval minds such as Albert the Great, Roger Bacon, and later Giambattista della Porta, who investigated the workings of a range of “occult” operations which today would blur the line between mechanical and magical inquiry. Albert the Great, wrote about “spirits,” both outside of and within the human body, sympathy/antipathy, occult qualities, and the shaping of the material world by human and celestial intelligences.²⁹ However, there was nothing intrinsically *super*-natural to usages of the word occult in medieval and early-modern circles; rather, it more commonly described operations which were *presumed* to be natural, if

²⁴ Eamon, *Science and the Secrets of Nature*, 65.

²⁵ Ibid.

²⁶ Idem, 73.

²⁷ Richard Kieckhefer, *Magic in the Middle Ages* (Cambridge: Cambridge University Press, 1989), 140.

²⁸ Walter Charleton, *Physiologia Epicuro-Gassendo-Charltoniana : Or a Fabrick of Science Natural upon the Hypothesis of Atoms* (London, 1654), 342-43.

²⁹ Lorraine Daston and Katharine Park, *Wonder and the Order of Nature* (New York: Zone Books, 2001), 161.

invisible or otherwise obscured, such as magnetism or devices hidden out of sight. Occult properties of natural materials- stones, plants, animals, meteorological phenomena- were in principle as regular in their operation as manifest ones, albeit opaque to reason. This presumed regularity was also applied to systems of interaction which we would class today as magical, such as the perceived influences of stars, planets, and heavenly bodies at specific times which, along with the field of astrology, was widely accepted (virtually universally) in medieval and early-modern society. Yet, even the esoteric sciences' operations were likewise mechanical and knowable, if immediately unseen or “occult.” The results of such occult action were classed by the sixteenth century as objects of preternatural philosophy, which were assimilated into the traditional “canon of marvels.”³⁰ Therefore, if we automatically assume that descriptions of Pratolino's automata as “occult” imply a magical or supernatural operative principle, this would be a mistake rooted in modern shifts of the word. This is indeed the first definition one frequently encounters in the English language (“1. of or relating to magic, astrology, or any system claiming use or knowledge of secret or supernatural powers or agencies.”³¹), but we must underline that the word “occult” did not immediately suggest magical or supernatural animation in itself when applied to the Pratolino automata; rather its meaning would have implied hidden operative principles: unseen, unknown, and unknowable to all except a privileged few. For example, when De' Vieri wrote that jets of water squirted at times “*occultamente*” from the Villa's grand staircase,³² or when De' Vieri describes the action of a scene of three automata, the winged allegorical figure of Fame, a dragon, and a peasant, moved “by virtue of water or by occult artifice,”³³ we need not assume that De' Vieri means anything more than that their operating agents were unseen. However, in the time period in which they were conceived, these “mechanical” operations could still encompass hydraulic, pneumatic, or even sympathetic or astral relationships, which we shall describe in more detail below. This is the ambiguity found in the description of a small number of Pratolino's “occult” automata with which this chapter principally concerns itself.

The aim of this study is to illuminate the significance which the animated automata of Francesco I de' Medici's Villa Pratolino would have possessed as “magical” objects for their makers and audience in late-sixteenth-century Florence in the twilight of Mannerist culture before

³⁰ Idem, 160.

³¹ From dictionary.com

³² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 34.

³³ Idem, 43.

Francesco's successor and brother Ferdinando I ushered the successive age irrevocably into the Baroque and its wholehearted embrace of the Counter-Reformation. That significance can be inferred by the remarks made by the sixteenth-century philosopher and chronicler Francesco de' Vieri's 1587 *Description of the Villa Pratolino*, by its strong evocations of the living statues of antiquity. Taking this as the study's starting point, we may proceed into what the ancient, medieval, and Renaissance civilizations understood to be the methods of magically animating statues with celestial spirits: what possible examples of magical automata preceded Pratolino's "wonders," and the evidence that Grand Duke Francesco I, famed for his alchemical and esoteric interests, consciously pursued such themes.

1.2. Status Quaestionis

The conclusion to be reached about the state of the research is that very few works have exposed the connection between Neoplatonic and Hermetic philosophy in the Renaissance and the moving statues produced for villas and gardens of the same time period; certainly no study has analyzed in greater depth the implications of the content of De' Vieri's philosophical treatise on Pratolino with the automata of this "magical" Medici domain. However, that is not to say that the component aspects to this state of affairs have not been well-connoitred by scholars; these component parts, though they encompass different fields by today's classifications, I have distinguished as (1) the theory and practice of theurgy from antiquity through the Renaissance (2) the "magical" automata of Pratolino specifically, (3) other "magical" Italian Renaissance villas, including Pratolino, (4) "magical" automata throughout history, (5) biographical considerations of the principle historical personages associated with the Pratolino automata: Francesco I de' Medici, Bernardo Buontalenti, and their chronicler Francesco de' Vieri, and finally (6) the wider significance of De' Vieri's description of the automata within the present state of research about vernacular Aristotelianism in the Italian Renaissance. Although the use of the term "magical" has been rather heavy-handed until this point, it is intended to distinguish my study of automata from those whose approach has been predominantly mechanical, some may say "scientific," although this risks discrediting the work of scholars such as Mary Quinlan-McGrath, David Pingree, and others mentioned below which has properly situated astral-based philosophies of past ages within the larger field of the history of science. "Magical" techniques of statue animation, deriving from astral,

natural, or even demonic powers, was a science in the cultures in which it was practiced: “This means that their intellectual content must be probed deeply, and not simply dismissed as rubbish or interpreted in the light of modern historical mythology; and that the intellectual content must be related to the culture that produced and nourished each, and to the social context within each arose and developed.”³⁴

1.2.a. The Theory and Practice of Theurgy from antiquity through the Renaissance

The activity of theurgy, whether in the general thaumaturgic sense as some authors employ it³⁵ or in the specialized sense of the present study examined shortly below, saddles the histories of both magical and natural philosophy, as this study aims to show, and in many cases is indistinguishable from traditions of astral image-magic. In the history of art, pioneering efforts at approaching what the magic of visual art signified in artwork of the medieval, Renaissance, and early-modern periods have been made by Aby Warburg, Fritz Sazl, Otto Kurz, Ernst Kris; A. A. Bard and W. Deonna have written about the subject in the ancient world. Other scholars in the past fifty years have written more extensively about the intersection of the philosophical tradition with how magical philosophy was understood in these periods, particularly how Aristotelian and Platonist concepts of Form relate to the production of astronomical images/magical talismans: Paul Oskar Kristeller, Daniel Pickering Walker, Eugenio Garin, Brian Copenhaver, Perrone Compagni, Cesare Vasoli, and Nicolas Weil-Parot. Particularly, the studies written about Ficino and his followers testify to a growing, rather than diminishing, intellectual interest in astral image-making which underwent its own mutations with the passage of time. Ernst Gombrich's work examines the real power attributed to symbolic figures and concepts which may present a degree of cognitive dissonance for contemporary minds in understanding the old world's philosophies of magic and art (for example, how the *imago* is understood to physically contain the *virtus* of a celestial/divine quality). Stimulation of interest in related theories present in what has been coined as “intellectual magic” during this time period has been credited to the works of Dame Frances Yates and further researches; however, recent scholarship still articulates how much more work is left to be done in

³⁴ Pingree, “Hellenophilia versus the History of Science,” 554.

³⁵ See John B. Friedman, *Safe Magic and Invisible Writing in the 'Secretum Philosophorum'*, in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: University of Pennsylvania Press, 1998, 76.

reconciling the available manuscript material to the relative paucity of scholarship dedicated to medieval learned magic.³⁶ Simonetta Bassi has contributed greatly towards understanding the nuances of the magical philosophy of Giordano Bruno.³⁷ For others, including Gombrich, magical practice itself is conflated with the astrological tradition.³⁸ The intimately-related fields of astronomy and astrology and their histories have been the subject of their own historical inquiries which have seen a changing approach by their scholars through the past century. More recent scholars have written about the gradual softening of the nineteenth and early-twentieth centuries' discomfort with placing astrology within the contemporary edifice of accepted science; Jacob Burckhardt, for example, judged astrology a perverse- yet unquestionably pervasive- superstition.³⁹ More broadly, Lynn Thorndike's eight volumes of the *History of Magic and Experimental Science* is a canonical reference text for the often-undefined limits of magic and proto-scientific experiments, and in many branches of this remains the only available source of information, but has by the same token been criticized as “riddled with errors, false leads, gaps in, and misconstructions of, the evidence.”⁴⁰ Furthermore, more recent historians have cautioned about older historical models which advocated for a steady evolutionary process from magic which, though similarly flawed, is recognized to be a “cornerstone of early anthropology.”⁴¹ Instead, many disciplines derived from and participated simultaneously in traditions of magic and science, as with astrology or applied mathematics and classical mechanics.

The study of ancient and Classical theurgy, the name of the practice of magical statue-animation in Neoplatonic tradition, has been the explicit provenance of scholars Wouter Hanegraaff, Eric Roberton Dodds, Grégoire Loukioanoff, Sarah Johnston, Anne Sheppard, Gregory Shaw, Polymnia Athanassiadi, and Algis Uzdavins. The study of theurgy by name specifically in the Renaissance has been undertaken to a limited extent in a 1998 article Hanegraaff. Although Hanegraaff submits “Hermetic idolatry” as an “archimedean” point of access to the complex

³⁶ Claire Fanger, *Introduction* in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ix.

³⁷ See as representative of a larger body of work, Simonetta Bassi, *L'arte di Giordano Bruno. Memoria, furore, magia* (Firenze: Olschki, 2004).

³⁸ Ernst Gombrich, *Art and Illusion: A Study in the Psychology of Pictorial Representation* (New York: Phaidon, 1959), 113-114.

³⁹ See Burckhardt, *Mixture of Ancient and Modern Superstition* in *The Civilization of the Renaissance in Italy*, 2 vols. (New York: Harper & Row, 1929), 484-509.

⁴⁰ *Idem*, ix-x.

⁴¹ Mary Quinlan-McGrath, *Influences: Art, Optics, and Astrology in the Italian Renaissance* (Chicago and London: Chicago University Press, 2013), 7; see also Catherine Bell, *Ritual Theory, Ritual Practice* (Oxford: Oxford University Press, 2009), 47-48.

phenomena which fall under the heading of Renaissance magic, Neoplatonic theurgy in antiquity and the Renaissance remain esoteric even in modern scholarship, in spite of the argument that Renaissance magic was directly influenced by the “god-making” instructions contained in the Hermetic texts.⁴² This observation of the inextricability of magic from not only visual arts but virtually all material culture of the age has been echoed by other sources.⁴³ Though he identifies figures of interest who wrote about theoretical theurgy, its practice remains speculation. Other scholars of Hermeticism have reduced its “god-making” passage to secondary importance. Hermetic statue-animation or Neoplatonic theurgy do not figure in any significant way in the works of Frances Yates, and A.J. Festugière's monumental work of 1944, considered the classic on hermetism, dismissed certain Egyptian elements as “local color,”⁴⁴ though successive scholars have suggested the true Egyptian roots of these texts.⁴⁵

1.2.b. The “Magical” Automata of Pratinolo

Although a magical aura surrounds historians' writings about Pratinolo and its wonders, rare are the works which I have encountered which speculate at any length about the precise magical nature of Pratinolo's automata, but though such mentions exist, they are exclusively as relatively minor topics within the works' wider field of study. The only exception, to my knowledge, is a short study, “L'artifice animé: sur l'esthétique maniériste de l'automata” by Hervé Brunon included in a 1999 volume of collected studies, *Artifici d'acque e Giardini*.⁴⁶ Here, the Pratinolo automata take center stage in the author's articulation of the age's fascinations and contradictions. Brunon also indicates a lineage of thought about the Pratinolo automata in the scholarship of Eugenio Battisti, who called for an iconology of automata and noted the stripping away of their medieval religious

⁴² Wouter Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” *Esoterica* 2 (1998): 2.

⁴³ Michael Camille, *Visual Art in Two Manuscripts of the Ars Notoria in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 111.

⁴⁴ André-Jean Festugière, *Le révélation d'Hermès Trismégiste I: L'astrologie et les sciences occultes* (1944, repr. Paris 1989), 85.

⁴⁵ See Jean-Pierre Mahé, *Hermès en Haute-Egypte: Les textes hermétiques de Nag Hammadi et leurs parallèles Grecs et Latins*, 2 vols. (Québec, 1978-82); Garth Fowden, *The Egyptian Hermes: A Historical Approach to the Late Pagan Mind* (Princeton, NJ: Princeton University Press, 1986); Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 5.

⁴⁶ Hervé Brunon, *L'artifice animé: sur l'esthétique maniériste de l'automate* in *Artifici d'acqua e giardini: La cultura delle grotte e dei ninfei in Italia e in Europa*, eds. Isabella Lapi Ballerini and Litta Maria Medri (Firenze: Centro Di, 1999): 164-79.

connotations and their assumption of a role in the epistemological order.⁴⁷ Alessandro Rinaldi also recognized the ambiguity between technology and magic, specifically within the parameters of the Pratolino automata as well, whereas Philippe Morel examines Bernardino Baldi's 1589 translation of Hero of Alexandria's *Automata*.⁴⁸ Morel and Brunon's conclusion that the automaton was a quintessential feature not only of the Mannerist convolutions of the art/nature debate incubated in the Renaissance, Brunon's article also makes the connection between Ficinian philosophy, Neoplatonism, and Hermeticism which the present study articulates in magnified detail in the pages to come. Of further significance is Brunon's recognition that these Mannerist automata and the texts of De' Vieri and Baldi were deeply informed by Aristotelian philosophy as well as a call for further investigation;⁴⁹ the present study addresses some of the nuances of the Aristotelian ramifications of the Pratolino automata, through the lens of De' Vieri's treatise, in further detail. Lastly, Brunon underlines that the Renaissance automata were received as objects which possessed a magical, cosmic, and dialectical significance, recalling for their audiences the archetypal statues of Hermes in antiquity and the animated idols of the *Asclepius*.⁵⁰

Beyond Brunon's study, Mila Mastrorocco and Costanza Riva analyze the magical identity of Pratolino's automata at the most length and depth of all of the sources I have encountered; she recognizes the inherently magical side to the age's experimental pursuits specifically in the context of the Pratolino android-simulacra:

The machine which metamorphosed to human appearance is revealing of that ambivalence surrounding science which must be underlined in the culture of this period. The passion for experimentation always retained a magical aspect and ambivalence with nature, alternately felt for its "naturalness" or perceived as magical playing-field of planetary influences.⁵¹

Elsewhere in her study, Mastrorocco relates the importance of these same astral influences to the Appennine's observatory in its upper grotto,⁵² but she goes no further to explain the role these astral influences would have played in the animation of the "magical" automata, as this study sets out to

⁴⁷ Eugenio Battisti, *L'antirinasimento* (Milan: Garzanti, 1989), 249-86; idem, 164.

⁴⁸ Brunon's incomplete citations of these works however have led to some difficulty in locating these works; see Brunon, *L'artifice animé*, 164-65.

⁴⁹ Idem, 166-69.

⁵⁰ Idem, 175.

⁵¹ My translation of Mastrorocco, *Le Mutazioni di Proteo*, 125.

⁵² Idem, 97-98.

do. Joscelyn Godwin prefaces her discussion of Pratolino and its grotto-theatres of automata with an articulation of the magical associations contemporary automata evoked with Hermetic and Neoplatonic philosophy as well as Aristotelian thought;⁵³ however, Godwin leaves the reader to make the connection with the following paragraphs which detail the appearances and movements of these machines at Pratolino.⁵⁴ Another contribution of Godwin's is the acknowledgment of the fluidity of classifications such as “automaton,” “statue,” or “fountain” when dealing with the hydraulic works.

Costanza Riva's work dedicates itself to reading Pratolino's features in an alchemical, Kabbalistic, and sometimes Hermetic, key. Riva puts forward possible literary sources to Pratolino's iconographical programme which have otherwise gone neglected, such as a manuscript sent to Francesco I by the Neapolitan philosopher Gerolamo Faggiuolo which reiterated the legend of Pan in an initiatic, Kabbalistic key as well as the *Arcadia* of Jacopo Sannazaro.⁵⁵ Within this context, the automata figure into these larger schemes generally, such as the automata of Pan and Syrinx at Pratolino and the recurring themes of a recovered Golden Age and bucolic harmony, illustrated by animated tableaux such as that of the “Samaritana” who captivates a mechanical shepherd figure who plays the pipes. Riva also articulates the theosophical associations which the “wonders” of Pratolino brought up; she touches on Hermetic philosophy's tenet that nature is a book to be read at a far deeper level than appearances, and that every body possessed its own kind of “musicality” or harmony. Within this context, Riva treats the musical automata and hydraulic organ of Pratolino as Hermetic works of art,⁵⁶ which is a different magical key than the present study's treatment of the same works. However, in this key, Riva unites Egyptian, Hermetic, and Greek (Orphic and Pythagorean) influences present in Pratolino's works of the late sixteenth-century. Resonances with the “god-making” traditions of Egyptian, Hermetic, and Neoplatonic theurgy are not made explicit. Instead, Riva points her analysis of Buontalenti's hydraulic automata more generally towards the resurrection not only of the ancient world, but of the golden age as well, and writes that these automata assumed a dual role as imitators of nature and the attempt to reproduce the divine creative capacity.⁵⁷ Riva roots this impetus in the Neoplatonic tradition of Marsilio Ficino, yet rather than

⁵³ Godwin, *The Pagan Dream of the Renaissance*, 174.

⁵⁴ Idem, 175-78.

⁵⁵ Riva, *Pratolino*, 29.

⁵⁶ See the section “Harmony, music, and animated mechanisms” (*Armonia, musica e meccanismi animati*) in idem, 59-66.

⁵⁷ Idem, 63.

locating this in the Ficinian tradition of investing images (artworks) with stellar or planetary energy, the controversial image-magic or talismans of his *De Vita Coelitus Comparanda*, Riva relies on a very general description of the Demiurge's creative capacity and the mystery of the divine word, which brought forth creation.⁵⁸ The subsequent analysis of the automata are in this auditory-mystic vein, such as the Triton automaton Riva locates in the Grotto of Europa,⁵⁹ whose sound produced by a conch shell is related to the ordering of the cosmos or the significance of the pan-pipes of other Pratolino automata in Ovidian as well as Orphic tradition.⁶⁰ Riva's detailed descriptions of the various automata's musical instruments and the mechanisms which allowed them to play stand unparalleled; however, her analysis of the automata's "magical" character does not go beyond these themes of musical harmony into the theurgic tradition. In another part of her study, Riva underlines that Francesco I inherited the interest and exploration of Kabbalistic philosophy from the Cardinal Egidio of Viterbo, who received the patronage of Francesco I's forebearers, the popes Leo X and Clement VII,⁶¹ and the way is cleared for her study to make more explicit any idea that the automata functioned in any way as experimental- either theoretical or practical- iterations of the animation of the inanimate in that particular tradition. Her study proceeds on a systematic Kabbalistic reading of the two parks and villa moving in a north-south direction, and she also makes valuable contributions to the reading of De' Vieri by emphasizing the eclectic currents at court which favored Hermetic and alchemical doctrines.⁶²

The Pratolino automata figure into more studies when their magical nature goes entirely unremarked. By and large, they are given the most attention by studies dedicated to the villa itself, and even at that, they are rarely the focus of that study, such as Webster Smith's article ("Pratolino," 1961), which to this day remains the principal English-language treatment of the villa and its features; it totals thirteen pages, a condensation of the same scholar's PhD Thesis, *Studies of Buontalenti's Villas*, submitted just three years prior.⁶³ These studies relied upon the documented testimony of early visitors to Pratolino, including Michel de Montaigne, Fynes Moryson, and

⁵⁸ Ibid.

⁵⁹ This automaton was moved at some point to the Grotto of Europa from its earlier installment in the tableau of the Grotto of Galatea, see below.

⁶⁰ Riva, *Pratolino*, 64.

⁶¹ Idem, 72; see also Paolo Maresca, *Giardini incantati, boschi sacri e architetture magiche* (Firenze: Pontecorboli, 2006), 69.

⁶² Riva, *Pratolino*, 75.

⁶³ See Smith, *Studies of Buontalenti's Villas*.

others.⁶⁴ Far more extensive research has been done by Italian scholars, beginning with Cesare Da Prato,⁶⁵ and an extensive bibliography of the subject was published in 2003.⁶⁶ Eight years after Smith's article, an analysis of the villa in its prime was written by Detlef Heikamp.⁶⁷ The most thorough synthesis of archival material in a single study was accomplished by Luigi Zangheri with two volumes published in 1979; all of the automata are described, dated, and located to specific grottoes. Also, it has been noted that Zangheri proposed the first complete iconological key to the total work since De' Vieri's treatise and the inspirational effect that this had upon the study of this villa and garden.⁶⁸ A volume edited by Alessandro Vezzosi and Marco Dezzi Bardeschi⁶⁹ featured contributions from Zangheri, Heikamp, Fagiolo, and others. Successive studies have analyzed aspects of Pratolino with a wide variety of approaches, contexts, and objectives, such as the work of Claudia Lazzaro in following the course and uses of Pratolino's water supply⁷⁰ or Edward Wright's analysis of how the garden was used and perceived during ritualized hunts.⁷¹ Pratolino continues to be revisited by scholars through specialized lenses; particularly germane to this study is Clare Brown's 2005 master's dissertation which correlates contemporary ideas in natural philosophy with the parks and villa's "wonders".⁷²

General analyses of Pratolino's site and diverse proposals of a iconological key to unify the villa site tend to outweigh examinations of the automata however, though some exceptions do exist. Mila Mastrorocco devotes attention to the mysteries surrounding Pratolino's grottoes and automata

⁶⁴ Early original English-language descriptions of automata and other features were left by visitors to Pratolino through the centuries which witnessed both splendor and decline, such as Fynes Moryson (1566-1630; *An Itinerary*, vol. I (Glasgow: James MacLehose and Sons, 1907)), Henry Wotton (1568-1639; *The Elements of Architecture* (Farnborough: Gregg International Publishers, 1969)), John Evelyn (1620-1706; De Beer, ed., *The Diary of John Evelyn*, vol. II (Oxford: Clarendon Press, 1955)), William Kent (1685-1748) and John Boyle, Fifth Earl of Corke and Orrery (1707-1762; Duncombe, ed., *Letters from Italy in the years 1754 and 1755 by the Late Right Honourable John, Earl of Corke and Orrery* (London, 1773), 74).

⁶⁵ Cesare Da Prato, *Firenze ai Demidoff- Pratolino e San Donato Relazione storica e descrittiva preceduta da cenni biografici sui Demidoff, Che sino dal Secolo XVII esisterono* (Firenze: Tipografia della Pia Casa di Patronato, 1887).

⁶⁶ Giovanni Valdré, *Pratolino e la scrittura: Bibliografia storico-ragionata della villa medicea e della sua gente* (Firenze: Alinea, 2003).

⁶⁷ Detlef Heikamp, "Pratolino nei suoi Giorni Splendidi," *Antichità Viva* 8.2 (1969).

⁶⁸ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 5.

⁶⁹ Marco Dezzi Bardeschi and Alessandro Vezzosi, eds., *Pratolino: Laboratorio delle Meraviglie* (Firenze: Alinea, 1984-86).

⁷⁰ Claudia Lazzaro, *From the Rain to the Wash Water: In the Medici Gardens at Pratolino in Renaissance Studies in Honour of Craig Hugh Smith*, ed. Andrew Morrogh (Firenze: Giunti Barbera, 1985), 317-326.

⁷¹ Edward Wright, *Some Medici Gardens of the Florentine Renaissance: an essay in post-aesthetic interpretation in The Italian Garden: Art, Design, and Culture*, ed. John Dixon Hunt (Cambridge: Cambridge University Press, 1996), 34-59.

⁷² Brown, *Pratolino and the Transforming Influence of Natural Philosophy*.

in a chapter of her larger work dedicated to sixteenth-century Medici gardens.⁷³ Certain details about Pratolino's automata, which Zangheri did not mention, can be found in Costanza Riva's scholarship.⁷⁴ Riva's study is also exceptional for the Cabalistic key which it employs, in addition to an alchemical analysis, in her treatment of Pratolino's works. This followed on the heels of an English-language analysis of the garden in an alchemical and elemental key by Gerd Neumann.⁷⁵ Conference proceedings which were published in a collection of essays whose aim was to raise awareness about the conservation of the park revisit familiar analyses of the site and its past wonders.⁷⁶ However, within this particular collection, an observation in the essay by Alessandro Vezzosi about the text of Francesco de' Vieri provides the starting point for this study; more will be made of this observation and its problematic phrasing in a later section of this work.

On the other hand, perhaps far more remarkable than the relatively scarce works which explicitly connect the Pratolino automata to magical philosophy are the number of works dedicated to related subjects which make no mention of these works at all; the Pratolino automata are obscure within many histories to which they are distinctly related. Historians of Renaissance efforts to create life, generally, such as William Newman and the authors of *Genesis Redux: Essays in the History and Philosophy of Artificial Life* (2007), or of automata specifically, such as Minsoo Kang, Derek DeSolla Price, and Anne Higley, omit them entirely. In the case of the latter, "mathematical" automata are summarized as a vast topic treated exhaustively by Butler, Thorndike, and Yates;⁷⁷ yet these secondary authors rarely touch upon Pratolino's works in this context. DeSolla Price offers an explanation for the relative dearth of studies on ancient automata which may related quite easily to Pratolino: he cites among historians of technology "private, somewhat peevish discontent because the most ingenious mechanical devices of antiquity were not useful machines but trivial toys... despicable playthings and over-ingenuous impracticable scientific models and instruments."⁷⁸ Higley echoes their rarefied nature and thus relative obscurity; hydraulics were "a past time for the wealthy and not a serious power to be harnessed."⁷⁹ Other historians of the development of

⁷³ Mastrococo, *Le Mutazioni di Proteo*, 91-129.

⁷⁴ Riva, *Pratolino: il sogno alchemico di Francesco I de' Medici*.

⁷⁵ Gerd Neumann, "Alchemical Speculations in Pratolino: Rediscovery of a Rediscovery," *Daidalos* 34 (1989): 22-29.

⁷⁶ Centro Mostre di Firenze, ed., *Il Giardino d'Europa: Pratolino come modello nella cultura europea* (Firenze: Mazzotta, 1986).

⁷⁷ Sarah Higley, *The Legend of the Learned Man's Android* in *Retelling Tales: Essays in Honor of Russel Peck*, eds. Thomas Hahn and Alan Lupack (Woodbridge, U.K.: Boydell & Brewer, 1997), 142.

⁷⁸ DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 15.

⁷⁹ Higley, *The Legend of the Learned Man's Android*, 133.

automata in Europe speak *around* Pratolino, never quite mentioning the name of the site. John Cohen cites a description by Michel de Montaigne of one of Pratolino's hydraulic displays without giving its proper provenance,⁸⁰ and Silvio Bedini cites the same writings of Montaigne as “an account of the best sixteenth-century examples” of automata, also without naming Francesco I's villa; instead, Bedini's study mentions automata of the Villa d'Este, the Archducal Villa Scarperio, and the “casino of the Archduke of Florence” as locations where devices such as “mills motivated by water and air power to operate small church clocks, animals, soldiers, and countless other automata could be found.”⁸¹ A wider circle is made by Bedini *around* the subject of the Villa Pratolino; his study examines the hydraulic and mechanical works created at Hellbrunn outside of Salzburg in detail, but he does not mention that Hellbrunn was dubbed the “Pratolino of the North” for its duplication of works which originated at the Florentine villa. Similarly, he recognizes the works of the Francini brother Tommaso and Alessandro at the gardens of Saint-Germain-en-Laye as the “highest peak of development” for Renaissance automata and waterworks⁸² while neglecting to mention that these engineers were sent to France from Florence, where they first worked on the earlier devices of Pratolino. The skill-set that enabled the brothers Francini to create virtuosic fountains and water-works at Versailles from a limited water-source was honed first in the large-scale engineering required by the site of Francesco I de' Medici's Villa Pratolino,⁸³ but this and indeed any mention of Pratolino by name is lacking in Bedini's work. Searching for mention of the Pratolino automata in wider studies of the phenomenon of Mannerism in art is futile,⁸⁴ although this is the movement and context to which they inextricably belong.

A recent study has pinpointed the merging of art history with mechanics, or properly technology, to a late eighteenth-century German work,⁸⁵ but that appears to have yet to occur for the

⁸⁰ John Cohen, *Human Robots in Myth and Science* (South Brunswick and New York: A.S. Barnes and Company, 1966), 82.

⁸¹ Bedini, “The Role of Technology in the History of Technology,” 26. Such devices certainly were present at Pratolino and have been located by other scholars even to the precise grottoes on the site to which they belonged, but rarely does that information appear in any but the most specialized studies of the late-Renaissance Medici villa and its wonders.

⁸² *Idem*, 27.

⁸³ *Idem*, 28.

⁸⁴ See John Shearman, *Mannerism (Style and Civilization)* (New York: Penguin Books, 1991); Arnold Hauser, *Mannerism: The Crisis of the Renaissance and the Origin of Modern Art* (Cambridge, MA: Belknap Press, 1986); Stephen J. Campbell, “Counter Reformation Polemic and Mannerist counter-aesthetics,” *Res* 46 (2004): 100.

⁸⁵ See Johann Beckmann, *Anleitung zur Technologie, öder zur Kenntniss der Handwerke, Fabriken und Manufacturen, vornehmlich derer, die mit der Landwirtschaft, Polizey, und Cameralwissenschaft in nächster Verbindung stehn. Nebst Beiträgen zur Kunstgeschichte* (Göttingen 1780), 18; Horst Bredekamp, *The Lure of Antiquity and the Cult of the Machine* (Princeton, N.J.: Markus Weiner Publishers, 1995), 84.

automata of late-sixteenth-century Florence. Pratolino's grottoes are judiciously included in Naomi Miller's study of the artificial grotto- after all, their author, Bernardo Buontalenti, is recognized by Miller as “the foremost inventor of grottoes in Italy;” the automata are mentioned but receive only brief and selected descriptions.⁸⁶ An equivalent class of treatment is given by Jessica Riskin to Pratolino and its automata in an otherwise splendidly detailed treatment of mechanical history.⁸⁷ She excerpts Montaigne's description of one splendid grotto in which he encounters dancing automata set to music, mechanical animals that seem to drink from the pools of water ubiquitously through the grotto as a type, and she juxtaposes these tranquil features with the jarring experience of being soaked with water from one's seat or the stairs under fleeing feet. Then Riskin's description takes a turn for the inaccurate; she implies that the same grotto full of tricks and mechanical animals and instruments described by Montaigne also is in possession of the well-known “Samaritan” automaton of a young girl who fetches water in a lifelike and fetching way from a stream while another automaton, this one of a shepherd, looks on longingly. This arrangement is not supported by any familiarity with the arrangement of the grottoes on the villa's ground floor and what documentary sources reveal about their contents. Montaigne's quoted description can be identified with what was called the “Grotto of the Deluge” (*la Grotta del Diluvio*), and the Samaritan tableau became so well known that the grotto it was housed the name “Grotto of the Samaritan” (*la Grotta della Samaritana*) gradually substituted its former distinction as the “Grotto of Food” (*la Grotta del Cibo*) in the historical documents following its installation. Finally, the last observation which Riskin makes on the topic of Francesco I de' Medici's Pratolino is confusing; she writes that another Grand Ducal residence boasted a hydraulic grotto bustling with hydraulically driven “water mills and windmills, little church bells, soldiers of the guard, animals, hunts, and a thousand such things.”⁸⁸ Pratolino too possessed such things; the Grotto of the Deluge possessed a pair of machines which substituted for human labor, albeit in miniature. A tiny, “graceful” oil press as well as a grind-stone featuring a small man with a ball on his shoulder that turned behind an ox. Later, the separate Grotto of the Samaritan acquired a miniature forge and a mill (which have been contextualized within a tableau based on the Ages of Man from the poetry of Torquato Tasso).⁸⁹ The church bells, soldiers,

⁸⁶ Naomi Miller, *Heavenly Caves: Reflections on the Garden Grotto* (New York: George Braziller, 1982), 47-49.

⁸⁷ Jessica Riskin, *The Restless Clock: A Centuries-Long Argument over What Makes Living Things Tick* (Chicago and London: University of Chicago Press, 2016), 29.

⁸⁸ *Ibid.*; quoted from Montaigne, *Journal de voyage*, 125.

⁸⁹ For a collection of documentary evidence for Pratolino's grottoes, see Zangheri, *Pratolino: Il Giardino delle meraviglie*, II, 37-52; Filson, *The Lost Grottoes of Late Sixteenth-Century Pratolino*. Partial sketches of these works are known from

hunters, animals, and potentially even the thousand other things recall a vivid tableau of a siege upon a castle installed after Francesco I's death by his successor and brother Ferdinando de' Medici. Does the quote, taken from Montaigne, indicate that these figures existed before, or some earlier, similar version did, at another Medici villa of the time? Which one? Riskin's brief commentary on Pratolino left more questions than it approached furnishing a comprehensive overview of this important chapter in the history of automata development. Elsewhere, Pratolino's grottoes and their water-works (automata included) appear frequently, if similarly briefly, in works dedicated to the Italian garden.⁹⁰

1.2.c. The “Magical” Italian Renaissance Villa

At Pratolino as we have highlighted above, Hermetic, Neoplatonic, Aristotelian, and alchemical keys have been advanced by authors such as Costanza Riva, Clare Brown, Joscelyn Godwin, and Mila Mastroiocco. Clare Brown's thesis proposes a reading of Pratolino's features which conform to a symbolism of alchemy and natural philosophy with consideration for how Francesco I may have understood it.⁹¹ However, Brown sets the stage with many elements of the Hermetic and Neoplatonic school rightly attributed by many scholars to the patronage of the Francesco I: the microcosm-macrocosm, the importance of alchemy as a “grandiose system of philosophy embodying a field of human beliefs and ideas vast in range and extending in time over a period of more than a thousand years,”⁹² the intimate connection between heavenly and earthly phenomena, and the unity of man and the world around him. She connects the ritualized colors of the Philosopher's stone's transformation (black through to white to red) as well as the poetic and esoteric language of alchemical texts⁹³ to rainbows which were designed to appear throughout the park, the statues of the Fontana dell'Ammanati, the whiteness of the Grotto of the Sponges under

Giovanni Guerra, *Gli automi del mulino, dell'arrotino, della fucina del fabbro e del frantoio*, Drawing, GSA; Heinrich Schickhardt, *L'automa del frantoio*, Drawing, LBS.

⁹⁰ For example, Judith Chatfield, *A Tour of Italian Gardens* (London: Wardlock, 1988), 92-95.

⁹¹ Versus the earlier alchemical interpretation of Gerd Neumann which, Brown observes, is more so a psychological interpretation by the modern author of little help to the serious historian. See Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 29.

⁹² Idem, 41.

⁹³ E.g. “Darkness will appear on the face of e Abyss; Night, Saturn and the Antimony of the Sages will appear; blackness, and the raven's head of the alchemist, and all the colours of the world, will appear at the hour of conjunction; the rainbow also, and the peacock's tail. Finally, after the matter has passed from ashen-coloured to white and yellow, you will see the Philosopher's Stone.” From Heinrich Khunrath, *Amphitheatrum Sapientiae Aeternae* (Hamburg, 1595); idem, 33.

the villa, and the mingling of hot and cold waters in a red basin in the adjacent Grotto of the Stove.⁹⁴ Themes of ablution or purification through water are intuited in the Basin of the Laundress, and the same operation through fire is read in the Basin of the Salamander at Pratolino.⁹⁵ Early-modern ideas about metals and gems growing organically in the womb of the Earth are related to the Appenine colossus and its grottoes, and the life-giving properties of water, its abundance at Pratolino, and its mastery by Francesco I are recognized as essential elements to the image of the Prince as well as inheritances from rediscovered classical treatises on architecture, automata, and hydraulics.⁹⁶

Mila Mastrococco also recognizes the importance which Renaissance culture attributed to what they thought was gleaned from the remotest antiquity of Egyptian civilization and how it manifested itself in the spectrum of culture from the literary to the concrete, and Pratolino specifically.⁹⁷ Another observation made is the veil of religion and ritual which Mastrococco recognizes as cast upon the taste of the era, “that found a way to confer nobility and depth to events and individuals which in reality contemporaneously obscured their sense of identity and validity.”⁹⁸

Widening our net of research, numerous and extensive bibliographies have been generated in this vein for the canon of “magical” villas and gardens that has emerged: (in no particular order) the Villa Lante at Bagnaia, the Sacro of Bomarzo, the Villa Farnese at Caprarola, Villa Aldobrandini at Frascati- whose patrons all knew, corresponded, and likely exchanged ideas and artists between them-, and numerous lesser-known examples still relatively untouched by scholars, such as the Valsanzibio Gardens and Villa Barbarigo outside of Padova and the garden of the Villa Bracci of Rovezzano, the latter of which possessed a magical/alchemical program articulated by a series of statues by a student of Giambologna's (Pierre de Francheville/“Pietro Francavilla”, 1548-1615) through the last years of Francesco I's reign.⁹⁹ In general, the identification of concealed esoteric

⁹⁴ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 33-35.

⁹⁵ Idem, 36-38.

⁹⁶ Idem, 39-41, 43.

⁹⁷ I translate here Mastrococco's most explicit articulations of Pratolino's identification with esoteric influences: “Undoubtedly the most intimate significance of Pratolino is this (esotericism). Dedicated space to a religion in which merged the mystique of Neoplatonism, the magic value attributed to the science of the ancients, a pantheistic interpretation of nature, an intimistic research into the unconscious which searched for its confirmation in the configuration of the environment, and undoubtedly a place dedicated to “true love.” “Connecting the formulae of hermeticism to the speculation of astrology and to the study of phenomena of resonances and magic, if not to scientific investigation, one arrived to conceive this consistency of nature, this coherence of its order and its course which comprises a mathematical system and together a complete organism. Mastrococco, *Le Mutazioni di Proteo*, 98-99, 108.

⁹⁸ Idem, 129.

⁹⁹ For the latter, see idem, 135-47.

and heretical themes as a key to Renaissance garden design has been advanced by Nicola and Emanuela Kretzulesco. Contributing authors to the 1979 volume of essays edited by Marcello Fagiolo already use this key, such as Maria Luisa Madonna's analysis of the Villa d'Este and Cristina Acidini Luchinat's study of the grotto. Two volumes edited by John Dixon Hunt also highlight elusive themes associated with magical philosophy within a more general context of study.

A word of caution however bears repeating in conjunction with this body of esoteric studies which have, until the recent past, languished at the margins of historical inquiry; as late as 1991, one scholars' relation of the light seen on the golden statue of Piero della Francesca's *Flagellation* to alchemy and early capitalism is deemed "too eccentric to be worth debating."¹⁰⁰ Esoteric studies are "mined territory" to a certain extent, and historians who have tread upon this ground before me have eloquently defended their passage. The words of Martin Kemp have been hailed as the throwing down of the gauntlet to the trend within modern scholarship to favor interpretative constructs which reflect our present reality rather than the historical milieu:

I will be arguing that a complex fluidity, ambiguity, and diversity of meaning characterizes the viewing of such items even in a number of apparently similar contexts in Renaissance societies, and that such viewing undermines any propensity to characterize them neatly in terms of the kind of historical 'meta-realities'- such as power, colonialism, possession, oppression, patriarchy, Eurocentrism, and otherness- which now tend to be taken as having a privileged explanatory power.¹⁰¹

1.2.e. Magical Automata throughout History

Here, a disclaimer should be made that the magical dimension of mechanical automata with which this study occupies itself in the Renaissance can be related to diverse areas of magical and mechanical works, including garden sculpture and fountains. Joscelyn Godwin in the above cited work concretized the link between Hermetic living cult statues of antiquity and the statues which populated Italian Renaissance gardens in language echoing the language of the sixteenth century,

¹⁰⁰ Here the author David Carrier is criticizing Maurizio Calvesi's reading of the *Flagellation*; see Carrier, *Principles of Art History Writing* University Park: Pennsylvania State University Press, 1991), 22.

¹⁰¹ Kemp, *Wrought by no Artist's Hand': The Natural, the Artificial, the Exotic, and the Scientific in Some Artifacts from the Renaissance* in *Reframing the Renaissance: Visual Culture in Europe and Latin America 1450-1650*, ed. Claire Farago (New Haven: Yale University Press, 1995), 179-80.

such as De' Vieri's description, which cultivated ambiguity over whether they were “men, gods, or statues.”¹⁰²

Statues...are like the intelligence and consciousness of the garden. While the mineral and vegetable elements are offered passively to our contemplation, the statues stand for an active awareness, returning our glance and speaking to us. Ideally, they should be authentically ancient sculptures, envoys from an epoch when statues were worshipped and brought to life (if we believe the *Asclepius*), because they incarnated the demonic influences that the pagans called gods... The sophisticated garden-building cardinals of the sixteenth century had grown out of that, but the memory of pagan idols was still there, together with the ambiguous allure of the nude.¹⁰³

The conflation of Renaissance automata with the sculptural form which they so frequently assumed in Italian Renaissance gardens however is not connected by Godwin at this junction; but the boundaries are eroded between statue, fountain, and automata with the presence, absence, or canalization of the water element, “(water) devices divert attention from the water to the statue, which becomes an actor, enlivened for as long as the water flows, after which it is just a statue again....automata that do not just move, but act, in the sense of playing out a drama.”¹⁰⁴ Anatole Tchikine dedicated an article to exploring the Renaissance topos of water as the living “soul” of the garden, in the works of two sixteenth-century Florentine horticultural writers Agostino del Riccio (1541-98) and Giovan Vettorino Soderini (1526-97) as well as the extensive hydraulic works, civic as well as private, undertaken by Francesco I's father Cosimo I.¹⁰⁵ Pratolino is given special recognition by Tchikine for its innovatively-designed, practical chains of fishponds which he proposes as a precursor to similarly-conceived Baroque cascades, and kinetic automata are included in his study for their perpetuation of ancient engineering devices and principles. While Pratolino's are not mentioned specifically, Tchikine highlights an installation of moving automata made of terracotta and lead in 1606 by Giovanni Antonio Nigrone (active 1585-1609) for the garden of Camillo Caracciolo, prince of Avellino, near Naples.¹⁰⁶ Overall though, Tchikine's study is

¹⁰² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 12.

¹⁰³ Godwin, *The Pagan Dream of the Italian Renaissance*, 154.

¹⁰⁴ Idem, 174.

¹⁰⁵ Anatole Tchikine, *L'anima del giardino: Water, gardens, and hydraulics in sixteenth-century Florence and Naples in Technology and the Garden*, eds. Michael G. Lee and Kenneth I. Helphand (Washington D.C.: Dumbarton Oaks, 2014), 135-39.

¹⁰⁶ Idem, 147.

rigorously oriented towards the physical mechanics of these works whose “soul” was flowing water, and now it is to the relevant literature on magical automata, with the understanding of the fluidity of boundaries between statue and fountain, water/wind and “soul,” which we now turn.

One further caveat in the treatment of magical vessels during this time period: the fluidity of potential forms which the astral image could take locates the question of an automaton invested with some divine or celestial quality in a gray area of related Renaissance experiments. As will be examined below in the study at considerable length, there was uncertainty whether “invested” objects, statues and by extension automata included, were natural or demonic operations. Sarah Higley however presents an artificial dichotomy in the aims of the natural philosopher from those of the magician: the natural philosopher's highest aim was the creation of the golem, whereas the magus devoted himself to the conjuring and binding of demons. Both have been recognized as important links between hermetic lore and historical narratives of technology, power, creation, and gender politics, the last due to both pursuits' exclusive provenance of learned, male philosopher-magicians of the time period.¹⁰⁷ Yet, what of the new kind of Renaissance “magus,” the astrological and natural philosopher, whose efforts to bring operations previously relegated to demonic and necromantic agencies into the light of natural philosophy? What of the efforts of the preternatural philosophers to articulate in their literature how astral images could be invested with their qualities naturally? While Renaissance pursuits in the manufacture of a golem or homonculus and the survival of demonic conjurings have received dedicated study (see William Newman and the volume of studies edited by Claire Fanger, respectively), automata and even statues more generally have resisted a similar analysis in this context.

Nevertheless, the idea of “magical” automata has certainly been explored, if not explicitly as invested astral-images in themselves. Above, I referred to a body of literature on the subject of the development of the automaton or the robot for its omission of the Pratolino automata specifically (Bedini, DeSolla Price, Cohen, Higley, and Kang); nevertheless, these authors, even when not directly tied to Pratolino's works, provide the necessary and crucial context to understand these neglected works in the timeframe in which they were created. In our study, numerous works were consulted to trace the development of the magical dimension of moving statues from antiquity through the Renaissance. Forbearing a summary of ancient sources, which is to be found in the study itself, notable modern studies of the early period include those of Grégoire Loukioanoff, E.R.

¹⁰⁷ Higley, *The Legend of the Learned Man's Android*, 128-9.

Dodds, Sarah I. Johnston, and Algis Uzdavinys. Here I may remark that the study of theurgic sculpture in antiquity, its point of origin, I have found to be somewhat less methodically reconnoitred than studies of magical automata in later periods. For these, there have been several authors who analyze the inextricability of magic from mechanics: Elly Truitt, William Eamon, as well as authors for whom the magical aspect of Renaissance automata is less in evidence, as in the works of Jessica Wolfe and Mark Rosheim.

Many variously-sourced magical philosophies intertwined in the pursuit of investing man-made statues with movement, spirit, or “life” in its myriad forms we might conceive it. Prominent among these was the method derived from the Hermetic text *Asclepius*; Godwin puts forward one of the most clear articulations of the link between the “god-making” passage of the Hermetic text *Asclepius* with Renaissance automata:

The machines completed the repertory of the *Kunstkammer* in a thoroughly Hermetic way. Of all the passages in the *Corpus Hermeticum*, the description in the Latin *Asclepius* of bringing gods into statues had caused most debate and curiosity. Now it could actually be done, after a fashion. Perhaps the ancient Egyptian statues mentioned in the *Asclepius* were also nothing more than clever automata. But perhaps this very art of setting lifeless matter in movement was something occult, an exercise of a creative power that had been reclaimed after an aeon of human abasement.¹⁰⁸

In addition to Godwin, other authors have solidified the legitimacy of this Hermetic reading. Dame Frances Yates's works accomplished great strides to eliminate boundaries that the modern mind may be prejudiced to perceive between Renaissance science and magic, while locating the primary theatres of enchantment in late-Renaissance masques, *intermezzi*, and- most germanely for the present study- garden grottoes built at the great Italian villas. John Mebane's study of Renaissance magic and the theme of the Golden Age in English literature and theatre recognizes the primacy of Yates's writings in the perspective adopted by subsequent historians that Renaissance practical magic stimulated the growth of modern science by advancing the idea that humanity's manipulation of nature was an appropriate and dignified pursuit.¹⁰⁹ Building on this intersectional ambiguity between science and magic of the period, Horst Bredekamp's interpretation of Renaissance

¹⁰⁸ Idem, 121.

¹⁰⁹ Mebane, *Renaissance Magic & the Return of the Golden Age: The Occult Tradition & Marlowe, Jonson, & Shakespeare*, 2. Peter French, R.J.W. Evans, Christopher Hill, Paolo Rossi, Allen Debus are the authors Mebane identifies who continued researching magic's stimulus to genuine science.

automata as manifestations of a divine set of interactions between its patron, the collector/demiurge, and the object brought to life establish in his study a transcendent facet of the phenomenon of the *Kunstkammer* in late-Renaissance culture. Godwin's study ties Bredekamp's ideas about the place of machines in the *Kunstkammer* explicitly to the statue-automata-fountains of Italian Renaissance villas.¹¹⁰

Although Hermetic and Neoplatonic theurgy seemingly receive the lion's share of attention by name in this study, it rests upon a much larger and long-standing system of astral magic underpinning how its operations were understood. Whereas general studies on magic like Richard Kieckhefer's articulate the spectrum of currents of thought swirling within magical philosophy at the time and more specialized studies such as Joan Evans's examination of the magical nature of jewels and stones provide a detailed examination of fundamentally the same astral magic put in practice however in a different medium, one recent author in particular is owed particular recognition for her contribution to our modern understanding of the physical science underscoring even the farthest reaches of astral magic. Mary Quinlan-McGrath's study takes for granted that art patrons in fifteenth- and sixteenth-century Italy believed that celestial forces could operate through works of art and architecture (making room for the present study's argument for the contemporary belief of the same principles at work in automata and sculpture). Quinlan-McGrath's conclusion that celestial forces animated Renaissance visual culture- specifically, urban plans, architecture, and images in her study- underscores the central idea of the present study, that automata, and most probably those of Francesco I de' Medici's Villa Pratolino, were perceived by this same milieu to have been works similarly invested with celestial energy. Just as Quinlan-McGrath observed that works of art which were believed to be infused with protective celestial powers led to them being perceived as "alive" in ways which would confound the modern observer of the same work, so too, I believe, must have been the automata of the age. Similarly, many questions which Quinlan-McGrath frames in her study ("How did the precepts of natural philosophy anchor a deeper understanding of the artworks? In what ways, beyond communicating ideas, did Renaissance intellectuals consider the artworks efficacious?"¹¹¹) helped to shape my own consideration of the "magical" automata of Pratolino and the Renaissance.

Quinlan-McGrath's study stands apart from other studies on magical philosophy which I

¹¹⁰ Godwin, *The Pagan Dream of the Italian Renaissance*, 154.

¹¹¹ Quinlan-McGrath, *Influences*, x.

have cited above for the author's rigorous demonstration that the Renaissance's combination of art and astral science was the “logical consequence of the finest Aristotelian and Neoplatonic natural philosophy of the time,”¹¹² which permits a fuller appreciation of De' Vieri text and particularly his citation of Aristotle on this topic. At the same time, it locates this text and its theurgical subject matter within the wider context of Aristotelianism in the Italian vernacular. This thread will be picked up below in the present examination of the state, or states more accurately, of the diverse fields of research which have been brought together in my study in the fifth and final part of the present *status quaestionis*.

However, returning to the subject at hand, that is, a review of sources which develop an understanding of magical automata generally, Quinlan-McGrath's work, though it does not treat automata specifically, articulates a physics-based system of astral science (astronomical mathematics or simply *mathesis* (science) in antiquity¹¹³) which as a discipline of study should justly be classed with the sciences, instead of with magic and superstitions. Previous historians of this astrological science, like David Pingree who has railed about the obstinacy of the modern scientific community to acknowledge its inclusion among the histories of Science, in my estimation, have not demonstrated as convincingly as Quinlan-McGrath the natural physics underlying esoteric systems of thought. Though her study does not make the leap to include theurgy or statue animation specifically among the astral sciences, it nevertheless should be, and though Quinlan-McGrath does not extend her study to automata, others authors have. Truitt's work cited above is among those that do, and his articulation of the mathesis which Quinlan-McGrath's study is dedicated to demystifying is duly articulated as one of the methods of making magical automata in the Middle Ages.¹¹⁴ Following this connection, my study has been able to offer what I believe to be the most thorough examination of magical automata's theurgic operations, as they were understood in the Renaissance, to date.

1.2.e. Biographical considerations: Francesco I de' Medici and Francesco de' Vieri

Any thorough investigation into the state of the research surrounding the Pratolino automata

¹¹² Ibid.

¹¹³ Firmicus Maternus is among the antique astrologers who use this term.

¹¹⁴ See “How to Make an Automaton” in Elly Truitt, *Medieval Robots: Mechanism, Magic, Nature, and Art* (Philadelphia University of Pennsylvania Press, 2015), 52-60, 84-86.

and the question of concrete examples of theurgic experiment in the Renaissance can not help but to take up the question of either their patron, Francesco de' Medici or their chronicler, Francesco de' Vieri.

For Francesco I, a common thread unites biographical considerations with the esoteric theme which we have examined above; Godwin observed pervasive “rumors”¹¹⁵ of a Medici esoteric tradition and grounded them in the recent works of Janet Cox-Rearick, Giulio Cesare Lenzi Orlandi, Jean Mallinger, and the nineteenth-century studies of J.M Ragon. Within more traditional scholarship, Luciano Berti's is the first modern comprehensive study of Francesco I since that of Riguccio Galuzzi in the late-eighteenth century, notwithstanding nineteenth-century mentions,¹¹⁶ mostly condemnatory of Francesco I's moral character and affair with Bianca Cappello, through the following century.¹¹⁷ Only recently have scholars begun to recognize the positive contributions to early modern science and intellectual history made by Francesco I; and yet, we must consider that the achievements which modern historians credit Francesco I are coloured by our own prejudices and values, prizing the useful, the mercantile/industrial, or even the readily-understandable over the more esoteric undercurrents which ran through the age and which condensed in the culture of Francesco I's court. For example, Joscelyn Godwin's observed, “For the whole of (Francesco's) reign, there was no war, but also no economic progress. It was at least two centuries too early for research and development in technology, which was one of Francesco's favorite pursuits, to have any practical economic development.”¹¹⁸ Yet elsewhere the same historian acknowledges the apparently unbroachable chasm between the age in which these works were created and our present attempts to comprehend them, “the central problem of Renaissance iconography: how to interpret works of art, when our knowledge and world-views are utterly different from those that brought them into being.”¹¹⁹ Following shortly afterwards, limitations of modern criticism, described in his

¹¹⁵ Godwin, *The Pagan Dream of the Italian Renaissance*, 74. Here Godwin makes a good point about the nature of these “rumors” about their esoteric activity, that if they were known with all of the certainty which good scholarship requires, they would instead be exoteric, ceasing to be that which defines them.

¹¹⁶ Including Arcangelo Piccioli, *I fatti principali della storia di Toscana*, 2 vols. (Firenze, 1856); Guglielmo Enrico Saltini, *Bianca Cappello e Francesco I* (Firenze: Rassegna Nazionale, 1898).

¹¹⁷ See Gaetano Pieraccini, *La Stirpe de' Medici di Cafaggiolo*, 3 vols. (Firenze: Vallecchi, 1925), Cipriano Giachetti, *Bianca Cappello* (Firenze: Bemporad, 1936); Antonio Panella, *Storia di Firenze* (Firenze: Sansoni, 1949); Sergio Camerani, *Bibliografia Medicea* (Firenze, 1964); see also Luciano Berti, *Il Principe dello Studiolo : Francesco I dei Medici e la fine del Rinascimento fiorentino* (Firenze: Maschietto & Musolino, 2002), 27-29.

¹¹⁸ Berti, *Il Principe dello Studiolo*, 100.

¹¹⁹ *Idem*, 135.

volume as “a secularist ideology with Marxist roots,”¹²⁰ are acknowledged to obstruct understanding of esoteric and alchemical themes relevant to the works' creators, but “indefensible” and “not worth debating” to the serious modern critic and scholar. Historians have analyzed the reign of Rudolph II in this light,¹²¹ but a similarly thorough study of Francesco I, as the historian Clare Brown has pointed out as recently as 2005,¹²² is still lacking. Like Francesco I, scholarship on Rudolph II has gradually evolved from perceptions of “extravagances of a semi-demented monarch” towards acknowledgments of these rulers' purposeful philosophical enterprises and contributions to science.¹²³

A similar treatment has not been afforded to Francesco I's right-hand polymath- architect, engineer, inventor, and designer- Bernardo Buontalenti, but biographical information about the man who accompanied the young Medici prince throughout Europe since the time of his youth can certainly be found in studies of the latter.¹²⁴ Otherwise, highly specialized studies have been carried out on diversely unified aspects of Buontalenti's works.¹²⁵ So far, none have focused exclusively on his automata or other engineering works for Pratolino in isolation.

As for Francesco De' Vieri, within studies of Pratolino, he is frequently invoked as its primary and most extensive textual source as well as a mediator between modern historian and the court culture of Francesco I de' Medici; however, De' Vieri's place in the larger body of scholarship also belongs to the history of the tension between Aristotelianism and Platonism within the Italian university system of the late-sixteenth century. Three major works published between 1568 and 1590 are recognized as demonstrating De' Vieri's break from a slavish adherence to Aristotelianism, his defence of Platonic thought, and furthering of a characteristic synthesis of eclectic elements.¹²⁶

¹²⁰ Ibid.

¹²¹ See Peter Marshall, *The Magic Circle of Rudolph II* (New York: Walker & Company, 2006); Robert J. W. Evans, *Rudolph II and his World: A Study in Intellectual History 1576-1612* (Oxford: Clarendon Press, 1973).

¹²² Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 13.

¹²³ Godwin, *The Pagan Dream of the Italian Renaissance*, 122.

¹²⁴ See Riva, *Pratolino: il sogno alchemico di Francesco I de' Medici*, 30; the analysis of the effects of a similar sojourn in Spain by Rudolph II presents many possibilities of a parallel analysis for the time Buontalenti and Francesco I spent at the court of Philip II earlier in the century. See Jiménez Díaz, *Spain, Prague, and the Habsburg Ideology: Some Aspects of the Architecture of Rudolf II in Rudolf II, Prague, and the World*, ed. Lubos Konečný (Prague, 1998).

¹²⁵ See Amelio Fara, *Bernardo Buontalenti: L'architettura, la guerra, e l'elemento geometrico* (Firenze: Mondadori Electa, 1988); Francesco Vossila, Valentina Co, and Cristina Acidini, *Bernardo Buontalenti e la Grotta Grande di Boboli* (Firenze: Maschietti, 2012).

¹²⁶ They are the *Discorso del soggetto del numero, dell'uso et della dignità et ordine degl'habiti dell'anima* (1568), the *Compendia dell dottrina di Platone in quello che ella è conforme con la fede nostra* (1577), and the *Vere conclusioni di Platone conformi all dottrina Christiana et a quella d'Aristotile* (1590). See Alistair C. Crombie, *Science, Art and Nature in Medieval and Modern Thought* (London: Hambledon Press, 1996), 138-39.

Contemporary scholars' treatments of Francesco de' Vieri are predominantly in this vein.¹²⁷ Other works of De' Vieri's are similarly noted for his eclectic blend of Classical and medieval authorities; the *Lezioni d'amore* made use of antique authors, Averroes, Al-Ghazali, Petrarch, Dante, Pico della Mirandola, Church fathers, and traditional teaching, but above all and in contrast to other treatments of the subject, the use of Aristotle by De' Vieri is "...practically ubiquitous in the work, both in direct references to him and in the employment of the Aristotelian manner of argumentation..."¹²⁸ In a similar vein, Craig Martin observed that De Vieri's *Meteorologia* cited works available only in Latin or Greek, in spite of its courtly audience lacking in university training; however, we know that this vernacular translation was received from Francesco I with the withering comment that he was already familiar with the text in Greek.¹²⁹ And this last point forms a bridge for the present review of relevant literature to the study to the fifth and final subcategory of broad topics, the state of the literature concerning Renaissance Aristotelian philosophy in the vernacular.

1.2.f. Vernacular Aristotelianism and its Relationship to Theurgy, Automata, Magical, and Preternatural Philosophy

As this study evolved and the link between magical methods of animating statues and Aristotelian natural philosophy coalesced (not only through De' Vieri's words, which attributed the statue's animation to a Democritan/atomic and sympathetic operative principle articulated in Aristotle's *De Anima*, but also from scholars Mary Quinlan-McGrath and Richard Kiekhefer whose works contextualized how Aristotelian natural philosophy was understood to be demonstrated through preternatural and magical operations), it became clear that a corner of Renaissance Aristotelian philosophy in the vernacular was becoming illuminated which had not yet been integrated into its larger context of study.

That larger context's present state of development has recently been articulated by David

¹²⁷ Particularly Charles B. Schmitt, "The Faculty of Arts at Pisa at the Time of Galileo," *Physis* 14 (1972): 243-272; Rosario Pintaudi, "Il Platone di Francesco Verino Secondo," *Rinascimento* 16 (1976): 241-244; Alessandro Gibba, "Francesco de' Vieri (1524-1591) and his Teaching at the University of Pisa," *History of Universities* 14 (1994-1995): 143-156; Cesare Vasoli, "Platone allo studio fiorentino-pisano," *Rinascimento* II s., XLI (2001): 39-69 ;Jill Kraye, *La filosofia nelle università italiane del XVI secolo*, in *Le filosofie del Rinascimento*, ed. C. Vasoli and P. Pissavino (Milano: Bruno Mondadori Editori, 2002), 350-373.

¹²⁸ Nicholas J. Perella, "Review: Francesco de' Vieri. *Lezioni d'amore*. Ed. with an introduction by John Colaneri (Humanistische Bibliothek, Reihell, Band 6.) Munich: Wilhelm Verlag, 1973. 188 pp. DM 36," *Renaissance Quarterly* 29 (1976): 232.

¹²⁹ Berti, *Il principe dello studiolo*, 75.

Lines who traces the “Copernican revolution” within the field of Renaissance philosophy in terms of recognizing that it was not quite the age of Plato, the construction which prevailed before the 1970's, but rather one in which an important and continuing Aristotelian influence could be felt.¹³⁰ The works of other scholars, such as F. Edward Cranz, Charles H. Lohr, Charles B. Schmidt, Edward Mahoney, Jill Krave, Eckhard Kessler, Bruno Nardi, Antonino Poppi, Luca Bianchi, and Marco Sgarbi have also been recognized for their critical demonstrations that Renaissance humanists engaged with Aristotelian philosophy in ways that were neither uniform nor impervious to outside influences.¹³¹ However, in spite of the great strides which historians of Renaissance philosophical currents have made in recognizing the continuing primacy of Aristotelianism, the primary purpose of Lines's article is to highlight the particular case for iterations of this philosophy in proto-national vernaculars as opposed to the Latin of universities and clergy¹³² and to break the “myth, inherited from both humanist and scholastic writers, that only Latin was able to provide the richness and sophistication necessary for serious learned discussion.”¹³³ In this respect, his article is a call-to-study and underlines several key lacunae into which, I believe, the present study of Renaissance theurgy and the Pratolino automata can fit. Lines outlines the present state of scholarship and what he perceives to be needed in future studies,

Although scholars have done well to emphasize the importance of Renaissance Aristotelianism, this movement was not confined to Latin, university-based works: those written in the vernacular also deserve to be inventoried and studied in detail. More generally, scholars need to pay closer attention to the interactions between vernacular and Latin Aristotelianism. Just as the category of vernacular humanism now makes perfect sense, so the label of Aristotelianism will need to be understood anew, as embracing both Latin and vernacular works.¹³⁴

Certain treatises of De' Vieri's have already been examined with an awareness of vernacular Aristotelian studies in mind; the above-cited work of Craig Martin, which takes the *Meteorologia* as

¹³⁰ David Lines, “Rethinking Renaissance Aristotelianism: Bernardo Segni's *Ethica*, the Florentine Academy, and the Vernacular in Sixteenth-Century Italy,” *Renaissance Quarterly* 66.3 (2013): 824. See also Lines, “Beyond Latin in Renaissance Philosophy: A plea for new critical perspectives,” *Intellectual History Review* 25 (2015): 373-389.

¹³¹ Lines, “Rethinking Renaissance Aristotelianism: Bernardo Segni's *Ethica*, the Florentine Academy, and the Vernacular in Sixteenth-Century Italy,” 824-25.

¹³² *Idem*, 826.

¹³³ *Idem*, 825.

¹³⁴ *Idem*, 859.

its subject, and John Colaneri's 1973 publication of and commentary on De' Vieri's *Lezioni d'Amore* are two prominent examples discussed above. However, although De' Vieri's description of Pratolino figures in most if not all Pratolino historians' review of primary-source materials, it has not made the leap from being considered a text of art or architectural historical importance to one recognized for its contribution to the wider phenomenon of vernacular iterations of Aristotelian philosophy in the Italian Renaissance. And this is unfortunate, from the standpoint which this study hopes to convey, that it has much to offer in terms of enriching our understanding of how Aristotelian philosophy was understood, in varying degrees of synthesis with Platonism, and implemented in preternatural and even magical operations. For although Pratolino's automata certainly, concretely belonged to the mechanical tradition, whose intersection with Aristotelian philosophy has been the focus of some study by Paul Lawrence Rose and Stillman Drake, De' Vieri's description links them to the sphere of so-called "occult," alchemical, magical, and preternatural experimentation in late-sixteenth-century Florence spearheaded by Francesco I. Other authors, such as Paolo Rossi, have acknowledged the grouping of Aristotelian philosophy with "every form of occult and arcane wisdom," and that both were targets which early-modern revolts in technical literature aimed to undermine.¹³⁵ This aligns well with Rose and Drake's observation that a central facet of the time period was the overlap of this nascent mechanical science with other cultural elements.¹³⁶ Craig Martin's 2014 study aims to chart the crumbling of the Aristotelian framework with the rise of modern science, but before this was accomplished at the threshold of our present era, Martin's study illuminates how closely Aristotelian matter theory was tied to the tradition of alchemical testing, in defiance of our modern prejudices that experimentalism was necessary inconsistent with such a text-based approach.¹³⁷ This "proto-Scientific Revolution," as some have termed it,¹³⁸ incorporated Aristotelian philosophy in the living language necessary for experimentation. That meeting between the Latin, university-based tradition of knowledge and the practical needs of artisans has been highlighted as one of the age's defining features,¹³⁹ and its reach

¹³⁵ Paolo Rossi, *Philosophy, Technology, and the Arts in the Early Modern Era*, trans. Salvator Attanasio (New York: Evanston, and London: Harper & Row, 1970), x.

¹³⁶ Paul Lawrence Rose and Stillman Drake, "The Pseudo-Aristotelian Questions of Mechanics in Renaissance Culture," *Studies in the Renaissance* 18 (1971): 68.

¹³⁷ Martin, *Subverting Aristotle*, 2.

¹³⁸ See for example, Steven A. Walton, *Protoscientific Revolution or Cookbook Science? Early Gunnery Manuals in the Craft Treatise Tradition in Craft Treatises and Handbooks: the Dissemination of Technical Knowledge in the Middle Ages*, ed. Ricardo Córdoba (Turnhout: Brepols Publisher, 2013), 221-236.

¹³⁹ See Edgar Zilsel, *The Social Origins of Modern Science* (Dordrecht, Boston, and London: Kluwer Academic

is even felt in the circumstance that the description of Pratolino's automata by Francesco de' Vieri, a professor of philosophy at the University of Pisa, is framed in Aristotelian terms which ground their ground-breaking innovations (and apparently magical operations) in terms acceptable to the most rigorous Scholasticism of the preceding age. As scholars like Martin have shown, the worth of Aristotelian philosophy stemmed from its "comprehensive conceptual framework for understanding nature and the cosmos,"¹⁴⁰ and this was not incompatible in the Renaissance with the aims of the Neoplatonist or Hermeticist who sought to combine ancient scripture with meditations on nature out of a sincere desire to reconcile natural philosophy with ancient theology.

The significance and identity of the hydraulic and pneumatic automata as instruments not only of mechanical wonder but also of lofty magical and philosophical contemplation is a facet of this aspect of Renaissance material culture whose intellectual and cultural legacy has far outlasted their physical forms. The weather glass, another early-modern apparatus akin to the Renaissance automata of villa and court, has been studied in a vein particularly germane to the present study. Arianna Borrelli's analysis of how a device which captured water and air "spirits" eventually acquired multiple significances according to the philosophical frameworks of those approaching it.¹⁴¹ Borrelli takes as her object of study the early "inverted glass" experiments which anticipated the earliest thermometers and barometers; a version of this experiment also constituted the celebrated "perpetua mobile" machines which relied on the expansion and contraction of air to cause its waters to move, in the total absence of any apparently mechanical cause, to the left and right.¹⁴² As we have seen in the preceding pages, Francesco I and Buontalenti's perpetual motion machine has remained more obscure in the present state of scholarship than, for example, Cornelius Drebbel's several famous constructions of the device, one of which was presented to King James I in England. These perpetual motion machines were, in England as in Florence, impressive statements about the mastery about no less than the cosmos itself.¹⁴³

Publishers, 2000); Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962); Pamela Long, *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600* (Corvallis, Oregon: Oregon State University Press, 2011).

¹⁴⁰ Long, *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600*, ii.

¹⁴¹ Arianna Borelli, *The Weatherglass and Its Observers in the Early Seventeenth Century in Philosophies of Technology: Francis Bacon and his Contemporaries*, 2 vols, eds. Claus Zittel, Romano Nanni, Gisela Engel and Nicole Karafyllis (Leiden: Brill, 2008), 67-130; 69. My thanks to James Bradburne for bringing this to my attention.

¹⁴² These machines, at the least the example presented to James I by Cornelius Drebbel, was composed of a hollow sphere and a circular glass tube larger than the sphere, which was fixed so that it passed above and below it. Idem, 69, 94.

¹⁴³ Borelli points to Robert Fludd's use in 1631 of the weatherglass as a form which embodied the whole of his cosmology. Idem, 69.

The animating air as “spiritus” or “pneuma” in the Stoic sense was received within the Neoplatonist works the Renaissance inherited with a well-articulated identity which sixteenth-century natural philosophers felt free to adopt and elaborate upon. A clear-cut dichotomy between matter and soul did not exist in the Stoic idea about the mix of air and fire which brought life as it descended down from the celestial regions to the earth; this was the breath of life in the divine sense, but it possessed material as well as incorporeal attributes. Likewise, the “spiritus” which late-Medieval and Renaissance writers invoked could be used to indicate the corporeal (air, breath, or wind) and the ineffable (the human soul and celestial qualities); the treatises of this age on pneumatics, the *Spirituali*, must not be read with only the former in mind.¹⁴⁴ Giambattista della Porta, for example, explained the possibility of life on earth by attributing to air the property of transmitting life-giving fiery spirits from the Prime Mover and the heavens.¹⁴⁵ The usage of the term “spirabilis” in the sense of both “air-like” as well as “life-giving” has been underlined as an illustration of the age’s natural philosophical currents.¹⁴⁶ Spirits could be medicinal, corresponding to the Aristotelian-Galenic spirits of the body, which could control health.¹⁴⁷ Within the body, this kind of spirit was thought of as a fine, hot vapor found in arterial blood, the live breath, and on a grander scale, the astral influences and the *anima mundi*. The same air then which when “captured” and canalized into the conduits designed by the engineer, whether in a “perpetual-motion machine,” an inverted-glass, or an automaton at Pratolino, rendered visible an otherwise “occult” moving force. In an age which considered this aspect of the natural world still as a medium between the material and the incorporeal, the mining of invisible, “subtle” qualities was as esoteric as it was a proto-scientific pursuit. The inclusion of Hero of Alexandria’s machines within Cardano’s treatise on *De subtilitate* certainly forged a link in the minds of its Renaissance readers between the mechanical know-how to build a working automaton and what it was, or could be, which the automaton channeled in order to “come to life.”

Another meaningful association forged by Borrelli is that between alchemists and the philosophical subtleties which permeated the question of pneumatic devices in the early modern period; Borrelli argues that alchemists would be on expert footing in the discussion of such

¹⁴⁴ Idem, 90.

¹⁴⁵ Ibid.

¹⁴⁶ Idem, 83.

¹⁴⁷ Idem, 91. See also Allen G. Debus, *Chemistry and the quest for a material spirit of life in the seventeenth century* in *Spiritus. IV° colloquio internazionale*, eds. M. Fattori, M. Bianchi (Rome: 1984), 245-63; Eugenio Garin, *Relazioen introduttiva* in idem, 3-14; D. P. Walker, *Medical ‘Spirits’ and God and the Soul* in idem, 223-244; Marielene Putscher, *Pneuma, spiritus, Geist. Vorstellungen vom Lebensantrieb in ihren geschichtlichen Wandlungen* (Wiesbaden, 1973).

questions as what today we would name thermodynamic properties of water (among many other elements amidst their constant Work¹⁴⁸) and thus were some of the earliest to be in a position to make scientific advances in meteorology.¹⁴⁹ The manufacture of the alchemist's alembics and distillation devices which canalized water vapors to their destined containers are not so far removed on a mechanical level from the late-Renaissance automata; by building varied iterations of pneumatic and hydraulic devices, knowledge about the mechanical physics of the natural world increased, but did not necessarily push out older, metaphysical conceptions about *what* was being canalized and what other occult influences were equitably believed to be at work, such as the astral impressions. The air and water that was canalized in the Pratolino automata was not the soulless atomic elements we hold to know as oxygen, nitrogen and other elements present in a given air sample; rather, the fine hot vapour which coursed through these works in the era of their creation was of much more significance to questions of metaphysical philosophy, and in consequence, those who built them or enjoyed them used these works at an entirely different depth of contemplation to which the simple entertainment function of their modern day analogues falls far short in comparison. No longer can do we look at the air, water, or other element powering through a given engine or device and conceive that its energy, its Form could be stamped with cosmic signatures from the stars and planets; further from the pale is the Renaissance humanist's empowerment, the giddy promise that with the proper knowledge, man could manipulate and "stamp" or "invest" these influences himself and thus become capable of untold masteries of the terrestrial sphere below.

Of course, the fulcrum of this astral philosophy, the direct influence of the distinctly separate aether upon the terrestrial sphere's four elements, hinged on the violation of Aristotelian principles, and the war waged upon the geocentric cosmology and division of superlunary from sublunary phenomena by a new breed of anti-Aristotelian natural philosophers including Cardano, Paracelsus, Drebbel, Giambattista della Porta, Libert Froidmond, and Descartes has been articulated by historians.¹⁵⁰ Yet, in the context of studies about the various ways in which the age's thinkers eroded Aristotelian authority, the automaton as a magical object, and most significantly the mechanical process of how that "magic" was understood in a proto-scientific light, has not been invoked as the study in its own right in the larger history of the Renaissance and Early Modern

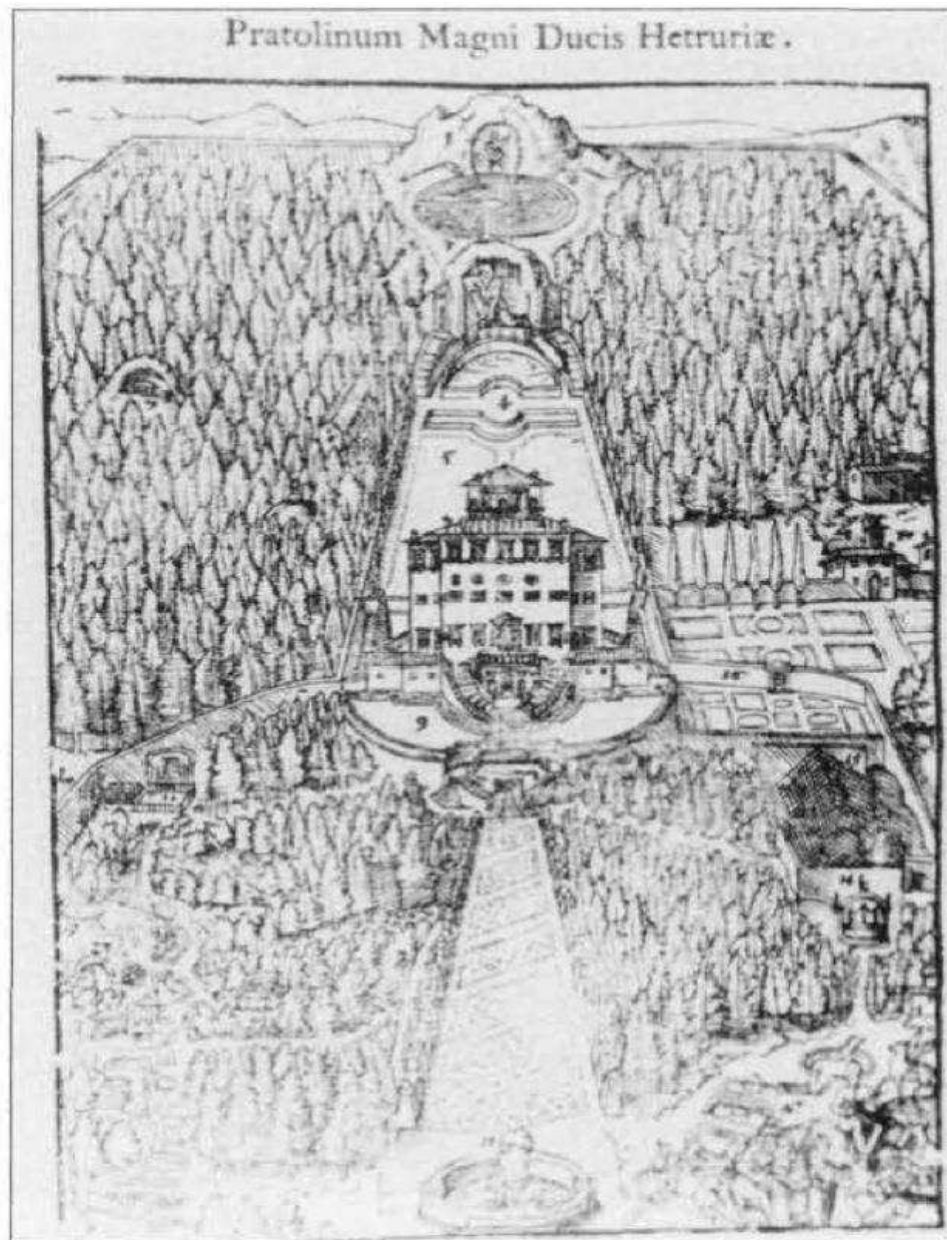
¹⁴⁸ Multhauf has written in detail about the processes of immolation and distillation of materials in the classic alchemical operation to produce the philosopher's stone.

¹⁴⁹ Borrelli, *The Weatherglass and Its Observers in the Early Seventeenth Century*, 89.

¹⁵⁰ *Idem*, 80.

subversion of Aristotle which it well deserves to be. Yet the late-Renaissance automata, particularly the archetypical examples at Pratolino to which the present study dedicates itself, certainly belong to the family of early-modern pneumatic devices, including the inverted-glass and the perpetual motion machine, which encapsulated much more for their makers and belie the simple technology of their shells which have passed in rare instances to modern collections.

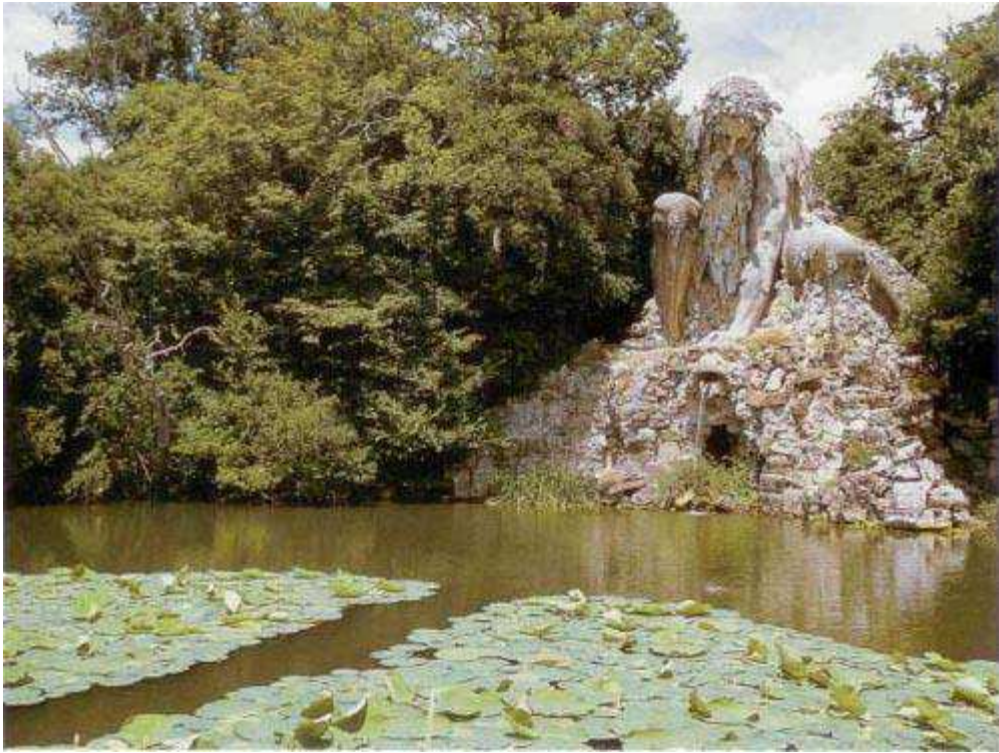
The overarching impression which the present *status quaestionis* seeks to convey is one of a fertile field of inquiry which has been only minimally grazed by scholars of its corollary fields; for example, there exists no parallel “Renaissance Robots” study on par with Truitt's treatment of the theme in the Medieval period, nor have automata been included in the fold of actual artworks (even if most are no longer extant) associated with fifteenth- and sixteenth-century art patrons' implementation of astral magic. The present study seeks to make a dent into this state of affairs with the submission of the Pratolino automata not only as possible, but likely examples of documented works of art and technology manufactured in the twilight of the “magical” Renaissance worldview which embodied ideas about astral magic and preternatural philosophy generally and Neoplatonic and Hermetic theurgy specifically. We turn now to the matter of De' Vieri's life, career, and the text of *Delle Maravigliose Opere di Pratolino*.



1. Salvatore Vitale, *Pratolinum Magni Ducis Hetruriæ*, from *Ad Annales Sardiniae*, Florence, 1639.



2. Baccio Bandinelli, *Seated Jupiter*, Boboli Gardens, Florence, 1556.



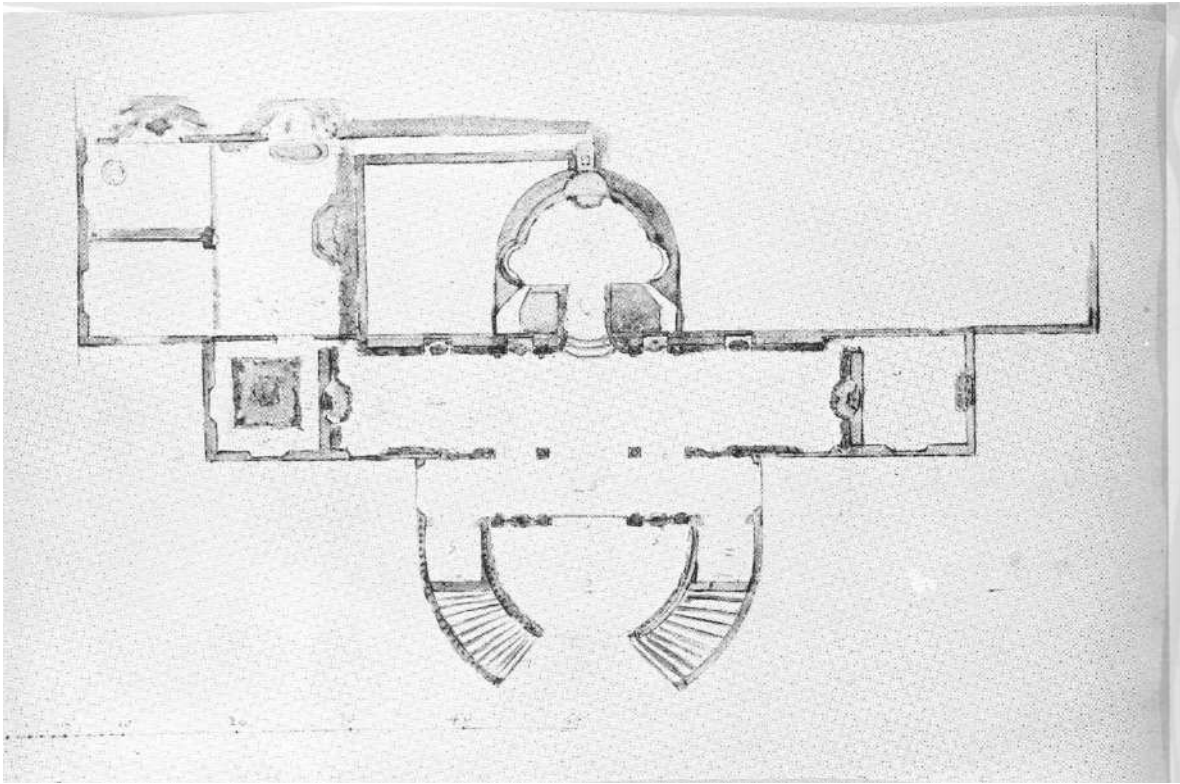
3. Giambologna, *Appennine Colossus*, Pratolino, ca. 1580.



4. Rocaille work, interior grotto of the *Appennine Colossus*.



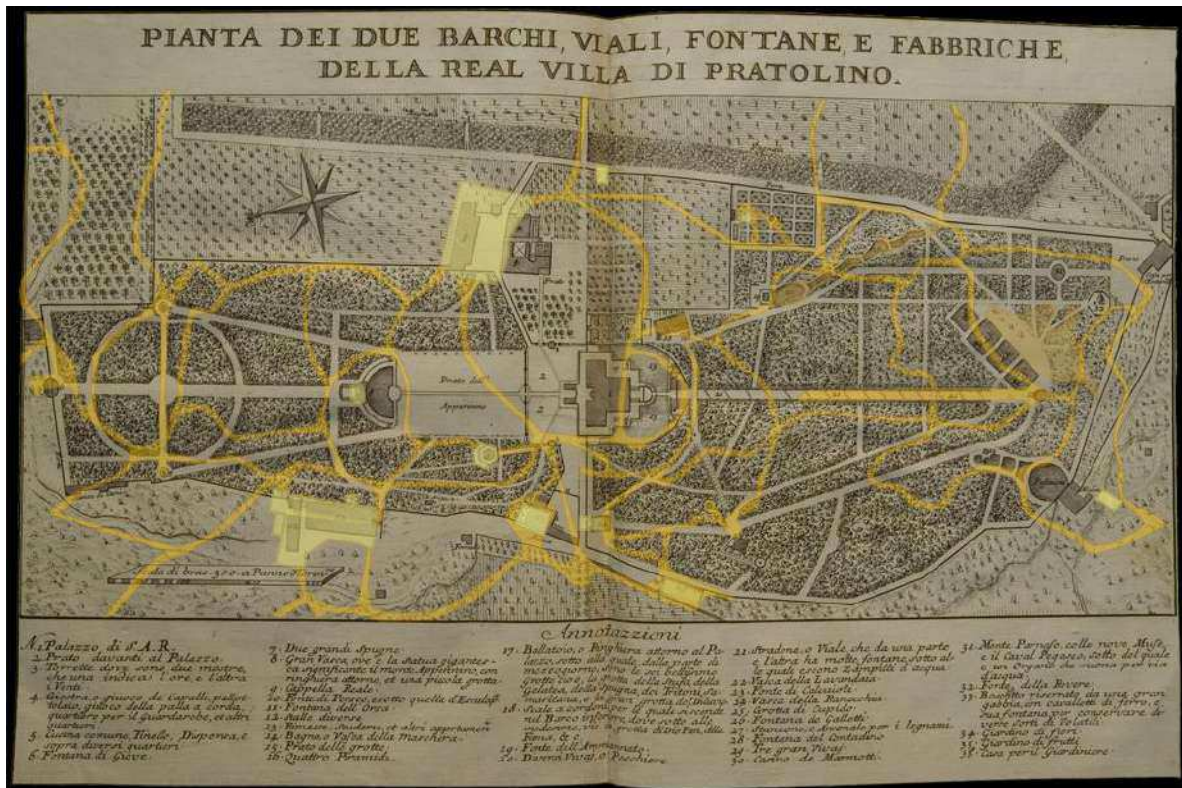
5. Lorenzo Bartolini, *Demidoff Monument*, Pratolino, 1847.



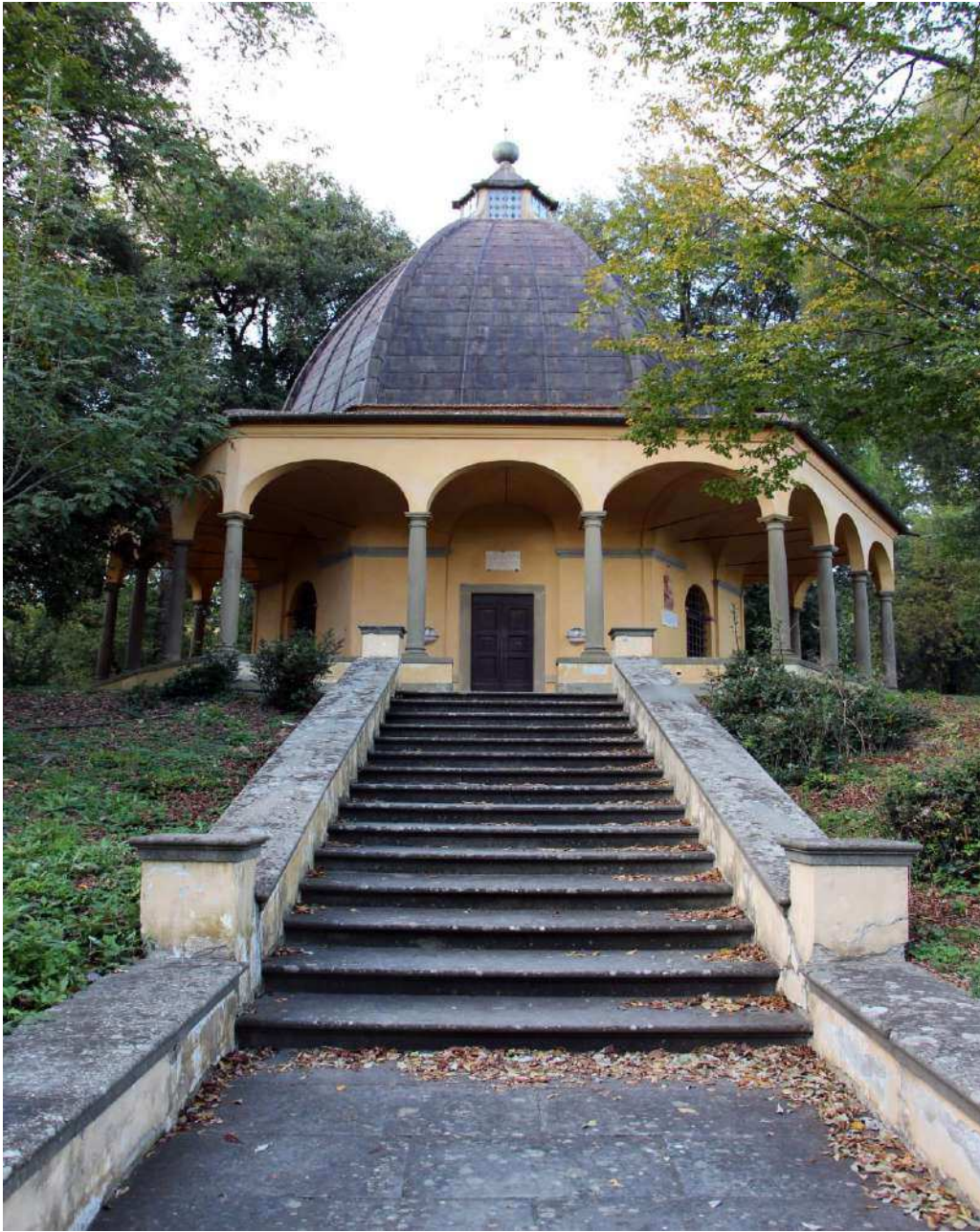
6. Giacinto Marmi, *Planimetria delle grotte del piano terreno della villa*. Drawing, GDSU, 5158 A.



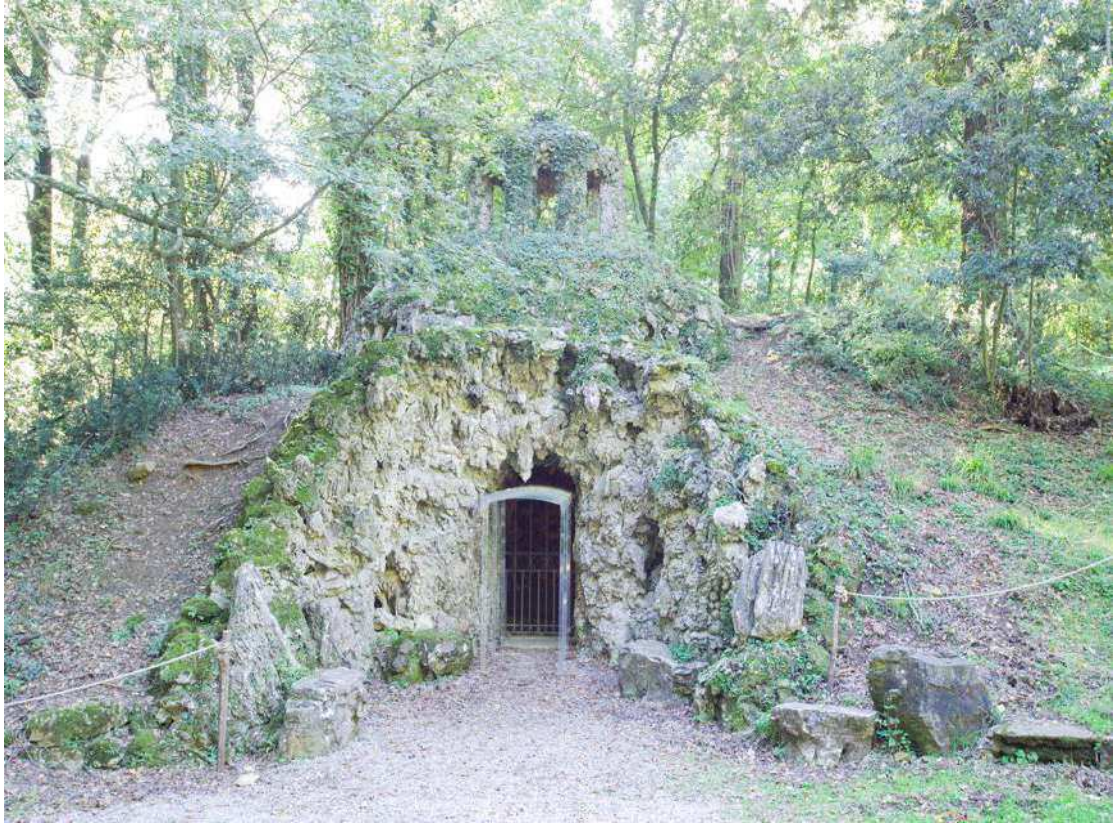
7. Present-day ruins of the Grottoes of Pan, Fame, and Mugnone, Pratolino.



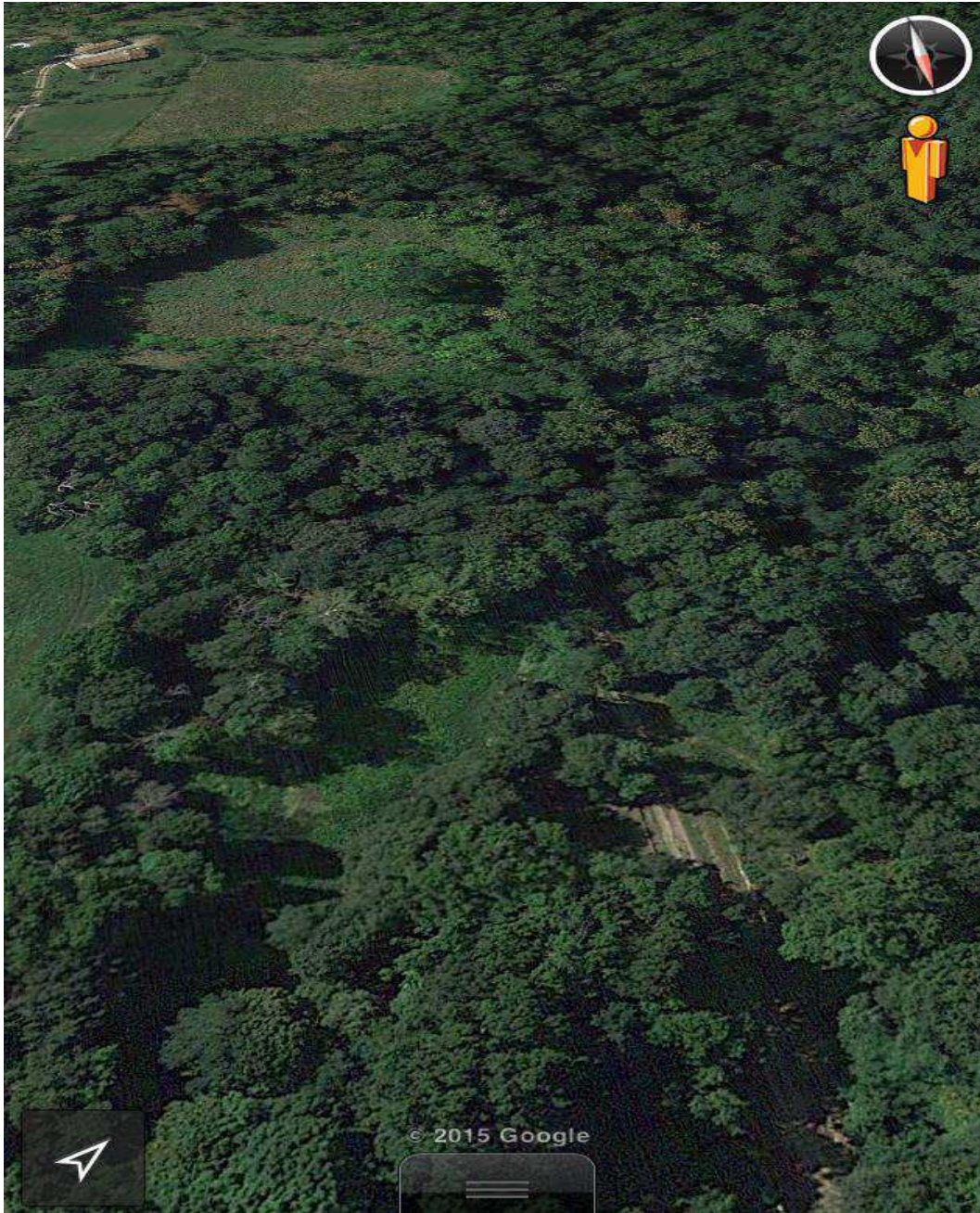
8. Bernardo Sansone Sgrilli, *Pianta dei due barchi, viali, fontane e fabbriche della real villa di Pratolino*, from *Descrizione della Regia Villa, Fontane, e Fabbriche di Pratolino* (1742), pl. 7



9. Bernardo Buontalenti, *Chapel*, Pratolino, ca. 1580.



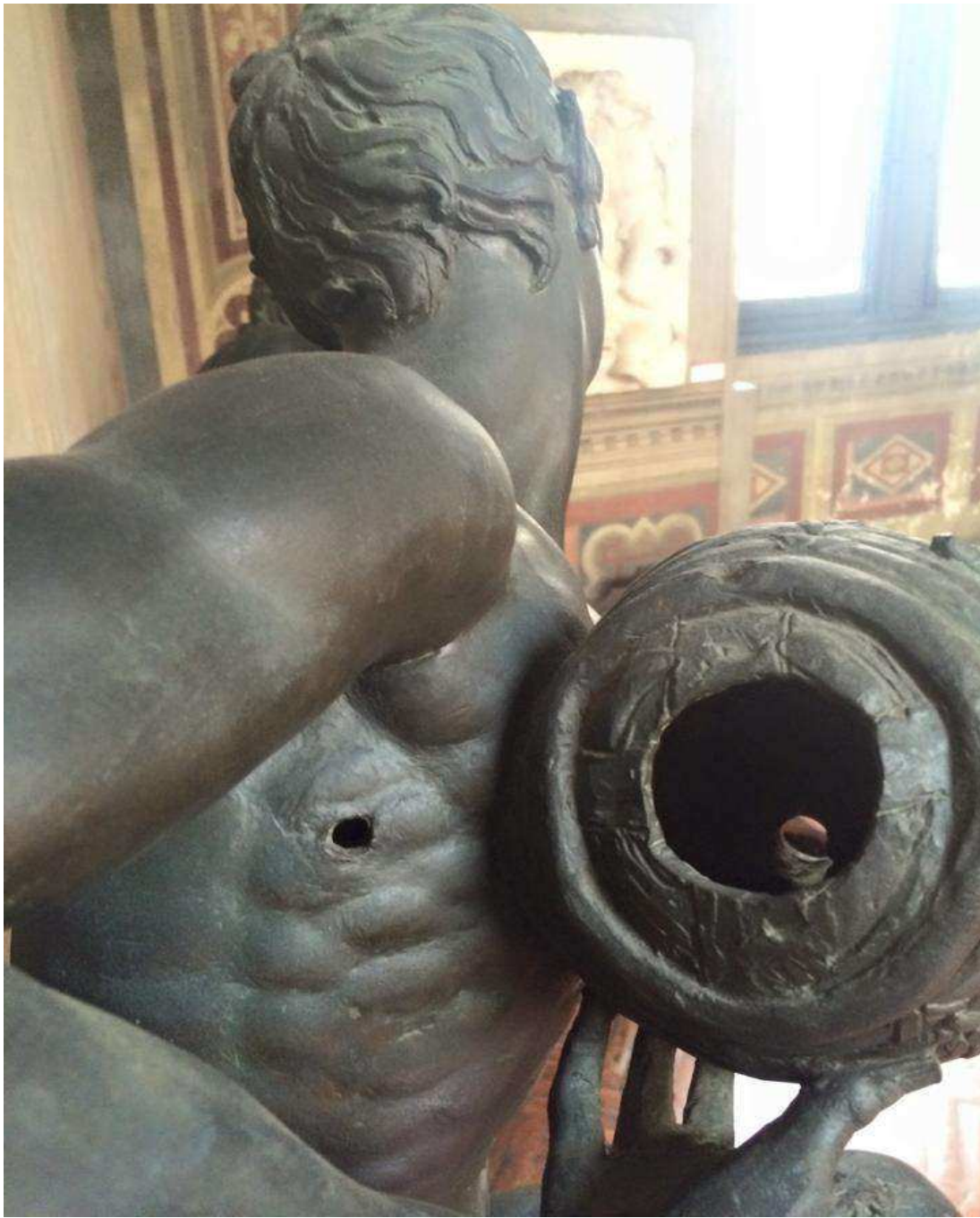
10. Bernardo Buontalenti, *Grotto of Cupid*, Pratolino, ca. 1580.



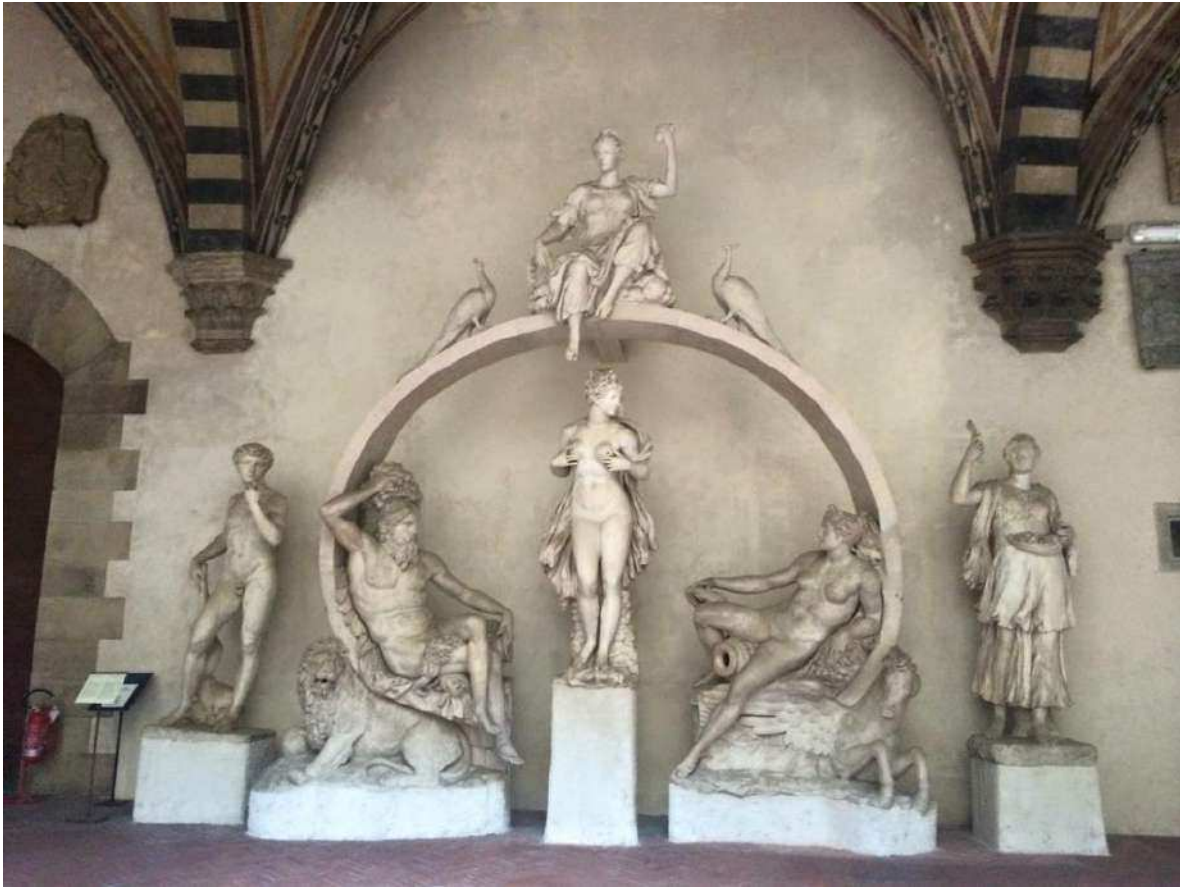
11. Site of the demolished Mount Parnassus, Pratinolo.



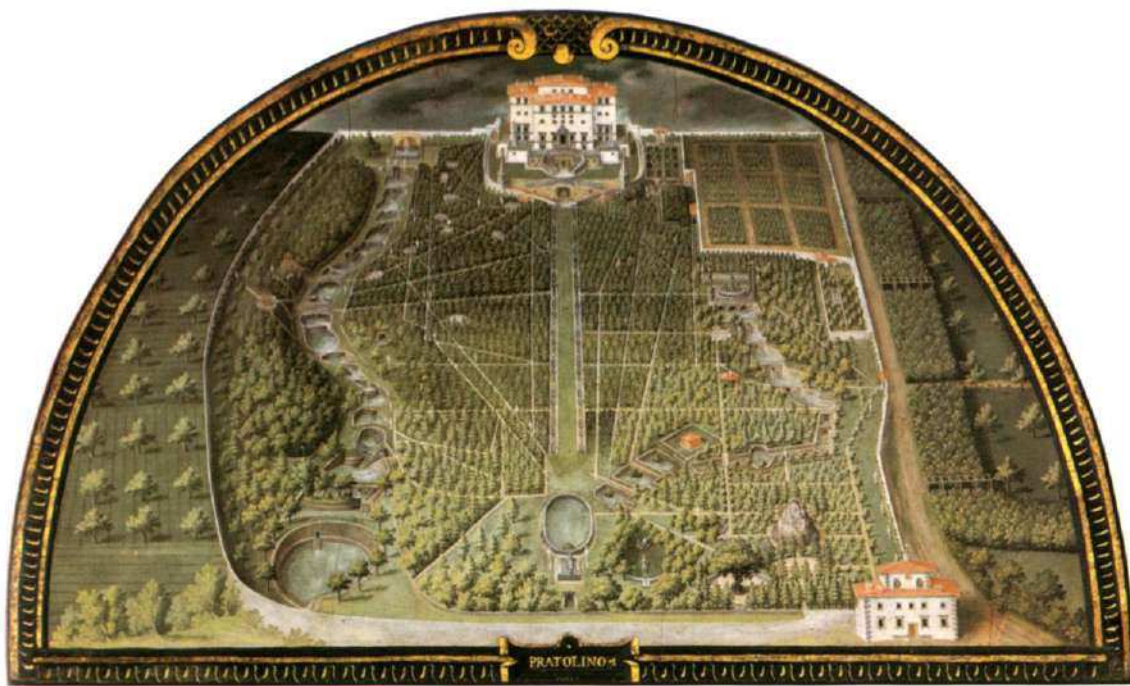
12. Giambologna, *Satyr with Flask*, Museo del Bargello, Florence, 1561-1562.



13. Detail of the *Satyr's* presumed water conduit.



14. Bartolomeo Ammannati, *"Concerto delle Statue,"* Museo del Bargello, Florence, ca. 1555.



15. Giusto Utens, *Pratolino*, Museo di Firenze Com'era, Florence, 1599-1602.



16. Vincenzo Danti and School of Giambologna, *Perseus*, Boboli Gardens, Florence, ca. 1577.



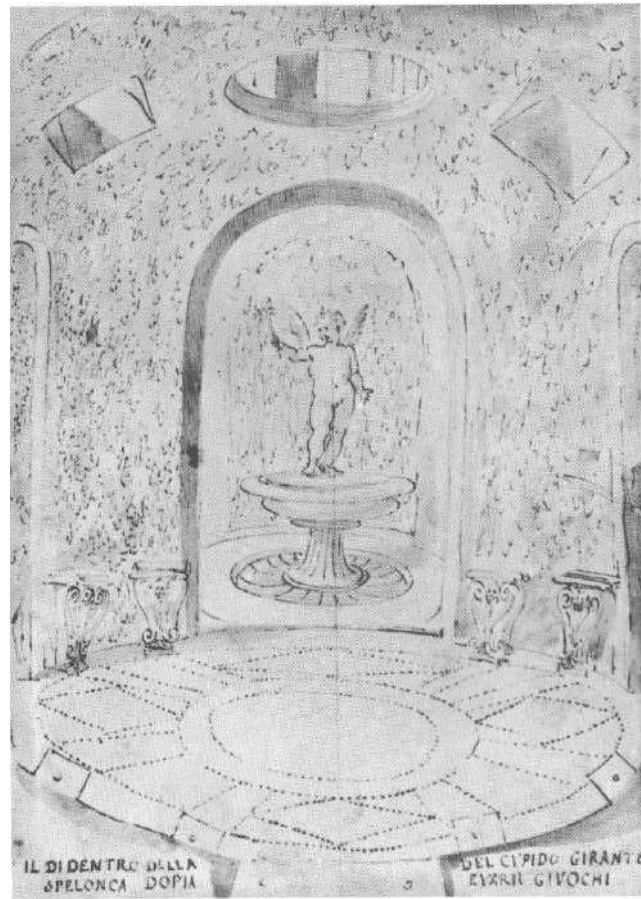
17. Roman (?), *Asclepius*, Boboli Gardens, Florence, late-first to early-second century AD. (?).



18. Aristodemo Costoli, *Pegasus*, Boboli Gardens, Florence, intervention *ca.* 1865.



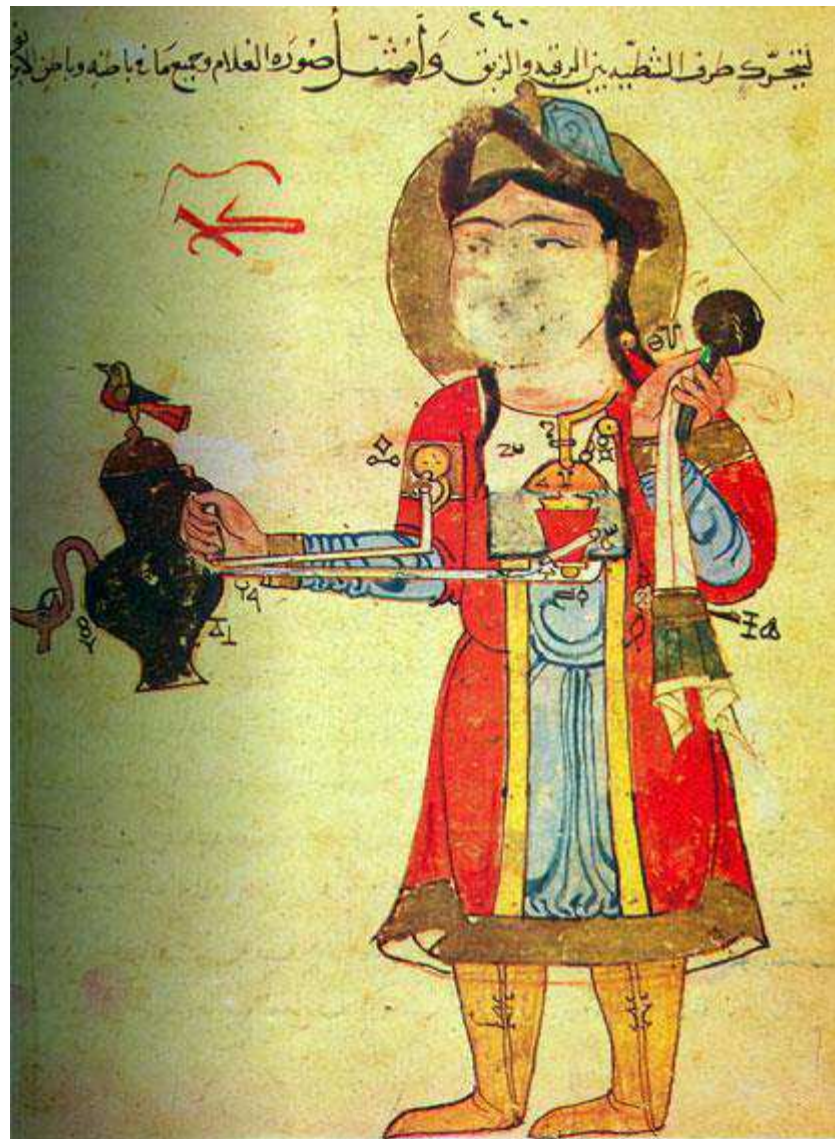
19. Giovanni Guerra, *Tre fontanelle di vari inventioni con scherzi d'aque...in nichi della seconda stanza de Apenino*, Albertina Museum, Vienna, 1601.



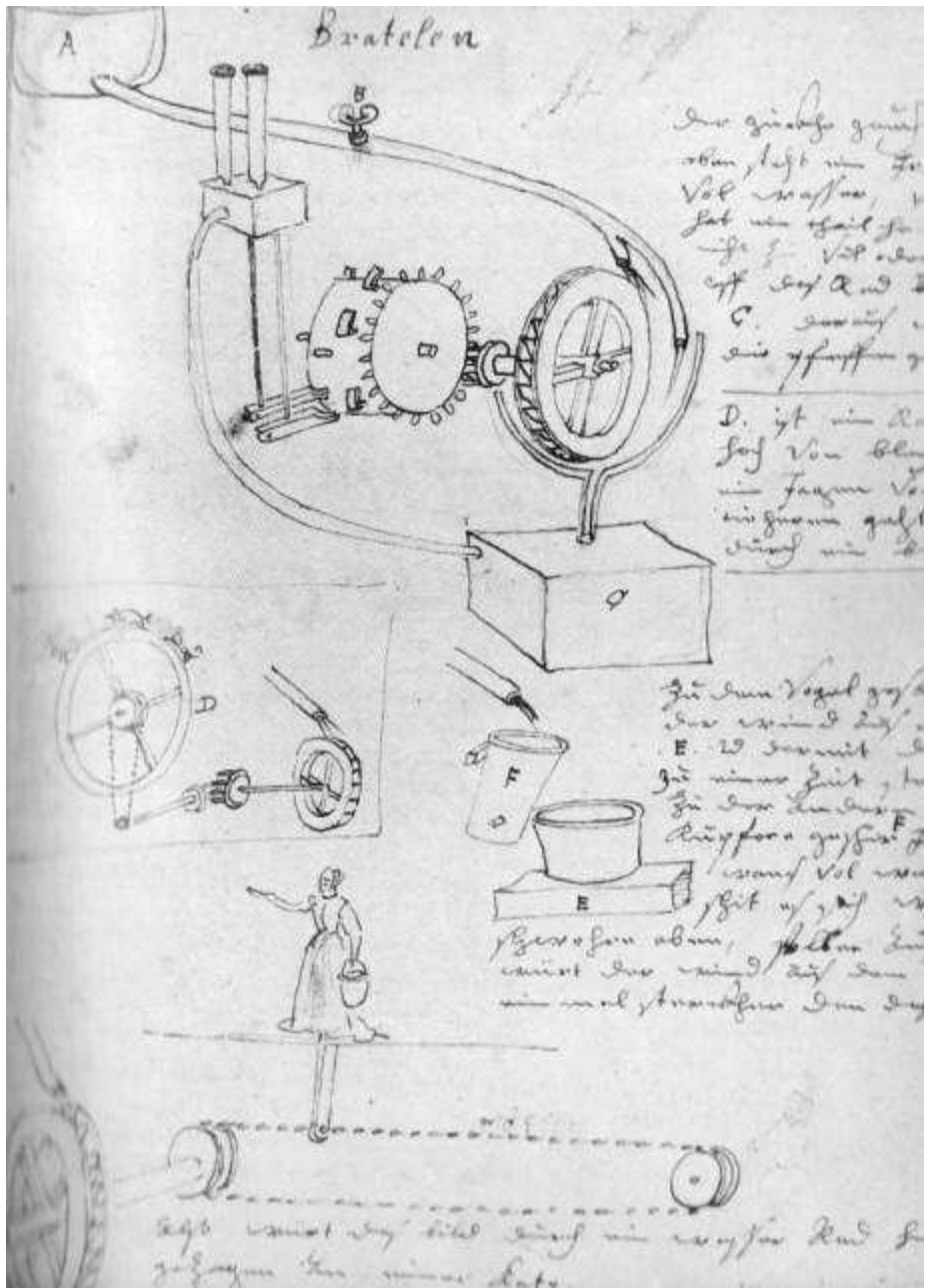
20. Giovanni Guerra, *Il di dentro della spelonca dopia del cupido girante e varii giuochi*, Albertina Museum, Vienna, 1601.



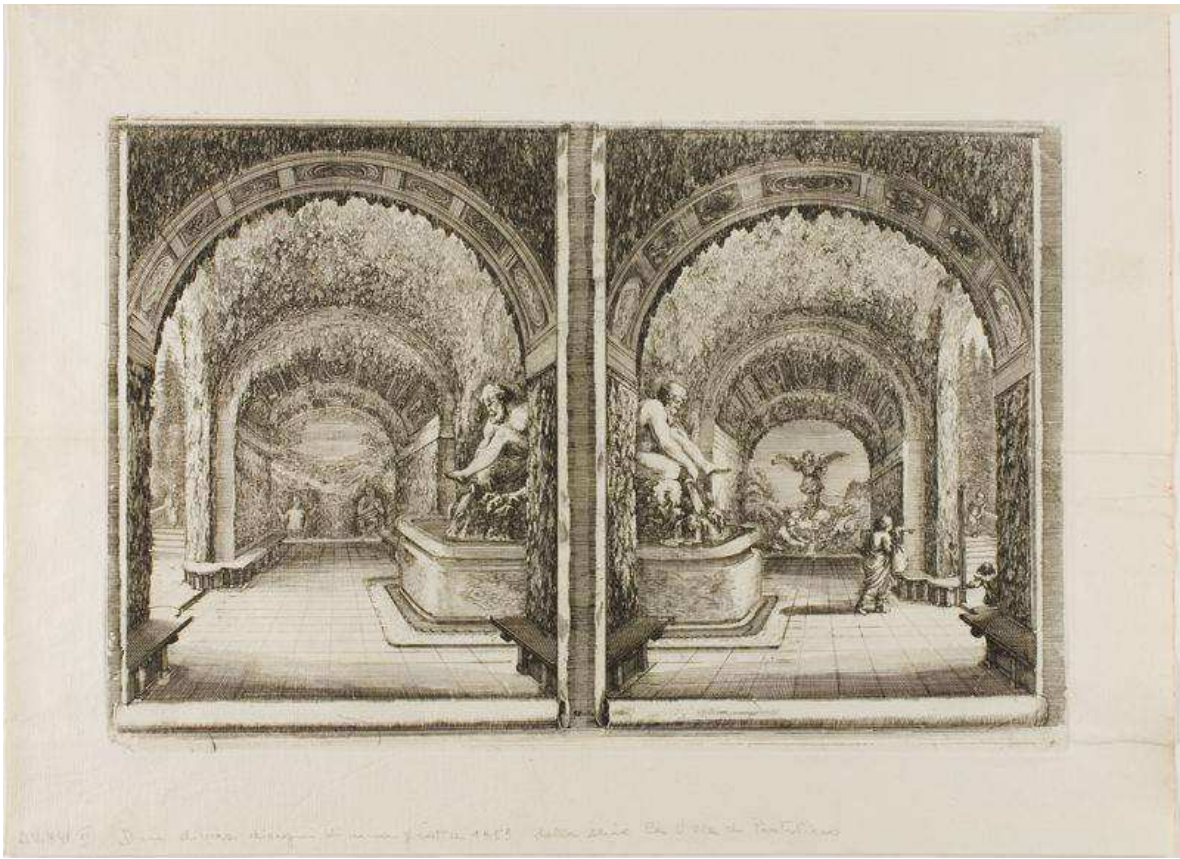
21. Giovanni Guerra, *Tavola gioco d'acque in vario scherzo con otto luoghi per li convitati ove sempre fresca concore*, Albertina Museum, Vienna, 1601.



22. Al-Jazari, *Illustration of a Mechanical Serving-Girl* from *The Book of Knowledge of Ingenious Devices*, 1206.



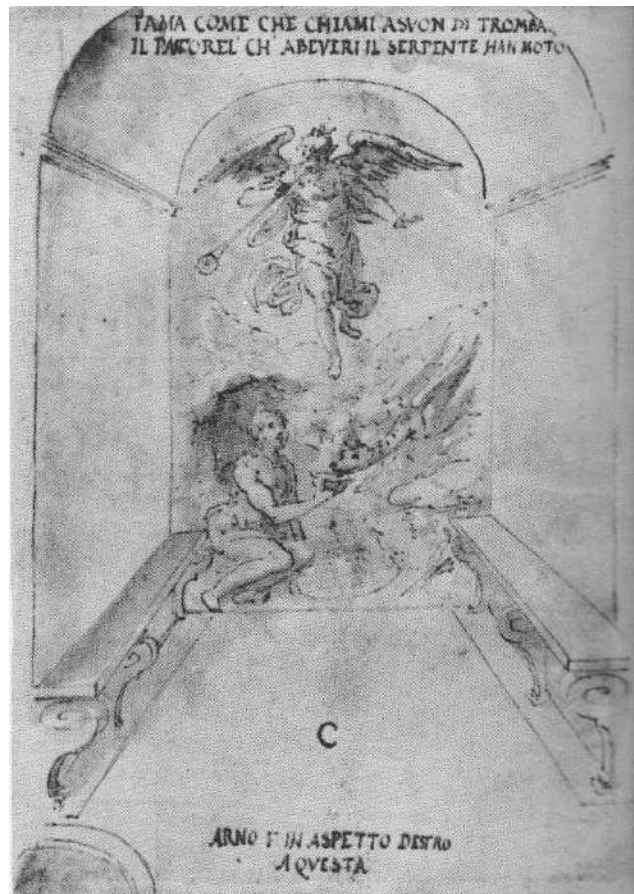
23. Heinrich Schickhardt, *Mechanism of the Samaritan Automaton*, Cod. Hist. 4, ms. 148, Württembergische Landesbibliothek, Stuttgart, 1600.



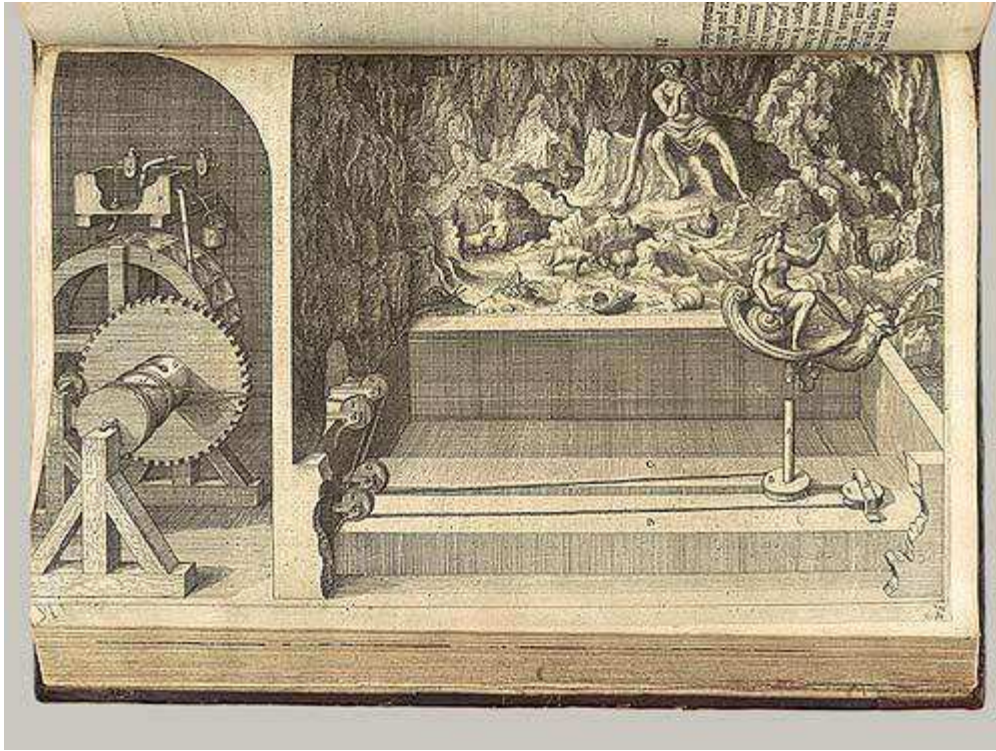
24. Stefano della Bella, *Grottoes of Pan and Fame*, from Bernardo Sansone Sgrilli, *Descrizione della Regia Villa, Fontane, e Fabbriche di Pratolino* (1742), pl. 4.



25. Giovanni Guerra, *Pan dio di pastori di cui l'amata sua Siringa in canna...*, Albertina Museum, Vienna, 1601.



26. Giovanni Guerra, *Fama come che chiami asvon di tromba...*, Albertina Museum, Vienna, 1601.



27. Salomon de Caus, *Grotto of Galatea*, from *Les Raisons des forces mouvants*, pl. p. 32.

2. Framing the Question of Magical Statue Animation in the Late-Sixteenth Century

2.1. The Philosophical Career of Francesco de' Vieri in Service to the Dukes of Tuscany

Like many of the philosophers of his age and those before, the career of Francesco de' Vieri (1524-1591), called Verino Secondo, was determined by his patronage relationship to the powerful Medici rulers of sixteenth-century Florence. His early philosophical treatises must be understood within the context of the renewed patronage of the University of Pisa and the promotion of the vernacular by Cosimo I de' Medici. Virtually all of De' Vieri's works were published in the vernacular, in keeping with a directive of Cosimo I's that aimed to exalt the vernacular to the social and academic heights previously afforded exclusively by Latin. This campaign is recognized to be part of a series of shrewd calculations by Cosimo I to ensure that "Florence, its great men, and notably the Medici" were to be celebrated in panegyrics to their greatness in their own tongue, "codified, refined, and molded into an instrument of equal flexibility and eloquence."¹ Its success was by no means assured; in the first decades of the same century, Benedetto Varchi (1503-1565) attested to the contempt in which the Florentine tongue was held and confessed that he hid his reading of Petrarch from his tutor.² Only through the works of theoretical and polemical publications did the Florentine vernacular advance and gain legitimacy. In the macro-vision of De' Vieri's career, his works contributed to a larger patronage pattern spanning all media whose ultimate aim was the aggrandizement of a conscious projection of Medici majesty: in this instance, through the propagation of works written in the vernacular that were learned enough to rival their Latin peers.

The diminutive second name derives from his grandfather, also named Francesco de' Vieri (called Verino primo), who was a humanist and subscriber to Ficinian Platonism, formed in the school of Iacopo da Diacceto, and who commented on Plato at Pisa in the beginning of the sixteenth century.³ Two generations later, the Francesco de' Vieri of the present study (Verino Secondo) taught

¹ Charles Dempsey, "Some Observations on the Education of Artists in Firenze and Bologna during the Later Sixteenth Century," *The Art Bulletin* 62:4 (1980): 555.

² Berti, *Il Principe dello Studiolo: Francesco I dei Medici e la fine del Rinascimento fiorentino*, 257.

³ On Verino primo, "che fù Filosofo famosissimo, e fù lettore pubblico della università di Pisa tanto celebre per tutto l'universo mondo, dove lesse per 40 anni continui,..." see Eugenio Gamurrini, *Istoria Genealogica dele famiglie nobili toscane et umbre*, vol. 5 (Firenze: Stamperia di S.A.S. alla Condotta, 1685), 219-20. For a contemporary summary see Museo Galileo, "Francesco de' Vieri, detto il Verino secondo." *Itinerari Scientifici in Toscana: Biografie*. Museo Galileo Istituto e Museo di Storia della Scienza. 9 Feb 2008; Teodoro Katinis, *Medicina e filosofia in Marsilio Ficino: il*

and held the chair of Logic at the University of Pisa, followed by the chair of Philosophy from 1559 to 1590. During this time, university statutes as proscribed by Cosimo I forbade any deviation from Aristotelian doctrine. It was only after the death of Cosimo I that De' Vieri was able to convince the Grand Duchess, Joanna of Austria, to sponsor a plan for a three-year course of Platonic philosophy at the University of Pisa: it was conceived to be conducted on holidays as a supplement to the regular instruction of logic and Aristotelian natural philosophy. The first year was to be dedicated to proving the compatibility of Platonism with Christianity, the second to confronting Aristotle with Plato, and the third to explaining the fundamental themes from Plato.⁴ Although De' Vieri was successful in obtaining permission in 1576 from Francesco I, his Platonist lectures quickly drew fire and were halted by university colleagues, never to be resumed by De' Vieri. De' Vieri's treatment was one which other philosophers and professors with Platonist leanings were encountering at the time in other universities, the traditional bastions of Aristotelian scholasticism.⁵ At Pisa, Platonic philosophy would not be taught again until 1589, by Jacopo Mazzoni (1548-1598).⁶

Italian universities at this time have been described generally as strongholds of rigid resistance to the entry of Platonism. The principal reasons given were that Plato's dialogues were too "asystematic" to be used in a didactic scope, especially compared to those of Aristotle, that Plato's use of irony would have been confusing to students, and that morally dubious passages would only be dangerous.⁷ The reinforcement of Aristotelianism has been noted by scholars as a characteristic of the late-sixteenth century.⁸

Nevertheless, De' Vieri's legacy in the history of Renaissance philosophy belongs to the impetus which sought to show the agreement of Platonism with Christianity and to Aristotelianism,

Consiglio contro la pestilenza (Roma: Istituto Nazionale di Studi sul Rinascimento, 2007), 75. The illustrious family also included a poet, Ugolino de' Vieri. On the latter see Alfonso Lazzari, *Ugolino e Michele Verino, studi biografici e critici. Contributo alla storia dell'umanesimo in Firenze* (Torino: Clausen, 1897), 27-30.

⁴ Kraye, "La filosofia nelle università italiane del XVI secolo," 363; Gibba, "Francesco de' Vieri (1524-1591) and his Teaching at the University of Pisa"; Pintaudi, "Il Platone di Francesco Verino Secondo."

⁵ E.g. the Spaniard Benito Periera (1536-1610) espoused Platonism and was subsequently moved in 1567 from his chair in metaphysics to scholastic theology, then in 1576 to scripture at the Collegio Romano; the historian A.C. Crombie traces the "sympathy for Platonism" in Jesuit thought in more detail. See Crombie, *Science, Art, and Nature in Medieval and Modern Thought*, 133. A notable exception was Francesco Patrizi, a leading critic of the dominant Aristotelianism of the time who was one of the few permitted to teach Platonism in a university setting, first at the University of Ferrara in 1578, then at La Sapienza in Rome in 1592. See Francesco Bottin, *Francesco Patrizi e l'aristotelismo padovano* (Università degli Studi di Padova, 1999).

⁶ Kraye, "La filosofia nelle università italiane del XVI secolo," 363.

⁷ Ibid; see also Schmitt, "The Faculty of Arts at Pisa at the Time of Galileo."

⁸ See Vasoli, "Platone allo studio fiorentino-pisano."

rather than substitution of one system for the other favored by hard-line Platonists.⁹ In De' Vieri's published works which spanned the period of the inception, and ultimately failure, of his Platonic lectures at the University of Pisa, an increasingly defensive tone has been observed in his three major works, *Discorso del soggetto del numero, dell'uso et della dignità et ordine degl'habiti dell'anima* (1568), the *Compendia della dottrina di Platone in quello che ella è conforme con la fede nostra* (1577), and the *Vere conclusioni di Platone conformi alla dottrina Christiana et a quella d'Aristotile* (1590).¹⁰ The first promoted the validity of Platonic political moral thought, and the second defended the conformity of Platonic doctrine with Christian theology with citations of Augustine, Thomas Aquinas, and Ficino. This second work was written one year into De' Vieri's public lectures on Platonism at the University of Pisa, and it hails Cosimo de' Medici's formation of a Platonic academy and an “unbroken” knowledge tradition resurrected in Tuscany from Zoroaster to Hermes Trismegistus to Plato. By the third, the lectures had been halted, and his writings respond to the obstruction of his colleagues, principally Girolamo Borro (1512-1592), and the forced abandonment of his Platonic lectures at Pisa. Borro's contention with De' Vieri's work was that he “mixed Aristotle's doctrine with Plato, and... wanted them to be in agreement, but... while they lived wanted there to be disputes [among each other];” the articulation of this sentiment is the basis for Borro's short Latin treatise, *The Causes of Our Ignorance Are Many*.¹¹

De' Vieri's writing style encapsulates the syncretist approach with which Borro takes umbrage. De' Vieri was, as mentioned above, not as extreme as some contemporaries who railed against Aristotle and exalted Plato, such as Francesco Patrizi (1529-1597) or Mario Nizolio (1498-1576),¹² but rather more like the more moderate of his contemporaries such as the Spanish humanist Sebastián Fox Morcillo (*ca.* 1527-1559) or the physician Jean Fernel (1497-1558), who also searched for harmony among the philosophers and orthodoxy.¹³ De' Vieri sought conciliation between Plato, Aristotle, and Christianity, in the stamp of the *pax philosophica* of Giovanni Pico della Mirandola (1463-1494),¹⁴ who perceived Aristotle as the first Platonist or Marsilio Ficino, whose “self-appointed task” was to demonstrate Platonic and Neoplatonic concepts' harmony with

⁹ E.g. Francesco Patrizi. See John Monfasani, *Francesco de' Vieri* in *Cambridge Translations of Renaissance Philosophical Texts*, ed. Jill Kraye, vol. 1 (Cambridge: Cambridge University Press, 1997), 166.

¹⁰ Crombie, *Science, Art, and Nature in Medieval and Modern Thought*, 138-139.

¹¹ Charles Schmitt, *Girolamo Borro's Multae sunt nostrorum ignoracionum causae (Ms. Vat. Ross. 1009)* in *Studies in Renaissance Philosophy and Science*, ed. Edward Mahoney (London: Brill, 1976), 475.

¹² Martin, *Subverting Aristotle*, 107, 113-115.

¹³ *Idem*, 107-108.

¹⁴ Hiram Haydn, *The Counter-Renaissance* (New York: Scribner, 1950), 37.

Christianity.¹⁵ This desire to process Aristotle with Platonism can be traced further back to the Academy of antiquity, with Simplicius, Proclus, and Ammonius making contributions and a curriculum established by Iamblichus that began with Aristotelian logic before transitioning to natural philosophy and Platonic metaphysics. Despite the efforts of Italian humanists of the fifteenth century, such as Pico and Ficino, to unseat Aristotelianism as the underpinning of natural philosophy, theology, medicine, scholastic curriculum,¹⁶ the “broad road of Christian humanism in the Renaissance,” to borrow imagery from Hiram Haydn,¹⁷ narrowed significantly by the end of the sixteenth century.

Platonism remained effectively banned- at least in the public universities- although courtly milieus followed a separate rule. For De' Vieri's writings which were aimed towards a courtly audience- the *Trattato delle metheore* (1572),¹⁸ *Il primo libro della nobiltà* (1574), *Discorso...Intorno a' dimonij, volgarmente chiamati spiriti* (1576), *Tratatto della lode, dell'honore, della fama et della gloria* (1577), *Discorso della grandezza, et felice fortuna d'una gentilissima, & graziosiss. donna; qual fu M. Laura* (1580), *Lezzione...dove si ragiona delle idee e delle bellezze* (1581), *Compendio della civile e regale potesta, con alcune notizie dell'arte militare, e di quella degli oratori* (1587), *Ragionamento de l'eccellenza et de piu meravigliosi artifzij della magnanima professione della filosofia* (1588), a *Libro del Sole* dedicated to Bianca Cappello,¹⁹ a *Breve discorso...intorno all'Arte dell'Alchimia* composed between 1579-80 and dedicated to Grand Duke Francesco I,²⁰ the *Discorsi delle maravigliose opere di Prato et d'Amore* (1587) which is the principle object of the present study, and an unpublished manuscript *Lezzioni d'amore, un commento al Cavalcanti*²¹- we witness an amalgamation of Aristotle with Plato, other Classical authors, Church theologians, Tuscan poets, and contemporary luminaries that scholars have rightly described as “eclectic Aristotelianism.” Nevertheless, De' Vieri's writings can not help but reflect the

¹⁵ Ibid.

¹⁶ Martin, *Subverting Aristotle*, 47.

¹⁷ Haydn, *The Counter-Renaissance*, 42.

¹⁸ Recently this text has been the subject of an analysis of its intended audience; see Martin, “Meteorology for Courtiers and Ladies: Vernacular Aristotelianism in Renaissance Italy.”

¹⁹ Collezione Corsiniana, Ms. 1823 (43 B 32); Paul Oscar Kristeller, *Iter Italicum* 6 vols. (London: The Warburg Institute; Leiden, Brill: 1963-1992), 112.

²⁰ Ms. Biblioteca Nazionale Centrale di Firenze, Magl. Cl. VXi, cod. 78, f. 2r; see Sylvain Matton and Jean-Marc Mandosio, “Le 'Breve discorso intorno all'arte dell'alchimia' de Francesco de Vieri,” *Chrysopeia*, vol. V (1992-1996): 545-569; see also Alessandra Del Fante, “Un testo inedito di Francesco Verino secondo sull'alchimia,” *Annali dell'Istituto di Filosofia di Firenze* IV (1982): 75-90.

²¹ Recently published and analyzed, see Colaneri, ed., *Lezzioni d'amore, un commento al Cavalcanti rimasto manoscritto pubblicato nel 1973* (Munich: Wilhelm Fink, 1973).

particular climate of their day, particularly the requisite acknowledgement of the supremacy of Aristotelian authority. Even in the structuring of his arguments, De' Vieri adheres to Aristotelian models.

If De' Vieri's writings intended for the court of Francesco I de' Medici could be more free in their philosophical citations, his *Delle Maravigliose Opere di Pratolino* provides ample instances which attest to currents of Florentine Neoplatonism and magical philosophy which were risky to promote in the religious climate of the sixteenth century. From the preface, which addresses itself to an unconventional tripartite hierarchy of God supreme, Francesco I underneath, and below them, "every judicious and gentle spirit,"²² an eclectic and original tone pervades the rest of the work's commentary on the villa, park, and wonders. For the remainder of this section devoted to the larger philosophy of the author of the text under examination, we will review some of the more aberrant ideas to be found within the work before we examine De' Vieri's treatment of antiquity and the Pratolino automata.

Because the present study is interested in the philosophy which informed ideas about "bringing life" to inanimate statues and the way in which De' Vieri relates Aristotle's explanation of Daedalus's accomplishment of the same, passages which in some way touch upon this will be of primary interest. Concerning the plurality of different kinds of souls imbuing nature, De' Vieri's writings possess a distinctly Neoplatonic ring in the Ficinian stamp: from the "invisible Sun" which descends into the body,²³ to the different kinds of animating spirits, "vegetal as only plants, human like men, or intellectual like the angels,"²⁴ the possibility of capturing or channelling these natural spirits is not far off.

The antique sources which De' Vieri's treatise chooses to relate to the animation of inanimate statues presents the Renaissance historian with a minefield of cultural implications. We recall that De' Vieri defers to Aristotle's passage in *De Anima* to make his comparison of Pratolino's automata to the wooden Venus of Daedalus in antiquity. Yet De' Vieri, as well as Aristotle, explicitly credit the philosopher Democritus (*ca.* 460 B.C.-*ca.* 370 B.C.) for the particulars of the theory which perceived a sympathy between the inherent movement of spherical atoms making up the human soul and the outward movement of the body as the movement of the mercury (quicksilver) atoms would bestow movement (*ergo* life) to the man-made vessel. This was not the only reference

²² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 7.

²³ *Idem*, 34.

²⁴ *Idem*, 12.

to Democritus to be found among the documents associated with Pratolino's automata or their maker. The 1582 *Natura del voto* by Bernardo Davanzati, which was dedicated to Bernardo Buontalenti, explicitly connects mechanical automata with the doctrines of Democritus and Epicurus.²⁵

In the century in which De' Vieri was writing, atomist understandings of the universe fundamentally challenged orthodox philosophy. Democritus's very name stirred up magical associations; the tradition that Democritus was educated and initiated by Persian magi, travelled to India, Egypt, and Babylon,²⁶ and a later body of alchemical works written under the pseudonym of Democritus by Bolos of Mendes in the first century²⁷ makes the historical figure of Democritus of Abdera perhaps a separate entity from the identify he acquired through accretions of legend and later "adepts."²⁸ In this sense, Democritus is understandable in the vein of another Hermes Trismegistus, with his composite identity and own body of wisdom transmitted from hoary antiquity in Egypt, Babylon, and in some accounts from antediluvian societies. A formula in one of these later "Democritean" alchemical treatise has been surmised by William Eamon as a reference to the law of sympathies and antipathies governing transmutation.²⁹ This appears to have been perhaps the underlying characteristic principle which informed Aristotle and De' Vieri's citation of Democritus's view of the sympathetic relationship between the motion of the atoms of both human souls and quicksilver mercury.

However, the most controversial aspect of true Democritean philosophy was this atomist conception in itself. The rediscovery and circulation of the first-century B.C. Roman philosopher

²⁵ "Cosi ho fatto spesso per meglio servirvi in questo discorso della natura del vòto del vostro Eron, che par fondato nella dottrina di Democrito e dell'Epicuro." Davanzati, *Natura del voto*; see also Vezzosi, "Pratolino d'Europa,' degli antichi e dei moderni," 21. This was not the only work to be dedicated to Buontalenti for his achievements at Pratolino. See Oreste Vannocj's *Libro de gli artifizi spiritali over di fiato d'Herone Alessandrino* (Biblioteca Comunale di Siena L.VI.44) and an imperial privilege from the Holy Roman Emperor in recognition of these feats of engineering. For the latter see Guido Carrai, "I Fiorentini al castello: il progetto di Bernardo Buontalenti e Giovanni Gargioli per la nuova galleria di Rodolfo II," *Umèni* L1 (2003): 378.

²⁶ This tradition is attested to in the third century C.E. by Hippolytus, and later in fragments and texts of Clement of Alexandria and Diogenes Laetios. Stephen Haar, *Simon Magus: The First Gnostic?* (Berlin and New York, Walter de Gruyter, 2003), 37-38.

²⁷ E.g. the first-century alchemical treatise *Physica et Mystica* and the Leyden papyrus which mentions Democritus as its source; Eamon, *Science and the Secrets of Nature*, 31; Festugière, *Le révélation d'Hermès Trismegiste I: L'astrologie et les sciences occultes*, 1:197-220, 227-38; Fowden, *Egyptian Hermes*, 87-91. See also Max Wellman, "Die Φυσικά des Bolos Demokritos und der Magier Anaxilaos aus Larissa," *Abhandlungen* 7 (1928); Robert P. Multhaus, *The Origins of Chemistry* (London: Oldbourn, 1966), 92-101.

²⁸ Much in the same way the historical figures of Gerbert of Aurillac, Albert the Great, and Roger Bacon rapidly ceased to resemble their legendary personas that persisted after their deaths.

²⁹ It reads, "One nature delights in another nature; one triumphs over another nature; one nature dominates the other nature." Eamon, *Science and the Secrets of Nature*, 31.

Lucretius's *On the Nature of Things* (*De rerum natura*) by Poggio Bracciolini and his circle in the fifteenth century resuscitated eloquent articulations of ancient philosophy which had since fallen into obscurity, atomistic philosophy among them.³⁰ Certainly, Lucretius's work possessed other dangerous ideas to Christian doctrine: the denial that there was any afterlife or indeed any transcendent life to the soul after the death of the body, the defence of Epicureanism (as an eroticized vision of nature), and so on. Nevertheless, it is primarily the controversiality of Atomism in the Renaissance which illuminates aspects of De' Vieri's decision to include this philosophy, even second-hand through Aristotle, in his description of the Pratolino automata.

At the close of the fifteenth century, the theory of atoms enjoyed enough circulation in Florence at least to merit Savonarola's lampooning of the philosophy in one of his fiery sermons. Marsilio Ficino turned to Lucretius (in tandem with Proclus and Synesius) to explain how celestial influences were able to operate continuously in the *Sophist* commentary (no. 6).³¹ Elsewhere in the same work, Ficino cites Lucretius and Democritus to underscore the materiality of both rays and images entering the eyes: in the atomist conception, material, atom-thin copies of bodies peeled off of the original and travelled, in imperceptibly material form, along rays to the eye.³² It has been suggested that Ficino's risky espousal of Atomist models in the fifteenth century was to furnish more support for an earlier, ancient model for the all-pervasive *anima mundi* he envisioned uniting all of the cosmos.³³ From Ficinian tradition, a clear line can be drawn to the philosophy of Francesco de' Vieri in the late sixteenth century: after all, De' Vieri's grandfather and namesake's career and legacy sprung from the wide wake left by Ficino in Florentine humanist circles. A profound familiarity with Ficino's works must be assumed for the younger Verino Secondo as well; this would have been his inheritance befitting his identity articulated in recent scholarship as “the scion of a noble family which had produced a long line of humanists, poets, lawyers, and doctors.”³⁴

To explore atomism in the late sixteenth century was to skate the razor-edge of accepted thought and even to risk physical harm. In addition to being linked in Lucretius's text to a host of other dangerous claims, the moral, ethical, political, and theological ramifications of a view of the universe built upon invisible particles were jarring to descendants of Medieval Christianity. The Florentine Synod in 1516 prohibited the reading of Lucretius in schools and effectively halted its

³⁰ See Stephen Greenblatt, *The Swerve* (New York and London: W. W. Norton & Company, 2011).

³¹ Ficino, *Icastes*, 274-75.

³² Quinlan-McGrath, *Influences*, 73.

³³ *Idem*, 74.

³⁴ Monfasani, “Francesco de' Vieri,” 166.

printing, though editions surfaced in Bologna, Paris, and Venice.³⁵ To the Renaissance mind, atoms however were not some pagan philosophical relic or a mere facet of a text otherwise judged to be too lascivious and debauched even for Latin instruction; rather, atoms were as threatening to the order of being in the sixteenth century as Copernicus's heliocentrism.

The precise way which Atomistic philosophy threatened a central pillar of Christianity has been deduced from the inquisition documents which convicted Galileo Galilei (1564-1642) of heresy in 1633, finding Galileo's treatise *The Assayer* (1623) to possess evidence of atomism. The heretical implications were made explicit by the inquisitor: atomism was incompatible with the second canon of the thirteenth session of the Council of Trent, which gave the Church's version of natural physics to explain how the Eucharist actually transformed in substance from bread to flesh.³⁶ This orthodox excursion into physical science had been put in place by 1551. It confirmed Thomas Aquinas's interpretations of Aristotle and his early attempts to reconcile transubstantiation with the laws of physics as they were understood at the time. Sixteenth-century theologians employed Aristotle's distinctions between the "accidents" and the "substance" of matter to explain to their satisfaction how the bread of communion may look, smell, and taste like bread, but in actuality (not symbolically) be the flesh of Christ: "what the human senses experienced was merely the accidents of bread; the substance of the consecrated wafer was God."³⁷ However, atomism, which nullified the very ideas of accident and substance, threatened the Aristotelian intellectual bulwark which the Church constructed against the rising tide of Protestantism. Accordingly, the only sanctioned response to this potentially-destabilizing philosophy was suppression. Only thirty-three years before Galileo's heresy trial, Giordano Bruno burned for his heretical adoption of much of Lucretius and other ancient philosophers' world view, atomism included. By the seventeenth century, young Jesuits at the University of Pisa were reciting repudiations of Democritus and atomism in a modified Latin prayer.³⁸

One might conservatively infer that De' Vieri's decision to indirectly cite Democritus through Aristotle was a deliberate tactic to distance his treatise from any potential controversy. Yet this may have been in an overabundance of caution, since the "ecclesiastical thought police" only

³⁵ Greenblatt, *The Swerve*, 226.

³⁶ Idem, 255.

³⁷ Idem, 252-53.

³⁸ "Nothing comes from atoms./ All the bodies of the world shine with the beauty of their forms./ Without these the globe would only be an immense chaos./ In the beginning God made all things, so that they might generate something./ Consider to be nothing that from which nothing can come./ You, O Democritus, form nothing different starting from atoms./ Atoms produce nothing; therefore, atoms are nothing." See idem, 250.

rarely investigated works of art and literature for heretical content.³⁹ Artists such as Sandro Botticelli, Piero di Cosimo, Leonardo da Vinci, and poets Matteo Boiardo, Ludovico Ariosto, and Torquato Tasso also disseminated subversive ideas which had been unearthed by the Italian humanists in their visual and written works. This is the expansive general category to which many if not most works of the period belong, but the Pratolino automata are distinct among the era's material culture by virtue of their being link to an Atomist understanding of movement in their primary textual source. What's more, the model of movement and materialism inherent in Atomist theory had previously been employed by Marsilio Ficino in the service of naturalizing the operations of astral images, for all intents and purposes the Renaissance's handbook to manufacturing artificial works invested with some kind of celestial spirit. The overlay of an Atomistic, superficially Aristotelian model to the moving automata of Pratolino significantly broadens how animated statues of the Hermetic and Neoplatonic traditions and the invested astral image of more-recent Ficinian stamp could be understood to physically operate.⁴⁰ The rediscovery and circulation of Lucretius's *De rerum natura* and other atomistic texts coincided with the "rediscovery" and increased circulation of the Hermetic *Asclepius* and Neoplatonic theurgical texts, with their own tradition of bringing statues to life, and these discoveries enriched the lively medieval debate whether images invested with celestial qualities were natural or demonic phenomena.

However, whereas Hermetic and Neoplatonic texts steered the development of Ficino's philosophy, Marsilio Ficino ultimately burned his commentary on the text of Lucretius, shaken by the ancient author's propositions about the nature of the world.⁴¹ The atomism and other theories of Lucretius in their entirety seem to have remained beyond the comfort zone of even the father of Renaissance Neoplatonic magic.⁴² Instead he eventually repudiated the "Lucretiani" and asserted the reconciliation of Christianity to Plato; no such reconciliation could be possible with Lucretius. Ficino's century had seen its own crackdown on materialist thought relative to the one prior in which, for a brief period saw Biagio Pelacani allowed to lecture on the subject as late as 1315 at the

³⁹ Idem, 242.

⁴⁰ This may reflect the historical and intellectual circumstance Greenblatt describes, that "these subversive Lucretian thoughts percolated and surfaced wherever the Renaissance imagination was at its most alive and intense." Idem, 220.

⁴¹ Idem, 221.

⁴² See Mebane, *Renaissance Magic & the Return of the Golden Age*, 22-35 ("Art and Magic in the Philosophy of Marsilio Ficino").

University of Parma.⁴³

At first glance, De' Vieri's description of the ancient automata unambiguously cites Aristotle, but its underlying attribution to the atomist Democritus would recall nuanced Ficinian philosophy to his learned readers. The action and effects of celestial rays were an acknowledged part of culture and early ideas about natural physics. Yet, the model which accounted for the animation of statues by the manipulation of these rays (which were commonly acknowledged to exist, to have effects on the sublunar world, and to be able to be harnessed by man), was a far less controversial proposition than the movement of tiny imperceptible atoms, whose existence threatened the central pillar of the Eucharist as understood by the Church after the Council of Trent.

As we have seen above, there were certainly risks in De' Vieri's day to writing too far out of line with established orthodoxy and Aristotelianism. It becomes then a process of teasing out ideas from De' Vieri's dense and eclectic use of sources for what was written for Francesco I, what may have reflected ideas, however esoteric and unorthodox, in circulation at the court, and what was written in conscious conformity and deference to Christian and Aristotelian constructs. The Pratolino historian Luigi Zangheri has dismissed much of De' Vieri's written iconographical programme for the parks as an attempt to counteract suspicion that it was overtly pagan or humanistic, and Naomi Miller describes the text merely an exegesis of the garden in allegorical terms as an earthly paradise.⁴⁴ Indeed, De' Vieri does continually vacillate between descriptions of the park's features and moralizing fulminations on its expression of harmonious Aristotelian, Platonic, and Christian ideals. However, De' Vieri's text eludes simple classification by its highly eclectic sources, with traces not only of atomism but also of Neoplatonism, Hermeticism, Pythagoreanism, Chaldaean and Zoroastrian elements as well. Nevertheless, in the sheer diversity of sources in De' Vieri's works produced for a courtly audience (versus his philosophical treatises produced for the university milieu), we may begin to perceive the differing conditions to which De' Vieri's writings responded.

At a court renowned for its embrace of pagan mysteries and its prince's obsession for experiments, there can be little argument made that a sense of orthodox propriety made any real dent in the boundless enthusiasm for uniting rediscovered Classical knowledge with experimentation and implementation in new works. This study argues for the possibility of the

⁴³ Quinlan-McGrath, *Influences*, 67.

⁴⁴ Miller, *Heavenly Caves*. 49.

Neoplatonic and Hermetic method of “god-making” being applied in tandem with mechanical philosophy from the same Classical source that “brought to life” Pratolino's automata, the denizens which populated Francesco I's private, artificial microcosm. In this milieu, De' Vieri inhabited a privileged position at this extraordinary court, where, as he wrote, the aim was the very highest reaches of philosophy: “scientists and philosophers if they still aspire to the truth, not least of which being the contemplation of universal things and most difficult to reach.”⁴⁵

We must take Francesco De' Vieri's 1587 panegyric for what it is: a treatise written, as he states himself, after only one day at Pratolino and an hour's consultation with the architect, Bernardo Buontalenti, and his son.⁴⁶ In his introduction of the second chapter, De' Vieri humbly depicts himself as a mere servant attempting to understand the thoughts of the Grand Duke. We might even speculate that the selection of rarefied philosophies to which De' Vieri alludes in his work reflected topics which specially interested Francesco I.

As both a professor of the University of Pisa and as a court writer, De' Vieri was beholden to Francesco I. In his treatise on Pratolino's wonders, Francesco de' Vieri takes every convenient opportunity to address his illustrious patron, underlining an association which functioned for De' Vieri as a mechanism of social and professional legitimation.⁴⁷ In this respect, we must not discount De' Vieri's eclectic philosophical citations as mere literary flourishes, but recognize their potential as documents of a short-lived intellectual twilight of unbridled thought and its application to innovative experiments, before Florence too was swept up by the post-Tridentine and Baroque culture of seventeenth-century Europe. What is remarkable about Verino's treatise on Pratolino's wonders is this implied sympathetic, atomistic operation of “magical” statue animation linked explicitly to Aristotle and Democritus (and thematically to Ficinian Hermeticism and Neoplatonism) effected in order to draw parallels between the automata of Francesco I de' Medici and legendary antique works. Other scholars have mentioned the Pratolino automata's vestiges of Classical animation as in line with these legends' larger context within the recovery of antiquity carried out on a large scale in the villa and parks.⁴⁸ We will now turn to a closer examination of this theme of the resurrection of Classical culture within the sixteenth-century treatise of Francesco De' Vieri in order

⁴⁵ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 9.

⁴⁶ Idem, 23.

⁴⁷ Idem, 3, 9, 14, 17, 18, 40, 66.

⁴⁸ Vezzosi, “Pratolino d'Europa, degli antichi e dei moderni,” 19-25; Marcello Fagiolo, *Le due anime nelle ville della Toscana in Il Giardino d'Europa: Pratolino come modello nella cultura europea*, ed. Centro Mostre di Firenze (Firenze: Mazzota, 1986): 68-81.

to better define this context in which the automata were conceived and received.

2.2. Pratolino's "Wonders" in Juxtaposition to Classical Philosophy

In the context of Francesco de' Vieri's other philosophical treatises, certain characteristics remain constant, such as his efforts to reconcile Classical philosophers with themselves, favoring discussions of their agreement while largely omitting their contradictions, and more generally advancing an overall agreement with orthodox Christianity. The theme of the resurrection (and outdoing) of antiquity is central to *Delle Maravigliose Opere di Pratolino*, and this descriptive text furnishes De' Vieri with material objects, the "wonders" of Pratolino, to which his demonstrated mastery of eclectic and wide-ranging philosophies can be related. In this endeavor, the application of these various Classical philosophies ranges from establishing a general and universal philosophical framework- both metaphysical and religious- to more direct comparisons between ideas and specific works of Pratolino's villa and parks. As Pratolino scholars like Alessandro Vezzosi, Luigi Zangheri, and several others have observed, the 1587 treatise by Francesco de' Vieri, *Delle Maravigliose Opere di Pratolino*, dedicates itself to the glorification of Pratolino's "wonders," and one of the primary ways by which Verino achieved this was through drawing parallels between the splendors of antiquity and their resurrection by Francesco I de' Medici and his engineers. The collection of antique sculpture and sarcophagi, which were used as basins for fountains at Pratolino, has received detailed scholarship,⁴⁹ and alchemy, which stems from the same Greco-Egyptian Alexandrian milieu which produced the body of Hermetic texts, has similarly been recognized by Clare Brown, Costanza Riva, Gerd Neumann, and others as a guiding theme behind the creation of esoteric artworks and has been proposed numerous times as Pratolino's underlying iconographical key.⁵⁰ However, the resurrection of Classical (specifically Alexandrian) mechanical innovations simultaneously with allusions to magical traditions of statue animation from antiquity have so far not been included in the existing framework of Pratolino's acknowledged revivals of Classical antiquity.

Francesco de' Vieri establishes a relationship between Pratolino and antiquity from the very beginning of his treatise. Classical references subsequently suffuse its philosophical constructions

⁴⁹ Including the twenty-six iron niches of the Great Lawn which De' Vieri records were each filled with an antique marble statue. See De' Vieri, *Delle Maravigliose Opere di Pratolino*, 29-30.

⁵⁰ Most recently, see Riva, *Pratolino*.

on a range of topics throughout. In the first chapter, De' Vieri constructs a vision of a proper universal order from the works of Aristotle (specifically the twelfth book of the *Metaphysics*), Plato (the *Parmenides*, and other works), Dionysus the Aeropagite, the “Sainted Theologians,” Dante, “astronomers,” and other sources.⁵¹ Aristotle and Plato appear virtually ubiquitously in tandem and generally in a synthesized state of agreement: in the governing of states and subjects of chapter two⁵² and in a stylistically self-effacing preface to the third chapter in which De' Vieri disclaims his own work against Plato and Aristotle's mastery of antique doctrine and philosophy.⁵³ Further on in the same chapter, when De' Vieri is describing Pratolino's Fountain of Jove, in corroborating that Jove is in fact the name of God, he also cites Aristotle's first book of the *On the Heavens* that God, along with the “other Divine intellects” rule above all.⁵⁴ Another discussion in the third chapter calls on the fourth book of Plato's *Laws* to illuminate the proper path for living well and arriving at the gate of eternal blessedness.⁵⁵ Plato's *Symposium* is invoked for its exaltation of the virtues and the love for a dignified profession.⁵⁶ Plato's *Theaetetus*, as well as the letters of St. Paul the Apostle are the authorities to which De' Vieri turns for a discussion of righteous and upright men and their works in connection to Pratolino's chapel and its surrounding.⁵⁷ Socrates's *Phaedo* is referenced for its view that philosophy is essentially a meditation of death.⁵⁸ Socrates is referred to again in an extended commentary on the Grotto of Cupid, wherein one finds an infinity of tricks and torments. De' Vieri reminds the reader that Socrates approached the beauties of the created world as a step to perceiving the beauty of the invisible, un-created realm.⁵⁹ In a later passage, the spirit of Socrates, “who has passed to the other world,” with religious piety testified to by Plato's *Phaedo*, is invoked to witness the wonders of Pratolino.⁶⁰

Perhaps the longest exposition on antique, and indeed Platonic and Hermetic philosophy is found at the end of chapter five: De' Vieri cites the “theologians and poets of the gentile” for his

⁵¹ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 13. More will be said in a later chapter about the characteristically eclectic nature of De' Vieri's philosophical writings; for the moment, our present subject of interest is De' Vieri's use of the antique in this treatise.

⁵² *Idem*, 20.

⁵³ *Idem*, 23.

⁵⁴ *Idem*, 25.

⁵⁵ *Idem*, 28.

⁵⁶ *Idem*, 30.

⁵⁷ *Idem*, 31; for example, the philosophers' concepts of interior moral rectitude find their visual realization in the copse of fir trees surrounding the chapel.

⁵⁸ *Idem*, 32.

⁵⁹ *Idem*, 53.

⁶⁰ *Idem*, 63.

exposition of the “speculative fable” of the Greco-Roman pantheon: God (*Celio*) above all produced Saturn, who produced Jove, Neptune, and Pluto. De' Vieri continues that the “excellent Platonists” interpreted this arrangement and hierarchy thusly: Celio is God and all creation; Saturn signifies the angelic intellect, which Plato in the *Timaeus* and Hermes Trismegistus identify as the ideal world.⁶¹ From this contemplative, angelic mind came into being the three “governors” in name (Jove, Neptune, and Pluto), but De' Vieri writes that they were in truth a single world soul. Within this single soul, De' Vieri writes, Jove, Neptune, and Pluto “unite, move, and govern” their respective realms. Aristotle is invoked as another authority for this arrangement further on in the discussion,⁶² and as the discussion shifts to the application of this “fable” to the world of man, the seventh book of Plato's *Republic* is referenced for the image of man trapped in a cave with only shadows to guide his beliefs.⁶³

De' Vieri's synthesis of Classical and Christian philosophy and religion at times strayed beyond what authors like Greenblatt and others held to be the orthodox mainstream of the time period. In addition to De' Vieri's description of some of the automata of Pratolino, which will be articulated in detail shortly below, Democritus is explicitly cited further in a handful of contexts: a Democritean saying is cited, but not reproduced, by De' Vieri in relation to the idea that reality consists of appearances; “nothing true and stable of us can be understood.”⁶⁴ However, he immediately follows with an opposing viewpoint which he attributes to Plato, that “either you understand the truth of many things or not: if you understand, then your opinion is false; if you don't understand, then you know a true thing, that one does not understand the truth.”⁶⁵ We may perceive a certain hedging of position and perhaps a purposefully ambiguous treatment of this controversial philosopher, as has been explored above. Shortly after this juxtaposition, Democritus is compared to Heraclitus for their treatment of the human condition; ultimately, the former laughed while the latter cried at the eternal cycles of human passions and miseries.⁶⁶ De' Vieri even touches upon the Pythagorean idea about the trans-migration of the human soul, although he insists that Pythagoras really did not mean that souls move from body to body, “as it seems his words signify.”⁶⁷ He finds clarification in Plato's *Timaeus* that human souls mutate, *as if* they entered into the bodies of

⁶¹ Idem, 77.

⁶² Idem, 78.

⁶³ Ibid.

⁶⁴ Idem, 41.

⁶⁵ Ibid.

⁶⁶ Idem, 42.

⁶⁷ Idem, 49.

different “ugly” animals.⁶⁸ In his description of a paradise-garden at Pratolino, De' Vieri uses Zoroaster's exhortation to “Seek Paradise.”⁶⁹

The citation of Classical authority extends to other monuments and features of Pratolino; in this respect, the automata are certainly not unique. Unnamed ancient “Wise Men” (“*Savi*”) provide De' Vieri with the Latin citation which links the care of the physical body with the care of the soul in his commentary on Pratolino's statue of Asclepius.⁷⁰ In a discussion of curative value of the natural love and providence which De' Vieri sees represented in Pratolino's fountain of a mother-bear suckling her cubs (no longer extant),⁷¹ he cites confirmation of these ideals in the teachings of Eryximachus in Plato's *Symposium*.⁷² Virgil is the authority to which De' Vieri refers in his discussion of the evil nature of Fame, in conjunction with the grotto and tableau of automata at Pratolino of the same name.⁷³ The resolution to this moral predicament is to turn to God and to ask for victory over all and for conformity of the soul to his divine will. De' Vieri finds confirmation of this view in Socrates as well as in Plato's *Phaedo*.⁷⁴ Further in the same chapter, De' Vieri compares Pratolino's three fish-ponds to Hell, Purgatory, and Paradise, he writes as holy scripture and the theologians have rationalized and to which, De' Vieri underlines, Plato conformed in his works on the soul and elsewhere.⁷⁵ The Appennine colossus recalls for De' Vieri the titans' arrogance, their efforts “putting one mountain on top of another to take the sky,” and how they were ultimately struck down by Jove.⁷⁶ A magnificent oak tree with two stairs around its trunk leading to a platform and a fountain was used by De' Vieri to denote the primitive condition of man in farthest antiquity.⁷⁷ On a macro-level, De' Vieri indulges in contemporary civic patriotism, which perceived of Florence as a flourishing new Rome, “for the number of magnificent edifices, for the ingenuity of its professors of art, and for rare men of letters and arms.”⁷⁸

Further in the work, an entire chapter dedicates itself to the realization of classical “fables”

⁶⁸ Idem, 49-50.

⁶⁹ Idem, 50.

⁷⁰ Idem, 33.

⁷¹ Other scholars have described this fountain as a mother-bear who disgorges water from her mouth, as she licks her cubs, which may represent the Classical myth that formless newborn bear cubs are licked into shape by their mothers; see Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 17; Pliny, *Of the Beares, and how they breed and bring forth their young* in *Natural History*, chapter XXXVL.

⁷² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 33.

⁷³ Idem, 43.

⁷⁴ Idem, 44.

⁷⁵ Idem, 46.

⁷⁶ Idem, 28.

⁷⁷ Idem, 47.

⁷⁸ Idem, 48.

(De' Vieri's term which overlaps with our modern usage of “mythology”) at Pratolino. Aristotle and Plato are still recognized as authorities, and the use of fables by the former is hailed by De' Vieri as both a preservation and a defence of an occult Truth.⁷⁹ Other works at Pratolino connected to fables include the statue of Jove, the Galatea automaton, the Cupid, the Apollo, and the nine muses.⁸⁰ During the course of his expansion upon the precise meaning of “fable,” De' Vieri touches upon the application of the term to “true things,” in order to imbue them with a deeper allegorical and “ingenius” meaning; the example which he cites is from Marsilio Ficino's commentary on the tenth book of Plato's *Republic*.⁸¹ Just as the “true” idea invests the fable with a kind of spirit of its own, which recalls aspects of Ficino's philosophy related to the manufacture of astral images similarly “invested” with spirit to be discussed further below, De' Vieri's continues to explore the phenomenon in fables of “things without life” being animated by outside forces: in addition to the statues, he gives the examples of tragic theatre, which uses the “lives of others” rather than the lives of the actors themselves as their driving spirit.⁸²

2.3. De' Vieri on the “Occult” Automata of Pratolino

The conscious comparison of Pratolino's works with those of antiquity becomes most explicit in Chapter Four, which is entitled a “Comparison of some very artificial works of Pratolino with some of the ancients'.” One of the articulated objectives of this chapter is the demonstration that Pratolino's modern works surpass those of antiquity.⁸³ Might we speculate that this might include also the ancients' mystical attempts to animate statues? De' Vieri further states that the most awesome works of the ancients are those whose operating principle remains elusive “either because the principle is unknown, or rather because the operations shall always be occult while we live in this world.”⁸⁴ In this usage of the word “occult,” it can be argued that De' Vieri refers to another kind of hidden operations beyond human understanding, and not only simply the hidden wheels and canals which he also describes as “occult” in the same work. It is this usage, and particularly this reference to another system of operations, which is of principal interest to this study.

⁷⁹ Idem, 74.

⁸⁰ Idem, 65.

⁸¹ Idem, 69.

⁸² Idem, 71.

⁸³ Idem, 56.

⁸⁴ *ibid.*

De' Vieri credits Aristotle with the reduction of natural philosophy to perfection, understanding the “workings of God” which naturally are no longer marvelous or stupendous on the sole account of ignorance.⁸⁵ On artificial works specifically, De' Vieri writes that they stupefy because their operation is not immediately understood and on account of the extraordinary virtue with which they are made; a following passage reduces wonder to the desire to know the cause of effects, to whose mercy we are subject when this desire occupies all thoughts and investigations. However in a later chapter, De' Vieri tempers the admiration for the ancients, perhaps in deference to prevailing Counter-Reformation, post-Tridentine sentiment swirling when his treatise was written; “all of the artifices, and ingenious devices” were indeed used to satisfy, delight, imitate, and to “fake wonderful things; and in this way it is also true that they erred by faking God.”⁸⁶ From this passage as well as his prior citations of Hermes Trismegistus, Ficino, and others, we must conclude that De' Vieri was aware of the antique tradition of magically animating statues found in Hermetic and Neoplatonic texts.

De' Vieri's pronouncement on the error of faking God by those in antiquity who worked wonders however occurs on the heels of his description of the Pratolino automata as no mere imitators but equals to this tradition.⁸⁷ De' Vieri writes that the statues of Daedalus, as recounted by Aristotle in the first book of *On the Soul*, were as Democritus originally described: the atoms of the soul move themselves first, then the soul, and then the body. How this was effected in the Venus of Daedalus is described by De' Vieri thusly: the statue moved because *argente vivo*, quicksilver mercury, moved inside, moving the wooden statue as a living soul animates the body. De' Vieri adds that Plato towards the end of the *Meno* remembers the mobile statues of Daedalus and writes that they could only be made to be still by tying them down with ropes.⁸⁸

Another second antique marvel which is juxtaposed to a Pratolino automaton is a “Mercury of Pasone,” described as a relief joined to and placed inside of a certain marble or transparent stone in such a manner that it was not clear whether the Mercury was in its interior or exterior; I assume here by the capitalization of “Mercury” in the text that De' Vieri intends the mythological figure, and not the physical substance, as in the prior example. De' Vieri also cites Aristotle's books of the

⁸⁵ Ibid.

⁸⁶ Idem, 75.

⁸⁷ Idem, 57-58.

⁸⁸ Idem, 58.

Metaphysics for its mention of the same.⁸⁹ The other ancient wonders De' Vieri cites⁹⁰ are the concave mirrors of ancient mathematicians which were capable of focusing the sun's rays to burn enemy ships, the clepsydra vase, the clock with gears (in conjunction with which De' Vieri cites Aristotle's discussion of the instrument in the *Generation of Animals*), the medicinal use of venom, the use of perspective in painting and what would be called *trompe-l'oeil* by later ages, and lastly antique engines for lifting heavy weights with little time and effort- to discover the workings of the latter, De' Vieri refers the reader to Aristotle's *Quisitione Mecchaniche*.⁹¹

De' Vieri proceeds to parallel each of the above-mentioned ancient works with works at Pratolino;⁹² however, we shall limit our discussion only to the first two, the statues of Daedalus and the Mercury of Pasone, and their comparison to automata at Pratolino. We find at this point that Vezzosi's summary of De' Vieri's treatise is inaccurate; De' Vieri does not, as Vezzosi's wording suggests,⁹³ at any point write that any of the Pratolino automata shared the same operating principle as the statues of Daedalus described by Aristotle and Democritus. Rather, De' Vieri writes that if the statues of Daedalus were held to be miraculous because they moved themselves from place to place by an "occult" principle, Pratolino's statue of the god Pan is all the more marvelous because not only does it move, standing and sitting down again, but because it also plays music from its instrument and moves its eyes and head.⁹⁴ In a similar vein, the Mercury of Pasone which seemed to appear in relief simultaneously within and outside of its marble or transparent stone is related to the Galatea automaton, which surpasses this antique model in its motion. De' Vieri describes the starting position of the Galatea within certain rocks, then its exit outside of them into the sea before it returns again to the rocks. In this way, De' Vieri claims, the Galatea exceeds the Mercury of Pasone of antiquity because it is simultaneously inside and outside, "quiet and mobile."⁹⁵ In De' Vieri's preceding chapter, the action of the Galatea automaton is contextualized within a choreographed mechanical tableau: when the rocks have parted, the Galatea appears riding on top of

⁸⁹ Ibid.

⁹⁰ Idem, 59-60.

⁹¹ Idem, 60. We know now that this work is a pseudo-Aristotelian treatise, see Rose and Drake, "The Pseudo-Aristotelian Questions of Mechanics in Renaissance Culture." Further exposition of De' Vieri's comparisons of antique works with those of Pratolino can be found in Mastroiocco, *Le Mutazioni di Proteo*, 108-9.

⁹² De' Vieri, *Delle Maravigliose Opere di Pratolino*, 61-64.

⁹³ Vezzosi wrote that according to Francesco de' Vieri, one Pratolino automaton was animated with quicksilver mercury in the way that Daedalus animated a wooden Venus in antiquity and that another automaton possessed a certain "Mercury of Pasone" which animated it, in the manner in which it was placed within transparent stone or marble. Vezzosi, "Pratolino d'Europa, degli antichi e dei moderni," 24.

⁹⁴ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 61.

⁹⁵ Ibid.

a golden shell drawn by two dolphins spouting water at the sound of a conch-shell blown by a Triton-automaton. In this way, the figure can be understood to be both “within and without,” and secondly, there is no evidence for any other articulated movement apart from the Galatea's transit across the “sea.” Thus, the description of “quiet and mobile” can be similarly explained. The Galatea was originally accompanied by two other nymphs holding coral in their hands which spouts water from diverse openings. No visual document of the full tableau is known to have ever been created, but a grotto-view in Salomon de Caus's *Des Forces Mouvantes* (fig. 26) is believed to preserve the appearance of the Pratolino Galatea, and the Pan can be seen in Giovanni Guerra's sketch and in the architectural context of its grotto in the Stefano della Bella engraving (Figs. 24 and 22 respectively).

Even though a close examination of De' Vieri's text yields a different impression than Vezzosi's article conveys, namely that the Pratolino automata shared the same animating agent- quicksilver mercury- as Daedalus's statues cited by Aristotle and Plato, the comparison of actual late-Renaissance automata with these legendary Classical models is the present study's point of departure for further investigation. De' Vieri principally cites Aristotle's *De Anima* for his description of the statues,⁹⁶ and when this passage is located, an operating principle emerges which can be related to magical and natural philosophical currents of thought elsewhere in the Renaissance. Whereas De' Vieri summarized the operating mechanism of the quicksilver mercury in Daedalus's statue in a linear fashion (the soul moves first the stars, then the body), this passage of Aristotle's *De Anima* preserves elements of Democritean Atomism originating in the late-fifth/early-fourth century B.C. In this case, a sympathetic relationship is proposed between the “spherical atoms” that make up the soul,⁹⁷ how through their ceaseless movement they draw the body in motion with them and thus make it move, and the way in which the movement of quicksilver mercury imparted movement to its container, in this case the wooden Venus of antiquity.⁹⁸ De'

⁹⁶ Idem, 57-8.

⁹⁷ Democritus, along with his mentor Leucippus, have been reevaluated by modern historians as remarkably prescient fathers of modern science, particularly for their early conceptions of the atom. Nevertheless, their work was derided by both Plato and Aristotle, who favored an elemental construct of the universe, so their theories lurked in obscurity for millennia until modern instruments such as the microscope could be developed which confirmed their early ideas.

⁹⁸ “Some go as far as to hold that the movements which the soul imparts to the body in which it is are the same in kind as those with which it itself is moved. An example of this is Democritus, who uses language like that of the comic dramatist Philippus, who accounts for the movements Daedalus imparted to his wooden Aphrodite by saying that he poured quicksilver into it; similarly Democritus says that the spherical atoms which according to him constitute soul, owing to their ceaseless movements draw the whole body after them and so produce its movements.” Aristotle, *De Anima*, 1.3.406b15-407a2.

Vieri's citation of the *Meno* adds little to the discussion of these statues' theoretical operation; the emphasis in the *Meno*'s dialogue is upon the characteristic of Daedalus's statues that they only run away if not properly tethered, which Socrates likens to the fleeting nature of true opinions.⁹⁹ No further explanation of the legendary automata's animation by De' Vieri is attempted.

Although the Aristotelian/Democritean citation of the Daedalian statues' operating principles provides for the antique wooden Venus a modicum of mechanical rationale (and by extension, a perceptible shift towards the preternatural, proto-scientific, and ultimately modern mentality), the motive quality of the quicksilver mercury to its container is essentially positioned in a relationship of sympathy to the identical relationship of the soul's atoms' movement to the body which contains it. Such sympathetic relationships we view today as hallmarks of a magical philosophy, persistent though they were in Renaissance “natural magic” and philosophy alike. Regardless of the fact that this method of animation is at no point asserted to have been replicated in the Pratolino automata, which one might incorrectly infer from Vezzosi's article, the connection which De' Vieri draws between legendary animated statues of antiquity and Pratolino's late-Renaissance moving sculpture creates a *trait-d'union* between actual, documented works of art and technology and methods of “bringing to life” statues of gods culled from antiquity and in brisk circulation in the intellectual life of the Renaissance: mechanical (hydraulic/pneumatic/clockwork) as well as “magical” in the sense of depending on unseen, or occult, sympathetic relationships.

Furthermore, Renaissance machinery conceived and realized with a classicizing, humanist programme in mind served their creators as both intellectual and political tools.¹⁰⁰ Within this construction, whether or not quicksilver mercury was placed in the center of an automaton at Pratolino, in theory causing it to be animated through an unseen sympathy to the human soul, becomes moot. The simple comparison by Pratolino's chronicler to the ancients' manufacture of gods invested these objects with power and significance of their own, as testament to the intellectual climate at Francesco I's court and in their capacity to communicate their patrons' total mastery of arcane methods of manufacturing life. In the sections that follow, we will look first at the histories and transmission of these diverse methods which were used to animate man-made statues. Often, this process was identical to methods which were used to draw down and retain some celestial or divine quality or spirit into natural materials as well, so in certain cases, whether or not the

⁹⁹ Plato, *Meno*, 97d.

¹⁰⁰ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 1.

destination for this ineffable spirit was a statue or something simpler, such as a jewel or a sheet of metal, becomes a superficial distinction in a process which was often identical. It will become clear that by the end of the sixteenth century, both esoteric and mechanical methods were known to philosophers and engineers and that these methods often overlapped conceptually. Air, water, or celestial or “occult” qualities were approached theoretically on equal footing as substances which could be canalized and manipulated to man's benefit. This study will follow the arc of transmission and eventual transformations in theories which informed this increasingly mechanistic view of “occult” statue animation before returning to Francesco I's court in order to place these “magical” automata in the wider context of his distinctive patronage and reign. Lastly, this study will trace some of the diverse and varied intellectual as well as practical routes which the magical and mechanical philosophies informing the Pratolino automata took in the centuries to follow.

3. The Practice and Philosophy of Statue-Animation Traditions in Western Civilization: Antiquity through the Early Modern Age

[Asclepius]: Are you talking about statues, Trismegistus?

[Hermes]: Statues, Asclepius, yes. See how little trust you have!

I mean statues ensouled and conscious,
filled with spirit and doing great deeds;
statues that foreknow the future and predict it by lots,
by prophecy, by dreams and by many other means;
statues that make people ill and cure them,
bringing them pain and pleasure as each deserves.¹

The 1587 text which is the primary focus of the present study relates the animation of Renaissance automata to antique principles of sympathetic magic, which Francesco de' Vieri locates in Aristotelian authority, which, upon closer examination, itself cites the earlier philosophy of Democritus. But the idea of animating statues can be traced much further back than the heyday of the Greek philosophers. Neither Aristotle nor Democritus can claim for their own the invention of either the theory or method which informed the description of Daedalus's wooden Venus. Instead, as we shall see shortly in more detail, the idea of drawing down something of the divine from the heavenly realm to be bound to a man-made vessel appears to be common to a certain extent in the collective human imagination, rather than a phenomenon particular to any one civilization.² This chapter surveys a variety of “god-making” theories and practices from a wide spectrum before narrowing its focus to the progress of a tradition which appears to have passed in some parts from Babylon to Egypt, from Egypt to the Classical Greek world, and from Late Antiquity onwards to the medieval civilizations, which will be the focus of study for the following chapter. The overview of the very ancient history of man’s fascination with the investment of “life” or “spirit” into inanimate objects of art and artifice is a necessary foundation upon which an understanding about the appearance of the “magical” automata of the Renaissance can be understood in its most broad context.

As we embark on this journey through millennia, a word of caution: the modern mind must

¹ *Asclepius* 23-24; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 3.

² For the seminal analysis of a similarly, seemingly omnipresent theme common to virtually all human civilization and religious experience, see Frazer, *The Golden Bough*.

prepare itself for ambiguity in fields and terms one is ordinarily accustomed to thinking of as fixed, at least from our modern, rationalist and materialist prejudices. The futility of modern-day distinctions between “magical” and “mechanical” occurs to the mind early on in the study of the temple mechanics of antiquity. Devices of the kind we would readily classify today as mechanical (for example, the water-weight, the pulley, the steam-powered engine) harnessed the unseen potential in natural forces which were imbued with sacred significance, and they belonged to the same repertoire of sacerdotal secrets. These included principles of astral influences, unseen but nevertheless held to be present in and active upon every material object on Earth (rocks, plants, animals, you and I, for example).

Through the early modern period, very few questions were brooked on the validity and existence of these celestial influences, and their actions were reduced among the learned to a predictable “science,” just as mechanistic to ancient, medieval, and early-modern minds as the steady drip of water. Therefore, the simultaneous presence of sympathetic magic or astral animation with hydraulic and pneumatic technology is not remarkable in itself; both derive from a wisdom-tradition, with its sources in divine revelation, about the occult virtues of the natural world. Rather, it is we that have changed; from our modern standpoint, the natural world is water and air but no longer tangible spiritual or celestial channels of influence. The nature of cosmic radiation which is researched today certainly bears little resemblance to the favorable or harmful qualities which were identified with star-deities falling within a broad spectrum of anthropomorphized personalities.

Still it is a theme worth keeping in mind that the manipulation of both classes of substance, divine and celestial influences as well as the terrestrial elements, was itself a form of mechanistic philosophy and overall a technological conception. William Eamon has charted the intellectual histories of civilizations from Classical antiquity through the Medieval and Early Modern periods around their conceptions about humanity's potential to know and use the forces of nature and the divine alike. The stars in antiquity were generally perceived as divine intelligences and knowledge about how they could be manipulated by man (usually through ritual, prayer, and image-making) was exclusively of a revelatory character. Only by the deity's appearance in a vision or some other divinely-orchestrated, extraordinary circumstance did magical as well as practical or technologic knowledge fall into man's possession.³ From this initial visionary point of transmission, these

³ Eamon uses the autobiographical letter of Thessalos of Tralles written in the first century A.D. as illustration of the age's pursuit of knowledge/wisdom through religious devotion with an aim towards divine revelation. Thessalos was unable to

theories and methods lay at the heart of multiple mystery cults and were the *raison d'être* of what later would be called the Western esoteric tradition. The ancient and Classical civilizations set the stage for great shifts in thinking which would be the hallmarks of subsequent generations: the growing insistence in the Medieval, Renaissance, and Early Modern that stars and their radiating light/qualities were natural and knowable components of a unified cosmos rather than unfathomable divinities and their influences. But we are getting ahead of ourselves. For the moment, we now turn to a survey of the methods and conceptions of manufacturing material vessels for the purpose of containing some living essence the celestial and the divine from prehistoric obscurity, through Babylonian, Egyptian, Greek, Latin, and finally Christian antiquity.

3.1. Distant and Diffuse Origins

The impetus to harness supernatural, often celestial, power into an image or container is an instinct seemingly as old as humanity and accordingly as widespread. Historians of the subject have pointed to European prehistoric naturalistic cave paintings and figurines from across the globe-articulated masks from Africa to Indonesia,⁴ Tibetan “tulpas,”⁵ the *Thay Phap*: wood, straw, and paper puppets that sorcerors of the Annamite mountains in Southeast Asia traditionally animated with their breath,⁶ and *khwai shuh*, a Chinese tradition of an animated portrait or statue that was compelled to serve its creator⁷- as examples of both the theme's antiquity and its diffusion in human history. In Burma the *zawgee*, a term derived from yogi, once he has attained the miraculous powers of a mystic alchemist (flying through the air, traveling under the earth, curing sickness, and transmuting metals) is forbidden to have sexual relationships with women; instead, he animates

master the astrological medicine he encountered in Alexandria within a treatise written by King Nechepso; only after he made a pilgrimage to Thebes, where he beseeched a priest skilled in theurgy (Eamon uses the term to mean the art of invoking visions, rather than the “god-making” of the present study). He then experienced a divine visitation by the god Asclepius, who told him that King Nechepso's shortcoming was that he did not know the proper astrological times which would make effective his otherwise comprehensive list of the occult astrological properties of plants, animals, stones, etc. Armed with this knowledge from the mouth of the god and having been sworn to secrecy, Thessalos went on to conduct a successful and lucrative career in medicine in Rome, where Pliny, less impressed, counted him among its charlatans. See Eamon, *Science and the Secrets of Nature*, 19-22.

⁴ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 10.

⁵ Cohen, *Human Robots in Myth and Science*, 43. For a more detailed exploration of the *tulpa*-phenomenon, see Michael Talbot, *Mysticism and the New Physics* (London: Arkana, 1993), 104-5.

⁶ Cohen, *Human Robots in Myth and Science*, 43.

⁷ *Idem*, 23.

fruits in the size and shape of young maidens for this purpose.⁸

The *ca.* fourteenth-century *maha yafei* heads (fig. 28), for example, were carved stone and metal buried by the Safi people of what is now Sierra Leone to act as guardians of the fields. Even today when a farmer finds one, its spiritually-invested dimension is still respected, and it is moved to an altar and incorporated into modern ritual life.⁹ Buried heads, whether human or artistic representations in various media, which conferred some power upon its resting location (as with the city of London in the Welsh mabinogi of *Branwen Daughter of Llyr* or across the planet with a fortresses protected by a magical wooden head in Polynesia¹⁰) beg the question about whether this perceived magic had its roots in burial-magic, with man-made renditions of heads in stone, clay, or wood eventually coming to function as stand-ins for the decedent.

We continue for the moment in the vein of cultures which turned to their deceased as vessels which could be invested with some divine consciousness. Severed heads with oracular powers are encountered in Celtic,¹¹ Irish,¹² and Norse myth.¹³ The latter preserves a tradition that Odin brought such a head from the East, where scholars have mused upon this practice's place with other rituals of human sacrifice in the Levant. As late as the 8th century, Pseudo-Dionysus of Tell-Mahre tells of a young scholar decapitated in order for his head be made into a mantic oracle, and out of 10th-century Baghdad comes a discussion about the preservation of heads for later oracular use.¹⁴ It is no surprise then to find encounters with this tradition from the Western perspective in legends of the Crusades, such as the thirteenth-century English knight who in Acre employed a man “versed in Saracen magic” to dig up a skull and question it; according to the legend, it obliged, informing the crusader of news in his homeland and the war between Henry III and the barons.¹⁵ We can still find recipes for boiling a freshly-severed head in order to obtain visions of animal-headed

⁸ Mircea Eliade, *The Forge and the Crucible: The Origins and Structures of Alchemy*, trans. Stephen Corrin (New York: Harper & Row, 1962), 188-89.

⁹ From the collection of Franco and Laura Monti, now in the MUDEC permanent collection in Milano.

¹⁰ George Lyman Kittredge, *Study of Gawain and the Green Knight* (Cambridge: Harvard University Press, 1916), 180; for the Polynesian phenomenon, see note 1 of *ibid.*

¹¹ E.g. the Bendigeiduran in “The Second Branch” of the *Mabinogi*, cited by Cohen, *Human Robots in Myth and Science*, 19.

¹² Irish speaking heads who utter prophecy or poetry after they have been severed are discussed in Kittredge, *Study of Gawain and the Green Knight*, 177-84.

¹³ E.g. the head of Mimir in chapters 4 and 6 of *Ynglinga Saga*. Another Norse account tells the tale of the earl Hakon who, together with the goddesses Thorgerd and Irpa, made a human figure out of driftwood and placed a heart inside of it. It's not clear whether this caused it to become animate, but when it was sent to Hakon's rival Thorleif, it caused the death of the latter immediately. Kieckhefer, *Magic in the Middle Ages*, 43.

¹⁴ Ibn al-Nadim, *Fihrist*; LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 410.

¹⁵ *Speculum Laicorum* (Additional MS. 11284, fol. 22, British Museum).

humans in the “natural magic” of the Renaissance,¹⁶ and there is a report that severed heads still factored into folklife superstition well in late-nineteenth-century Sicily with the tale about a robber who kept a witch's head to provide information before he undertook anything.¹⁷ However, we are getting ahead of ourselves. Suffice to say, the severed head remained a potent factor in magical, visionary, and mantic ritual across many cultures and time periods. However, it falls a bit beyond the scope of the present inquiry into the creation of artificial works as receiving vessels for some kind of spiritual influence.¹⁸ These mantic heads may be to a certain extent related by shared magical operational principles, but they do not belong to the cross-over between magical philosophy with classical mechanics and engineering works of the early-modern period.

Another far-distant origin for the kind of magic which invested man-made vessels with some kind of spirit and power has been located in the creation of images as a kind of conjuring magic: the crafting of the form of an animal, or a god for example, in the hopes to bring either a good hunt or a religious experience. At an early date, certain cultures made the transition from creating material representations of their gods and animals with painting, sculpture, or other vessels from the natural world and turned to their fellow man. The lingering association of the animation of statues or other vessels with necromancy may be traced to Biblical sources like the Book of Ezekiel's¹⁹ *teraphim*, thought by some to be mummified heads with incantations inscribed onto a plate of gold under the tongue.²⁰ Another corollary can be read in the New Testament account which implies that Simon Magus killed a child to provide a soul to inhabit a magical boy he formed from air.²¹ Nevertheless, Hebrew Scriptures were explicit in their condemnation of the manufacture of graven images: “no man can make a god like to himself.”²² In Deuteronomy, the idol-maker and the “works of the hands of artificers” are cursed as abominations,²³ and the Book of Samuel appears to

¹⁶ Giambattista della Porta, *De i miracoli* II, 17, fol. 78v-79r; Kodera, “Giambattista della Porta's Histrionic Science,” *California Italian Studies* 3 (2012): 16.

¹⁷ Gonzenbach, *Sicilianische Märchen* 22.1 (1870), 135.

¹⁸ For a thorough treatment of this subject, see Jan Bremmer, *Ancient Necromancy: Fact or Fiction?* in *Mantic Perspectives: Oracles, Prophecy, and Performance*, ed. Krzysztof Bielawski (Warsaw: Warsaw Liberal Arts University, 2015), 119-141.

¹⁹ Ezek. xxxi.21 .

²⁰ Cohen puts another possible interpretation forward that the term might apply to the small figures of gods in human shape employed by Rachel and Michal. Cohen, *Human Robots in Myth and Science*, 19. See also Kevin LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” *English Studies* 5 (1999): 410; James Hastings, *A Dictionary of the Bible* IV (New York, 1905), 718.

²¹ *Pseudo-Clementine Homilies*, II, xxii ; see also Higley, *The Legend of the Learned Man's Android*, 137.

²² Wisdom 15.17; Truitt, *Medieval Robots: Mechanism, Magic, Nature, and Art* 58.

²³ Deuteronomy 27:15.

endorse the life and agency of idols by mocking the idol Dagon for stumbling.²⁴ Nevertheless, the ability of man to create artificial life from natural materials present in mystical Hebrew texts would play a significant role for later civilizations in Europe.

The very ancient worship of meteors and stones among ancient Semitic and Asiatic peoples constitutes for David Freedberg the most ancient religious impulse informing mankind's relationship to certain idols and images up through the present day.²⁵ Stone and meteor worship, *litholatry*, was a defining feature of pre-Islamic Arabia, and in the Hebrew tradition, the stone which Jacob slept on and subsequently venerated with oil as the "house of God" - *Beth-el* – has been put forward as the etymological origin of the Greek word *baitulia*, used for the usually black meteoric stones which fell from the sky; the nodal point of this transfer of cultures is traditionally located in Cretan civilization.²⁶ Freedberg points to meteors and trees as the ancestral nature spirits to much of the phenomena associated with religion, ritual, and image production the former inspired worship of both work and unworked stones, while the latter produced the planks of wood, often modified but not always to great degrees, which became the prototypical cult statues of the ancient Greeks,²⁷ which shall be explored shortly below. With time, different shapes (cubes, cones, rectangles) became associated with different gods, but this degree of detail is for now beyond the scope of the present study. We pass now to the primary examination of the methods and traditions which the ancient world associated with "living gods" and cult statues in temples in the orbits of Mesopotamia, Egypt, Greece, and Rome.

3.2. Egyptian and Mesopotamian Tradition

Egyptian religion in its earliest history developed attributes that marked it in the eyes of later civilizations as the ancient world's most highly developed "god-makers." Greco-Egyptian or Hermetic accounts of the transmission of this practice always place the point of origin in Egypt; although the argument can be made for manifestations of this theme in diverse cultures in virtually every point of the globe. The human tendency to endow stones, wood, and other materials with not

²⁴ Emma Maggie Solberg, "Mechanical Miracles and the Statue of Hermione." Unpublished essay, 20; 1 Samuel 1-5.

²⁵ The Black Stone in Mecca, while no longer doctrinally the object of worship, nevertheless is the focal point of the Islamic *haj*. See David Freedberg, *The Power of Images: Studies in the History and Theory of Response* (Chicago: University of Chicago Press, 1989), 68.

²⁶ *Idem*, 67; Genesis 38.11-12.

²⁷ *Idem*, 33-37, 66-76.

only anthropomorphic form but with all of the requisite responses for the worship of a present, living spirit transcends distinctions of time and culture.

Nevertheless, the Egyptian tradition represented a powerful ancestral seat, though perhaps not the most ancient as we shall shortly see, of many traditions whose course shall be plotted through late sixteenth-century Florence and early-modern Europe. At the risk of grossly oversimplifying a highly elaborate religious society, when the ancient Egyptian looked to the stars, he looked to his gods and goddesses and to the point of origin for all knowledge. Themes which will rise to prominence in later discussions about medieval and Renaissance “invested” statues and images find an analogous germ in very early forms of Egyptian worship. For one example, the red giant star we know most commonly by its Greek name Antares at the “heart” of the Scorpio constellation was worshipped by the Egyptians as the scorpion-goddess Serket, a largely benevolent, protective nature goddess who bequeathed to humanity medicinal knowledge, particularly of venom, its uses, and its antidotes. Serket would later be absorbed as an aspect in the later, broader cult of Isis. The priests of Serket occupied themselves, like the later priests of Asclepius, with the custodianship of this celestially-derived body of medicinal knowledge for a time span of roughly three thousand years.²⁸ Medicine and astrology remained fully intertwined through the large part of the following two millenia, and we shall encounter this theme at more length below. Medieval doctors who believed that a ring or stone invested with the proper celestial radiation could dissipate poison were not too far removed on a theoretical basis from the priests of Serket from the protodynastic period. This illustrates, briefly, the long shadow cast by Egyptian civilization was not limited to the idea of manufacturing “living gods” which occupied the minds and imaginations of later civilizations. To the contrary, a fully-developed system of belief in celestial agency, influence, and intercession in human affairs on earth is in evidence in the religion and rituals of ancient Egypt.

The oldest dated objects with the greatest significance for the discussion of animated cult statues are quite small in comparison. The earliest proto-automata that draw scholars' attention are the jointed, articulated dolls found in tombs of the XII Dynasty onwards²⁹ (ca. 1991 B.C.³⁰). Statues ornamented with eyes of precious stones and copper eyelids excavated by Auguste Mariette-Bey

9. Frédérique Von Känel, “Les Pretres-Ouâb de Sekhmet et les Conjurateurs de Serket,” *École pratique des hautes études. Section des sciences religieuses* 91 (1978): 467-469.

²⁹ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 10.

³⁰ Being an early approximate dating of the period, beginning with the reign of Amenemhat I.

(1821-1881, “Bey” was an honorific bestowed by Ismail Pasha) and included in a lecture by the American author Bayard Taylor have been sensationally dated to before the first dynasties,³¹ but these objects have been difficult to track down after their nineteenth-century mentions in the early museum at Boolak.³² An analogy might be submitted between these Egyptian statues and similar busts excavated in Yemen with eyes of semi-precious stones and a strip of coral inlaid into the forehead (fig. 29).³³

These early, lifelike statue-objects likely may have possessed for their makers an “invested” dimension, like the *ka* effigies meant to house the spirit of the deceased. In this respect, Sigmund Freud (1856-1939) theorized that these statues fulfilled man's desire to “double” or replicate his own ego.³⁴ Putting aside the central drama of the Egyptian religion, that of Osiris's death and resurrection of the re-united body (which relates more directly to the necromantic tradition touched upon above), the ability to “bring to life” a panoply of other Egyptian deities as cult statues figure largely in temple rites and mysteries.

The ancient Mesopotamian rites designated “Mouth-Washing” and “Mouth-Opening” have been posited as a potential common source of Near Eastern and Egyptian observance alike.³⁵ The rite may have varied over time and culture, for example the Babylonian rite consisted of at least ten stages and the Egyptian even more, but the action and intention transcend these relatively trivial concerns; Freedberg recognizes the power of the sculpture or picture's gaze, and therefore the special attention and rites paid to the creation of its eyes, as the locus wherein the spirit is rendered operable in the image.³⁶

Although there are many potential examples of this ritual phenomenon, *Papsukkal* has been a term used for an invested figure in Babylonian tradition,³⁷ but further research reveals an even more nuanced potential influence in Egyptian and later Hermetic god-making traditions. *Papsukkal*

³¹ Helena P. Blavatsky, *Isis Unveiled* (1877. Reprint. Seattle: Pacific Publishing Studio, 2011), 3.

³² “The Egyptian Museum at Boolak: M. Mariette's Remarkable Discoveries.” *Australian Town and Country Journal* (Sydney) 12 Sep. 1874: 20.

³³ Examples can be seen in the Berlin Museum and the Nasli M. Heeramanek Collection in the Los Angeles County Museum of Art. See no. 343 (M.73.5.356) in *Islamic Art: The Nasli M. Heeramanek Collection*, ed. Pratapaditya Pal, (Los Angeles: Los Angeles County Museum of Art, 1976), 176.

³⁴ Sigmund Freud, “The Uncanny,” *Imago* Bd. 5 (1919): 8.

³⁵ Similar rituals for gods (and men, in the case of mummification) have been reported from Sumer, Assyria, Babylonia, and Egypt. Algis Uzdavinys, *Animation of Statues in Ancient Civilizations and Neoplatonism in Late Antique Epistemology: Other Ways to Truth*, eds. Panayiota Vassilopoulou and Stephen Clark (Basingstoke, U.K.: MacMillan, 2009), 118-119, 129. Cf. Hanegraaff, which mentions “mouth-opening” only in Egypt; “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 5. See also Freedberg, *The Power of Images*, 82-83.

³⁶ Freedberg, *The Power of Images*, 51.

³⁷ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 10.

is the name of the messenger god in Akkadian tradition, and figures of the same were placed beneath cult statues in temples of other deities as a kind of “gate keeper” or intercessor to a higher god.³⁸ The iconography of Papsukkal as a bearded male with a horned cap and a long staff also provides another point of comparison to the later Hermes of Greek tradition. Papsukkal later became syncretised in the Kassite period with the Sumerian goddess Ninshubur, who was associated likewise with the planet Mercury. The transformative influence which Babylonian astrology had upon Egyptian religion and tradition has been well-documented, and as we will encounter below, the broad strokes of Babylonian culture's integration into Egypt elsewhere survive in Hermetic tradition from a later era. The Mesopotamian messenger god Papsukkal, whose figurines appear to have been invested with an apotropaic, “living” dimension in relation to other cult statues,³⁹ and who ultimately came to be identified with Mercury, presents a further avenue of study into the transfer of beliefs and tradition to Egypt from an earlier, Babylonian point of origin.

Recent scholarship has observed that in Egyptian language and culture, the word for sculptor (*s^cnh*) meant “the one who makes alive.”⁴⁰ Indeed, legends of statues of Egyptian gods that came to life, that walked and talked, were widespread in antiquity⁴¹ and are abundant in the written and archaeological record. Their principal interaction with supplicants appears to have been via *hanu*, a movement of the arm or the head in response to a query; such dependence on the god's will put a great deal of power into this performance, as in the case when the new king was chosen from a line of princes by the god's *hanu*, (or more cynically, the priest's manipulation of its hidden mechanism).⁴² Perhaps the most emblematic “living” statue of Egypt is the “speaking” colossus of Memnon at Thebes (fig. 30). Not in any known way documented as an “invested” cult statue though, the Memnon colossus acquired its “living” reputation by its unique voice. Philostratus (*ca.* 170- *ca.* 250 A.D.),⁴³ Juvenal (*ca.* 55- *ca.* 127 A.D.),⁴⁴ Strabo (*ca.* 64 B.C.- *ca.* 24 A.D.),⁴⁵ Pliny (*ca.*

³⁸ Rykle Borger, “Tonmännchen und Puppen,” *Bibliotheca Orientalis* 30 (1973): 176-185; Rod Ellis, “Papsukkal' figures beneath the daises of Mesopotamian temples,” *Revue d'Assyriologie* 61 (1967): 51-61.

³⁹Eva Braun-Holzinger, *Apotropaic figures at Mesopotamian temples in the third and second millennia in Mesopotamian Magic: Textual, Historical and Interpretative Perspectives*, eds. T. Abusch and K. Van Der Toorn (Gröningen: Styx, 1999): 49-72.

⁴⁰ Jan Zandee, *Het Hermetisme en het oude Egypte in De Hermetische Gnosis in the loop der eeuwen* (Baarn: Quispel, 1992), 112; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 5.

⁴¹ LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 409; Cohen, *Human Robots in Myth and Science*, 19.

⁴² Cohen, *Human Robots in Myth and Science*, 19-20; see also Robert K. Ritner, *The Mechanics of Ancient Egyptian Magical Practice* (Chicago: University of Chicago Press, 1993).

⁴³ Philostratus, *Life and Times of Apollonius of Tyana*, ans. C.F. Conybeare (New York: The Macmillan Co., 1912), 151.

⁴⁴ Juvenal, *Satires*, 2.103.

23-79 A.D.), Pausanias (*ca.* 110- *ca.* 180 A.D.),⁴⁶ and Tacitus (*ca.* 56- *ca.* 117 A.D.)⁴⁷ have described and sometimes tried to explain how this Egyptian statue of Amenhotep III⁴⁸ at Thebes produced sound. The more or less common element to these accounts is that it produced its sound at dawn, when the sun's rays struck its mouth. For this reason it became identified in the Greek imagination with Memnon, the slain son of Aurora, the goddess of dawn, for whom every morning fresh dew-tears cover the land.⁴⁹ It is still a question explored in the early modern period: by Athanasius Kircher (1602-1680), who imagined levers or even a harpsichord inside the statue's body,⁵⁰ and recently in 1966 by John Cohen, who draws a possible parallel with rocks in South America which generate sound at sunrise by the sound of air escaping from their crevices.⁵¹

Other ancient Egyptian statues intentionally mimicked a living voice with speaking tubes. with speaking-tubes, some which are in museum collections today: a painted wooden Anubis in the Louvre today and a white limestone bust of the God Re-Harmakhis presently at the Cairo Museum.⁵² Hollow statues which concealed space in which a priest could hide and speak came to light during the destruction by Bishop Theophilus (385-412) of temples in Alexandria, the Hellenic outpost at the mouth of the Nile delta. However, those statues at Alexandria in particular, though they doubtlessly employed age-old methods refined in Egyptian temples, were already products of a merged Greco-Egyptian tradition. The speaking head of Orpheus, for example, at Lesbos employed the same mixture of mechanics and deception, which Sir David Brewster used in a nineteenth-century essay detailing how the ignorant masses could be thus enslaved.⁵³ This Alexandrian tradition lies at the root of later practices of bringing statues to life in a variety of contexts between the Islamic and Byzantine East and later in Western Europe, but let us turn now to the Greek

⁴⁵ Strabo, *Geography*, 17.42-46.

⁴⁶ Modern authors cite Pausanias's observation that the Memnon colossus's voice was akin to the "breaking of a harp-string," but in my reading have not provided a citation. See Edwin Winfield Bowen, ed., *The Annals of Tacitus* (Boston, New York, and Chicago: Benj. H. Sanborn & Co., 1913), 246, note 61; Cohen, *Human Robots in Myth and Science*, 16-24; George Long, *The Egyptian Antiquities of the British Museum* (London: M. A. Nattali: 1846), 421.

⁴⁷ Tacitus, *Annals*, 2.61.

⁴⁸ The general agreement on the identity of the two colossoi of Memnon in the Theban necropolis is Amenhotep III, yet John Cohen instead submits the name Amenophis without further discussion; see Cohen, *Human Robots in Myth and Science*, 16.

⁴⁹ *Ibid.*

⁵⁰ *Idem*, 24; Arthur Cleveland Wigan, *The great wonders of the world; from the pyramids to the Crystal palace* (London: Sampson Low & Son, 1856), 11.

⁵¹ Cohen, *Human Robots in Myth and Science*, 16.

⁵² *Idem*, 22; Grégoire Loukioanoff, "Une Statue parlante ou Oracle du dieu Re-Hermakhis," *Annales du service des Antiquités de l'Égypte* (Cairo, 1936): 187-193.

⁵³ David Brewster, *Letters on Natural Magic Addressed to Sir Walter Scott, Bart* (London: J. Murray, 1832), letters 1 and 7; Thomas L. Hankins and Robert J. Silverman, *Instruments and the Imagination* (Princeton, New Jersey: Princeton University Press, 1995), 179.

contribution to this legacy.

3.3. Greece and the Hellenic Diaspora

In the earliest literature of Greece, we encounter the god Hephaestus manufacturing self-moving automata: the tripods and golden female servants of Homeric epic.⁵⁴ In Greek mythology, the topic of antique idols brought to life by gods and priests was recently considered by one historian “too vast” to attempt a comprehensive undertaking,⁵⁵ and this study certainly does not intend to seriously challenge that judgment. Nevertheless, a comprehensive arc has been traced from the Archaic period, when a divinity was not differentiated from its statue, to the post-Classical.⁵⁶ Such statues occupied a central place in religious practice and accordingly figure widely in legend.

For example, Herodotus tells of the fifth-century B.C. Spartan king Cleomenes who went to seek approval to take the city of Argos after defeating its army from a small, archaic statue of Hera fashioned from pear wood; a flame which shot out of its breast was interpreted to be a reply in the negative, and this statue was also known to have the ability to drive people mad.⁵⁷ Another archaic wooden Hera of Samos was stolen by pirates, abandoned when it caused their ship to stall, and recovered by the Carians, who chained it to a tree trunk before its transfer back to its temple, so that it would not “wander” again.⁵⁸ Another example of the same type, an Artemis at Pellene, was kept covered when it was not paraded on its feast day; on these occasions, Plutarch recounts, its eyes caused terror and death and caused trees to become sterile.⁵⁹ These archaic gods, invested with spirit, agency, mobility, and sight by those who worshipped them, are representatives of a class of early images called *bretas*, *bretades*, or *xoana* which could be unformed planks, as with the *xoanon*

⁵⁴ Homer, *The Iliad*, trans Robert Fagles (New York: Penguin Books, 1990), Book 18; LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 408-409; Cohen, *Human Robots in Myth and Science*, 15. These self-moving tripods recall an account from Chinese alchemical lore of Yu the Great, the happy miner, who successfully cast the nine cauldrons of the Hia and ensured the union of the High and the Low. These cauldrons were self-moving, could boil without being heated, and could recognize virtue. See Eliade, *The Forge and the Crucible*, 62.

⁵⁵ Higley, *The Legend of the Learned Man's Android*, 131.

⁵⁶ See in particular Jan Bremmer, “The Agency of Greek and Roman Statues: From Homer to Constantine,” *Opuscula* 6 (2013): 7-21.

⁵⁷ Idem, 10; Herodotus, *The Histories*, trans. A. D. Godley (Cambridge: Harvard University Press, 1920), 6.82.

⁵⁸ The sixth-century B.C. stone *Hera of Samos*, though missing its head, has been recognized for being an intermediate cult statue which Freeberg believes preserves the arboreal quality in her trunk-like skirt. Freeberg, *The Power of Images*, 70-71 fig. 26.

⁵⁹ Idem, 33; Plutarch, *Numa*, 7.7-8.

of Hermes Perpheraios of Ainos which was at one point discarded by fishermen who did not recognize its divinity, or which with time became increasingly anthropomorphized. The wooden counterparts to the lithic, often meteoric *baitulia* commonly held to be sensate *lithoi empsychoi*,⁶⁰ were likewise believed to have fallen from heaven, though their rough, unworked forms which recalled their arboreal origins prolonged, for Freeberg, the connection to “the god in the tree” too.⁶¹ Fascinating mid-way points within this process of integration demonstrate the tension between unworked stock and crafted sculpture; there is the fifth-century B.C. funerary sculpture which preserves a face of unworked stone upon an otherwise highly wrought body of the defunct on one end of the spectrum and the unworked stones or planks topped by a crafted head, amply testified by numismatic evidence, on the other.⁶² For the latter, these are the earliest archetypical herms, what would later be enshrined in the *Asclepius* text’s tradition as the statues of Hermes endowed with sense and sensibility. Regardless of their degree of workmanship, “living” statues in the Greek world were frequently chained in ritual as well as legend

Other stories of living statues, like the story of Pygmalion, the King of Cyprus, who brought his Venus to life with divine aid, revolve around the statue or god; whereas others, like the case of Daedalus, “the primal sculptor among humans,”⁶³ paint a picture of man’s achievement and capability. Pausanias is recognized as the ancient author who furnishes the most seemingly reliable biographical information on what has become a legendary, even magical figure.⁶⁴ He wrote that the appellation of Daedalus derives from *daedala*, an older Greek term for statues, and not from birth. Among the many inventions for which Daedalus receives the first credit, the statues of gods and heroes occupy a pivotal role in this study. Plato (*ca.* 425- *ca.* 348 B.C.) put down that some were so life-like that measures had to be taken to prevent them running away, and Aristophanes scripted his play *Daedalus* around these chained statues.⁶⁵ Aristotle’s *De anima* features walking creations of Daedalus guarding the labyrinth⁶⁶ as well as the Venus animated by quicksilver that appears in De’ Vieri’s sixteenth-century text.⁶⁷ In contrast to Aristotle, Callistratus (d. 350 B.C.), writing in the

⁶⁰ Pausanias is recognized by Freeberg as the source of the fullest range of references to these unworked stones. Freeberg, *The Power of Images*, 66; see Pausanias 7.22-24.

⁶¹ *Idem*, 73.

⁶² See *idem*, 34 fig. 13, 73 fig. 28.

⁶³ *Idem*, 36.

⁶⁴ Cohen, *Human Robots in Myth and Science*, 17.

⁶⁵ The practice of chaining cult statues not only to prevent their escape but either to retain their beneficial effects or to mitigate their destructive powers was widespread in Greek religion. See Freeberg, *The Power of Images*, 74-76.

⁶⁶ Aristotle, *De anima*, I.3.

⁶⁷ Cohen, *Human Robots in Myth and Science*, 16-17.

third century B.C., assigns a distinctly mechanical character to the statues of Daedalus.⁶⁸ Diodorus Siculus (d. 60 B.C.) positions Daedalus at a fundamental turning point in human history: the figure of Daedalus is the first human credited with endowing his creations with open eyes, separated legs as if walking, and arms and hands stretching out.⁶⁹ For Diodorus, as Freeberg points out, his artistic innovations are what imbues the statue with life: “all talk about Daedalus and recollections of him, mythical or not, embody a crucial stage in people’s thinking about images and the way they respond to them.”⁷⁰

By this time in Greek history, there is evidence for mechanical developments which would not preclude the real possibility of the actualization on some level of Daedalus's legendary works. In spite of Derek J. DeSolla Price's contention that the early Greeks did not possess “the technological skill to materialize the dream (of lifelike automata) more extensively than in speaking tubes and simple jointed arms,”⁷¹ there is a much subtler sophistication in their simple mechanisms to be observed. The fourth-century wooden doves of Archytas seem to have possessed elegant arrangements of hidden weights activated by a current of air in their bodies, according to an account by Aulus Gellius (*ca.* 125- *ca.* 180 B.C.),⁷² and tales of fully mobile “living statues” percolate from the islands and coastlines. Delos and Rhodes were famed as centers for astronomy as well as for their automatic statues. Pindar (*ca.* 522- *ca.* 443 B.C.) asserts that the celebrated colossus of the latter island was also animated in some way,⁷³ and it is known that the later Alexandrian authority on mechanics, Philo of Byzantium (*ca.* 280 B.C.- *ca.* 220 B.C.), one of the great writers on mechanics whose texts have survived (albeit in fragmentary form) from Hellenistic Alexandria, is known to have been familiar with the engineering at Rhodes.⁷⁴ Cassius Dio (155-240 A.D.) describes a further range of movement in the statues at Heliopolis that descended from a pedestal and others that could sweat or bleed.⁷⁵ Antium as well exhibited walking statues, and the temple at Delphi maintained “stone virgins” which spoke.⁷⁶ Here, the Egyptian speaking tubes and hidden cavities certainly come to mind.

⁶⁸ Ibid.

⁶⁹ Freeberg, *The Power of Images*, 36-37.

⁷⁰ Idem, 37.

⁷¹ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 12.

⁷² Rosheim, *Leonardo's Lost Robots*, 5.

⁷³ Ibid.

⁷⁴ Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2001), 25.

⁷⁵ Cohen, *Human Robots in Myth and Science*, 19.

⁷⁶ Idem, 15.

The recent recovery of the sophisticated Antikythera mechanism positions the surviving writings of Vitruvius (*ca.* 80- *ca.* 15 B.C.), Ctesibius (flourished *ca.* 250 B.C.), Philo of Byzantium, and Hero of Alexandria (*ca.* 10-70 A.D.) as “only a small and incidental portion” of a larger, lost antique technological capability.”⁷⁷ Alexandria, a port on the Egyptian coast founded by Alexander the Great and ruled over by the Ptolemies, was the epicenter for these developments. Ctesibius's *Commentaries* are hailed as the origin of the hydraulic organ, the water pump, and the water-clock, the latter which appeared around the same time in monumental form at the Agora of Athens and Oropos.⁷⁸ Ctesibius was succeeded by Philo of Byzantium, mentioned above in connection to the Rhodes engineering, who wrote nine books on mechanical matters. However, Philo's inquiries into the natural physics of pneumatics were startling prescient. Air, Philo argued pointing to Democritus, Strabo, and perhaps Ctesibius, was not a void but rather composed of particles amidst the empty space; Philo's designs were intended to illustrate the various properties of air⁷⁹ With Hero of Alexandria's writing three centuries later, a similar profusion of designs specific to temple automata appeared which relied on the power of water displacement as well as steam-powered engines, such as dancing Bacchantes or a dragon shot by an archer (fig. 31).⁸⁰ Such devices served the temples, particularly the sensational displays at Alexandria, and reinforced the coupling between mechanics and mystic rite already present in Egyptian worship. Mechanically-animated statues were in many cases the theatrical articulation of doctrines rooted in a religious and magical tradition about stellar deities' power and their embodiment in the terrestrial sphere.

Because of the Ptolemy dynasty's aggressive competitiveness to be the cultural leaders of the ancient world, the culture promoted at Alexandria was unique from other cosmopolitan centers. One of the ways which Alexandrian culture diverged from mainland Hellenistic culture was its expansion of the traditional canon of fourth-century academies to include mechanical knowledge, *technē*, at the Museum.⁸¹ Furthermore, the open quality of Philo of Byzantium's technical writings as well as an explicit mention that his works were intended to form part of the canon of knowledge “displayed” at the Ptolemaic court underlines the culture of information-sharing, rather than

⁷⁷ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 14.

⁷⁸ Idem, 13; A.G. Drachmann, “Ktesibios, Philon, and Heron: A Study in Ancient Pneumatics,” *Acta Historica Scientiarum Naturalium et Medicinalium* IV (Copenhagen, 1948) and *The Mechanical Technology of Greek and Roman Antiquity* (Copenhagen: Lubrecht and Kramer, 1963); Long, *Openness, Secrecy, Authorship*, 25.

⁷⁹ Long, *Openness, Secrecy, Authorship*, 26.

⁸⁰ Higley, *The Legend of the Learned Man's Android*, 133.

⁸¹ Long, *Openness, Secrecy, Authorship*, 25.

hoarding, which pervaded.⁸² Alexandria distinguished itself not only as the capital city for much of the ancient world's most sophisticated temple mechanics, it was also the epicenter where an influential Greco-Egyptian magical doctrine coalesced from their own respective traditions and germinated in a wide spectrum of works belonging to a recognizable genre of magical, religious, and philosophical traditions: this is the Hermetic tradition.

3.4. The Intersection of Egypt, Greece, and the Stars: the Hermetic Tradition and Ptolemaic Astrology

A doctrine of revelations credited to the Greek messenger god Hermes, identified with the planet Mercury, functioned later as one of certain primordial sources (alternatives include sourcing the wisdom-tradition in Chaldean, Persians, and Brahmanic civilizations) for the later magical tradition which persisted even in Western European civilization through the Medieval/Renaissance and beyond. Above, we have noted certain, perhaps not-coincidental similarities between the Mesopotamian Papsukkal and the Greek Hermes. The egret-headed Thoth, Egyptian god of wisdom, also acquired an identification with Hermes at some early point in the exchange of cultures.⁸³ It is a bit too simplistic to say however that this interchangeable name and identity is a sufficient summary of the towering figure of Hermes Trismegistus in legend and literature.

Hermes Trismegistus is associated with great revelations of wisdom that have fundamentally changed human technology and capability. The body of Hermetic writings consists of around forty-two works composed by the third century A.D. which comprise the revelatory dialogues between Hermes Trismegistus to his son and initiate Tat. In some traditions, there is one Hermes, and in others, there are three separate individuals at different points in history. Most but not all historians⁸⁴ locate the origin of Hermetic philosophy in Alexandria, that crucible of invention and cultural exchange from the fourth century B.C. through roughly the fifth of the common era.

Much of the “biographical”⁸⁵ information about Hermes Trismegistus was preserved in medieval Arabic sources. After the destruction of Alexandria's libraries and temples, Hermetic lore

⁸² *Idem*, 27.

⁸³ See Multhauf, *Origins of Chemistry*, 90.

⁸⁴ Kieckhefer acknowledges their common linkage to Alexandria but maintains that Hermetic writings are in fact of uncertain provenance; Kieckhefer, *Magic in the Middle Ages*, 26.

⁸⁵ To what extent a divinity or legendary conflation of multiple persons can have a biography is a discussion rather past the point of using the convenience of the term. Nevertheless, these problems are noted.

passed largely to the Islamic East, where it acquired another sacred dimension with the conflation of the earliest Hermes Trismegistus with Enoch and Idris, a prophet-figure who constructed pyramids and temples before the Great Flood.⁸⁶ For Abu Mashar (787-886) and Abu Sahl al-Fadl ibn Nawbakht (*ca.* 735- *ca.* 815), a second Babylonian Hermes renewed the sciences of medicine, philosophy, and numerology after the Flood and brought them to the Egyptians when he became their king.⁸⁷ This Hermes also bestowed upon the Egyptians the secret of how to make their living gods; it is interesting to note here agreement between this tradition and the observation above which connects Egyptian theurgy with Mesopotamian rituals to invest statues with life. Furthermore, scholars of the earliest Hermetic astrological treatise, the *Salmeschoiniaka*, have discerned a Mesopotamian origin from the mention of the god Nebu and its five-day time-keeping method (a Babylonian convention, as opposed to the Egyptian ten-day week).⁸⁸ This Egyptian flowering of astrology has elsewhere been connected to the success of the Chaldean astronomers in Seleucid times or perhaps the influx of Babylonian refugees into Egypt.⁸⁹

For the moment, the first two Hermes of Eastern tradition can be left to their relative obscurity; the third and final Hermes becomes the father of Greco-Egyptian wisdom-traditions which reverberate through the ages. This third Hermes is an Egyptian, usually Alexandrian, magus who invented alchemy and who taught to Asclepius the secrets of medicine, star magic, and other Egyptian lore. In Hellenic mythology, Asclepius is the legendary figure who then disseminated this wisdom among the Greeks. The pseudo-historical persons in this narrative are arguably irrelevant outside of their literature and traditions; however, the transfer of knowledge between Hermes Trismegistus and Asclepius encapsulates a very real exchange of cultures occurring across the ancient Mediterranean.

Ptolemaic Egypt was the source of much of the Hermetic literature that began to emanate all over the antique world. The production of these texts was the fruit of a concerted effort to translate Egyptian texts into Greek.⁹⁰ Although the Hermetic works' Hellenistic vocabulary betrays the signs of these linguistic and conceptual redactions which occurred between the first and third centuries of

⁸⁶ David Pingree, *The Thousands of Abu Mashar* (London: The Warburg Institute, 1968), 9-10.

⁸⁷ *Idem*, 10-11f.

⁸⁸ Briant Bohleke, "In Terms of Fate: a survey of the indigenous Egyptian contribution to ancient astrology in light of Papyrus CtYBR inv. 1132(B)," *Studien zur Altägyptischen Kultur* 23 (1996): 17. The author also notes the common occurrence of the absorption of foreign elements into the Egyptian religion: not only Nebu (Mercury), but also Astarte and others.

⁸⁹ Multhauf, *Origins of Chemistry*, 89.

⁹⁰ Bohleke, "In Terms of Fate: a survey of the indigenous Egyptian contribution to ancient astrology in light of Papyrus CtYBR inv. 1132(B)," 16.

the common era, they are acknowledged to preserve elements from Egyptian papyri, some which have been dated by to the sixth century B.C.⁹¹ In Alexandria as well occurred the union of Gnosticism, the various magical systems of the ancient world, Eastern astrology, and the Neoplatonic conception of the universe; out of this mélange developed that system of Hermetic philosophy which ultimately influenced European magic.⁹² Furthermore, within this milieu the foundation for the astrological philosophies and practices were codified into a tradition that remained authoritative for the learned world well through the Copernican revolution of the modern era.

The *Almagest*, “The Greatest,” written by Ptolemy (ca. 100- ca. 170) ca. 150 was the canonical text for the next fifteen-hundred years' studies of the sky above.⁹³ However, by the time it was written in the second century, as also has been observed in the closely-related magical, religious, and philosophical texts of the Greco-Egyptian Hermetic tradition, Ptolemy's vision and arrangement of the heavens drew upon truly ancient celestial observations recorded from as early as the eighth century B.C. from such diverse sources as India, China, Babylon, Egypt, and Greece, including the second century B.C. collation, analysis, and editing of Greek astrological records by Hipparchus.⁹⁴ The ancients had worked out orbits of the planets and stars to explain the visible motions of the heavens, but adopted the position that all of the heavens revolved in perfectly circular tracks with respect to the Earth, the terrestrial and therefore most material and dense sphere, at the concept's universal center. Thus, the earth-centered vision of the cosmos is known as the Ptolemaic model.

These spherical motions were intuited from tracking the night sky's changes, and a great distance of the terrestrial sphere from these heavenly objects was similarly intuited to explain some stars' rapid transits and others' apparently fixed positions. In this line of reasoning, it was possible for the ancients to calculate the relative distance of the planets and stars from the Earth premised on the amount of time it was observed a particular star took to go around the Earth. In this arrangement, the Moon was the closest, followed by Mercury, Venus, the Sun, Mars, Jupiter, and

⁹¹ Petrie Flinders, “Historical References in the Hermetic Writings,” *Transactions of the Third International Congress of the History of Religions* 1 (1908): 196-225.

⁹² Evans, *Magical Jewels of the Middle Ages and the Renaissance*, 11.

⁹³ Quinlan-McGrath, *Influences*, 28-9.

⁹⁴ Hipparchus's only known work out of at least fourteen books known to have been written is the commentary on an astronomical poem of Aratus. Otherwise, information about Hipparchus's life and works is furnished from others: Strabo's *Geography*, Pliny's *Natural History*, Ptolemy's *Almagest*, and later in the fourth century, Pappus of Alexandria and Theon of Alexandria's commentaries on the *Almagest*.

Saturn. From these calculations, the ancients drew suppositions about the relative powers of the gods upon the Earth. From ancient times, the effects of Mercury, Venus, the Sun, Mars, Jupiter, and even “distant Saturn” were believed to radiate stronger influences upon the terrestrial sphere due to their proximity than did the stars of the outer firmament. We also can perceive in this hierarchy vestiges of the Mesopotamian construct about messenger or “gate-keeper” gods who acted as middle-men with humans and the otherwise inaccessible deities of the spheres above. In addition to establishing the order and progression of the seven heavens, the *Almagest* mapped the coordinates of 1,022 “fixed” stars in the outer firmament and bestowed a greater importance upon those who made up the constellations through which the sun passed over the course of a year, the zodiac signs and stars.

In terms of astrology's inseparable involvement in all matters of life upon earth in ancient cultures, here we make a brief digression to underline the mathematical sciences informed by the Ptolemaic blend of astronomy and astrology. The contemplation of the moving points of light in the night certainly rewarded ancient civilizations with “real” wisdom, in the sense of being confirmed by modern astronomical investigations, about the cosmos beyond. Looking, tracking, and measuring, remains the primary model by which humanity continues to make discoveries about the natural universe.⁹⁵ The intuition of spherical orbits and an ordered series of planetary stars in the skies above were revelations which required a great deal, millennia's worth, of observations and record keeping.

More immediately, man could witness the actions of some of these celestial bodies upon all life on Earth, including his own: the hot sun's drying of mud and the evaporation of water, swollen rivers and bodies of water under a full moon, and later, the north star's apparent command of the lodestone. However, these were not anomalies in the ancient and early-modern cosmos; every star and each planet was presumed to affect the terrestrial sphere in tangible ways. Some in visible ways, others through unseen, “occult,” effects, all of the heavenly bodies rained down their influences on the Earth, and it was acknowledged that their varying distances and the different angles which the rays hit were factors which affected their strength; the strength of the Sun's radiation is of course felt quite differently on a summer day closer to the equator than it is in the arctic circle. Therefore,

⁹⁵ For example, the confirmation of the Copernican model of the solar system by modern science came about through the observation (and the unsuccessful attempt to measure the parallax) of the star Eltanin, also known as Gamma Draconis, by James Bradley in 1728. James B. Kaler, “ELTANIN (Gamma Draconis),” *Stars*. University of Illinois. Retrieved 2016-21-8.

timing became of critical importance when calculating works against an ever-changing celestial backdrop, and the angle of stars to not only the Earth but also to each other factored into calculations about the cumulative effect of the energy received. In this sense, the prediction of future conditions was not an esoteric or mystical gift, it was in nature much closer to a science based on eons of observation and mathematics, at least as far as the establishment of position. Simultaneously however, these angle-relationships took on subjective qualities with characteristics, sympathies, and antipathies being related in personified terms which departed from what previously could be considered in strictly mathematical and geometric terms.⁹⁶ For example, 120 degrees (“trine”) or 60 degrees apart (“sextile”) were perceived as friendly and strengthening to their collective influences, but 90 degrees (“quartile”) or 180 degrees (“opposition”) were unfriendly and detrimental to their combination.⁹⁷ The positions of the stars and planets were “frozen” in an entity at the moment of its generation, with all of the significance in their angles and locations like an open book to be read by the able astrologer, and we possess testimony of the great pains which both ancient and early-modern civilizations took to insure the favorable “birth” horoscopes of artworks, buildings, and cities.⁹⁸

3.5. “Stairways to Heaven”: Ancient Philosophy, Magic, and Theurgy

Ptolemaic astrological tradition was fomented from and fully participated in the Classical world's philosophies of metaphysics, theology, and natural philosophy. Ancient developments in mathematical astronomy, theoretical physics, and geometry which came about as the stars and planets' interactions were questioned undergirded the heavens' integration within a wholly natural framework by later ages. Yet, from the earliest times, the study of the heavens was inseparable from the metaphysical philosophy of the Classical period and thus incorporated into the philosophical foundation of the later West. Plato's *Timaeus* associated the observation of the heavens and the reflection it prompted in the human intellect as the starting point for all philosophy; from Plato's own contemplations on the nature of the universe and of the divine and man's place in the cosmos,

⁹⁶ For an articulation of the process by which ascribing agency to any non-human entity became a cardinal offense to our present concepts of scientific theory, see Riskin, Jessica, *The Restless Clock: A History of the Centuries-Long Argument over What Makes Living Things Tick*.

⁹⁷ Quinlan-McGrath, *Influences*, 39.

⁹⁸ E.g. the postponement of work on Alessandro Farnese's astrological vault in the audience hall at Caprarola and the botched founding of Forlì under auspicious stars recorded in the *Annales Forolivienses*; see idem, 9-11, 81-82.

the idea of a beneficent Demiurge emerged.⁹⁹

With Plato was ushered in as well the language which would dominate the following two millennia's discussion of how heavenly qualities could be transmitted to the Earth. In envisioning a set of original, but removed Forms of which everything sensible was but an imperfect copy,¹⁰⁰ this existent and unchanging world was largely posited in the heavenly lights and their divinities. How this was accomplished was imagined to be the result of a divine power's creation of triangular forms through space, which gradually coalesced following the rules of geometry to form the solid figures recognizable as the four elements.¹⁰¹ The “top” of the triangle of course resided in unreachable space (χώρα), and we may recognize in this the first model for a material channel of cosmic influence upon the terrestrial sphere. In the later *Epinomis*,¹⁰² the heavenly ether constitutes the substantial connection to the Creator and people with “spirits” or “demons”; the longevity of this vision as a religious construct has been exceptional. We also find in Plato's thought the first iteration of a world soul,¹⁰³ which would become increasingly related to pre-modern ideas cosmic radiation right throughout the early modern era. Though Aristotle's thought subsumed Plato's Forms into metaphysics and mathematics, change nevertheless remained the essential characteristic of the sensible world. With Aristotle's characterization of light as a diaphanous fluid, “a substratum of visibility which only manifests itself in the presence of the fiery element,”¹⁰⁴ as well as his postulation of the ether with which he filled the heavens, further groundwork was laid for the Stoic pneuma, Neoplatonic emanations, and even the “Newtonian ether” of the early modern period.

Furthermore, a tendency has been observed in the development of Greek metaphysical philosophy that, over time, what is at first intended to be metaphorical or poetic often coalesces later into sincerely physical, materialist understandings of phenomena, with consequences for the advancement of scientific theories by later cultures. The Platonist vehicle of the soul is one such theme in which this has been observed.¹⁰⁵ It seems that what was originally Platonic imagery¹⁰⁶ or

⁹⁹ Idem, 14; see also John Gray, “A Rescue of Religion: Review of *Why Is There Something Rather Than Nothing?* 23 *Questions from Great Philosophers*, by Leszek Kołakowski,” *New York Review of Books* 55.15 (2008), 43-45.

¹⁰⁰ Plato, *Timaeus*, trans. F. M. Cornford (London: Kegan Paul, 1937), 28-29.

¹⁰¹ Idem, 49-52.

¹⁰² Plato, *Epinomis*, ed. and trans. W. R. M. Lamb (London: Heinemann, 1927).

¹⁰³ Plato, *Timaeus*, 34-36. We find foreshadowing of the Platonic world soul's future role in future cosmological philosophy: “And yet his world soul itself proves to be a mathematically derived entity, and seems to have as its chief function the explanation of the regularities of astronomy.” Robert P. Multhauf, *Origins of Chemistry* (London: Oldbourne, 1966), 62.

¹⁰⁴ Idem, 59.

¹⁰⁵ Hermann S. Schibli, “Hierocles of Alexandria and the Vehicle of the Soul,” *Hermes* 121 (1993): 117.

¹⁰⁶ Plato, *Timaeus*, 41e1-2; *Phaedrus*, 264aff.

Aristotelian analogy¹⁰⁷ first became a practical, then necessary device for later philosophers. By the late third century A.D., Plato's chariot-vehicle of the soul had been wedded to the Aristotelian-Stoic soul composed of fire and air as the "luminous body," the "astral vehicle," and the "pneumatic vehicle/body" in the Chaldean Oracles and the Neoplatonist philosophy of Iamblichus, Synesius, Proclus, which shall be addressed shortly below.¹⁰⁸ This process represented the artificial recreation of antiquity's doctrine of the descent of the soul, interpreted materially, as with Hierocles, who cites sacred rites and theurgical practices as the material means for the purification of the spiritual body.¹⁰⁹ In this way, the "vehicles" imagined poetically by Plato became new trails blazed into the philosophy about the physical/material composition of the cosmos. No longer was the human soul subject to only a one-way trip at birth, but Hierocles and others proposed that these were real channels which could be traversed in the opposite direction, towards a union with the Godhead.

Plotinus then arranged the universe's structure as a series of successive emanations from the Divine in a schema wherein these emanations' power diminished in strength with distance as it accrued a denser material nature; the densest sphere at the center in the ancient world view was the terrestrial, and then also organized into elemental spheres which descended from fire through air and water to the fully material earth. Between the gross Earth and the ineffable One were the heavens and their planetary star-rulers, through which passed the original light from the Creator, as well as the human soul, through the series of heavenly spheres as the soul incarnated on Earth. The arrangement of the heavens at the moment of generation, as described shortly above, determined the trajectory which the soul took in its descent and, consequently, the character imparted by the stars. This Neoplatonic idea of descent expounded by Plotinus and others provided a kind of celestial roadmap by which its inner essences, impressed as they were by the heavens on its moment of creation regardless whether the being was man, animal, plant, or mineral, revealed themselves by backtracking the soul's descent through the heavenly spheres. Some works suggested that each successive layer contributed ever-increasing degrees of materiality, with the immaterial soul emerging from the highest sphere and receiving qualities in some material sense upon the ineffable core from the gradually denser realms below.¹¹⁰

The ancient and early-modern understanding of the process of generation and the physical

¹⁰⁷ Aristotle, *Generation of Animals*, 736b, 37-8.

¹⁰⁸ Schibli, "Hierocles of Alexandria and the Vehicle of the Soul," 110-11.

¹⁰⁹ Idem, 114.

¹¹⁰ S. James Tester, *A History of Western Astrology* (Woodbridge: Boydell, 1987), 117-19.

nature of celestial influences was marked by Aristotelian philosophy, even if the Stagirite himself did not hold astrology in high esteem.¹¹¹ Regarding the possibility of a magically-speaking mantic head, Aristotle dismissed any hope of function once the windpipe had been severed.¹¹² As for the question of man-made vessels being capable of receiving any kind of spiritual investment, this was essentially excluded from the limited makeup of the Aristotelian elemental universe.

The natural philosophy of the ancient Greek world rested on the assumption, from Empedocles, that all entities were composed of four elements: Fire, Air, Water, and Earth. Plato subsequently speculated on the inherently mathematical nature of the elements, and Aristotle's further theories about their natures dominated how the natural world was understood for subsequent millennia, well into the early modern period. Aristotle's major innovation consisted in the perception that a pairing with the four elements with four elemental qualities (hot, cold, moist, or dry) effected all transformations on the Earth. Elements could change into one another by the modification of one or both of the qualities; Earth was cold and dry but when heated, became Fire. Material entities, for Aristotle as articulated in *De generatione et corruptione*, were amalgamations of form and matter; the latter was undifferentiated and common to all the universe, whereas the former was what determined the entity's unique nature.¹¹³ Separate, both could only exist as abstractions, but when some agent that was neither form nor quality effected their union, the moment of generation occurred, producing the material entity.

Astrological theory furnished a continuous stream of qualities which descended upon the Earth from the stars, which effected elemental transformations as they introduced or replaced pre-existing qualities in matter. However, one aspect of Aristotle's natural philosophy which would be challenged by later astrological and proto-astrophysical theories was his position that celestial bodies were composed of an entirely different substance than any found within the terrestrial sphere: a fifth element, aether. From the lunar sphere on upwards, the heavens were a disconnected system all to themselves; their aether was limitless and self-replenishing, and stars existed in permanent and unchanging states. How could stars transmit their essences to the terrestrial sphere

¹¹¹ Astrology's debt to Aristotelian philosophy is one acknowledged from the nineteenth century onwards in modern scholarship. See Bouché-Leclercq, *L'astrologie grecque*, 1-34; John D. North, *Celestial Influence: the Major Premise of Astrology* in *'Astrologi hallucinati': Stars and the End of the World in Luther's Time*, ed. Paolo Zambelli (Berlin: De Gruyter, 1986), 45-100; H. Darrel Rutkin, *Astrology, Natural Philosophy, and the History of Science, c. 1250-1700: Studies toward an Interpretation of Giovanni Pico della Mirandola's Disputationes adversus astrologiam divinatricem* (Ann Arbor, MI: University of Michigan, 2003).

¹¹² Aristotle, *De Partibus Animalium*, iii.10.9.12.

¹¹³ Aristotle, *De generatione et corruptione*, 2.10.

from their closed-off, lofty perches in the Aristotelian model? The short answer was that they could not. The heavens no more possessed qualities which could be found on Earth than the Earth did heavenly aether. This Aristotelian stumbling-block occasioned a great deal of inventive theories from the later ages about how planets and stars could elicit qualitative changes in earthly matter, including the idea that powerful orbital movements of stars were capable of effecting qualitative change in earthly matter.¹¹⁴ The Medieval, Renaissance, and Early Modern periods found fertile terrain for debate and original philosophy in the synthesizing of Classical authority with theories about not only form, matter, and qualities, but also light, vision, the nature of rays, and human manipulation of these phenomena.

Ideas about vision and optics from the ancient world were a critical component within the framework of how celestial radiation, most evidently vis-à-vis light but not necessarily restricted to visible light, was theorized. With Aristotle's characterization of light as a diaphanous fluid, “a substratum of visibility which only manifests itself in the presence of the fiery element,”¹¹⁵ as well as his postulation of the ether with which he filled the heavens, further groundwork was laid for the Stoic pneuma, Neoplatonic emanations, and even the “Newtonian ether” of the early modern period. One of the most spectacular sights in the natural world, for untold eons past and future, is the vision of shining points of light in the night sky, and a critical revolution in how man conceived of this outside world was the relation of the celestial rays, and all that they were believed to bring, to the action, properties, and reception of light. Vision evolved from its perception as a threshold to an intellectual understanding of the heavens towards a physical channel for celestial rays (either directly from the heavens or the secondary radiation perceived to be emitted from astral images) through the eyes to the soul. For Aristotle, images entered into the eyes immaterially, preserving only their qualities.¹¹⁶ Within his wider philosophy, for Aristotle, sight was the “queen of the senses” and the first stimulus to wonder, the ultimate contemplation of the divine, and therefore the beginning of all philosophy,¹¹⁷ and this reverence set the tone for later investigations of the phenomena by which the human mind perceived its surroundings.

Other ancient philosophers advanced a more active participation of vision with the material world, a theory known generally as extromission. Plato, Galen, and others subscribed to the idea

¹¹⁴ See Quinlan-McGrath, *Influences*, 47.

¹¹⁵ Multhauf, *Origins of Chemistry*, 59.

¹¹⁶ *Idem*, 62, 68.

¹¹⁷ Aristotle, *Metaphysics*, 1.1.1-2, 1.2.9.

that eyes emitted their own rays which diffused into the material world along the all-present rays of Spiritus (as understood by Platonists and the Stoics), made contact with the visible surfaces of objects, and brought information back on its return to the eyes. One theory conceptualized the force of vision-rays from the eyes being enough to occasion a vibration in the materials they contacted, which stimulated their own emission of rays in turn, which proceeded to transmit their information to the eye (versus the “bounce-back” model of the eye's original rays).¹¹⁸ In a model that would be adopted and promoted later by the scholastic philosophers of the Middle Ages, these light rays were believed to be in a continuous state of transmitting to the eye a mathematically-exact copy of the original object, the image, whether or not they happened to be illuminated.¹¹⁹ Ancient atomist theories of Democritus and Lucretius imagined a very material process by which this took place: material, atom-thin copies physically peeled off the original and traveled along the ray, physically entering the eye.¹²⁰

A corpus of magical texts furnished the ancient world with proposed methods of capturing and manipulating the rays which were in constant transmission from the stars and the distinct, separated realms or spheres they were imagined to inhabit in relation to Earth. Though magic was not given any quarter in the traditional corpus of Aristotle's known works, a body of pseudo-Aristotelian works which rationalized magic within the by-then authoritative philosophical tradition circulated in later ages. The *Liber de causis*, the *Secretum Philosophorum*, and others lent this authority to many derivative aspects of magical theory, which consequently informed theory and practice through late antiquity and the middle ages.¹²¹ A body of late-antique poeticized compendiums of astrological knowledge mingled religion, mythology, astronomy, and natural philosophy and infused the study of the heavens of with its particular markings and framework. The oft-acknowledged pseudo-Ptolemaic *De imaginibus* stands as a cornerstone of a subsequent body of astral magic texts which furnished instructions for correctly making astral images: attracting and retaining some celestial quality into a natural or man-made repository such as a stone or a ring bearing the appropriate inscription. In medieval libraries, *De imaginibus* often circulated with later works on the same theme: Thabit ibn Qurrah's work of the same name, the *Liber lune* of Arabic

¹¹⁸ Quinlan-McGrath, *Influences*, 61.

¹¹⁹ For later adoptions of this construct, see Pecham, *Perspectiva communis*, 108-109 (prop. 1.27); Bacon, *Opus majus*, 1.164; Ficino, *De Vita*, 324-25 (3.16).

¹²⁰ Quinlan-McGrath, *Influences*, 74.

¹²¹ Charles Burnett, *Arabic, Greek, and Latin Works on Astrological Magic attributed to Aristotle in Pseudo-Aristotle in the Middle Ages*, eds. J. Kraye, W.F. Ryan, and C.B. Schmidt (London: Warburg Institute, 1987), 84-96.

astral-magical origin, the *Sworn Book of Honorius*, various versions on the *Ars notoria*, and other texts which provided practical manipulations of celestial qualities towards highly specific purposes, whether they were causing harm to others (as with the *Liber lune*) or procuring a revelatory divine vision (as with the *Ars notoria*).¹²²

Narrowing down the focus to the process of investing a man-made vessel with some divine and celestial quality, the legacy of Hermes Trismegistus's magically-animated statues assumes a central importance. After all, this is the personage credited with bestowing secret knowledge to produce moving, speaking, sweating, and *hanu*-granting cult statues discussed above. One legend recounts that Hermes Trismegistus constructed four animal-headed gods to guard the cardinal points of a city. He introduces spirits into them, which endows the statues with the power to speak and to prevent anyone without their permission from entering the city.¹²³

Vastly more influential than the tale of these four statues is the dialogue in the *Asclepius* text of the Hermetic corpus, which transmits precise instructions how to bind spirits to such statues and manufacture the “living gods” of antiquity, a technique which relied on intrinsic sympathies between herbs, stones, aromatics, and other materials and the soul of the angel or demon the operator wished to bind.¹²⁴ The *Liber Sacer* (sacred book) of Hermes is a list of decan images, stones, and plants in sympathy with these celestial spirits as well as instructions for the proper manufacture of rings and other talismans to harness these energies.¹²⁵ Although Hermetic texts have been dated only as far back as the first centuries of the common era, this practice appears in Egyptian magical papyri and may with confidence said to be authentically ancient.¹²⁶

A new focus on wonder and mystery in Greek worship (particularly for this study the animation or investment of statues with *spiritus* and its related sources in astrology, astronomy, metaphysics, philosophy, magic, and religion) has been traced by scholars of Greek philosophy and

¹²² Frank Klaassen, *English Manuscripts of Magic, 1300-1500* in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 9.

¹²³ Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (Chicago: University of Chicago Press, 1964), 54-55.

¹²⁴ “Just as the Lord and Father is the creator of the gods in heaven, so man is the author of the gods who reside in the temples. Not only does he receive life, but he gives it in his turn. Not only does he progress towards God, but he makes gods... They are animated statues, full of sensus and spiritus who can accomplish many things, foretelling the future, giving ills to men and curing them... Our first ancestors invented the art of making gods. They mingled a virtue, drawn from a material nature, to the substance of the statues, and since they could not actually create souls of demons or angels, they introduced these into their idols by holy and divine rites, so that the idols had the power of doing good and evil.” *Asclepius*, reproduced in idem, 37.

¹²⁵ Idem, 48.

¹²⁶ See the Egyptian papyrus ζωπορευν, XII.318, specifically in sections iv.1841 ff., 2360ff; see Eric Robertson Dodds, *The Greeks and the Irrational* (Berkeley: University of California Press, 1951), 293.

intellectual history as a devolution from Rationalism, the golden standard for many modern scholars. For a host of socio-political motivations, Eric Robertson Dodds perceived a cause-effect relationship between insecure conditions in ancient Greece and man's belief in and dependence on suprahuman intervention, observing witheringly that “vulgar magic is the last resort of the personally desperate.”¹²⁷ A “spiritual resignation” has also been this phenomenon's description elsewhere.¹²⁸ Although these characterizations certainly reflect our present culture's high value on logic and rational experience, their analyses pry open a window into the Greek mentality's relationship to the “living” gods inhabiting their temples. Whatever its root causes,¹²⁹ religious life in Classical Greece experienced a re-orientation towards individual salvation, obtained through a personal revelation by an oracle, vision, or dream; in many cases, but certainly not all of them, a cult statue invested with divine spirit plays a central role.

The first-century A.D. letter of Thessalos of Tralles has been identified as emblematic of this kind of religious experience sought after in late antiquity. Thessalos, finding little success in his life, undertakes a pilgrimage to the Theban priests who are skilled in the art of obtaining oracular visions; the vision comes to him while in the temple and reveals critical knowledge that allows Thessalos to go on to build a successful and prosperous career.¹³⁰ In another story, a speaking Hecate oracle is credited with delivering instructions to manufacture an image which will procure dream-visions of the goddess.¹³¹ In both cases and in the late-Classical world's cultural framework, wisdom is inherently secret and transmitted by divine revelation. Knowledge of *arcana naturae*, nature's secret workings, was classified a sacrament to be passed from god to man and protected from abuse by less worthy men with rigorous secrecy.¹³² The sentiments of Thessalos's letter and Hermetic or revealed wisdom traditions in general for the time period embody an estoeric tradition which passed into subsequent cultures. The arcane processes by which the ancient world brought to life its temple idols certainly belonged to this class of knowledge which was guarded by the built-in safeguards the secrets literature genre incorporated. Whether these methods were magical or mechanical can be viewed as a modern splitting of hairs; to the ancient world, either method relied

¹²⁷ Idem, 288.

¹²⁸ Festugière, *Révélation d'Hermès Trismégiste*, 1:5; Eamon, *Science and the Secrets of Nature*, 18.

¹²⁹ E.g. “the break-up of the *polis*, religious syncretism, the loss of political freedom, spiritual anxiety resulting from continuous warfare and the Roman dominion, and plain intellectual exhaustion.” Eamon, *Science and the Secrets of Nature*, 18. On the same subject see also Clagett, *Greek Science in Antiquity*, 149; Dodds, *The Greeks and the Irrational*, 235-6.

¹³⁰ This is the barest summary; for a more detailed account, see Eamon, *Science and the Secrets of Nature*, 19.

¹³¹ Dodds, *The Greeks and the Irrational*, 294.

¹³² Eamon, *Science and the Secrets of Nature*, 354-55.

on the manipulation of insight preserved from the masses and passed only to initiates.

This common thread whose aim was to shield an inherently secret and privileged wisdom from the common purview runs through many philosophical attitudes and magical traditions of late antiquity. Different schools of thought contributed varying approaches and attitudes about how best to transmit this sacred knowledge. Initially, this esotericism was not restricted to religious doctrines. Aristotle's popular, "exoteric discourses" have been distinguished by scholars from his treatments of the same subject on philosophical lines more systematic and intended for the specialist.¹³³ With Neo-Pythagoreanism can be observed a codification of philosophical magic with the identification of Pythagoras as a grand magus in a succession of wizards that included Empedocles, Democritus, and Plato.¹³⁴

The figure of the magus assumed a special identity as one privy to the occult relations in the universe via the reception of divine *gnosis*, which was otherwise beyond the reach of normal men.¹³⁵ By the first centuries of the common era, a heightened interest in mysticism and spiritualism is marked by the composition of the Hermetic works.¹³⁶ Two types of texts have been distinguished within this body of work: the philosophical component of the *Corpus Hermetica* and the technical tracts on alchemy, astrology, natural history, medicine, magic.¹³⁷ The manufacture of "living gods" straddles both the philosophical, as it relied on an understanding of the presence of the divine in natural materials, as well as the crafts-making tradition of the second category. Garth Fowden articulated the significant continuities between Hermeticism and Neoplatonic theurgy,¹³⁸ and it is to this later evolution which we now turn.

So far, I have avoided using the word "theurgy" in this discussion of ancient traditions of animating statues because it did not, as a term, appear outside of the works of Neoplatonic philosophers, and when it did, it was invested with a far greater sense than the simple endowment of spirit or movement into a vessel. Different scholars have used theurgy to mean both the range of wonder-working ritual magic, in the more general sense of thaumaturgy, as well as specific aspects of its practice, such as the procurement of a divine vision or the channeling of a non-human spirit

¹³³ E.g. Aristotle, *Eudemian Ethics*, 1217b20-25.

¹³⁴ Eamon, *Science and the Secrets of Nature*, 24.

¹³⁵ *Idem*, 18.

¹³⁶ *Ibid.*

¹³⁷ See Hans Dieter Betz, *Greek Magical Papyri in Translation* (Chicago: University of Chicago Press, 1986).

¹³⁸ Garth Fowden, *The Egyptian Hermes: A Historical Approach to the Late Pagan Mind* (Princeton, New Jersey: Princeton University Press, 1986), 126-153; Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 5-6.

through mediumship.¹³⁹ To the theurgists themselves, the rituals observed and the phenomena sought after has been summed up by Georg Luck with the statement, “Let us assume now that twelve Neoplatonists conducted twelve different theurgical practices within the space of a month and then met to discuss their results. It seems very unlikely that anything like a uniform picture or a consensus would emerge.”¹⁴⁰ Not every Neoplatonist from the several schools which emerged over the course of four centuries was a theurgist or even held the same opinion of the practice; the following discussion focuses on those Neoplatonists who shaped the legacy of theurgy and particularly its “god-making” component which later ages inherited.

Theurgy has been juxtaposed to theology and set apart by its requisite activity: practice or operation. Whereas theology is contemplative or theoretical, theurgy is a highly practical form of worship in which its adherents perceived an assured channel of communication to the gods.¹⁴¹ Because of the capacity of the theurgist to unite with and thus become equal to, for however brief a time, the gods, they ranked themselves above theologians: “they not only think and talk about the gods; they know how to act upon them.”¹⁴² From the third to the sixth centuries, many Neoplatonists wrote about theurgy and appear to have been practitioners, to varying extents. Not only Plotinus, Proclus, Iamblichus, Synesius, and other well-known philosophers have been associated, but also a slew of more minor philosophers and devotees have been documented as well: Aedesius, Asclepiodotus, Chrysanthius, Eunapius, Heraiscus, Isidorus, Julian the Emperor, Marinus, Maximus, Nestorius, Plutarch of Athens, Sallustius, Sopater, Sosipatra, her husband Eustathius and son Antoninus the Anchorite, Syrianus, and Theosebius.¹⁴³

In the extraordinary account of Sosipatra in the fourth century, as told by Eunapius, we find that participation in theurgy is not the exclusive domain of male priests or philosophers; having been tutored by two extraordinary men, believed to be blessed demons, angels, or otherwise unworldly, Sosipatra of Ephesus developed what appears to have been extraordinary psychic gifts of clairvoyance and insight. She married, had three children, and after the death of her husband moved to Pergamon. When an admirer sought to use magic to capture her affection, she turned to Maximus,

¹³⁹ For the first, see Friedman, *Safe Magic and Invisible Writing in the Secretum Philosophorum*; for the second, Richard Kieckhefer, *The Devil's Contemplatives: The Liber Iuratus, the Liber Visionum, and Christian Appropriation of Jewish Occultism* in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 3-31.

¹⁴⁰ Georg Luck, *Theurgy and Forms of Worship in Neoplatonism in Religion, Science, and Magic: In Concert and in Conflict*, eds. Neusner, Jacob et al. (New York and Oxford: Oxford University Press, 1989), 202.

¹⁴¹ Idem, 186.

¹⁴² Idem, 189.

¹⁴³ Idem, 191; Luck sources this list in Damascius's *Vita Isidori* and Eunapius's *Vitae Sophistarum*.

who was the pupil of Aedisius and the teacher of the Emperor Julian, to counteract this attempt with even stronger magic.¹⁴⁴ It would seem that the circle of theurgists in fourth-century Asia Minor was an intimate one indeed.

The “father” of theurgy is acknowledged to be the second-century Julian the Theurgist, son of Julian the Chaldean, known best by a story recounted by Proclus as the maker of a clay human head which emitted flashes of lightning at the Dacians and brought victory to Emperor Marcus Aurelius.¹⁴⁵ However, the Chaldeans themselves have been positioned as the heirs to the Assyro-Babylonian civilization and the nexus by which Babylonian science impacted Greek tradition.¹⁴⁶ Their ability to predict eclipses is testified to have been invented before 600 B.C., a tablet dated 523 B.C. puts in evidence their ability to track the relative positions of the sun and moon, and by 200 B.C., the principal phenomena of the planets could be correctly anticipated.¹⁴⁷ Their astral religion and its attached priesthood appears to be in existence by the sixth century B.C. The source of the theurgic technique which surfaced in late-antique literature has been pinpointed to the second-century *Oracula Chaldaica* attributed to the same, called “the basic code” or “bible” of theurgy,¹⁴⁸ which is a now-fragmentary collection of Greek hexameters imparting *logia*, or sayings written in such an enigmatic style that it would probably have necessitated a spiritual guide or mentor to receive its deepest meanings. Dodds recognizes the Chaldean Oracles as the “last important Sacred Book of pagan antiquity” and has charted their rediscovery by modern scholars.¹⁴⁹

After the *Oracula*, the earliest properly theurgic text is a no-longer extant book entitled *Telestikè* by the same Julian the Theurgist; the title indicates that its principal aim was the practice of consecrating and animating statues, a distinct brand of theurgy known by the same Greek term. The Chaldean Oracles diverged from a simple, albeit profound, knowledge of natural materials to the sphere of ritual only when the theurgist requested divine help or direct communication with higher beings.¹⁵⁰ In fragment 147, for example, the goddess Hecate speaks to the devotee, providing a kind of guide to the visions one would expect:

¹⁴⁴ Ibid.

¹⁴⁵ See Hans Lewy, *Chaldean Oracles and Theurgy: Mysticism, Magic and Platonism in the Later Roman Empire* (Cairo, 1956, 2nd edn. Paris, 1978), 247-48; Luck, *Theurgy and Forms of Worship in Neoplatonism*, 186; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 6.

¹⁴⁶ Multhauf, *Origins of Chemistry*, 88.

¹⁴⁷ Ibid.

¹⁴⁸ Luck, *Theurgy and Forms of Worship in Neoplatonism*, 185; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 6.

¹⁴⁹ Eric Robertson Dodds, “New Light on the 'Chaldaean Oracles',” *The Harvard Theological Review* 54.4 (1961): 263.

¹⁵⁰ Blavatsky, *Isis Unveiled*, 37.

After this invocation you will see either a fire which, like a child, leaps in the direction of the flow of the air, or a shapeless fire from which a voice rushes forth, or an abundant light which encircles, as it whirrs, the earth, or a horse which flashes more brightly than light, or a child riding on the swift back of the horse, on fire, or covered with gold, or else naked, or holding a bow and standing on the horse's back.¹⁵¹

Theurgy, as Georg Luck and E.R. Dodds have explored, centred not only around the god-making which is the focus of the present study, but a whole range of practices to induce trance or an otherwise mediumistic state.¹⁵² The theurgist's ambition to see the gods' luminous bodies themselves (or rather, the forms which the otherwise incorporeal gods assume for the benefit of the human theurgist¹⁵³), when fulfilled, became the criterion for full initiation into the rite and its other mysteries, including *telestikè*. The fiery vessel of the soul, whose development into a physical understanding by Hierocles and others has been discussed above, had an integral role to play within this facet of theurgy because it was the only way which man's soul could physically ascend upon a chain of common “matter” to the divine. Material rites which involved purifying stones, herbs, or incantations served to strengthen this vessel.¹⁵⁴ Within this body of tradition, the invocation and vision of the God “of the winding form” has been interpreted by moderns to allude to the vibratory rays of astral light, omnipresent in nature, which theurgic ritual and technique aimed to harness and manipulate.¹⁵⁵

The manufacture and consecration of statues in the proper way so as to contain this substance is what the god-making branch of theurgy hinged upon. Two passages, one from fragment 224 of the *Oracula* and the other from Porphyry, provide formulaic examples of how this was achieved.

Create a statue, purified in the manner I shall teach you. Make the body of Mountain rue [πήγαιου

¹⁵¹ Quoted by Luck, *Theurgy and Forms of Worship in Neoplatonism*, 196. Other fragments (147, 148) speak of the sacred fire that shines without a shape or a fire that does not diverge from a lion-shape, all the while lit by flashes of lightning.

¹⁵² The “evocation of light” is another term applied to still another branch of theurgy; its method relied upon staring at a lamp, closing the eyes, reopening them, praying, and repeating or, alternately, staring for a long time at a white (presumably illuminated wall) painted with magical symbols. The desired effect was to obliterate the sight of the lamp or wall with an overwhelming radiance. Idem, 202.

¹⁵³ Idem, 197.

¹⁵⁴ Psellus, *Comment. in Oracles chaldaïques*, ed. E. des Places (Paris: 1971), 169.

¹⁵⁵ Blavatsky, *Isis Unveiled*, 31-32. Whether this substance interpreted as the vessel of the human soul or the substance of the gods is to a certain degree moot, as they are posited to be identical.

ἄργιου = *Ruta halapensis*, according to Dioscorides 3.45, who identifies it in 3.46 with the magical Homeric herb *moly*] and adorn it with little animals, with domestic lizards, and when you have crushed a mixture of myrrh, gum [στραξ] and frankincense, blend it with these creatures, go out into the open air under a waxing moon and perform the rite by saying this prayer.

You consecrate a statue of Hecate in the following way: Produce a certain kind of fillet; grind lizards together with fragrant essences and burn all that; say a certain prayer in the open air under a waxing moon; do all this to consecrate the statue of Hecate. Then she will appear to you in your sleep.¹⁵⁶

In addition to consecrated statues, the theurgist also made use of a “rhombus of Hecate” made of a gold ball enclosing a sapphire (the “bull roarer” found in Aboriginal, Oceanic, Scandinavian, and Celtic usage from prehistory onwards crafted from much simpler materials like wood and bone) and a magical wheel which in its earliest ritual had a bird, the wryneck (*Lynx torquilla*) tied or nailed onto it, but later stood alone in ritual. The latter appears to have origins in Babylonian tradition, called “tongues of the gods” by the magi observable on Apulian vases, and is perhaps the same feature observed by Philostratus to be hanging from the ceiling of the palace in Babylon.¹⁵⁷ These fill out an expanded picture of the material culture of the late-antique theurgist, but while they may have been used in ritual in trance or to “speak” for the gods, their relationship to the invested statues also produced by the theurgist remains to be further explored.

Plotinus (*ca.* 204-270) has been associated with Neoplatonic theurgy, but Eric Dodds and Arthur Armstrong have chipped away at previous perceptions that his philosophy embodied both Neoplatonism and theurgic ritual simultaneously.¹⁵⁸ Nevertheless, Plotinist philosophy maintains that beings on Earth are linked with the heavenly bodies through an intricate, living network of influences, thus articulating the foundational rationale for how magic and prayer can work through natural sympathetic bonds within the universe.¹⁵⁹ Particularly, a discussion of invested vessels which appears in the fourth *Ennead*,¹⁶⁰ which were collected and edited by Porphyry (*ca.* 234-*ca.*

¹⁵⁶ Both reproduced by Luck, *Theurgy and Forms of Worship in Neoplatonism*, 200.

¹⁵⁷ Idem, 200-201; Philostratus, *The Life of Apollonius of Tyana*, 77.

¹⁵⁸ Dodds refutes that Plotinus was a theurgist himself and was instead a lone beacon of lucidity before his successors' retrogression to “spineless syncretism.” Dodds, *The Greeks and the Irrational*, 286; Arthur Hilary Armstrong, “Was Plotinus a Magician?” *Phronesis* 1 (1955): 73-79. Cf. Gregory Shaw, “Theurgy: Rituals of Unification in the Neoplatonism of Iamblichus,” *Traditio* 41 (1985): 1-28; Philip Merlan, “Plotinus and Magic,” *Isis* 44 (1953): 341-348.

¹⁵⁹ Kieckhefer, *Magic in the Middle Ages*, 26-27.

¹⁶⁰ “And I think that the wise men of old, who made temples and statues in the wish that the gods should be present to them, looking to the nature of the All, had in mind that the nature of a soul is everywhere easy to attract, but that if

305), grounded both Neoplatonic philosophers as the antique authorities for later ages.¹⁶¹ Porphyry also left testimony (*Vita Plotini* 23) that four times a year, Plotinus succeeded in the ascent to the highest god, and Plotinus's own definition of ecstasy rested upon the soul's awakening from its physical nature.¹⁶² As for the investment of statues with divine consciousness, Porphyry also describes a theurgical ritual in which a statue of Apollo, bound with wreaths and linen straps and surrounded by bright lights and the assault of chanted prayers, does indeed speak, begging to be left alone.¹⁶³ However, although the *Oracula* were known to Plotinus, he apparently considered Orphism to be the origin of the god-making branch of theurgy,¹⁶⁴ which seems to be in agreement with Luck's assessment that for Plotinus, magic and music equally possessed the capacity to affect the irrational soul.¹⁶⁵ Here the distinction is made that although his biographer reports that Plotinus possessed supernatural abilities and believed to a certain extent in the efficacy of magic, this does not mean *de facto* that Plotinus was a practicing magician himself. In order to address magic, which was a part the world which Plotinus inhabited, principles of sympathy and antipathy believed to be freely available and omni-present in the universe were used. This approach anticipates the passage of Aristotle cited by De' Vieri to best explain the animation of Daedalus's statues and by implication the late-Renaissance automata which are the central object of the present study. Within this framework of belief, magic becomes a wholly natural phenomenon, linked to the effects of incoming cosmic influences which affected humans and other terrestrial matter alike.

With the absence of the *Telestikè* text of Julian the Theurgist, which we presume discussed

someone were to construct something sympathetic to it and able to receive a part of it, it would of all things receive soul most easily. That which is sympathetic to it is what imitates it in some way, like a mirror able to catch the reflection of a form." Plotinus, *Ennead* IV, 3:11; cited by Voss, *Marsilio Ficino*, p. 41. Elsewhere this passage has been translated, "...those ancient sages, who sought to secure the presence of divine beings by the erection of shrines and statues, showed insight into the nature of the All; they perceived that, though this Soul (of the World) is everywhere tractable, its presence will be secured all the more readily when an appropriate receptacle is elaborated, a place especially capable of receiving some portion or phase of it, something reproducing it and serving like a mirror to catch an image of it." Yates, *Giordano Bruno and the Hermetic Tradition*, 64.

¹⁶¹ "Plotinus uses almost the same examples in that place where, paraphrasing Hermes Trismegistus, he says that the ancient priests or Magi used to capture in statues and material sacrifices something divine and wonderful. He holds moreover, with Hermes Trismegistus that through these materials they did not, properly speaking, capture divinities wholly separate from matter but deities who are merely cosmic..., that is, a life or something vital from the *anima mundi* and the souls of the spheres and of the stars or even a motion and, as it were, a vital presence from the daemons. Indeed, the same Hermes, whom Plotinus follows, holds that daemons of this kind- air ones, not celestial, let alone any higher- are present all along in the materials and that Hermes himself put together statues from herbs, trees, stones, and spices, which had within themselves, as he says, a natural force of divinity." Ficino, *De Vita Coelitus Comparanda* in Voss, *Marsilio Ficino*, 176.

¹⁶² Luck, *Theurgy and Forms of Worship in Neoplatonism*, 195.

¹⁶³ Idem, 199; Porphyry, *De Philos. ex Oracul. Haur.*, 162ff.

¹⁶⁴ Luck, *Theurgy and Forms of Worship in Neoplatonism*, 186; Plotinus, *Enneads*, 4.9.11.

¹⁶⁵ Luck, *Theurgy and Forms of Worship in Neoplatonism*, 205.

the animation of statues by priests (*telestès*) who concealed within them natural substances with affinities and sympathetic bonds to their corresponding deity,¹⁶⁶ we do not encounter a comprehensive treatment of theurgy until Proclus (412-485), whose conception extended far beyond the animation of mere statues; it was, “a power higher than all human wisdom, embracing the blessings of divination, the purifying powers of initiation, and in a word all the operations of divine possession.”¹⁶⁷

Historians have elaborated further on this aspect. Dodds clarifies theurgy's distinction from previous eras' conceptions of magic, “Whereas vulgar magic used names and formulae of religious origin to profane ends, theurgy used the procedures of vulgar magic primarily to a religious end.”¹⁶⁸ Wouter Hanegraaff writes that “Theurgy is the work of the gods on man, not the work of man on the gods. Neither the rationale behind its operations nor the meaning of its symbols can be understood by mere humans, nor need they be: what is essential is that the ritual is performed correctly.”¹⁶⁹

More general still, the term theurgy has been used to encompass the Neoplatonists' “extravagant rituals for invoking the gods and heightening their own magical powers.”¹⁷⁰ It is within the works of Proclus that we encounter specialized names for the various magical operations which today we know simply as theurgy: *telestike* (τελεστική) was the consecration and animation of statues,¹⁷¹ and *symbola* (σμβολα) were the concealed combinations of materials held to be their animating agents within.¹⁷² Proclus's commentary on the Chaldean Oracles survived through an eleventh-century Byzantine commentary by Psellus (1018- ca. 1078) and, along with the *De Sacrificiis et Magia*, became authoritative for later writers on theurgy.¹⁷³

However, it was not until Iamblichus (ca. 242-327), specifically the treatise *De mysteriis*,

¹⁶⁶ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 6.

¹⁶⁷ Proclus, *Theol. Plat.*, 63; Dodds, *The Greeks and the Irrational*, 291.

¹⁶⁸ Dodds, p. 291.

¹⁶⁹ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 6.

¹⁷⁰ Kieckhefer, *Magic in the Middle Ages*, 27.

¹⁷¹ Proclus, *Tim.*, III.6.13.

¹⁷² Idem, I.273.2. My thanks to Dylan Rogers of the the American School of Classical Studies in Athens for furnishing the English transliterations.

¹⁷³ See Laurence J. Rosán, *The Philosophy of Proclus: The Final Phase of Ancient Thought* (New York, 1949), 213 ff.; Lewy, *Chaldean Oracles and Theurgy*, 462-3; André-Jean Festugière, “Proclus et la religion traditionnelle,” *Mélanges Piganiol* 3 (Paris, 1963): 1581-90 and “Contemplation philosophique et art theurgique chez Proclus,” *Studia di storia religiosa di tarde antichità* (Messina, 1968): 7-18; Anthony Smith, *Porphyry's Place in the Neoplatonic Tradition* (The Hague, 1974), 111-21; Jean Trouillard, *L'un et l'âme selon Proclus* (Paris, 1972) and “Le merveilleux dans la vie et la pensée de Proclus,” *Rhphilos* 163 (1973): 439-51; Anne Sheppard, “Proclus's Attitude to Theurgy” *The Classical Quarterly* 32 (1982), 212-24.

that theurgy found its theoretical systematization in Neoplatonism¹⁷⁴ and ushered in a “vogue” for the art.¹⁷⁵ This work's tenet that stellar manifestations were the true vessels of the gods and that an imitation of their universal forms enabled the theurgist to draw their spirit into earthly vessels¹⁷⁶ proved a tenacious concept when Neoplatonic treatises were rediscovered in Renaissance Italy. However, Hanegraaff has raised the issue of a puzzling feature of Iamblican theurgy; two complementary spiritual phenomena, “possession” and “soul flight” (the arriving of a soul into a vessel vs. the leaving of the human soul out of the body) are suggested to be inseparable from each other: “possession of statues seems to have been seen as a means for having ecstatic experiences.”¹⁷⁷ According to the testimony of Iamblichus's slaves recorded by Eunapius, Iamblichus's ecstasies involved actual levitation.¹⁷⁸ A similarly nebulous relationship between the animation of statues and mystical experiences would later resurface in Renaissance Neoplatonism, though levitation was more frequently found associated with the lives of Christian holy men and women.¹⁷⁹ Nevertheless, the *sine qua non* of magical philosophy remains the synthesis of religion and the nascent natural sciences.

Commonalities in origin and aim can be perceived in Neoplatonic theurgy, Hermeticism, and alchemical doctrines. Divine *gnosis*, which encompassed for the ancients a broad spectrum of natural secrets, is given as the point of origin for the technique of animating statues, which was taken up and expounded upon by Neoplatonic philosophers and alchemists alike. Traditionally both are the received teachings of Hermes Trismegistus from distant antiquity acknowledged by modern historians to have their capital at Greco-Egyptian Alexandria. Hermetic and alchemical texts alike possess characteristic cryptic and allegorical language.¹⁸⁰ Concerning alchemy more specifically, this esotericism guarded technical secrets for a range of craft-activities related to the art, including glass-making and metal-working. However, it is worth remembering here however that both disciplines possessed a common dimension aiming for higher spiritual rewards than the investment

¹⁷⁴ Sheppard, “Proclus's Attitude to Theurgy,” 212; Eric Robertson Dodds, “Theurgy and its Relationship to Neoplatonism,” *The Journal of Roman Studies* 37 (1947): 58-59, 64.

¹⁷⁵ Dodds, *The Greeks and the Irrational*, 294.

¹⁷⁶ Iamblichus, *De Mysteriis*, 168.4-5.

¹⁷⁷ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 8.

¹⁷⁸ Eunapius, *Vita soph.*, 458.

¹⁷⁹ E.g. Teresa of Avila, Veronica Laparelli, and Monica the mother of Saint Augustine. Cornelia W. Wolfskeel, “Some Remarks on the Religious Life of Monica, Mother of Saint Augustine,” *Studies in Hellenistic Religions*, ed. M. J. Vermaseren (Leiden: Brill, 1979), 280-90.

¹⁸⁰ Put in the imagery of scripture, it safeguarded the initiates' philosophical pearls from the masses of swine, from the Gospel of Matthew 7:6 but co-opted in esoteric literature and its commentaries from late antiquity through modern scholarship.

of a vessel or the transmutation of metal to gold. The majority of modern analyses of the field tend to frequently miss this point:¹⁸¹ alchemy's highest aim was the ascension of the soul into a state of union with the divine.

In a similar vein, Porphyry explored in *De regressu animae* the use of theurgic ritual to cleanse the soul and effect its return to God;¹⁸² such a process of transmuting the human soul into a state of union with the divine was *aegoge* (ἀγγελωγή), the goal of the theurgist in late antiquity.¹⁸³ This process of “inner theurgy” can be observed in Plato's *Laws*¹⁸⁴ as well as in other works of Platonic, Pythagorean, and Orphic philosophy.¹⁸⁵ The alchemists's activity was a religious observance in a parallel vein; the projection onto matter of “the mystical drama of the passion, death, and resurrection of the god of the mystery cult” was its sublime secret, and the enlightened alchemist¹⁸⁶ strove for a sympathetic operation upon his own soul. The intermingling of theurgic and alchemical theory and practice was not unique to antiquity; rather, it was taken up enthusiastically by early-modern thinkers of all stripes: proto-scientists, experimenters, princes, and patrons.

For many centuries however, the theosophic germ lay present but often dormant in the subsequent history of the animation of statues by divine or mechanical ends. The soul's quest for enlightenment by the operator of alchemical works or the observer of theurgic ritual is an essentially religious motivation that receives little attention but which accounts for the legions of faithful both mysteries attracted in the Classical world and beyond. Yet this is neither to say that the perpetuation of religious or spiritually-invested mechanics and technology continued solely on account of pious motivations. From their crucible in Greco-Egyptian Alexandria, texts which communicated secrets revealed by the gods themselves equipped their readers with a new-found mastery over nature's occult forces and an advantage over their fellow men. Little wonder then, that the Romans remained deeply impressed and were quick to adapt these methods for their own uses.¹⁸⁷

3.6. Rome and the Latin West

¹⁸¹ As in Kieckhefer, *Magic in the Middle Ages*, 134.

¹⁸² *Idem*, 287.

¹⁸³ Sarah I. Johnston, “Riders in the Sky: Cavalier Gods and Theurgic Salvation in the Second Century A.D.,” *Classical Philology* 87 (1992): 303.

¹⁸⁴ Plato, *Laws*, 803-4.

¹⁸⁵ Uzdavinys wrote that “no great energy” was required to see theurgy's influence in these works; Uzdavinys, “Animation of Statues in Ancient Civilizations and Neoplatonism,” 118-20.

¹⁸⁶ Eamon, *Science and the Secrets of Nature*, 31-32, 42.

¹⁸⁷ *Idem*, 18.

The Romans inherited more or less the Greeks' attitude towards mystical secrets and its preoccupation with the marvelous: nature was itself a miracle and knowable only by divine revelation, and this mystery was disclosed to only a select few. For virtually every conventional science, there existed its secret counterpart for the privileged initiate.¹⁸⁸ Roman *neuropastes* are the counterpart to Greek oracular statues and ancestors of modern automata.¹⁸⁹

The neuropastes are understood to have been images or puppets controlled by a priest manipulating strings. It is not certain whether this was accomplished openly or clandestinely on the part of the priest, but they were considered to be vessels possessed by the gods all the same.¹⁹⁰ Other instances of invested statuettes appear in an account of Nero, who supposedly possessed such a statuette which warned him of conspiracies,¹⁹¹ the accusation against Apuleius that he was in possession of a similar object, Philostratus's mention that they were used as amulets, and the story of Maximus's fabrication of a statue of Hecate that laughs and lights torches in her hands in another Neoplatonic work.¹⁹² Georg Luck has noted that Apuleius was a contemporary and possibly a rival of Julian the theurgist.¹⁹³ Although Apuleius protested his innocence and was acquitted by a court, Psellus used Apuleius as a reference point for the practice of compelling the gods to descend by means of enchanting songs, fettering, and releasing them as well as compelling “the god with the seven rays” by oaths not to communicate with his rival (Julian).¹⁹⁴

However, with the Roman adaptation of Greco-Egyptian mystical tradition and technology emerged a decidedly more cynical and worldly commentary; biting literary satire furnishes colorful anecdotes of humans' interactions with the gods through their animated statues. Horace (65-8 B.C.) wrote in the *Satires* of two hags conjuring spirits who were sent fleeing by the god Priapus, embodied in a nearby statue, who showed his ire by letting forth an explosive fart.¹⁹⁵ Lucian of Samosata (117- ca. 180 A.D.) satirized such statues in his *Philopsuedes*, which offered no quarter to superstition; a magician brings a clay image of Cupid to life to compel a woman to fall in love with

¹⁸⁸ Idem, 15-17.

¹⁸⁹ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 11.

¹⁹⁰ Cohen, *Human Robots in Myth and Science*, 21.

¹⁹¹ Suetonius, *Nero*, 56; Dodds, *The Greeks and the Irrational*, 294.

¹⁹² Eunapius, *Vitae Sophistarum.*, 475. See also Uzdavinys, “Statue Animation in Ancient Civilizations and Neoplatonism,” 118-20.

¹⁹³ Luck, *Theurgy and Forms of Worship in Neoplatonism*, 198.

¹⁹⁴ Ibid; Psellus, *For Those Who Asked How Many Kinds of Philosophical Investigations There Are in Oracles chaldaïques*, ed. E. des Places (Paris: 1971), 221f.

¹⁹⁵ Horace, *Satires*; Kieckhefer, *Magic in the Middle Ages*, 32.

a client. It worked, but the same result could have been accomplished by giving the money directly to the woman.¹⁹⁶

Outside the realm of literary fiction, a life-like moving wax-work of the corpse of Julius Caesar was contrived by Marc Anthony for maximum political effect. During the emotionally-charged atmosphere of the recently-slain ruler's funeral, it appeared that his corpse sat up by its own power on the funeral bier, with twenty-three bleeding stab-wounds in evidence.¹⁹⁷ The sight was incendiary to the crowds, and riot turned to revolution. Unlike the animate Egyptian gods which chose future rulers or oracles issued from speaking gods in Greek temples, this episode from Roman history illustrates a precocious example wherein technology is totally divorced from celestial/divine agency or will (in its imitation of the dead Caesar, it is also more conceptually akin to necromantic animation). Although the Roman masses, like the Egyptian or Greek worshipers before them, could not have known that it was human ingenuity rather than supernatural agency that made Julius Caesar rise from his funeral bier, they nevertheless were one of the earliest audiences to be manipulated by the creation of a life-like wax-work made entirely without the pretence of aid or investment of any divine spirit. However, with Augustus's reign (31 B.C.-14 A.D.) came a law which banned (with limited efficacy however) the consultations of personal astrology in the Egyptian mode and its attendant practices (presumably including the manufacture of astrological images). This did not prevent Augustus's successor Tiberius from executing men with a horoscope disposed to imperial ambitions to safeguard his reign.¹⁹⁸ The reign of Hadrian, who was himself an adept, has been characterized by one historian as the "height of interest in astrology,"¹⁹⁹ yet overall, Rome made few original additions to the content of magic, and divination was the only official use condoned until the Christian era.²⁰⁰

Nevertheless, Roman writers did contribute astrological treatises which, to a certain extent, codified pervading ideological frameworks about the stars and their qualities and at the same time elaborated upon the metaphysical model of the cosmos in terms which passed to and were taken up by later ages. Macrobius's fifth-century *Saturnalia and Commentary on the Dream of Scipio*, which

¹⁹⁶ Kieckhefer, *Magic in the Middle Age*, 32. Lucian also is credited with a prototype of the tale of the sorcerer's apprentice: a pestle is animated by enchantment and becomes uncontrollable. Since this is an ordinary object and not a statue or image, I've excluded its mention in the main text, but it raises another curiosity whether rites associated with statues were applied to other inanimate objects willy-nilly.

¹⁹⁷ DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 11.

¹⁹⁸ Bohleke, "In Terms of Fate: a survey of the indigenous Egyptian contribution to ancient astrology in light of Papyrus CtYBR inv. 1132(B)," 13.

¹⁹⁹ Idem, 15.

²⁰⁰ Evans, *Magical Jewels*, 11.

enjoyed a great popularity in European humanist circles roughly a millenium later, developed the Platonic descent of the soul through highly personalized planetary spheres. The amorous qualities of Venus, the martial ones of Mars, and the jovial aspect of Jupiter, to name but a few commonplace psychological states associated with the planet,²⁰¹ can be observed in this Latin work. Macrobius relied heavily on lists from Ptolemy's *Tetrabiblos*, which emerged from second-century Alexandria and put down a code of qualities associated with each planet or star (for example, physical qualities, heat and moisture, as well as personal, subjective and emotional qualities, like beneficence and masculinity, for Jupiter, the fiery-masculine combination of Leo, or the earthy-feminine nature of Virgo.²⁰²

Marcus Manilius's early *Astronomica*, written in the first century, reads as deeply religious in its reverence for the beauty and perfection of the cosmos, not only for its apparent qualities, but for its implication of a divine creator and an overarching perfection of reason.²⁰³ The sky's constellations, individual stars, planets, and phenomena were imbued with highly specific implications. Consider Manilius's treatment of the constellation Cygnus, associated in legend with the seduction of Leda by Zeus as a swan and the birth of Castor and Pollux:²⁰⁴

From this constellation shall flow a thousand human skills (*artes*): its child will declare war on heaven and catch a bird in mid-flight, or he will rob it of its nestling, or draw nets up and over a bird whilst it is perched on a branch or feeds on the ground... Nay more, such a man will impart to the birds of the air the language of men and what words mean; he will introduce them to a new kind of intercourse, teaching them the speech denied them by nature's law.²⁰⁵

We see in Manilius's approach direct and literal associations between the bird-asterism, the Greek myth and its interpretations, and its relation to a human experience which incorporates both the bird theme as well as powerful traits worthy of the association of Jupiter. Both Manilius and Macrobius were widely read and influential in the formation of medieval and early modern astrological and

²⁰¹ Ambrosius Aurelius Theodosius Macrobius, *The Saturnalia*, ed. and trans. Percival Vaughn Davies (New York: Columbia University Press, 1969); for a modern counterpart in psychological relations of the planetary influences, see Thomas Moore, *The Planets Within: The Astrological Psychology of Marsilio Ficino* (Great Barrington, Massachusetts: Lindisfarne Press, 1990).

²⁰² Ptolemy, *Tetrabiblos*, 1.4-24

²⁰³ *Manilius, Astronomica*, ed. and trans., George P. Goold (Cambridge, MA: Harvard University Press, 1977), 1.483-531.

²⁰⁴ "Hard by is the place allotted to the Swan: as a reward for the shape with which he [Jupiter or Zeus] snared the admiring Leda when, a god changed into a snow-white swan, he came down and offered his feathered form to the unsuspecting woman. Now too with outspread wings it flies among the stars." Idem, 1.31.

²⁰⁵ Idem, 5.331.

astrophysical philosophies and contributed to the growing trend of increasingly making the connection between these celestial emanations in the Plotinist sense, as springing directly from the divine First Mover, and the physical reality of the natural world and universe beyond, with great consequences for how humanity related and interacted with the skies in the centuries to come.

3.7. Magic and Mechanics from Early-Christian Antiquity

As we conclude this overview of the many statues that were “brought to life” in Classical antiquity, either by the manipulation of occult virtues to draw down spirit (or demons, as later centuries would assert) or through more prosaic means, it becomes clear that the knowledge to effect this method of animation remained restricted to a select few: priests, as in the temples of Egypt, Greece, and Rome, initiates of mystery cults and particularly those influenced by Neoplatonic concepts of theurgy, and certain magi-figures. However, bringing statues to life *all'antica* appears only rarely in the supernatural repertoire of magi in antiquity and is not generally including among most canons of “miraculous works.” When it does, its associations tend more towards the necromantic, such as the case of Simon Magus who is a representative magus from both the Roman empire as well apostolic Christianity.²⁰⁶ In the *Clementine Recognitions*, Simon Magus proclaims, “Once on a time I, by my power, turning air into water, and water again into blood and solidifying it into flesh, formed a new human creature- a boy- and produced a much nobler work than God the Creator.”²⁰⁷ Elsewhere, the feats of Simon Magus appear to be more mechanical: the animation of statues to make them laugh and dance and causing a brazen serpent to move.²⁰⁸

Nevertheless, these dramatic feats performed by magi like Simon Magus and Maximus or the awe-inspiring displays of pagan temples preserve only some, by no means all, of the components of the theurgic tradition that endured and resurfaced through subsequent ages. The mechanical texts of Ctesibius, Hero of Alexandria, and Vitruvius surely belong to a larger, lost corpus of works that sustained an active industry of temple mechanics and other inventors. From the

²⁰⁶ The strictly Biblical account is restricted to Acts of the Apostles 8:9-24, but variations appear in the apocryphal Acts of Peter and the medieval *Golden Legend*; Kieckhefer, *Magic in the Middle Ages*, 34. Simon Magus may have historically been a Simon of Gitta mentioned in works of Justin Martyr, Josephus, and Irenaeus, and early church heresiologists. Gitta was a village located by the Roman settlement Flavia Neapolis founded at the end of the first century, and Simon was the figurehead for the Samaritan faith of the time period.

²⁰⁷ Clement of Alexandria, *Recognitions*, 2.15 in *202 Ante-Nicene Christian Library: Translations of the Writings of the Fathers*, vol. 2, eds. Alexander Roberts and James Donaldson (Edinburgh: T. and T. Clark, 1867), 202.

²⁰⁸ Butler, *The Myth of the Magus*, 80.

Classical period however, the technical aspect of this work was subject to cultural prejudices which would endure through the early modern period. Aristotle's perspective on the mechanical arts and the place of its practitioners determined to a certain extent how later ages perceived and made distinctions in its fields. Technical workers' only distinction from slaves lay in the fact that their work served the many, whereas a slave toiled for a single master.²⁰⁹ Accordingly, of these workers we find scant mention; Pappus of Alexandria (*ca.* 290-350 A.D.) reveals that his city's temples' *thaumasiourgoi*, or wonder-workers, used ropes of animal intestines and grass to make their statues' movements more lifelike.²¹⁰ Countless of these anonymous workers were responsible for the operation of other temple machines which manipulated water, air, heat, floats, and pulleys to make their idols cry or lactate (as with an Ephesian Artemis) and scenes to be put in motion when a burnt offering was placed on an altar.²¹¹ In the early-Christian epoch, we find illusionistic hydraulic technology adapted to demonstrate a Gnostic, rather than pagan, analogy: a device that made a small cup appear to fill a larger one to overflowing was put on display by the magician to promise his followers that divine Grace would do the same to their hearts.²¹²

Where did such mechanical operations figure in antiquity's rudimentary framework to distinguish between science and magic? The discourse inherited by the Classical world between *scientia* and *secreta* affords thaumaturgic temple-mechanics a place in both. Aristotelian authority dominated the first and was rivalled by the later, equivalently influential effect of pseudo-Aristotelian works which treated the latter. Whereas *scientia* grounds itself in “demonstrable knowledge of the universal and necessary causes of normal, quotidian natural phenomena... ordinarily in terms of the manifest qualities of the four terrestrial elements, earth, air, fire, and water,” phenomena classed as *secreta* are characterized by occult qualities, unexpected or idiosyncratic outcomes, and artificial manipulations: “tricks of the trade.”²¹³ After all, “art is concerned neither with things that are, or come into being, by necessity, nor with things that do so in accordance with nature;”²¹⁴ ergo, since a thaumaturgical secret, regardless of whether it was mechanical or philosophical in nature, could not properly be the object of scientific knowledge because it, according Aristotle's view, relied on the manipulation rather than the natural state of the

²⁰⁹ Aristotle, *Politics*, 1278a, 1319a, 1338b; Cf. Plato, *Laws*, VIII.846.

²¹⁰ William Newman, *Promethean Ambitions and the Quest to Perfect Nature* (Chicago and London: University of Chicago Press, 2004), 23.

²¹¹ *Machines of the Gods*. Ancient Discoveries. The History Channel. 6 Feb. 2007.

²¹² Irenaeus, *Against the Heresies*, I.13.2.

²¹³ Eamon, *Science and the Secrets of Nature*, 54.

²¹⁴ Aristotle, *Ethics*, 1140a13ff.

elements (and in the case of the astral rays, utilized an extra-elemental quality which Aristotle relegated permanently to an untouchable heavenly sphere, astral images of the magical tradition fell to *secreta*.

A similar development has been observed in the uncoupling of magic and religion during the transition from the pagan to the Christian era.²¹⁵ The veracity of the magic of pagan gods and temples remained unquestioned, but its legitimacy was cast aside. Richard Kieckhefer remarks that the distinction between pagan magic and Christian miracles was difficult to understand from a non-Christian point of view,²¹⁶ but this problematic distinction remained Christianity's legacy for centuries to come. Nevertheless, we find variation in the treatment of antique theurgy by early Christian writers. In one remarkable anecdote from the transitional period in Egypt from paganism to Christianity, the access which the theurgist had to his divinities was acknowledged to be superior to the Christian's:

The abbot Olympius told the following story: A pagan priest once came down to Scetis [the name, or the location, of the monastery], entered my cell and spent the night there. When he observed the lifestyle of the monks, he said to me: "Leading this kind of life, do you see anything of your God?" I said to him: "No." Then the priest said to me: "When we perform the sacred rites for our God, he hides nothing from us but reveals his mysteries to us. But you, after so many labors, vigils, periods of silence, ascetic exercises say: we see nothing? Altogether it would seem that, if you see nothing, you keep evil thoughts in your heart which separate you from your God and that because of this he does not reveal his mysteries to you." I went away and reported the words of the priest to the elders, and they marveled and said that it was so; for unclean thoughts separate God from humans.²¹⁷

Needless to say, this is quite out of step from the general history of the early Christian age in Egypt characterized by the burning of temples²¹⁸ and the exposition of its idols as frauds. The colossus of Serapis in the Alexandria Serapeum, which is believed to have incorporated magnets in order to

²¹⁵ See the discussion of magic, early Christianity, and the Greco-Roman world in Kieckhefer, *Magic in the Middle Ages*, 36-42.

²¹⁶ *Idem*, 37.

²¹⁷ *Apophthegmata Patrum* (PG, 65.314c/d); quoted by Richard Reitzenstein, *Poimandres: Studien zur Griechisch-Ägyptischen und Frühchristlichen Literatur* (Leipzig: Druck und Verlag von B.G Teubner, 1904), 34; translated by Luck, *Theurgy and Forms of Worship in Neoplatonism*, 197.

²¹⁸ As with, for example, the Temple of Atripe. See Stephen Emmel, *Shenoute of Atripe and the Destruction of Temples in Egypt* in *From Temple to Church: Destruction and Renewal of Local Cultic Topography in Late Antiquity*, eds. Johannes Hahn, Stephen Emmel, and Ulrich Gotter (Leiden: Brill, 2008), 161-201; 163-5.

achieve its supernatural-seeming levitation, is perhaps the most well known of works which were swept under Bishop Theophilus's wave of iconoclasm in the late fourth century.²¹⁹

Lactantius (240- ca. 320) quoted the *Asclepius* in his third-century writings without any strong prohibition, but a century later, Augustine (354-430) unequivocally condemned its god-making passage.²²⁰ The latter tended to be the authoritative voice heeded throughout the history of Christendom, and thusly the ancient world's diverse methods used to bring statues to life, both theurgical as well as mechanical, acquired the stamp of the heretical in the Christian. This fate assigned to the animated statues of antiquity places them in the company of other kinds of knowledge belonging to the esoteric tradition and the courses taken by this "cult of secrecy" over the centuries, a topic which has been explored in detail by William Eamon²²¹ and others.²²²

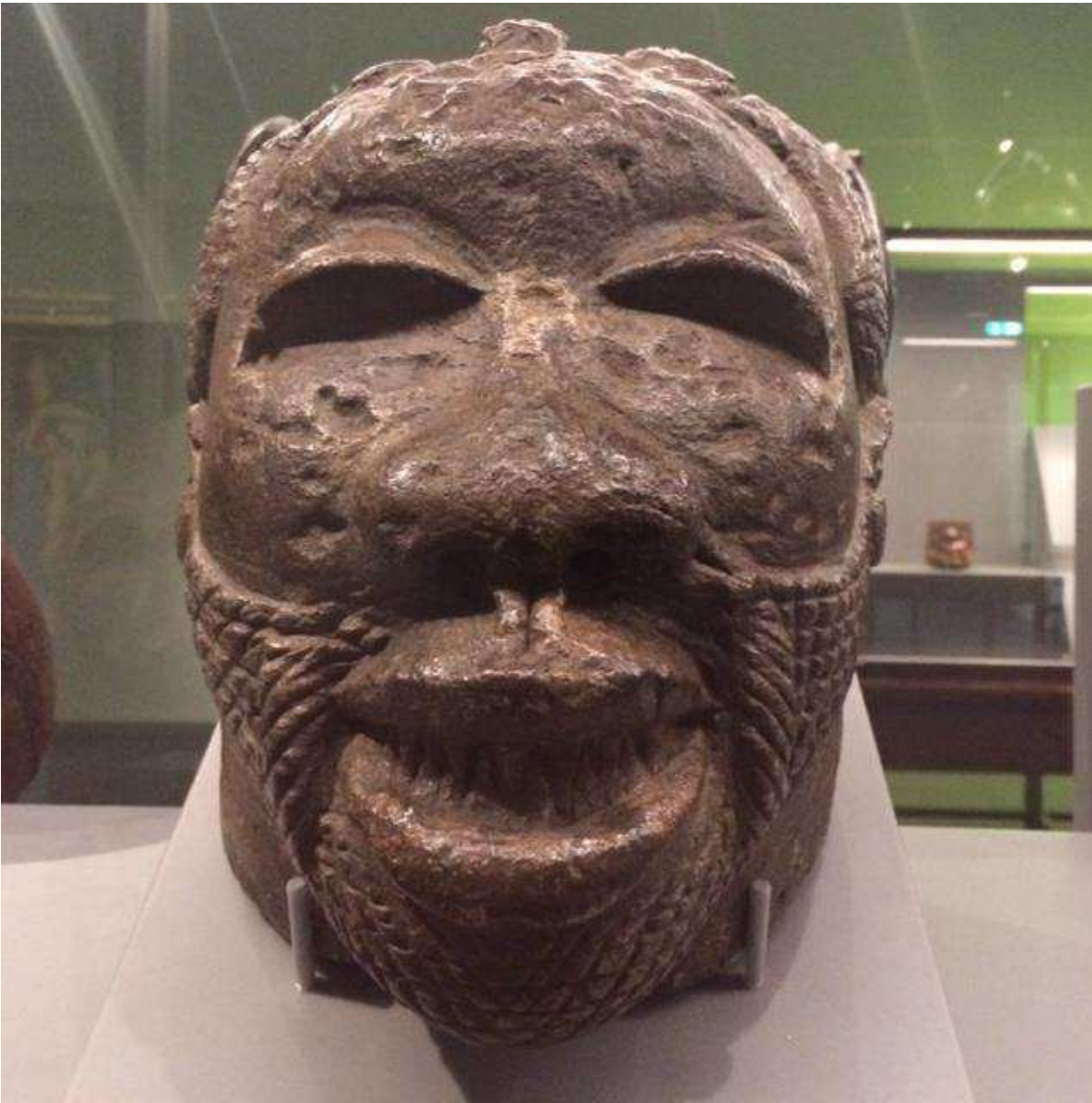
The tradition of manufacturing statues that moved, spoke and otherwise appeared to come alive in the ancient world straddles many classifications imposed upon it by subsequent eras. Although the modern mind can perceive a nascent scientific aspect in the technology it sometimes employed, its inherent art (ie. the manipulation of natural substances, whether they were the air, water, steam, weights, and pulleys in the mechanical devices of Ctesibius, Heron and Vitruvius or hidden (occult) virtues of plants and other substances linked to an astral but no less mechanical network of influences) positioned this discipline outside the bounds of Aristotelian science. Additionally, unlike forms of popular magic and common superstition, the secrets of the temples were those of the highest orders of a closed priesthood, technological secrets and religious mysteries reserved only for the initiate. Thus, already inhabiting a rarefied niche of the Greco-Roman magical landscape, the rise of a dominant Christian worldview pushed theurgical tradition and temple devices to the very margins of experience.

²¹⁹ See Alexandre Foubert, "La Destruction du Serapeum d'Alexandrie" (Ph.D. diss., Université Libre de Bruxelles, 2013).

²²⁰ Yates, *Giordano Bruno and the Hermetic Tradition*, 3, 8-9.

²²¹ Eamon, *Science and the Secrets of Nature*.

²²² Kieckhefer, *Magic in the Middle Ages*, 140-44; James A. Weisheipl, "Classification of the Sciences in Medieval Thought," *Medieval Studies* 27 (1965): 54-90. However, whereas these authors have dedicated segments of their studies to magical recipes which anticipated modern medicine, chemistry, or warfare, comparatively little has been written on vestigial theurgy's contribution to early modern automata or its survival in handbooks or treatises.



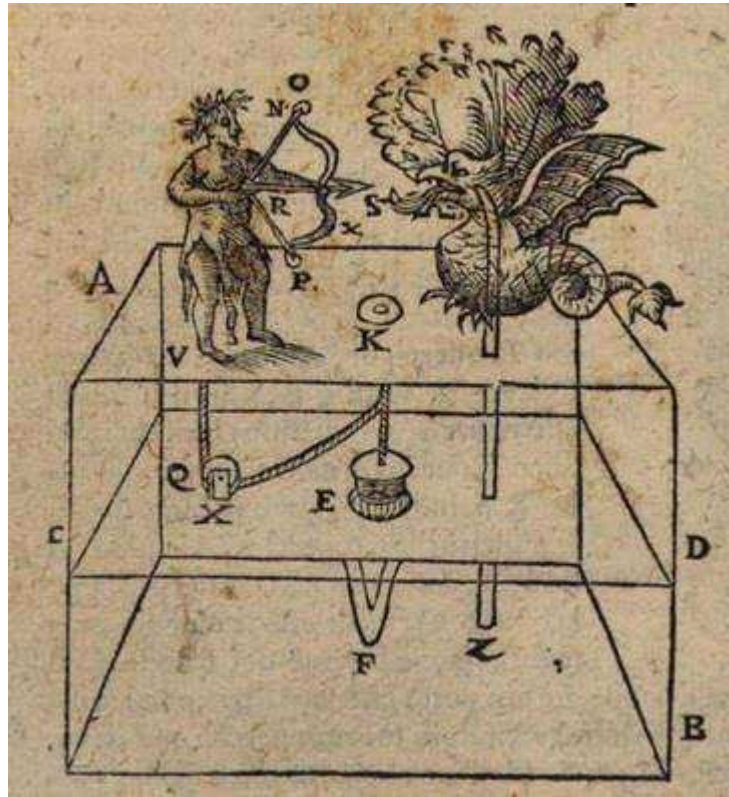
28. *Maha yafei head*, Sierra Leone, ca. 14th c, MUDEC Museum Milano.



29. Pre-Islamic bust with inlaid eyes and coral. Nasli M. Heeramack Collection, Los Angeles County Museum of Art, no. 343.



30. Colossoi of Memnon, Luxor, 1350 B.C.



31. Giovan Battista Aleotti, *Se sopra una data base si fara una macchia di arbori, & in essa s'aviilippi un Drago, & all'incontro di esso un Hercole in atto Saggittante, se alcuno leverà dalla base un pomo con una mano far che Hercole saetti il Dracone, & esso Dracone mani in questo à un Sibilo. Theor. XL in Delli Spiritali di Herone* (Ferrara: Vittorio Baldini Stampator Ducale), 1589, 48.

4. The Medieval Legacy of Magical Automata

The Middle Ages across the Mediterranean basin were awash in traditions that allowed for the animation of statues by a diverse spectrum of means: demonic, as in the most damning stories told of scholastic philosophers who dabbled in natural magic and occult mechanics, hydraulic, pneumatic, or clock-work-powered, as in the jacquemarts of astronomical church towers and Heronic- and Islamic-derived automata, or what can be classified the emerging “preternatural” method- using the occult astral-properties commonly acknowledged to reside unseen in plants, animals, and stones in a controlled approach. This last may be interpreted as “magic,” but also as a kind of astral-technology or astral-mechanics. All three of these methods have direct connections to the Greco-Egyptian, Hermetic, and Neoplatonic traditions which characterize statue animation in the ancient world and whose survival the present study seeks to chart through the early modern period. These immediate predecessors to the moving statues of the Renaissance must be taken in context as foundational ancestors to the automata described by De’ Vieri which were realized in the late-sixteenth century. As this chapter aims to show, neither the mechanical capabilities of the Pratolino automata nor necessarily their identity as objects which demonstrated their makers’ mastery of higher powers was confined to De’ Vieri’s time; in the following pages, we will see which currents of thought were anticipated and in some cases heralded by the Pratolino automata’s medieval forbearers.

The survival and indeed flourishing of the antique world's dual legacies of statue animation comprised not only the “magical” or ritual continued not only Neoplatonic “god-making” theurgy but, in many related instances, its visionary component as well. The production of elaborate, awe-inspiring automata in the service of religion and empire likewise continued to mingle spectacle, power, and privileged knowledge. This chapter examines these individual threads, organized and separated in roughly chronological and geographical fashion. Beginning with the magical or ritual aspect of statue-animation, from the Byzantine and Muslim East to Latin Europe, the study proceeds to examine the razor-thin line between magic and proto-science, such as Al-Kindi's ray theory which was often used by reputable scholars to legitimate the real effects of sidereal bodies (and by extension, astral magic). Pingree's stance should also be underlined: that no matter what we may think with our modern minds about the legitimacy of such magic, we must acknowledge it as scientific, “if for no other reason than because many Western scientists in the sixteenth and

seventeenth centuries took them to be genuine sciences.”¹ Following these two sections is one devoted to the automata documented in the Medieval East and West, as well as the religious contexts in which they were sometimes employed, which strongly mirrored those of the Alexandrian temples.

Finally, a section about the “techno-mythology” of the Medieval period follows. The magical animation of statues featured in fantastic stories with the primary purpose of entertainment is somewhat analogous to the living dolls and possessed statues that populate horror movies today: would the Chucky movies, for example, be used five-hundred years in the future as evidence that late twenty-first century culture still nurtured a sincere belief in the possibility that spirits could inhabit or be bound to man-made vessels? And so we must tread cautiously with the stock-figures, including animated statues, of medieval romances. Nevertheless, the mythology about the creation of magical automata and brazen heads which grew up around the great Scholastic philosophers whose works advanced proto-scientific ray theory, discussed in this chapter's earlier section, is a rich vein for the analysis of how their brilliant innovations, and their time period generally, were received by later ages which saw themselves already in a different and distinct epoch. That epoch constitutes the material to be further explored at length in the following chapter.

4.1. Classical and Arabian Magical Philosophy and its Relation to Statue Animation and the West

In broad strokes, antiquity's knowledge, including its magic and ritual, shifted to the East, to the Arabic-speaking civilizations and to the Eastern Roman Empire and Byzantine civilization. From these incubators, animating methods and techniques made their way to the West, often marked by certain accretions which marked them as “Eastern” products, when in many cases their roots traced much farther back. Egyptian and Greco-Roman astronomical image-making formulae and theory, components of Hermetic magic and Neoplatonic theurgy alike, figure prominently as informing principles to a later corpus of Arabic magical works which rose to dominate the field following the collapse of pagan antiquity. Never mind that the spread of Islam “monotheologized” much of its content and demoted stellar and planetary gods to incrementally-different categorizations as demons or angels, elemental as well as celestial. Philosophical elements from this legacy manifested themselves in the Arabic “secret sciences” as well as those in the open, which

¹ Ibid.

were so influential in European intellectual life from the twelfth century onwards. The East generally was looked to as a repository of magic by virtue of geography alone in some cases. William of Auvergne, Gerald of Wales,² and other writers of the age perceived a higher concentration of magic in the Eastern lands. The former wrote, “In parts of India, and other adjoining regions, there is a great quantity of things of this sort, and on account of this, natural magic particularly flourishes there.”³ However this is not to say that magical texts were not widely translated, read, and disseminated among Western medieval clerics and intellectuals. To the contrary, they fully belong to the “cult of secrecy” and the vogue for esotericism in medieval Europe which has been charted at length by recent historians.⁴

Esoteric and occult sciences survived and surfaced in Byzantium as well, and its research is still ongoing. Collective catalogues of Greek astrological and alchemical manuscripts appeared in multi-volume sets between the end of the nineteenth century through the first half of the twentieth,⁵ and subsequent scholarship is primarily confined to article-length studies. Other recent projects in the field of Byzantine occult studies include the editing of surviving Greek alchemical texts and the publication of the corpus of Byzantine astronomers.⁶ However, the historian who has sketched the present state of this research observed, “...a related topic, Byzantine eschatology, has received much more attention, perhaps because its connection with respectable political history.”⁷ On the whole, the study of any of the Byzantine sciences, let alone its esoteric ones, has received less attention than its parallels in the medieval Western or Islamic worlds.

Nevertheless, two major episodes in Byzantine history stand out for its entwinement with Neoplatonic theurgy: the reign of Emperor Julian (361-363) and a description of a theurgical ceremony by Psellus that took place in 1059 A.D. For the former, the description of Julian's initiation into the rites of theurgy in a work of historical fiction⁸ has been recognized for the plausibility of its details: particularly, clamorous noises, unseen voices, fog, sooty vapors,

² Gerald of Wales, *History and Topography*, [after 1185], trans. John J. O'Meara (Harmondsworth: Penguin, 1982), 1.11, 41; Daston and Park, *Wonder and the Order of Nature*, 75.

³ Here I came across a discrepancy in the citation; in the text, this quote is attributed to William of Auvergne, but the endnote leads to a source for Gerald of Wales; see Daston and Park, *Wonder and the Order of Nature*, 376.

⁴ Kieckhefer, *Magic in the Middle Ages*, 140-44.

⁵ See Marcellin Berthélot, *Collection des anciens alchimistes grecs*, 3 vols (Paris: Georges Steinheil, 1888); *Catalogus Codicum Astrologorum Graecorum*, vols. I-XII (Brussels, 1898-1953); *Catalogue des manuscrits alchimiques grecs*, vols. I-VIII (Brussels, 1924-32); Armand Delatte, *Anecdota Atheniensia*, 2 vols. (Paris: É. Champion, 1927).

⁶ Maria Mavroudi and Paul Magdalino, *The Occult Sciences in Byzantium* (Geneva: La Pomme d'Or, 2006), 45.

⁷ Ibid.

⁸ Joseph Bidez, *La vie de l'empereur Julien* (Paris, 1930), 79.

“luminous shadows,” moving shadows, and “statues that seem to be animated and look at the candidate kindly and threateningly in turn.”⁹ For the latter, the eleventh-century theurgical ceremony in question was the event which Psellus was tasked with investigating; ultimately, it led to the formal accusation of the patriarch Michael Cerularius and the monks of Chios under his power.¹⁰ This ceremony featured “singing, monotonous movements of the limbs, blinking of eyelids, ingesting of narcotics or hallucinogens and rubbing them in, inhaling them as well,” before the prophetess/medium Dosithea levitated and spoke of the cosmos. Christian figures- prophets, martyrs, saints, the Virgin Mary, and the Holy Trinity- also made an appearance through the medium without revealing anything other than the most trivial of salutations.¹¹ Georg Luck highlighted this document as one which still awaits a proper analysis for its implications about the survival of pagan-derived theurgy well into the Byzantine Empire's Macedonian Renaissance.

Historians of medieval magic in the East and West alike however tend to dedicate more ink to alchemy and astrology, with both fields' antecedents in Classical, Persian, Indian and Arabian cultures.¹² Both fields can be related to ancient and medieval methods to manufacture artificial life. Although the aim of this study is to follow techniques which purported to animate man-made vessels (especially statues and other works of art), rather than biological or natural materials (although the distinction becomes fine when a man-made image of dirt becomes a statue; is it when the dirt or clay is fired, for example, and becomes ceramic?), a considerable overlap exists in the surrounding theory and trappings of animating magic. This pursuit hinged upon secrets about the transformation of materials (as in the tradition of Simon Magus of Biblical record and other semitic traditions forming artificial beings from earth or clay). As some historians of automata and theurgy alike have noted,¹³ passages in the eight-century writings of Jâbir ibn Hayyân¹⁴ (ca. 721- ca. 815) which explore the creation of the fabled *homunculus*, constitute an alternative channel for the exercise of man's god-like power of creation and occupied alchemists for centuries to come.¹⁵ Jâbir's

⁹ Luck, *Theurgy and Forms of Worship in Neoplatonism*, 203.

¹⁰ Idem, 203-204.

¹¹ Idem, 204.

¹² See foremost Multhauf, *Origins of Chemistry*.

¹³ See Dodds, *The Greeks and the Irrational*, 294; Eamon, *Science and the Secrets of Nature*, 40-42; Bredekamp, *The Lure of Antiquity and the Cult of the Machine*, 46.

¹⁴ See Syed Nomanul Haq, *Names, Natures and Things: The Alchemist Jâbir ibn Hayyân and his Kitâb al-Ahjár (Book of Stones)* (Boston, Dordrecht, and London: Kluwer Academic Publishers, 1994); Kraus, “Jâbir ibn Hayyân: Contributions à l'Histoire des Idées dans l'Islam,” 2 vols. (*Mémoires de l'Institut d'Égypte* 44 (1943-44); Kieckhefer, *Magic in the Middle Ages*, 118.

¹⁵ See Newman, *Promethean Ambitions and the Quest to Perfect Nature*.

inspiration in Classical culture was extraordinary for his day; in other writings, he proclaimed the imminent advent of a new Imam that would abolish the law of the Koran and Islam itself with Greek science and philosophy.¹⁶

Yet, it appears that the alchemical pursuit of artificial life also had roots in a branch of “Sabaeen” magic localized in the Syrian city of Harran, an outpost which retained a primitive form of Gnosticism and the last shelter for Sumerian, Hittite, and Babylonian civilizations.¹⁷ However, the incorporation of Aristotelian and Platonic theories about the generation of animal and human souls was observed by Pingree in the passage:

...the magus artificially creates new animals by uniting either within a womb or within a womblike chamber animal or human parts representing the material body and the particular part or function of the soul that he wishes his creation to be endowed with. The magus can then employ his artificial animal to accomplish wonders.¹⁸

Achemical recipes for creating a homonculus, an artificial human created mostly *in vitro*, often involved the handling of biological matter (semen, blood, and rotting flesh feature in Paracelsan techniques and elsewhere). Whereas some aspects of their operations may be deemed “mechanical” in the sense that their components were expected to respond in a predictable fashion within the established parameters or steps, there was no special celestial, planetary, or otherwise sidereal intervention required. The Middle Ages also saw the mingling of related but distinct lores as well: the shamanistic Mantic-head branch along with its larger scope of necromantic manipulations of the

¹⁶ Eamon, *Science and the Secrets of Nature*, 40-42.

¹⁷ Saba, or Sheba, was the kingdom in what is now Yemen, with its capital identified with the archaeological finds at Ma'rib. Lore tells of seven temples dedicated to the seven planets, which they considered as intermediaries to a supreme God; each temple had a characteristic geometric shape, color, and image made from one of the seven metals. Similarities have been observed between the doctrine of the star-sect of Saba and that of Hermes Trismegistus. The current situation in Yemen however has nullified what gains were made by past archaeological digs including, at one point, the almost-complete excavation of the Temple of the Moon at Ma'rib, so much work remains for future generation to ascertain the physical evidence in support of this characterization of Sabaeen religion. However, it bears noting that when the term “Sabaeen” is encountered in conjunction with astrological heritage, it is more likely that it is in reference to the “self-styled Sabaeans of Harrān” of the ninth century, as David Pingree characterizes them. Multhauf writes that in response to the Moslem's ire that the Harranians had no religion, they adopted that of the Sabaeans. This legacy, combined with Babylonian and Indian liturgies and iconographies, Greek astrology, Ptolemaic astronomy, and Hellenistic philosophy ultimately produced the body of what is called astral magic. See Pingree, “Hellenophilia and versus the History of Science,” 561; Multhauf, *Origins of Chemistry*, 115. The “Sabaeans” of Harran adopted conventions which mirrored those of South Arabia: seven temples dedicated to seven planets, considered to be intermediaries to the Creator god. Each had its own characteristic shape, color, image, and metal. Two sects have been described, the star and idol worshippers, who worshipped Hermus al-Huramisah (Hermes Trismegistus) and his proper Adimum (Agathodaimon). See Julius Ruska, *Tabula smaragdina* (Heidelberg: Winter, 1926), 64.

¹⁸ Pingree, “Hellenophilia versus the History of Science,” 561.

dead,¹⁹ Jabir and later practitioners such as Paracelsus, also following the legendary model of Simon Magus, occupied themselves with the manipulation of biological materials- blood, air, semen, and decaying matter- towards a similar but not identical end as those who manufactured and consecrated vessels in order to contain a god or spirit same.²⁰ But we follow this thread no further in our discussion of the magical animation of statues. Certainly, necromancy and alchemy continued to be influential to Renaissance experimental magic, but the difference of materials makes it unlikely that in the case of early-modern automata, necromantic or bio-alchemical homonculi overshadowed Hermetic, Neoplatonic, or other astral theories tailored to invest images and statues specifically. Most simply, this exclusion is due to the difference between the *prima materiae* between the methods; one relies on wood, metal, or other typical craft materials while the other makes use of biological fluids or cadavers.

In the division of animatory traditions more properly connected to the theurgic idol-manufacture of antiquity, astrological magic persisted and found ever-more elaborate practices in a corpus of Arabic magical, scientific, and philosophical texts which found their way to Western European culture from the thirteenth century onwards.²¹ This body of magical lore mingled pre-Islamic traditions, with distant origins acknowledged in Mesopotamian and Sabaeen religions, with astrological, astronomical, and philosophical ideas received from the Greco-Roman-Egyptian, as well as those of civilizations further east. This is the body which has been come to be known as “Arabian star magic.”

At this time, we also can see the introduction, or rather assimilation, of an explicitly demonic dimension into the field. Whereas before decan daimons or planetary gods and spirits were part of the antique heritage, “demon” in the Judeo-Christian and Islamic sense as an inherently evil entity replaced these earlier constructs. Demons later appear to have been frequently converted into angelic identities as magical texts made the transition into Latin Christendom. Nevertheless, these non-human intelligences are conjured and compelled by the magician's command of esoteric language, signs, and symbols; the dramatic ritual element of Neoplatonic theurgy appears to have

¹⁹ Necromancy “flourished” in the medieval clerical underworld, see its dedicated chapter in Kieckhefer, *Magic in the Middle Ages*, 151-175; *Forbidden Rites: A Necromancer's Manual of the Fifteenth Century*. The manual in question is the “Munich handbook,” Clm 849 (Bayerische Staatsbibliothek, Munich) fos. 3r-108v.

²⁰ Butler, *The Myth of the Magus*, 81-82.

²¹ Elizabeth Wade, *A Fragmentary German Divination Device: Medieval Analogues and Pseudo-Lullian Tradition in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 87; see also David Pingree, *The Diffusion of Arabic Magical Texts in Western Europe* in *La diffusione delle scienze islamiche nel medioevo Europeo*, ed. Fondazione Leone Caetani (Roma: Accademia Nazionale dei Lincei, 1987), 57-102.

been co-opted, but the intrinsically occult elements of natural materials assumed a new correspondence with specific demons, rather than the astral emanations associated with the pagan pantheon. A review of a selection of medieval magical manuscripts communicates certain changes in form while preserving the essential character of elements common to Neoplatonic theurgy as well, including state animation as well as its visionary component briefly discussed in the previous chapter.

The *Liber lune* has been identified as a Latin translation of an Arabic work of image magic dateable in one English manuscript version to the late fourteenth century.²² Here we have a specimen which combines several elements: primarily formulae intended to cause harm (ranging in scope from binding an enemy's tongue or twisting his limbs to destroying an entire region) effected by engraving images as the moon moves through its houses, the recitation of “angelic” names, and the burning of incense. Ritual elements from antiquity are present alongside the basic premise of Hermetic image magic in the sense that it relied upon the drawing down of celestial and planetary intelligent influences, which were thought to bestow their conscious power to the images the operator was inscribing under precise astronomical conditions. In the context of this study, I would hazard to observe that this text illustrates a characteristic moment fraught with particularities of how astrological image-making traditions transitioned from the ancient world, which formerly relied on powers conceived of as planetary gods, to the medieval Islamic civilization, where they were reclassified elemental or celestial demons in deference to the new, monotheistic religious climate. Nevertheless the aim was the same: to draw down power or wisdom and effect changes in the terrestrial sphere through the manipulation of non-earthly, non-human intelligences associated with planets and stars. The *Liber lune* to my knowledge has been the subject of only one recent dedicated study, which observes its peculiarity as an essentially demonological work conforming to the codicology of other works in the tradition of Greco-Egyptian Hermetic image magic.²³

The tradition of appealing to religious ritual in order to communicate with these higher beings, which we have seen in the letter of Thessalos of Tralles from antiquity, also persisted in later magical traditions which would appear in the West. The *Ars Notoria*, the traditionally Solomonic magical art of strengthening the practitioner's memory, eloquence, and understanding of the seven

²² In the codex Digby 228, which is observed to be the work of at least two scribes; the first seems to have written the original material and the second who added to its contents with indications of his own interest. See Klaassen, *English Manuscripts of Magic, 1300-1500*, 12.

²³ Ibid.

liberal arts through the making of figures (*notae*) and the use of invocations appealed to this same framework of celestial angels/demons. In a wider context, this phenomenon appears to have been reasonably well-known by the second half of the thirteenth century.²⁴

This older angelic-, demonic-, or celestially-derived source of revealed knowledge to the ritually “pure” practitioner was essentially repackaged by John the Monk of Morigny in the early fourteenth-century *Liber visionum* or *Liber florum celestis doctrine* into what he perceived would be an acceptable Christianized framework (although the Church condemned his works as heretical and sorcerous and they were burnt in Paris in 1323). Nevertheless, in the method which John the Monk put forward to obtain dream-visions of the Virgin Mary we may keenly perceive the survival of elements of ancient Babylonian and Greco-Egyptian rituals of obtaining divine revelatory visions.²⁵ Of special interest to the present study is the particular that when the Virgin Mary did appear in the dreams of John the Monk, after he had ascended through the nine tiers of the heavenly court, it was as a speaking statue, evoking for the modern historian unmistakable trait-d'union with antique conventions.

Images and rituals directed to the nine branches of learning, whose custodians were nine heavenly orders of angels superimposed onto the old order of planetary and stellar gods, had to be precisely timed,²⁶ and in this arrangement, one can perceive the legacy of mathematical astronomy's importance in rituals directed to the lights of the sky. This innately practical method of procuring a

²⁴ Thomas Aquinas condemns the *Ars Notoria* in a *Quaestio* on superstitious observances in the *Summa Theologiae* (2a-2ae, q. 96), deriving his responses from Augustine's *De doctrina christiana*, as well as alluding to the *De civitate dei*'s condemnation of theurgy. The figures and unknown words which were an integral part to the *Ars Notoria* were for Thomas Aquinas and Vincent of Beauvais, who repeats the former almost verbatim in the *Speculum Morale*, incontrovertible proof of traffic with demons. Defendants did not necessarily challenge this position, but they challenged that the scientific truths, of which the demons were in unquestioned possession of, were not inherently unlawful knowledge for humans to possess. See Claire Fanger, *Plundering the Egyptian Treasure: John the Monk's Book of Visions and Its Relation to the Ars Notoria of Solomon in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 222-23. On the *Ars Notoria*, see Lynn Thorndike, *A History of Magic and Experimental Science*, 8 vols. (New York, 1923-58), vol. 2, 279-89.

²⁵ We witness here a similar “gate-keeper” hierarchical arrangement which the *Liber visionum* has in common with the ancient religions: only the lowest, “messenger” orders, the Angels and Archangels, remain on Earth and convey information from the other seven orders, who never leave their positions in the heavens. In these nine orders, we can easily perceive an analogism with a combination of the Aristotelian and Ptolemaic arrangement of the elemental spheres and the heavens. In the *Liber visionum*, they stand in for guardians to the knowledge of the seven liberal arts, plus philosophy and theology. Medicine, mechanics, and the “exceptive arts” (magic, generally) are not included in the schema but are addressed in a digression which explains how to adapt prayers to acquire competency in these fields too. See Nicholas Watson, *John the Monk's Book of Visions of the Blessed and Undeified Virgin Mary, Mother of God: Two Versions of a Newly Discovered Ritual Magic Text in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 176.

²⁶ Michael Camille, *Visual Art in Two Manuscripts of the Ars Notoria in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 110.

divine vision in dreams through ritual, prayer, and in some cases the manufacture of a magical ring, to be discussed immediately below, is also found in other magical texts of the medieval Latin west, such as the *Sworn Book of Honorius* (*Liber iuratus* or *Liber sacratus*).²⁷ This work has as its highest aim the procurement of a vision of the Virgin Mary, but it also lists and describes a vast array of planetary, aerial, and terrestrial spirits.²⁸ Richard Kieckhefer has identified in this last work the possible influence of the Merkabah tradition of Jewish mysticism, which featured imagery of ascending to the divine throne or chariot to God and the majesty of the celestial court, behind western ritual and visionary magic.²⁹

The rituals and prayers dedicated to procure a divine vision in the *Sworn Book*, the *Liber visionum*, and the *Ars Notoria* tradition feature the creation of a magical ring alongside its more ritual components, thus tying it to the image-making and investment traditions equally germane to cult statues. In some cases, as with the *Sworn Book*, the ring, like the rituals and the divinities which they address, is rendered more Christian by instructions to carve the names of Jesus and Mary on it (versus the astrologically-derived images of the older *Ars Notoria*),³⁰ but the manufacturing process continues a method rooted in antiquity to attract and retain some kind of stellar/celestial/divine influence in a man-made vessel.

The Greek tradition of selecting stones, held in the Hermetic and certain Egyptian systems, to possess astral correspondences along with the correlating belief that inscriptions could confer or bind this celestial quality to their matter continued in the Arabian magical tradition. In the history of the genre of lapidary texts, Joan Evans describes the heritage of Greek medicine as overshadowed by the elaborate system of magical belief with its roots in the characteristically Eastern science of astrology.³¹ Whereas intrinsically magical properties of stones and metals have been written down since Babylonian times,³² this belief became conflated at a comparably early date with the influence

²⁷ Or the “demon tutor” which could be summoned through explicitly demonic/necromantic rituals in a fifteenth-century German necromantic manual; however, this manuscript is a departure from the ostensibly Christianized, non-demonic magical texts mentioned above. See Richard Kieckhefer, *Forbidden Rites: A Necromancer's Manual of the Fifteenth Century* (Stroud: Sutton, 1997).

²⁸ Richard Kieckhefer, *The Devil's Contemplatives: The Liber Iuratus, the Liber Visionum, and Christian Appropriation of Jewish Occultism in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 255.

²⁹ Ibid. Kieckhefer suggests that the *Sworn Book* of Honorius fills in a gap left between Yates's scholarship of Ramon Lull's thirteenth-century Christian Kabbalah based on the Zohar and Pico della Mirandola's taking up of the subject in the fifteenth century. Idem, 256.

³⁰ Idem, 260.

³¹ Joan Evans, *Magical Jewels in the Middle Ages and Renaissance* (New York: Dover Publications, 1976), 50

³² Idem, 13.

of sidereal powers upon the terrestrial sphere. The idea that celestial influences physically penetrated the Earth and effected the generation of minerals was an idea hatched in antiquity which persisted even though the early history of modern geology.³³ Stones were associated with the various planets by their colors' previously-fixed associations with the same. In addition to this planetary system, the Egyptian tradition assigned each day of the month and each decan of the signs its particular stone; we must also remember that each degree of the heavens in some antique systems was ruled by some decan god, so these could become quite numerous. Later Alexandrian and Hermetic lapidaries such as the *Kyranides* are eclectic repositories of traditions associated with Greek festivals, Mithraic rites, Babylonian astrology, Jewish religion, and Greek medicine.³⁴ Others attributed to Dionysius, Socrates, and Damigeron assign magical virtues to a number of gems and recommend which symbol to engrave upon them for added power.³⁵

The word “talisman” itself derives from an Arabic term for “the influence of the heavenly bodies upon the universe.”³⁶ Explicit demonological associations do not appear until much later, and certainly not in all of the lapidaries produced in the East and Muslim Spain. The eighth-century *Book of Stones* by Jābir ben Hayyan is recognized as the first of its genre, and scientifically-minded works which followed were the twelfth-century treatise of Muhammad ibn Mansur, the *Treatise of Simples* by Ibnu 'l Baitar, and the mineralogical treatises by Tīfashī, Hunain ibn Ishaq the Wise, and 'Utarid ibn Muhammad al Kātib.³⁷

However, the magical contribution is best observed in an Arabic lapidary known by the name of Alfonso X, for the patron of the learned court of thirteenth-century Castille.³⁸ The Alfonso

³³ See Multhauf, *Origins of Chemistry*, 287-88. Avicenna, among others, propounded the Classical view on the sidereal influence on mineral and stone formation which was to leave its mark in Western philosophy as well; see Avicenna, *De congelatione et conglutinatione lapidum*, eds. and trans. E. J. Holmyard and D. C. Mandeville (Paris, P. Guethner, 1927), 33-42. For the retention of the heavenly influences in the formation of stones and minerals, see René Descartes, *Les meteoros* in *Discours de la méthode & essais*, eds. Ch. Adam and P. Tannery (Paris: Leopold Cerf, 1902), 239-64.

³⁴ Idem, 18.

³⁵ E.g. MS. Lat. 7418, fol. 116-23v, Bibliothèque National de Paris; Hatton MS. 76, fol. 131-9, Bodleian Library Oxford; MS. Vatican 578; idem, 20- 21. Damigeron's work is preserved wholly only in a fifth- or sixth-century Latin translation extant in two medieval manuscripts; it is the source for the famous early twelfth-century lapidary of Marbode, Bishop of Rennes.

³⁶ “ἀποτέλεσμα,” idem, 4.

³⁷ Idem, 39-41.

³⁸ Alfonso's court has been hailed as typical of the Arab Renaissance as that of cultural efflorescence surrounding Lorenzo de' Medici's in fifteenth-century Florence. The lapidary's only recorded manuscript is a codex given to the Escorial Library by Philip II from the library of Don Diego de Mendoza, dated a little later than Alfonso X's reign. Idem, 42. Alfonso is also responsible for fostering advances in hydraulic engineering and their attendant marvels through the commissioning of the translation of an Arabic work of water-clocks; see *Libros del Saber de Astronomia*, ed. Manuel Rico y Sinobas, 5 vols. (Madrid, 1863-67), IV, 24-107. Two books deal with water-clocks, one with a “candle clock,” and still another with a “mercury clock,” which harnessed quicksilver through small holes from one container to another. See Merriam Sherwood,

X codex's primary concern is the engraving upon stones of sigils which correspond to the Zodiac, and it is heavily influenced by the idea that stones directly reflect through their color and shape the star, planet, or constellation (in other words, the astronomical conditions) under which they were formed and the occult virtues which they were believed to possess as well.³⁹

The sigils recommended by the Alfonso X lapidary correspond to celestial bodies, which in the ancient and medieval eras were interpreted to be sentient, divine intelligences. Although the art of the astrologer and lapidarian does not overlap explicitly in this case with the art of the necromancer or demon-conjurer, this link is made elsewhere (as with the *Liber lune*). Evans writes that the Alfonso X lapidary is the principle source which bequeathed engraved talismans to Western Europe, and that over time, “science has become magic”: as we similarly perceive in visionary ritual magic's insistence on proper times to conduct the ritual, the sigils lost their association with the Eastern astrological tradition and acquired new demonological associations.⁴⁰ For example, the stone diadochos was one believed to possess demonic correspondence and one lapidary advised that visions of demons and the dead could be procured by pulverizing it and sprinkling it in water.⁴¹

The straddling of magic philosophy with natural philosophy's inquiries into the material world is present in both the literature of the subject and the traditional manufacture of its associated material culture. Whereas some gems and objects were associated with demons, as we have seen above, others provided for medieval minds an anticipation of the natural philosophy of the following age. Many of the stones' magical powers were believed to derive exclusively from nature by occult means, sometimes astral in their operation or by some other hidden sympathy. Many were adapted to medical applications, such as the eagle-stones recognized for their properties to aid in childbirth, as Neoplatonic astral magic too found a medicinal application with the later writings, rituals, and talismans of Marsilio Ficino. This tradition of harnessing the sympathies or spirits of celestial bodies was preserved and augmented in the Medieval Islamic East from its apparent inception in Greco-Egyptian culture.

Magical recipes for conjuring and binding a demon or spirit into various vessels are

“Magic and Mechanics in Medieval Fiction,” *Studies in Philology* 44 (1947): 579.

³⁹ “The Eastern and magical character of this lapidary is very noticeable. The properties ascribed to the stones are in no case medicinal; they make the wearer beloved by men or women, young or old, kings or judges; they preserve him from wild beasts and the perils of the sea; they make him intelligent or learned, or brave or victorious; but they are never concerned with his bodily ills. Further, the names of the stones always appear in their Eastern form; there is absolutely no trace of the influence of Greek medicine and mineralogy.” *Idem*, 48.

⁴⁰ *Idem*, 95.

⁴¹ Kieckhefer, *Magic in the Middle Ages*, 105.

characteristic of this magic; the popular motif of the genie in the lamp falls into this category. Rings and gems were frequent repositories for bound spirits or influences and have been grouped together with automata by one modern historian of magical practices.⁴² Through the medieval period, such magical Eastern stones were a “staple” of medieval church treasuries and princely collections in Western Europe.⁴³ In these collections, they could function as objects of both prestige and meditation; for whatever symbolic and magical power they possessed, they became invested with moral and religious significance as well. Over time, each rare, exotic, or magical gem from the East acquired a correspondence to a particular Christian virtue as well as a scriptural association.⁴⁴ Engraved images, or at least the ancient worlds' astrological sigils and their medieval derivatives, were no longer palatable to the most orthodox of the era, but the medicinal virtues attributed by Classical science lived on.⁴⁵

These sigils corresponding to constellations and planets were believed to be the mechanism by which they drew their power down from their corresponding sidereal sources. Astral images in Arabic treatises were held to be effective for a wide range of applications: to ward off scorpions, gain favor, capture affection, inflict illness, destroy a town, replace friendship with enmity, and so on.⁴⁶ The quintessential magical text of this stamp was the *Picatrix* (*Ghayat al-Hakim*),⁴⁷ which, although not completely devoid of demonic operations, concerns itself also with instructions on the many ways spirit can be coaxed from its natural dwelling place in the stars and brought down to Earth by various channels. The manufacture of talismans under exacting astrological conditions, the lists of magical substances with occult properties, the treatment of created images (fumigation, wearing, burying, or burning), and prayers offered up to the planets recall Hermetic and Neoplatonic ritual and give the sense that the invested cult-statues of antiquity have been “shrunk,” in a sense to smaller, but no less powerful, astral images.⁴⁸

Some of the Arabic texts recognized their own transmission from the divine revelation of Hermes Trismegistus or to secondary, interpretative magi such as Bâlinas (Pseudo-Apollonius of Tyana). The latter's *Secret of Creation*, believed to be a pre-Arabic work from between 600-750

⁴² See the section “Magical objects: automatons and gems”; Kieckhefer, *Magic in the Middle Ages*, 100-104.

⁴³ Lorraine Daston and Katherine Park, *Wonder and the Order of Nature* (New York: Zone Books, 2001), 69.

⁴⁴ *Idem*, 76.

⁴⁵ Evans, *Magical Jewels*, 29.

⁴⁶ *Idem*, 132.

⁴⁷ See Pingree, ed., *Picatrix: The Latin Version of the Ghayat al-Hakim* (London: The Warburg Institute, 1986); see also Kieckhefer, *Magic in the Middle Ages*, 133; Yates, *Giordano Bruno and the Hermetic Tradition*, 48-51.

⁴⁸ Kieckhefer, *Magic in the Middle Ages*, 132-33.

A.D. originating in Balkh, an intellectual center of ancient Persia,⁴⁹ was translated by Hugo of Santalla ca. 1125. This text's importance for the Latin West has been localized in its transfer of a clear enunciation of Hellenistic Hermeticism's division of scientific and arcane knowledge.⁵⁰ The text opens with a familiar topos of discovered or revealed knowledge. An underground tunnel is discovered underneath a public statue of Hermes which leads to an old man seated upon a golden throne holding a book, the "Secret of Creation," in one hand and an emerald tablet, "The art of reproducing nature," in the other. The latter is written in obscure symbols only the initiate can decipher and possesses the techniques to manipulate nature to serve human ends; it is *magia*, the esoteric counterpart to the legible and public book, *scientiae*, the knowledge of only the causes of natural phenomena.⁵¹ The seven heavenly spheres are articulated and related by a principle of a "spirit of sympathetic correspondence" to the seven metals, which are assigned gender identities as well.⁵² William Eamon has used this text as a big-picture illustration of the adoption of this Classical paradigm in medieval thought- as in antiquity, *secreta* were excluded from *scientiae* and continued to fall into the only other possible category, that is, magic- but for this study it is of special interest for its continuation of recognizably Hermetic motifs.⁵³ We may reasonably speculate that in this text, with the statue of Hermes guarding a secret entrance and the emerald tablet's promise to reveal the secrets of reproducing nature, that the characteristic, associated memory of those arts put to use in temples of distant antiquity survived as well.

If knowledge of hidden and wonderful properties of natural materials (stones, plants, and animals) was an acknowledged source of the twelfth- and thirteenth-century necromancers' powers, the potential resort to demons in order to animate statues and accomplish feats of force nevertheless remained.⁵⁴ Arabian magical lore muddied the waters with the introduction of "demons" (the elemental spirits as well as celestial intelligences) into various kinds of vessels although we also witness the survival of "pure" traditions of astral animation from Hermetic and Classical sources.

⁴⁹ For its known manuscript versions and their translations, see Multhauf, *Origins of Chemistry*, 126; on dating, idem, 127-28

⁵⁰ Eamon, *Science and the Secrets of Nature*, 42-43.

⁵¹ See also Walter Burkert, *Lore and Science in Ancient Pythagoreanism*, trans. Edwin L. Minar, Jr. (Cambridge: Harvard University Press, 1972); Arthur Darby Nock, *Greek Magical Papyri and Greeks and Magi in Essays on Religion and the Ancient World* (Cambridge: Harvard University Press, 1972).

⁵² Gold, iron, and lead are male; copper, tin, and silver, are female, and mercury is hermaphroditic. Multhauf, *Origins of Chemistry*, 133.

⁵³ Eamon, *Science and the Secrets of Nature*, 43.

⁵⁴ Daston and Park, *Wonder and the Order of Nature*, 95; see also Arthur Dickson, *Valentine and Orson: A Study in Late Medieval Romance*, (New York: Columbia University Press, 1929), 195-99.

To most medieval Christendom as we will see in the sections to follow, these fine distinctions were largely irrelevant, as these Eastern adaptations of theurgy's "god-making" techniques were disreputable activities appropriate only for the necromancer or the magus, not the scholar or the philosopher. However, for elite segments of society, a growing acceptance of the place which "learned magic" occupied in the medieval hierarchy of learning is now coming to light.⁵⁵ With the diffusion of the East's custodianship of these elements of magic and natural physics in Latin Europe, distinctions in Arabic texts between demonic or astral operations became moot to the most daring Christian medieval minds that received them. Astrology could be accepted on the basis of an Aristotelian cosmology in which stars exercised influence over earthly persons and objects via unseen but natural channels (for example, as with magnets). Thaumaturgic ritual and magic survived to varying degrees in Arabian texts, embedded in the occult sciences which were perceived to be more deeply rooted in ancient philosophy, more sophisticated, and more rigorous than their contemporary counterparts in the West. We now turn to an examination of the age's most scientific approach to the question of astral influences and its associated art of image-magic, as it was understood by learned Medieval Latin civilization.

4.2. Ray Theory and Image Magic among the Western Scholastic Philosophers

In order for magical talismans such as those described above to gain acceptance in Medieval Christian society, the proposed astral mechanics by which they were theorized to operate were subject rigorous scrutiny based upon readings of the Classical authorities on natural philosophy.⁵⁶ The field of image-making, with its method to invest artificial, man-made images, with some quality or consciousness from a remote, deity/demon/angel visible as points of light in the heavens, was enriched by the involvement of science and mathematics from medieval Islamic culture. The bridge between ritual, often forbidden magic and proto-scientific inquiry in the Middle Ages was built upon the ray theory of Al-Kindi and the minds which his work influenced in Medieval Latin Europe.

⁵⁵ John B. Friedman, *Safe Magic and Invisible Writing in the Secretum Philosophorum* in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, PA: Pennsylvania State University Press, 1998), 81.

⁵⁶ Quinlan-McGrath, *Influences*, 49.

The ninth-century Arab philosopher who we know by his abbreviated moniker Al-Kindi⁵⁷ (ca. 801- ca. 873) functioned as both repository for Classical knowledge and mold to subsequent centuries and civilizations. Considered to be the Muslim father of philosophy during the golden age of medieval Islam, Al-Kindi benefitted from the patronage of the Abbasid caliph Ma'mun and access to the House of Wisdom, which served as a large-scale translation endeavor to process scientific and philosophical texts which came from Greek, Syriac, Indian, and Persian traditions. Al-Kindi's texts were for later ages a lens to the earlier thought of Aristotle; however, with the perspective of time, scholars have observed that Al-Kindi frequently and explicitly references Aristotle in a framework that is Neoplatonic and influenced by the thought of Proclus, Plotinus, and others.⁵⁸ Later scholars in the Latin West who read and translated Al-Kindi inherited in many respects this eclectic Aristotelian perspective on all matters covered in the philosophical tradition.

Al-Kindi also did not insist on any division between theology and philosophy, and his discussion of the natural world is infused with theological conceptions which mingle the nature of celestial rays with questions about the very essence of God. He espoused the Platonic model of a First Intellect, incorporeal and universal, created first and the generative force of all that came after. Every material being has its source and double in the universal heavenly realm. For example, an abstract form in the heavenly sphere, a red apple for example, is the source from which a material red apple on Earth derives its form. Al-Kindi also believed that the human imagination, in its pure state and as conceived by Aristotle, was inherently receptive to prophecy, revelation, and visions, and that the human intellect vied with the traditional position of the angels in proximity to God.⁵⁹ He subscribed to the Ptolemaic organization of the cosmos and interpreted the planets and stars embedded into the celestial spheres as rational entities demonstrating their obedience to and worship of God by perfect circular revolutions. Their purpose was as instruments of transmission of divine providence, and his speculations upon the physical nature of that delivery from heavens to Earth are the germ of ray theory for which Al-Kindi is most well-known. Al-Kindi further refined the theory of emanations, whose substance he theorized to be a triad of soul, form, and matter; these were classified as well to be intelligences of incorporeal substances.⁶⁰

⁵⁷ Abu Yusuf Ya'qub ibn 'Ishaq al-Sabbah al-Kindi (d. 873).

⁵⁸ Peter Adamson, *Al-Kindi and the reception of Greek philosophy* in *The Cambridge Companion to Arabic Philosophy*, eds. Peter Adamson and R. Taylor (Cambridge: Cambridge University Press, 2006), 36.

⁵⁹ *Idem*, 47.

⁶⁰ Gustav L. Flügel, "Al-Kindi. Genannt 'der Philosoph der Araber'," *Abhandlungen für die Kunde des Morgenlands* 1.2 (1857): 10-12.

Al-Kindi's ray theory expounded in the *De radiis stellarum* was a logical, mathematically-informed development from the emanation theory which had emerged from the Neoplatonists' theological necessity of explaining how the One could be continuously present in all things. Although Al-Kindi acknowledges the Aristotelian model which imagined the separate, never mingling heavens' affecting the Earth through the force of their orbits' friction on the sublunar sphere, thus driving the combination of elements and the cycle of generation below, a second model of delivery, a physical ray, was proposed. Every part of the terrestrial world in this model was dependent on the transformative action of incoming stellar rays upon the material Earth.⁶¹ This solved the dilemma of how celestial powers or emanations could flow downward, and al-Kindi conceived of their composition in straight lines and subject to behavior conforming to geometric phenomena. Nor was the phenomenon exclusive to the higher spheres; elemental earthly objects also radiated their qualities outward in straight lines from every point in their multi-dimensional form, affecting everything in their proximity. When earthly objects absorbed celestial radiation, their own radiation absorbed and re-emitted what it had absorbed of the celestial.⁶²

Al-Kindi became a foundational authority in the theory underlying the production of astral images with magical properties; witness the inclusion of *De radiis*'s section on astrological/magical theory in Selden Supra 76, an English codex of magical texts presently conserved at the Bodleian Library in Oxford or its inclusion with other works on image magic, astronomy, and astrology in a codex collected under the heading “Prophecie et Supersticiosa” in the late fourteenth-century collection of Thomas Erghome at the library of the Austin Friars at York.⁶³ Through the connection, via a straight ray, of the abstract form of the heavenly idea with its material counterpart in the terrestrial sphere, the operator could manipulate celestial energy as he saw fit. The appropriate object for a desired correspondence with a celestial ray was not restricted to material objects either; suffumigation, gestures, incantations, sounds, as well as images had their proper places in this earliest iteration of radiation theory (though all but the last of these would be avoided by the later Latin West as too close for comfort with necromantic and demonic magical rituals). Al-Kindi's text detailing how metaphysical emanations behave essentially as early precursors to the behavior delineated in modern particle-radiation theory appears frequently in conjunction with other texts on image magic, including the work on image magic, *De imaginibus*, by the ninth-century

⁶¹ Al-Kindi, *De Radiis Stellarum*, 218-21; see also Ficino, *De Vita*, 3.1.244-45, 248-51.

⁶² Quinlan-McGrath, *Influences*, 50.

⁶³ See Klaassen, *English Manuscripts of Magic, 1300-1500*, 3-31, 5, 9-10.

mathematician Thabit ibn Qurra(*ca.* 836-901).⁶⁴ Frank Klaassen remarks that this magical work does not seem to accompany collections of Thabit ibn Qurra's non-magical works, which have been credited with important discoveries in algebra, geometry, in astronomy as a reformer of the Ptolemaic system, and in mechanics as a founder of statics; rather, the magical work seems to have travelled instead with other image-magic texts.⁶⁵ These texts as a genre virtually always accompanied a larger collection oriented towards the study of natural philosophy, medicine, and practical prusuits from planting trees to chemical recipes and nature's hidden properties.⁶⁶

Frank Klaassen's 1998 study of the composition of medieval English collections of magical manuscripts revealed a strong practical interest on the part of the collectors of texts of image magic, going so far as to observe that as a rule, texts of image magic, of the kind which aimed to draw down and manipulate celestial influences, were collected by collectors with an interest in natural philosophy and astrology, evidenced by the other texts of the collection, rather than necromancy or an interest in illicit magic, evidenced by these texts' absence. This phenomenon was not restricted to the English collections, as configurations of texts combining theory and images ar to be observed in Continental Europe of the same time period as well.⁶⁷ For Klaassen, this indicated that scribes and collectors of these texts were making explicit use of the theoretical works and were being integrated into their research and understanding about the natural world. To illustrate the integration of astral magical theory into the age's growing edifice of natural philosophy stands the edition of Thomas of Cantimpré (1201-1272) of the *De natura rerum* in which he has included the full text of “The Seals of Thetel,” a work on image magic purporting to be that used by the sons of Israel while in the desert.⁶⁸ In the collection of Thomas Erghome which was joined to the library of the Austin Friars at York in the late fourteenth century, texts on image and theory are grouped with one another, apart from works on necromancy or more explicitly ritual magic. Instead these texts accompany Al-Kindi's treatise on stellar rays (*De radiis stellarum*) and Thomas Aquinas's *De occultis operibus naturae*.⁶⁹ Klaassen infers a division maintained between a more legitimized image magic and ritual magic, as an illicit and dangerous substrate. For the collectors of books in the early modern period, the presence of works on image magic and astrology indicate a wider interest in natural philosophy

⁶⁴ Kieckhefer, *Magic in the Middle Ages*, 132.

⁶⁵ *Idem*, 4-5.

⁶⁶ E.g. the conjunction of Al-Kindi's *De radiis stellarum* with Thomas Aquinas's *De occultis operibus naturae* in the collection of Thomas Erghome. See Klaassen, *English Manuscripts of Magic, 1300-1500*, 9-11.

⁶⁷ Klaassen, *English Manuscripts of Magic, 1300-1500*, 6.

⁶⁸ *Idem*, 7; see also Thorndike, *History of Magic and Experimental Science II*, 390-2.

⁶⁹ Klaassen, *English Manuscripts of Magic, 1300-1500*, 11.

rather than any necromantic leaning.

Another collection, Sloane 312, contains fifteenth-century texts with a practical and involved scope, in this case judicial astrology, accompanied by a text on magical images by Sahl Ibn Bishr.⁷⁰ Still more common is the conjunction of texts on image magic with lapidaries, a logical association given that stones were desired as much for the efficacy and occult powers as for their beauty as the medium into which astrological characters would be inscribed. A text such as *Corpus Christi* 125 at Oxford assimilates astrological information with virtually all facets of the natural world and practical applications: recipes, chemical experiments, secrets, tree planting, and properties of animals, plants, and stones. As Klaassen observed, this only underlines the centrality of astral theories in natural philosophy of the period, specifically that all things on Earth derive their occult properties from astral impressions and affinities.⁷¹

The medieval treatises on astral image-making stand testimony to the germination of our modern understandings of stellar radiation and ray-theory, which was conceived in part as an explanation of how divine qualities from the stars could be “trapped” into properly-made artificial vessels. Manuscripts such as these were a principal vector through which the theory and practice of the magical animation (or investment) of statues and other man-made vessels infiltrated Latin Europe in the Middle Ages. This was a wave of influence that anticipated the translation of Neoplatonic and Hermetic works by Marsilio Ficino, which themselves confirmed many of the features of the Arabic texts. These magical texts also often preserved traditions from texts originating in Ptolemaic Alexandria, with their own recollection of older elements of Greek and Egyptian (further back, Mesopotamian) religion and magic.

As Al-Kindi's ray-theory was synthesized into magical and natural philosophical traditions, it was also taken up enthusiastically by the great scholastic intellects of the medieval Latin West. Al-Kindi's ideas shaped their works on natural philosophy and magic, and they persisted in learned culture well through the early modern period. *Speculum astronomiae* of Albert the Great (*ca.* 1200-1280) is indebted to Al-Kindi's *De radiis*, and renders explicit the allowability of astral images due to their natural operation gleaned from Al-Kindi.⁷² In this work as well as *De mineralibus* not only Al-Kindi but also a wide range of sources are accepted as evidence for the author's insistence on the

⁷⁰ *Idem*, 6.

⁷¹ *Idem*, 9.

⁷² Klaassen, *English Manuscripts of Magic, 1300-1500*, 13.

efficacy of these kinds of images.⁷³ The Dominican philosopher appears to have understood the functionality of such images logically as God, the Prime Mover who put into motion all radiation from the first moment of its combination with matter, working through nature. He also accepted the construct that God could and did bestow special powers and prophecy through these rays which penetrated the physical heavens. Knowledge about how celestial radiation marked all matter on Earth and the resulting albeit unseen chains of correspondence established between these earthly materials and the heavenly realms above was one of these powers man had come to possess. Mary Quinlan-McGrath has analyzed this in practical terms, “The Creator subcontracted the job to the gifted image maker and provided requisite natural supplies- Rays and natural material.”⁷⁴

In Albert the Great's mineralogical treatise, discussion centers on the form of the material component rather than of the image *per se*, yet this treatment furnished a synthesis of a wide range of material in its effort to comprehensively treat the natural materials of the earth. For example, stones were acknowledged by Albert the Great to behave properly in the Aristotelian construct of the natural world, while metals defied this model, and faced with this anomaly, Albert the Great turned to Platonic and Hermetic notions on the topic: metals' Forms were dependent on numerical proportions, which linked them through numerical sympathy to one of the celestial spheres and in this way fell under the dominion of Jupiter or Venus (the model of this assignation of planetary dominions can be found in Plato's *Timaeus*), for example.⁷⁵

The possibility of number and mathematics being considered as actionable qualities, though present in ancient traditions of magical philosophy, came into play under the rubric of the Medieval Scholastic effort to understand the universe in natural terms. Albert the Great's treatise *Nature of Place* makes great use of the mathematically-measurable nature of rays seen in Al-Kindi, and geography correspondingly remains the crucial determinant of ray strength and position.⁷⁶ Ray-geometry is indeed fundamental to Albert the Great's vision and was central to continuing theories of astral image-making indebted to his works. The practice of founding a city under the most auspicious skies was then a real and desirable possibility, and the significance which these alignments were believed to possess for the future of that city is testified to be the account of a missed astrological alignment in the botched founding ceremony of Forlì in the *Annales*

⁷³ See Albert the Great, *De mineralibus*, 2.3.3-5.

⁷⁴ Quinlan-McGrath, *Influences*, 131.

⁷⁵ *Idem*, 130.

⁷⁶ *Idem*, 79; Albert the Great, *Nature of Place*, 47-49 (1.5), 94-95 (2.1), 97-98 (2.2).

forolivienses.⁷⁷

Robert Grosseteste (*ca.* 1175-1253) incorporated Al-Kindi and also the astrological works of Abu Ma'shar into the hexameral literature which was expanding with scientific inquiries into the nature of the Genesis creation story. Grosseteste elaborated on the idea of the first moment of creation ("Let there be Light." Gen. 1:3) consisted of a single, dimensionless point of light combined with a single, dimensionless point of matter; from that initial collision, light rays proceeded to shoot across the universe, and speculation about the nature of these light rays became a traceable current of thought transmitted from Aristotle and antiquity, to Al-Kindi, Grosseteste and the medieval scholastic philosophers.⁷⁸ The survival of Greek elements has been observed in the theories about Form and Matter in Grosseteste's philosophy, as has a connection been drawn to Grosseteste's anticipation and mirroring to some degree of the modern "Big Bang Theory."⁷⁹

Grosseteste also speculated on the physics of this light radiation: what were the natural laws to which Light was subject? Light, Grosseteste submitted, was what effected the physical creation of the universe by pulling matter out (from its original single and dimensionless point) along with it as it radiated along infinite lines of rays as an orb. It was the "essential corporeal Form" of the universe and was theorized that as the first Form, called *lumen*, it carried matter with it from the initial moment of fusion, spread as far as was possible, and settled into the familiar arrangement of the heavens (for Grosseteste, the medieval scholastics, and later philosophers of the Renaissance, these heavens conformed to the Ptolemaic model). Light was not only the First Form, it also was the responsible agent for uniting the universe in what was conceptualized since antiquity to be an ordered hierarchy. Grosseteste also theorized that light was integrally present in all matter, and that as the soul descended from the highest realm, the First Mover, the different qualities of light present in the heavens since the first moment of creation actively impressed their light (and their image) into the soul descending to the lowest, dense realm: terrestrial Earth.

In this way, Grosseteste advanced what even in the present day is a stunningly detailed conception of the natural physics underlying ancient tenets of astrology and image magic, in this case the impressing of qualities and images (through light, as Grosseteste imagined in what we might accurately term primitive particle-physics theory) by stars upon all living things on Earth. The Neoplatonic model of emanations did not fundamentally change since antiquity; later

⁷⁷ See the excerpted and translated passage in Quinlan-McGrath, *Influences*, 81.

⁷⁸ *Idem*, 26.

⁷⁹ *Ibid.*

philosophers used it as their base for increasingly naturalistic theorizing about the physical mechanics of the universe. Light in the course of this flow was increasingly perceived as having some unifying quality as it passed through more or less material spheres of heaven and Earth.⁸⁰ When celestial radiation encountered the dense material Earth, the influences which it carried were understood to permeate living bodies in a roughly analogous way to how a plant absorbs sunlight, water, and nutrients from the earth. Although the idea that celestial agency affected transformations on terrestrial life was one at the heart of antique thought, it was not until the Classical philosophy was utilized by the group of medieval scholastic thinkers in the Latin West that detailed natural, physical, and mechanical processes were proposed to explain how this was accomplished.

Grosseteste also bequeathed to later philosophers a logical argument rooted in the Aristotelian construct which maintained a single pairing of two elemental qualities to any given Form (ie., hot and dry, cold and wet): light as a ray was submitted to constitute the Form (written about interchangeably as the Species, Seminal Reasons, Qualities; the light ray is alternately referenced as Form, Species, nature, intentio, imago, similitude, simulacrum, phantasia, idol, lumen, ombra, and virtus).⁸¹ In this way, celestial bodies, through their emitted light, either contributed their qualities directly or elicited transformations in pre-existing Qualities (such as how the sun's rays cause mud to become dry). This Aristotelian framework made it theoretically possible for astral magic and its images, the practice of which dates to antiquity immemorial, to be fully understood for the first time in terms of natural forces rather than necessarily works of superhuman, divine beings. Effectively, Qualities became conflated with their vehicle of delivery, the light ray's combination with matter. The aggregate of these Qualities, the Form, was active and in motion through the medium of the ray.⁸²

Further theorizing by medieval philosophers envisioned a cosmos in which every material being, not only the heavens' lights, diffused its power radiantly to other beings, whether or not this radiant light was visible to the eye or not. This integration of ray theory, and particularly the geometry to which it was subject, informed the refinement of perspective as directional rays many believed to be carrying material qualities were considered to be transmitted from virtually all points

⁸⁰ Idem, 27-28.

⁸¹ Idem, 46, 51; for the Aristotelian influence, see also David C. Lindberg, *The Beginnings of Western Science* (Chicago: Chicago University Press, 1992), 287-92; David Pingree, "Some Sources of the Ghayat al-Hakim," *Journal of the Warburg and Courtauld Institutes* 43 (1980): 1-15, 3. See also distinctions of terms in Roger Bacon's *Multiplication of Species*, 2-7, 24-25.

⁸² The modern model of light as a photon's wave carrying its particle-matter is not too far off from this early ray-model.

and angles in the earthly sphere as well. This was the “multiplication of form” by which a given natural body begat others as it radiated its “image” or qualities continuously outward. The accepted geometric behavior of this radiation inherited from Al-Kindi was as a line segment between two points; points in heaven and points on Earth could serve interchangeably as points of departure for innumerable rays emanating either spherically, from all of the points on an orb, or conically, with the base being the limited surface of rays that ultimately converged in a single point.⁸³ This shape was the basis for what Roger Bacon (*ca.* 1219-*ca.* 1292) called the “apexes of celestial pyramids,” that is, the lights' point of origin.⁸⁴ John Peckham (1230-1292), a medieval Scholastic philosopher whose works influenced Leonardo da Vinci and other minds of the Renaissance, associated the direct lines of geometry with a ray's strength: “And since action in a straight line is easier and stronger for nature, every natural body, whether visible or not, must multiply its species in a continuous straight line; and this is to radiate.”⁸⁵

As already mentioned above in the context of antique theories about vision, Peckham, along with Bacon and later Marsilio Ficino held that objects were continuously radiated mathematically-exact copies of themselves, their image, which either penetrated into the eye (as with intromission) or which interacted with the rays theorized to be emitted from the eyes.⁸⁶ By the time of the medieval scholastic philosophers in the thirteenth century, inquiries into the nature of radiation, celestial or earthly, had become an eclectic affair, mingling elements of Aristotelian, Platonic, Stoic, and magical philosophies. Certain aspects were apparent to contemporaries to be more forced than others.

More rigorous philosophers hesitated at this model of the universe's interconnectedness of the heavens and earth.⁸⁷ This contradicted Aristotelian philosophy in its pure form and relies on Stoic and Platonic thought to function, but by the medieval period, the works of the Classical

⁸³ Quinlan-McGrath, *Influences*, 54.

⁸⁴ *Idem*, 38.

⁸⁵ *Idem*, 53; John Peckham, *Perspectiva communis*, trans. Henry Crew (London, 194), 108-9.

⁸⁶ See Charles Burnett, *Arabic, Greek, and Latin Works on Astrological Magic attributed to Aristotle in Pseudo-Aristotle in the Middle Ages*, eds. Jill Kraye, W. F. Ryan, and Charles Schmidt (London: Warburg Institute, 1986), 84-96.

⁸⁷ For example, Abu Ma'shar took Ptolemy to task for his insufficient reconciliation of Aristotle's quintessence (Abu Ma'shar, *Kitab*, 1:37). There was certainly ample room for debate and even more for confusion in the writings of those who grappled with Form, Matter, and celestial agencies implied in the sympathies/antipathies of heavenly orbs. Giovanni Pontano's thoughtful examination in *De rebus coelestibus* can be juxtaposed against Luca Bellanti's “quasi-scholastic” liberal jumbling of Form, Matter, Qualities, and motion in *Defensio astrologiae*. Renaissance detractors of astrological magic used this faulty application of Aristotelian philosophy as far back as Ptolemy to attack its entire edifice as a pretentious cover-up of utter nonsense, such as Pico della Mirandola (*Disputationes*, 1:70-71) and Savonarola (*Contro l'astrologia*, fols. 10, 14v, 17, 20). See Quinlan-McGrath, *Influences*, 47-49.

philosophers had achieved a synthesis through centuries of commentaries and compendia, the extent to which few were fully aware of at the time. Aristotle's separate and disconnected realm of aether was for the most part gently modified to permit the unified and connected cosmos favored by the Neoplatonists (and later the Renaissance philosophers). Aether was reclassified as not a separate, but rather a higher degree of essence which was connected and no longer remote and impenetrable. The Stoics employed *pneuma*, breath or spirit, in its place: a composite of fire and air; its significance encompassed air, breath, and soul. Pneuma was dynamic, and it could fill empty space and explain astrophysical phenomena as well as cohesion and change in the terrestrial sphere.⁸⁸ This became the *anima mundi* favored by the Neoplatonists of late antiquity and the Renaissance. Though many medieval and early-modern continued to also deploy the terms quintessence and aether in their arguments, this term no longer bore any practical resemblance to the Aristotelian model.

The writings of Albert the Great and other who departed from Aristotle's vision of separate, distinct, and by their nature impenetrable heavens to a certain extent undermined the Aristotelian criticism of the Platonic Idea by investing Form with a dual metaphysical and physical state: reminiscent of the Idea, but lacking an explanation for how Form transformed from one state to another (the heavens only had the power to either impress upon or activate Form, not to move it out of its divine or metaphysical state).⁸⁹ At the same time, Albert the Great refuted the Platonist concept that Idea was a separate substance that never fused with matter, this time siding with the Aristotelian construct of Form. Quinlan-McGrath however observes that Albert's the Great "Aristotelian Form" was closer to the Platonic Idea in his concept of the First Intelligence in which Form exists purely in the metaphysical state.⁹⁰ Furthermore, the Platonic model that the union of matter and form retained the power of the original Idea the closer it was to the immaterial, rarefied heavens, in contradiction of the Aristotelian understanding of the impossibility of the heavens sharing any part of the material nature of the Earth.

Nevertheless, for their time, the logical rigor of the scholastic philosophers compelled the recognition of questions about the physical mechanics of the universe, and magical images' relationship to the stars occupied the minds of Albert the Great, Thomas Aquinas, and later Marsilio Ficino and others in the Renaissance. For the question of magical images, medieval philosophers

⁸⁸ See Samuel Samburski, *Physics of the Stoics* (New York: Macmillan, 1959).

⁸⁹ *Idem*, 129-30.

⁹⁰ *Ibid.*

balanced either their approval or condemnation of astral images on whether or not true Form (versus one only existing in the imagination) truly joined with matter. Did the form, the image ever truly leave the realm of the artist's imagination, even if it was inscribed in wax or on a stone? Did it truly join with matter and participate in the all-present rays of light and stellar radiation which were envisioned (correctly) to permeate the universe? The question was not whether astronomical images were effective- that fact was virtually ubiquitously agreed upon and met with quick rebuttals of images witnessed to work- only whether or not these images owed their operation to mechanical and natural physics or to the traditional fall-back of demonic agency.⁹¹

On the other side of the debate about the permissibility about astrological images fell Thomas Aquinas and the majority of orthodox Christians, who adopted Augustine's condemnation of this branch of magical philosophy. In *On the Occult Works of Nature*, he objected that while a would-be image-maker could discern the Form of the planets and their rulers, he could never give substantial, or true Form to an inert, mathematical, and drawn figure. It followed that astronomical images could never function naturally and was "at best irrelevant and at worst a lure for demons."⁹² He defied the presumed relationship between celestials and artificial figures and found no argument for their union in philosophical tradition. Yet Aquinas did not abandon completely the naturalistic model of the heavens that was emerging from the medieval scholastic milieu. He repeated the Aristotelian understanding present in *De generatione et corruptione* of the heavens' role in the fusion of Form and Matter, as Albert the Great had as well. Both Aquinas, Albert, and other philosophers of their time period however had long abandoned Aristotle's model that only the sun could fuse Form with Matter and effect change in the terrestrial sphere. By the Middle Ages in the Latin West, all of the other celestial bodies were believed to participate in the alteration of terrestrial forms.⁹³ In spite of his Aristotelian rigor, Aquinas's agreement with the correspondence of varying states of materiality to the hierarchy of power comes very close to Platonist philosophy.⁹⁴

Nevertheless, it was generally accepted by the mid-thirteenth century, on the merit of its traceability to the authority of Aristotle, that celestial bodies could impress natural materials with

⁹¹ Idem, 158.

⁹² Idem, 134-35.

⁹³ Idem, 133.

⁹⁴ Thomas Aquinas, *A Letter of Thomas Aquinas to a Certain Knight beyond the Mountains on the Occult Workings of Nature or Concerning the Causality of Heavenly Bodies*, trans. J. B. McAllister (Washington D.C.: Catholic University of America Press, 1939).

occult and wondrous properties;⁹⁵ notable exceptions are the *De causis mirabilium* (ca. 1370) of Nicole Oresme and the *Questio de cometa* (1368) of Henry of Hesse which attacked the edifice of astrology, ranging from astrological divination to its theory of celestial influences.⁹⁶ However in general, these celestial influences were not classified amongst the fantastic or ridiculous, as the edifice of astral magic would be labelled later in the modern age.⁹⁷

To the contrary, most Latin and Arabic philosophers and medical theorists held that intrinsic formal properties, such as what made a rose red or why a lodestone attracts iron, were hidden, or occult, and could be the result of distant operations. The action of celestial rays and their unique angle and direction accounted for the geographical variation in the natural order the world over in the pseudo-Albertine *De mirabilibus mundo*; other preternatural objects explained by the effect of celestial emanations are monstrous human-hybrid births and figured stones, including fossils.⁹⁸ In the same work, and pushing the boundaries of “natural” philosophy, the author allowed for the possibility of sub-celestial intelligences, either human or demonic, working upon material objects; however, this belongs to the perennial discussion of supernatural (and therefore not preternatural) agency which always lurked in the recesses of poorly-understood operations.

The exceptionalism and survival of originally Neoplatonic and Hermetic theurgic techniques, which relied on celestial sympathies to animate statues, can be located in the methods' apparent compatibility with natural philosophy of the age. However, as long as there was discussion about whether these celestial bodies were also celestial intelligences, there was always the shadow of demonic intervention. Theurgic statues and images would have theoretically straddled the battle lines drawn in the middle ages between “good” magic, which employed the occult properties of natural objects, and “bad magic,” which employed demons. This distinction was attempted by William of Auvergne, Albert the Great, Roger Bacon, and Thomas Aquinas; the last two reserved the word “magic” for the latter category and emphasized the limited role of demonic action in the

⁹⁵ Daston and Park, 127.

⁹⁶ Idem, 130-31; see also Bert Hansen, *Nicole Oresme and the Marvels of Nature: A Study of his De causis mirabilium with Critical Edition, Translation, and Commentary* (Toronto: Pontifical Institute of Mediaeval Studies, 1985), 137; Henry of Hesse, *Questio de cometa* [1368] in *Studien zu den astrologischen Schriften des Heinrich von Langenstein*, ed. Hubert Pruckner (Berlin: B. G. Teubner, 1933), 89-138.

⁹⁷ To quote the historian Joan Evans, we must avoid the tendency “to put into the category of magic much that is based upon the fallacious and unfamiliar premises of obsolete science, and much that is derived from the tradition inherited from a religion more ancient and more remote than the age in which its last manifestations appear.” Evans, *Magical Jewels of the Middle Ages and the Renaissance*, 10.

⁹⁸ Daston and Park, *Wonder and the Order of Nature*, 127, 130.

world.⁹⁹

4.3. Automata in Byzantium and the Medieval Muslim World

The mechanical realization of feats which could, theoretically, be accomplished through man's manipulation of mystical (as with demons, angels, and other religious or spiritual beings) or natural quantities (as with the emerging view of astral emanations as real and measurable components of the universe) remained the provenance of learned men and magi from antiquity through the Middle Ages. However, the capture, canalization, and manipulation of other natural but no-less-mystifying elements of terrestrial life, such as air and water, have furnished us with far more concrete examples of documented, moving, and working automata in both religious and secular contexts in the Medieval Mediterranean basin. If the manufacture of pagan cult statues *per se* effectively ceased to occur in the lands which adopted the Christian religion and abandoned the pagan pantheon, different components which originally contributed to this art lived on, branched off, and continued to be developed. Living idols invested with some divine quality from the stars were acceptable neither to Christians nor to Muslims, but pagan technology nevertheless came to be adapted for diverse ends by both faiths. Below, the integration of automata-technology in certain instances of Latin Christian worship makes the distinction not only possible but necessary in any discussion of the continued service of technology in inspiring religious faith and fervor. However, in the medieval cultures within the sphere of the expanded Islamic territories, this practice became extinct in worship, with the exception of hydraulic devices adopted to the requirements of *wudu*, the ritual washing essential before prayers. Nevertheless, the mechanical principles and automata-building expertise of antiquity, many elements of traceable to the efflorescence of the fallen Alexandrian civilization were received and applied differently in certain contexts. Continued contact through war and trade brought what was cutting-edge technology from one power-pole of the Mediterranean basin to the other. For the purposes of a smooth trajectory in line with the transmission of magical philosophy from east to west, we begin our discussion of known medieval automata usage and development in the medieval period from the Eastern side of this basin.

Reports of mechanical wonders from Byzantium and the Islamic East testify to the endurance and continual refinement of technical knowledge from the Classical world while, as we

⁹⁹ *Idem*, p. 128.

have just seen in the section above, magical theory about the manipulation of astral influences, spirits, or demons through sympathetic materials was undergoing significant elaboration as well.¹⁰⁰ Eventually in the early modern era, these disparate disciplines would converge again in new and unexpected ways. It is similarly possible to identify continuous threads of knowledge in the survival of single elements (clock-work, hydraulic, and pneumatic devices) as they appeared in Byzantine and Islamic accounts following the decisive demolition of pagan temples in Alexandria and elsewhere at the end of the fourth century AD. These acts established more or less a timeframe of the collapse of Classical antiquity.

While the Greek-speaking Eastern-Christian world certainly was in many ways the primary and direct heir to the mantle of Classical antiquity, Greek manuscripts were prized acquisitions in the House of Wisdom established by Harun al-Rashid and one of the monuments of the Islamic Golden Age. However, these acquisitions belong to a much larger campaign of knowledge-consolidation and intellectual patronage by the Abbasid caliph and his successors. The wide arc of traditional historical constructions maintains that Byzantium and the medieval Islamic caliphates were principally heirs to Classical knowledge.¹⁰¹ David Pingree challenged the common perception that the Islamic East received, preserved, and passed on Hellenic science and culture; he presents instead a more nuanced portrait of a Medieval Muslim civilization which synthesized elements from Indian, Iranian, and Syrian sources, revised them, and in turn produced its own unique product to be then exported: Islamic sciences, rather than Greek sciences.¹⁰²

The wonder which was the currency which pagan temples generated by stunning displays of man-made gods and other mechanical devices was appropriated by Byzantine and Muslim rulers in Constantinople and Baghdad alike. Reports spanning the ninth through the eleventh centuries provide a glimpse of their splendor. Harun al-Rashid (r. 786-809) relaxed in gardens with moving, chirping mechanical birds of Classical¹⁰³ design executed in gold and silver and water gardens with

¹⁰⁰ More generally, the legacy of Classical esotericism has been identified in Arabic alchemical texts and in some schools of Islamic philosophy. Eamon delineates the exoteric/esoteric distinction encountered in Islamic exegetical tradition, which differentiated between the apparent meaning of the Koran (*zahir*) and the hidden truth concealed within it (*batin*); corresponding with scriptural batinism were the Islamic “secret sciences” which recognized a gap between nature’s outward appearances and the occult powers lying within.” Eamon, *Science and the Secrets of Nature*, 355.

¹⁰¹ See Johnathan Lyons, *The House of Wisdom: How the Arabs Transformed Western Civilization* (New York: Bloomsbury Press, 2009).

¹⁰² Pingree, “Hellenophilia versus the History of Science,” 555.

¹⁰³ Such birds appear in the texts of Hero as well as Vitruvius; the latter cites Ctesibius for their invention: “This, however, is not the only apparatus which Ctesibius is said to have thought out, but many more of various kinds are shown by him to produce effects, borrowed from nature, by means of water pressure and compression of the air; as, for example, blackbirds singing by means of waterworks and “angobatae,” and figures that drink and move, and other things that are

fountains demonstrating a sophisticated command of hydraulics;¹⁰⁴ this same ruler's gift to Charlemagne of a clepsydra water clock prompted the earliest detailed description of an automaton in the Latin West. A Carolingian chronicler described it as,

marvelously contrived by mechanical art, on which the course of the twelve hours was marked by a clepsydra, with the right number of little bronze balls, which would fall into a basin when the hour was complete and make a sound. [This clock] also had the same number of horsemen, and they would, through twelve windows, come forth at the end of the hours. With the force of their exit they would close the proper number of windows, which had before been open.¹⁰⁵

Harun al-Rashid's son and successor caliph al-Ma'mun (r. 813-833) possessed an artificial tree with mechanical birds after the Heronic model as early as 827, as did caliph al-Muqtadir (r. 908-932) a century later at his palace in Samarra, which was described by the visiting Greek dignitary and future Byzantine emperor Romanos Lekapenos in 917 as a tree of gold and silver branches ornamented by artificial singing birds standing in the middle of a pool.¹⁰⁶

In a parallel vein, the Byzantine court mirrored the 'Abbasid caliphate both in diplomatic gifts to the West and the types of automata documented at Constantinople.¹⁰⁷ In 757, the Byzantine emperor Constantine V sent an organ, presumably steam-powered, to the court of Pepin the Short in Francia.¹⁰⁸ As for the latter, a certain Leo the Magician is said to have created a golden tree with singing mechanical birds for the Byzantine emperor Theophilus (r. 829-842) as well as an automated throne with roaring lions and moving beasts in imitation of King Solomon's legendary original.¹⁰⁹ The throne and its automata are documented in the *Book of Ceremonies* of Constantine Porphyrogenitos, and an account by Liudprand of Cremona following his visit to Constantinople in

found to be pleasing to the eye and ear.” Vitruvius, *The Ten Books On Architecture*, trans. Morris Hicky Morgan (Cambridge: Harvard University Press, 1914), 10.7.4.

¹⁰⁴ Jean Delumeau and Matthew O'Connell, *History of Paradise: The Garden of Eden in Myth and Tradition* (New York: Continuum, 1995), 128.

¹⁰⁵ *Annales regni Francorum*, ann. 807, *MGH, SS. rer. Ger.*, ed. F. Kurze (Hanover: Hahn, 1895), 123-24, trans. in Truitt, *Medieval Robots*, 21.

¹⁰⁶ *Idem*, 20.

¹⁰⁷ A considerable body of scholarship has been generated around the automata from the Oriental, particularly Byzantine courts; see Otto Söhring, “Werke Bildender Kunst in altfranzösischen Epen,” *Romanische Forschungen* 12 (1900): 580-98; James Douglas Bruce, “Human Automata in Classical Tradition and Mediaeval Romance,” *Modern Philology* 10 (1912-13): 511-26; Edmond Faral, *Recherches sur les sources latines des contes et romans courtois au moyen âge* (Paris, 1913), 328-35; Alfred Chapuis and Edouard Gélis, *Le Monde des automates*, 2 vols. (Paris, 1928), I, 3-41, 199-213; II, 335.

¹⁰⁸ *Idem*, 22.

¹⁰⁹ Gerard Brett, “The automata in the Byzantine Throne of Solomon,” *Speculum* 29 (1954): 477-87; Henry Maguire, *Byzantine Court Culture from 829 to 1204*, (Washington D.C.: Trustees for Harvard University, 1997). 32.

949 furnishes more details; the throne moved up and down, two mechanical lions on either side roared and thumped their tails, and different kinds of mechanical birds produced the calls appropriate to their species.¹¹⁰ The throne also figures into the *ca.* 956-959 court manual *De cermoniis* written by emperor Constantine VII Porphyrogenetos:

When the *logothete* puts the customary questions [to the foreign envoy], the lions begin to roar, and the birds on the throne and likewise those in the trees begin to sing harmoniously, and the animals on the throne stand upright on their bases. While this is taking place in this way, the foreigner's gift is brought in by the protonotary of the post and again, after a little while, the organs stop and the lions subside and the birds stop singing and the beasts sit down in their places. After the presentation of the gift the foreigner, directed by the logothete makes obeisance and goes out, and while he is moving away to go out, the organs sound and the lions and birds each make their own sound and all the beasts stand upright on their bases. When the foreigner goes out through the curtain, the organs stop and the birds and the beasts sit down in their places.¹¹¹

Lorraine Daston and Katherine Park maintain that by the High Middle Ages in the West, Byzantium's imperial automata had probably corroded into immobility; the description left by the soldier Robert of Clari from the fourth crusade has been interpreted to testify to defunct automata in the Hippodrome of Constantinople:

there were figures of men and women, and of horses and oxen and camels and bears and lions and of many manner of beasts, all made of copper, and which were so well made made and so naturally formed that there is not master in heathendom or Christendom who has enough skill as to make figures as good as these figures were made. And in the past they used to perform by enchantment, but they do not play any longer. And the Franks looked at the Games of the Emperor in wonder when they saw it.¹¹²

However, some works survived or were continued to be manufactured.¹¹³ An eleventh-century

¹¹⁰ William Eamon, "Technology as magic in the late Middle Ages and Renaissance," *Janus* 70 (1983): 175; Kieckhefer, *Magic in the Middle Ages*, 100-101.

¹¹¹ Constantine VII, *The Book of Ceremonies*, 2.15, trans. Anne Moffat and Maxeme Tall, 2 vols. (Canberra: Australian Association for Byzantine Studies, 2012), 2, 569.

¹¹² Robert of Clari, *La conquête de Constantinople*, ed. Philippe Lauer (Paris: Champion, 1924), § 90, 88, translated in Truitt, *Medieval Robots*, 26.

¹¹³ Daston and Park, *Wonder and the Order of Nature*, 92.

report of the visit of Charlemagne to Constantinople describes two bronze infants which during a storm turn to look at each other and produce life-like laughter.¹¹⁴ Elsewhere, travelers encountered mechanical angels which blew trumpets, and mechanical horsemen that announced the hours,¹¹⁵ it would not be long before these appeared in the West.

Meanwhile, over the course of the intervening centuries in the Muslim East, great strides in engineering were made by inventors and engineers that adapted technology from the temples to service and entertainment at the court. Automata in the form of apes gamboled and provided observers at court the opportunity to contemplate the nature of man,¹¹⁶ a band of automata beat their instruments and created timed music, and mechanical servants proffered their masters with a drink and a napkin.

A concern for comfort informed the invention of automata designed to serve or relieve a burden of labor otherwise falling to humans, a development which has come to be seen as a distinctly Arabic legacy. Writing in the sixteenth century, Leonardi Alberti hypothesized in his treatise *Descrittione della tutta italia ed isole appartenenti* (1560) a somewhat stereotypical “Moorish flair for extravagant artifice” from the ruined palace Al-Zisa at previously Muslim-controlled Palermo: namely that its central channel of water brought bottles of wine down to the guests dining in the palace's atrium!¹¹⁷ The idea (if not documentable instances of practice) however had been present in the Greek literary imagination; the tripods and serving-girls of Hephaestus from the *Iliad* are one example, and virtually identical motifs appear later in Philostratus's *Life of Apollonius of Tyana*.¹¹⁸ Aristotle mused in his *Politics* about the possibility of a “tool [that] could follow orders, or could perceive in advance what is needed and so could complete its work by itself.”¹¹⁹ A device which dispensed soap and water appears in Greek sources, but mechanics were deployed in the Eastern courts to provide music, entertainment, refreshment, and comfort on an unprecedented scale.

This new emphasis on comfort in no way diminished the enormity of Islamic mechanical

¹¹⁴ Cohen, *Human Robots in Myth and Science*, 52.

¹¹⁵ Kieckhefer, *Magic in the Middle Ages*, 100.

¹¹⁶ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 16-17.

¹¹⁷ Christopher Pastore, “Expanding Antiquity: Andrea Navagero, Renaissance Gardens, and the Islamic Landscape,” *Rutgers Art Review* 19 (2001): 7-8. My thanks to Dr. Bradburne for bringing this article to my attention. See also Leandro Alberti, *Descrittione della tutta italia ed isole appartenente* (Venice, 1560), 47r.

¹¹⁸ Tripods and cup-bearers of black brass serve the guests at the Indian court Apollonius visits, but the animation of statues or automata is not among the marvels ascribed to the famed magus. Philostratus, *Life of Apollonius of Tyana*, trans. C.F. Conybeare (New York: The Macmillan Co., 1912), 289-91.

¹¹⁹ Aristotle, *Politics*, 1253b.

sciences' contribution to wider engineering applications in the medieval West; engineers such as Ismail Al-Jazari (1136-1206), Ridwan ibn al-Saati (d. *ca.* 1225), and the Banu Musa (active in the ninth century) invented hundreds of devices, and their texts describe in detail how simple Heronic mechanisms harnessed the forces of water and air not only to animate automata, blow whistles, make organs play, and birds sing but also to lift water and construct terrifying war engines.¹²⁰ Ridwan is the source of a representation of the water-clock at Damascus, the first of its kind.¹²¹

Even further east, legendary reports surface of Indian automata: wooden men that walked, talked, danced, and sang, mechanical elephants, fish, and courtesans that deactivated if embraced too amorously.¹²² Many devices made their way to Western Europe from the twelfth century onwards with the unprecedented influx of people that came with the crusades. This thread will be picked up again later, and we will follow where water clocks and other examples of Eastern mechanics appeared in medieval Europe below.

4.4. Automata in Medieval Western Europe

During these centuries in the West, in spite of the prevailingly dim view of the “Dark Ages” as a time in which the loss of knowledge and developments from the Classical world defines the historical period, intellectual oblivion of ancient technology was not necessarily immediate. What has been deduced to be descriptions of a sundial and clepsidra (the Latin has stymied translation efforts in some editions) are commissioned at the request of King Gundibad of the Burgundians in the early sixth century in a letter from Cassiodorus to Boethius. Cassiodorus's praise of the mechanician is rooted in his capacity to make man believe in miracles:

What a wonderful art is Mechanics! The mechanician, if we may say so, is almost Nature's comrade, opening her secrets, changing her manifestations, sporting with miracles, feigning so beautifully that what we know to be an illusion is accepted by us as truth.¹²³

¹²⁰ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 17. Original engines of war which emerged from the Islamic Medieval period include a trebuchet known in Arabic as “The Furious One” (*al-ghadban*) and a design for a rocket-propelled torpedo.

¹²¹ Before this, there is only a description from Procopius in the sixth century of the monumental clock at Gaza. See Sherwood, “Magic and Mechanics in Medieval Fiction,” 578.

¹²² Cohen, *Human Robots in Myth and Science*, 23.

¹²³ Cassiodorus, Magnus Aurelius, *The Letters of Cassiodorus*, ed. and trans. Thomas Hodgkin (London: Henry Frowde, 1886), 45: 170.

Cassiodorus also write about the existence of a machine that exhibits “the course of the planets and the causes of eclipses.”¹²⁴ The water clock is mentioned in a subsequent letter accompanying its expedition to the Burgundian king,¹²⁵ and this device has been recognized as perhaps the last Western example of the type from purely Classical sources.¹²⁶ It would not be until the early ninth century with the gift of the water clock from Harun al-Rashid, mentioned above, that this particular iteration of hydraulic technology reappeared in the West. Nevertheless, compared to the preservation of similar technology in Byzantium and the Islamic East in the intervening centuries, the state of decay in the Western Roman Empire is apparent. Simply put, there was no parallel Western phenomenon on the scale of the House of Wisdom and other efforts in the East to preserve and create mechanical texts, such as the translation of Hero's *Mechanics* in the ninth century under caliph al-Motassim (r. 862-866) or the original work of the three sons of Musa ibn Sakir (the Banu Musa mentioned shortly above): the automaton-making treatise *Kitab al-Hiyal (Book of Ingenious Devices)* written around 850.¹²⁷

To a certain extent, Western culture absorbed more technically-minded Arab treatises into the characteristic literary genre of “Books of Secrets,” which disseminated a wealth of knowledge on a vast range of topics (medicine, pharmacology, metallurgy, craft-secrets, and even home economics) as well as those fields relevant to our study of animated statues: Hermetic philosophy and astral-magical operations, on one hand, and technical guild-books, like the thirteenth-century notebook of Villard de Honnecourt, on the other. However, caution is recommended before creating any solid dividing line between apparently technical texts of the mechanical/automata line of descent and the philosophical or magical treatises relevant to the astral or demonic principle of animation. As it has been observed and as we shall see below, “magic and science never really part company up through the Middle Ages.”¹²⁸

In the vast corpus of medieval and early-modern books of secrets, magical recipes, or mechanical treatises, which can be identified as the most relevant towards tracing both the development of automata and the survival of antique philosophies and technologies about animating

¹²⁴ *ibid.*

¹²⁵ *Idem*, 46: 170.

¹²⁶ Minsoo Kang, *Sublime Dreams of Living Machines: The Automaton in the European Imagination* (Cambridge: Harvard University, Press, 2011), 87-88.

¹²⁷ Truitt, *Medieval Robots*, 20.

¹²⁸ Eamon, *Science and the Secrets of Nature*, 134.

statues? In the attempt to answer this question, we encounter phenomena in the definitions of magic and mechanics in the Middle Ages that see a continuous overlap; hard-and-fast distinctions that are the rule of modern perception do not apply. Medieval practitioners of magic employed its various arts in a practical rather than theoretical fashion, and on this basis the argument has been made that magic itself was a form of technology.¹²⁹ Indeed, magic came to be appropriated as the theoretical framework for emerging technical disciplines; magic and technology were sister-arts, rather than the two incompatible fields we perceive in the modern era. William of Conches (*ca.* 1090- after 1154) placed magic on an equivalent footing as the mechanical arts in his *De philosophia mundi* as studies which aided man in overcoming physical infirmity.¹³⁰ Hugh of St. Victor (1096-1141) also included mechanics with the liberal arts on the basis that of its potential to prepare the mind for blessedness and to overcome ignorance.¹³¹ In Scholastic works, we encounter the magical arts grouped with other mechanical disciplines, increasingly identified with *techne* rather than *scientia*, adhering to the critical distinction that magic and technology were both “artificial” in the sense that they manipulated unseen properties of nature.¹³² At one extreme, we sometimes find necromancy classed as a seventh liberal art in the attempt to legitimize its pursuit as legitimate study.¹³³

Thusly, the medieval hand-books promising to reveal various techniques or recipes by which man could gain some mastery over nature chipped away at the antique notion that knowledge was principally transmitted by divine revelation (although traditions of procuring divine, revelatory visions persisted through the medieval period in the tradition of the magical *Ars Notoria* texts which were discussed in the first section of the present chapter).¹³⁴ Eamon observes that whereas the “secrets of nature” were presumed to be unknowable in antiquity without the direct divine intercession, they became knowable to the medieval mind as recipes, formulae, and techniques.¹³⁵

The transmission of mechanical and mystical techniques to animate the inanimate belongs within the circulation of works which treated “secrets” relevant to a wide spectrum of arts and

¹²⁹ Kieckhefer, *Magic in the Middle Ages*, 131.

¹³⁰ Eamon, *Science and the Secrets of Nature*, 59.

¹³¹ However, it's been cautioned not to take this schema as representative in any way of common medieval hierarchies; *ibid.*, 83.

¹³² James A. Weisheipl, “Classification of the Sciences in Medieval Thought,” *Medieval Studies* 27 (1965): 54-90.

¹³³ Charles Burnett, *Talismans: Magic as Science? Necromancy among the Seven Liberal Arts* in *Magic and Divination* (Aldershot: Variorum, 1996), 1-15.

¹³⁴ See Klaassen, *English Manuscripts of Magic, 1300-1500*, 14-19; Watson, *John the Monk's Book of Visions of the Blessed and Undefined Virgin Mary, Mother of God: Two Versions of a Newly Discovered Ritual Magic Text*, 163-215; Fanger, *Plundering the Egyptian Treasure: John the Monk's Book of Visions and its Relation to the Ars Notoria of Solomon*, 216-249; and to a lesser degree, Camille, *Visual Art in Two Manuscripts of the Ars Notoria*, 110-142.

¹³⁵ Eamon, *Science and the Secrets of Nature*, 353.

applications: metallurgy, alchemy, medicine, horticulture, etc. as well as ritual and image magic. However, whereas “secrets of nature” pertaining to the fields just mentioned were known and practiced commonly, theurgic or thaumaturgic activities remained the reserve of those in rarefied positions. There is, for example, a strong historical and recently-demonstrated paleographical association between works of medicine and texts on astrological image magic theory. Frank Klaassen corroborated medieval medicine's longstanding association with astrological images as well as magical suspensions, ligatures, and rings with his study of the organization of medieval collections of magical manuscripts; from a survey of British magical manuscripts dating from 1250 to 1500, he finds an interest in medical material in six of the twenty-two collections and independently identifies two of the collectors as medical practitioners.¹³⁶ In the case of John Argentine, the doctor to Edward V and his brother Richard in the late fifteenth and early sixteenth centuries, instead of any medical texts at all, we find the only fifteenth-century reference to the *Picatrix* and works on images by Ptolemy and Thebit ben Corat.¹³⁷ However the possibility is given that the collection of texts of astral magic could very well have been motivated “for the sake of show” or a theoretical, rather than practical, interest. Nevertheless, the suggestion of an active interest is strongly present.

Magic formed a component of virtually all learned men's education and seeped into the fiber of early scientific investigations. “Magus-mechanician” becomes an appropriate designation in the Middle Ages; often the boundaries blurred between wonder-working, magic, virtuosity in engineering or war-craft, and spectacle in Church or at court. Giving statues or other creations motion and the semblance of life was but one aspect of a continual exploration of technological possibilities, and we now take a look at the application of animated statues in statecraft as well as religion in the medieval Latin West.

An extreme example of the suitability of magic to medieval military arts is the figure of Conrad Kyeser (1366-1405). Born to burgher parents and university-educated, Kyeser's life was largely spent as a military engineer to several princely courts, but it is his treatise *Bellifortis* that ensured the survival of his peculiar blend of magical philosophy in the service of contemporary rulers. Historians of magic and technology alike have remarked on the *Bellifortis*'s eclectic character which blends dozens of fantastical magical recipes and formulae with hard-headed military

¹³⁶ Klaassen, *English Manuscripts of Magic, 1300-1500*, 6.

¹³⁷ Idem, 6-7; Pingree, “Diffusion of Arab Magical Texts,” 98

technology.¹³⁸ Alongside herbal and animal magic are references to Byzantine technological secrets, namely the famed “Greek fire.” Although Kyesser worked in German-speaking lands, one must pose the question not of whether, but rather to what degree Italy, which evidenced a comprehensive science and art of military affairs earlier than anywhere else in Europe,¹³⁹ integrated what we would call magical or astral theory into its engineering works. Like the “secrets of nature” and esoteric teachings of philosophy, aspects of military technology were secrets of those who held (and wanted to maintain) power, then as now. In a parallel vein to theurgic methods, which were secrets of temples which wished to maintain their monopoly on spiritual experiences, these belong to the discussion of the persistence and transmission of guarded knowledge through time.

Although Kyesser's *Bellifortis* does not occupy itself explicitly with the animation of statues, it is an extended enunciation of the close proximity in which the magical arts were grouped with military and engineering endeavors. Elsewhere it has been observed that the medieval military engineer did not hold himself above the use of magical formulae, amulets, experiments to produce “marvels,” or even conjuring demons when furnishing his client-kingdoms with tools to protect themselves or to go on the offense.¹⁴⁰ these all belonged to the *artes theurgices* which were recognized as a theoretical matrix which provided the medieval engineer new lines of attack and unseen channels of engagement upon his foe. In the medieval and early-modern period, the engineer, being one who acts upon nature by constructing bridges, dams, forts or other projects necessitating a command of the laws of natural physics, could not be precluded from a similar engagement upon nature through subtle, occult channels held to be equally effective. This conflation with the engineer, at least partially, with the identity of the magus, is an idea which reverberates through the centuries up to the creation of the role of the many engineered “wonders” at Pratolino.

Automata pressed into the service of the Latin Christian Church continued to awe congregations with phenomena which was maintained in most cases, as at Alexandria, in the highest reverence and secrecy. Before the Reformation, Catholic Europe's distinctions between material and spiritual or earthly and divine were not as rigid as they subsequently became. Jessica Riskin describes these religious automata as “neither passive nor rote.... they were representations in

¹³⁸ Eamon, *Science and the Secrets of Nature*, 69; Kieckhefer, *Magic in the Middle Ages*, 98-100.

¹³⁹ Burckhardt, *The Civilization of the Renaissance in Italy*, 54.

¹⁴⁰ Eamon, *Science and the Secrets of Nature*, 69-71.

motion, inspirited statues: they were mechanical *and* divine.”¹⁴¹

Most illustrative of this blurred boundary perhaps is the “Rood of Grace,” a mechanical Christ on a crucifix at Boxley Abbey in Kent from the fourteenth century, which displayed a wide range of movement: bowing, straightening up, shaking hands and feet, nodding its head, and a range of emotional expressions made possible by moving eyebrows, eyes and lips able to be manipulated “by stringes of hair.”¹⁴² The Rood of Boxley has been the subject of inquiry of English historians for the deep insights which it and the larger phenomenon of the place of moving or religious images in English faith. Emma Maggie Solberg has traced in reformist historiography wildly divergent views of the Boxley Rood through the eighteenth and nineteenth centuries¹⁴³ which ultimately informed the present-day’s appreciation of the wide spectrum of cultural and devotional significance which these automata possessed for their intended audience.¹⁴⁴

However, before approaching the iconic mechanized Christ at Boxley, pilgrims would pass before another mechanical contrivance in the figure of Saint Rumwald who recalls the Egyptian practice of receiving the *hanu* blessing from an invisibly-operated device incorporated into the statue. As a contemporary described it, “by the helpe of an engine fixed to the back thereof,” a kind of foot-pedal allowed the priest to move the hands of what seemed to be a stone statue and to grant,

¹⁴¹ Riskin, *The Restless Clock*, 22.

¹⁴² Idem, 12; quotation from Wriothesley, *Chronicle*, 1:75. See also Michael Jones, “Theatrical History in the Croxton Play of the Sacrament” *ELH* 66.2 (1999): 223-60.

¹⁴³ The Catholic resurgence brought with it new questions about the Rood, with Augustus Pugin in 1842 going so far as to assert that the Rood could only have been a fantasy of iconoclasts. The research of Catholic antiquarians towards the end of the same century established the existence of the mechanisms, but defended their classification as trickery or frauds, advancing the present-day historian’s nuanced vision of the “living statue’s” legitimate use and purpose in devotional pageantry of the age. In English historiography, two perspectives of the Rood and its kind emerged along religious and political lines: for the Catholic apologists, it was a simple mechanism deployed for a specific contest and purpose; for Whig historians it persisted as a “fiendish android.” See Emma Maggie Solberg, “Mechanical Miracles and the Statue of Hermione,” unpublished essay, 10. My thanks to Dr. Solberg for sharing this work with me. For the Catholic apologists, see Augustus W. N. Pugin, *The Present State of Ecclesiastical Architecture in England* (London: Charles Dolman, 1843), 139-140; T. E. Bridgett, “The Rood of Boxley; or, How a Lie Grows,” *The Dublin Review*, 3rd ser., 191.1 (January 1888), 2; J. Brownbill, “Boxley Abbey and the Rood of Grace,” *The Antiquary* 7 (1883), 162-5, 210-13; on the Whig histories, see David Hume, *The History of England* (London: T. Cadell, 1778), 1.649; Bridgett, “The Rood of Boxley,” 4-6. See also Kara Reily, *Automata and Mimesis on the Stage of Theatre History* (New York: Palgrave Macmillan, 2011), 19-23; Leanne Groeneveld, “A Theatrical Miracle: The Boxley Rood of Grace as Puppet,” *Early Theatre* 10.2 (2007).

¹⁴⁴ Furthermore, Solberg argues that the Reformers’ destruction of these “living statues” was an extreme end on a spectrum of worship which went so far as ritual humiliation of these idols in order to reinforce their agency. Testament to this phenomenon are the flummoxed accounts of the Reformers in the face of those who would not abandon their conviction that these were sacred objects, even when their apparatus had been put in plain view. Ultimately, it can be argued that the destruction and desecration of the moving religious statuary in England fulfilled the extremities of ritual humiliation, which motivated the images’ power and agency rather than extinguish them. Although the custom of ritual humiliation was banned by the church in the late thirteenth century, Solberg traces the survival of the custom in early modern English religious theatre and culture. See Solberg, “Mechanical Miracles and the Statue of Hermione,” 20; Patrick Geary, *Furta Sacra: Thefts of Relics in the Central Middle Ages* (Princeton: Princeton University Press, 1978), 123-40; Lester Little, *Benedictine Maledictions: Liturgical Cursing in Romanesque France* (Cornell University Press, 1996).

by mechanical proxy, acknowledgment of the purity of those who sought the Rood of Grace; a secondary feature was a rigged test of religious faith and physical test which recalls the sword in the stone of Arthurian legend.¹⁴⁵ In Wiltshire, the Rood of Ramsbury, which was famed to be immovable by sixteen oxen, was taken down by one man.¹⁴⁶ In sixteenth-century Brittany, a mechanical Jesus rolled his eyes, moved his lips, and spurted blood from the wound in his side and was accompanied by another mechanized, gesticulating Virgin Mary with three attendants as well as a head with moving eyes fixed on top to symbolize the Trinity.¹⁴⁷ A moving Virgin Mary was a motif in itself; Surviving roods include the fifteenth-century example of Oswald Bierstorfer aus Memmingen and the *Santo Cristo de Burgos*.¹⁴⁸ The fifteenth-century wooden Crucifix in Santa Croce attributed to Donatello and its mobile, jointed shoulders has been studied by John Paoletti, as has a Mary with jointed arms attributed to Mario d'Angelo Romanelli in the church of Santa Chiara della Marca in Castelfiorentino.¹⁴⁹ A large number of surviving medieval automata, specifically the Church's life-sized, articulable religious statues, have been identified in the works published by Johannes and Gesine Taubert (1969) and Johannes Tripps (200)¹⁵⁰ We are confronted with statues wrought to convey as close an impression of life as possible: arms that fold, heads that turn, mouths that move, eyes that open and shut, as well as the capacity to "bleed."¹⁵¹ Furthermore, the wood was clothed in true skin; as an object of furniture, we would say they were upholstered in leather, but in their capacity of simulacra, this leather skin, as well as the statues' anatomical correctness, fleshed

¹⁴⁵ "...this Saint Rumwald was the picture of a prettie Boy Saint of stone, standing in the same churche, of it selfe short, and not seeming heavie: but for as much as it was wrought out of a great and weightie stone (being the base thereof) it was hardly to be lifted by the handes of the strongest man. Neverthelesse (such was the conveighance) by the helpe of an engine fixed to its back thereof, it was easily prised up with the foote of him that was the keeper; and therefore, of no moment at all in the handes of such as had offered frankly: and contrariwise, by the meane of a pinne, running into a post (which that religious imposter standing out of sight, could put in, and pull out, at his pleasure) it was, to such as offered faintly, so fast and unmoveable, that no force of hande might once stirre it. In so much, as many times it mooved more laughter than devotion, to beholde a great lubber to lift at that in vaine, which a young boy (or wench) had easily taken up before him." William Lambarde, *A Perambulation of Kent: Description, Hystorie, and Customes of That Shire. Written in the Yeere 1570* (London: Baldwin, Cradock, and Joy, 1826), 209-10.

¹⁴⁶ Peter Marshall, "Forgery and Miracles in the Reign of Henry VIII," *Past & Present* 178 (2003): 39-73; 59. This rood, as well as the intriguingly-named "juggling casts" of St. Erth in Cornwall, appear in the 1538-9 ballad *The Fantasie of Idolatrie* by William Gray.

¹⁴⁷ Burckhardt, *The Civilization of the Renaissance in Italy*, 13-14.

¹⁴⁸ Solberg, "Mechanical Miracles and the Statue of Hermione," 11; see also Amy Knight Powell, *Depositions: Scenes from the Late Medieval Church and the Modern Museum* (New York: Zone Books 2012), 84-5; Maria José, "El Santo Cristo de Burgos: Y Los Cristos Dolorosos Articulados," *Boletín del Seminario de Estudios de Arte y Arqueología* 69-70 (2003-4): 207-246.

¹⁴⁹ John T. Paoletti, "Wooden Sculpture in Italy as Sacral Presence," *Artibus et Historiae* 13.26 (1992): 85-100; 94.

¹⁵⁰ Johannes and Gesine Taubert, Johannes and Gesine, "Mittelalterliche Kruzifixe mit schwenkbaren Armen," *Zeitschrift des deutschen Vereins für Kunstwissenschaft* 22 (1969): 79-121; Johannes Tripps, *Das handelnde Bildwerk in der Gotik* (Berlin: Mann, 2000).

¹⁵¹ Solberg, "Mechanical Miracles and the Statue of Hermione," 11.

out an entity that necessitated clothes and prompted rituals of care-taking.¹⁵² For example, the figures of Adam and Eve as well as the resurrected dead on Doomsday from the York Mercer's indenture of 1433 are documented as being clad in "whytt lether."¹⁵³

Technological trickery extended beyond the realm of roods and moving saints. Mechanical Eucharistic doves were also deployed in churches, and the Cloisters Museum in New York possesses a surviving example from Limoges of this kind of device.¹⁵⁴ A thin wire allowed unconsecrated Eucharistic bread to apparently fly from the paten in the prior's hand to the priory rood loft, where the "holy maid" Elizabeth of Leominster (Herefordshire) was imprisoned during the reign of Henry VII.¹⁵⁵ The secret of the venerated "Our ladyes taper" at Cardigan, a candle believed to burn indefinitely without being consumed, also owed to the concealed presence of wood.¹⁵⁶ All over England through the early 1540's, the campaign of dismantling "superstitious" objects continued, including the shrine of St. Hugh at Lincoln, St. William of York, and other "divers feigned jewels and relics."¹⁵⁷ The impulse to destroy the cross and crucifix can be traced as far back as the Lollards in the fifteenth century.¹⁵⁸ In stark contrast are areas today which have retained a Catholic identity's sporadic episodes of miraculous "living" sculpture, most notably the Ballinspittle, North Ireland moving Virgin Mary housed in a road-side grotto.¹⁵⁹ These and other icons which have been known to sweat or bleed likewise have their antecedents in ancient Greek and Roman sources.¹⁶⁰

¹⁵² Idem, 18; see also Elina Gertsman, "Image and Performance: An Art Historian at the Crossroads," *ROMARD* 51 (2012), 53.

¹⁵³ Solberg, "Mechanical Miracles and the Statue of Hermione," 11; *Records of the Early English Drama: York*, eds. Alexandra F. Johnston and Margaret Rogerson (Toronto: Toronto University Press, 1979), 1.55; Clifford Davidson, *Material Culture and Medieval Drama* (Kalamazoo: Medieval Institute Publications, 1999), 112-3. Solberg comments on the interesting circumstance that both wooden sculpture and living actors donned leather skins to represent nudity on the medieval stage.

¹⁵⁴ It has been dated to ca. 1215-35. Accession number: 17.190.344; see also Mary Flowers Braswell, "The Magic of Machinery: A Context for Chaucer's 'Franklin's Tale,'" *Mosaic: A Journal for the Interdisciplinary Study of Literature* 18.2 (1985): 101-110; 102; Elizabeth Parker McLachlan, "Liturgical Vessels and Implements," in *The Liturgy of the Medieval Church*, ed. Thomas J. Heffernan and E. Ann Matter. Consortium for the Teaching of the Middle Ages (Kalamazoo, Michigan: Western Michigan University, 2005), 398-399, fig. 6.

¹⁵⁵ In this instance, this mechanical manipulation was ultimately confessed, as was the fact that she was the prior's lover. Marshall, "Forgery and Miracles in the Reign of Henry VIII," 46; Thomas More, *A Dialogue Concerning Heresies*, ed. Thomas M. C. Lawler et al. (New Haven: Yale University Press, 1981), 87-8.

¹⁵⁶ This object was exposed by Bishop Barlow of St. Davids in 1538; Marshall, "Forgery and Miracles in the Reign of Henry VIII," 55.

¹⁵⁷ G. W. Bernard, "The Making of Religious Policy, 1533-1546: Henry VIII and the Search for the Middle Way," *The Historical Journal* 14 (1998): 321-349; 347.

¹⁵⁸ Margaret Aston, "Cross and Crucifix in the English Reformation," *Historische Zeitschrift Beihefte* 33 (2002): 253-72; 253-6.

¹⁵⁹ "A Moving Tale from County Cork," *BBC News*, 29 March 2000.

¹⁶⁰ For example, the sweating cedar-wood Orpheus statue of Macedonian Liebethra, believed to be of the archaic small

Mechanical beings made their way into more transparently-theatrical religious displays as well. Static images, statues, articulated puppets, and mechanical devices mingled on the medieval theatrical stage, religious and secular. Solberg observes that there is little difference between the animated figures and the puppets implied in the stage directions which accompany medieval theatrical play-scripts.¹⁶¹ Nor was it taken for granted that these inventors of spectacle played to an “easy” audience, at least not in urbane Florence; the noisy hitches of devices that enabled figures to rise into the air in religious plays were a stock subject of popular ridicule.¹⁶² We find some of the most spectacular applications of stagecraft engineering associated with religious celebrations, such as the feast of the Annunciation at San Felice in Florence, the occasion for which in the fifteenth century Filippo Brunelleschi rigged the archangel Gabriel in a mechanical mandorla (representing the union of Heaven and earth, matter and spirit) and animated a moving, illuminated tableau of the heavenly paradise, though it seems little boys were also employed to act as angels.¹⁶³ The apparatus was so heavy that the church's roof collapsed. For the Florentine festival of Saint Cecilia, fully mechanized angels seem to have been deployed.¹⁶⁴ The engineering of Christ's ascension at the Florentine Church of Santa Maria del Carmine in the second half of the century by Cecca (Francesco D'Angelo, 1446-1488) was accompanied by a rotating model of the heavens and descending angels.¹⁶⁵ In 1501, the Virgin was propelled heavenward during the Feast of the Assumption at the small village of Rabastens near Toulouse by an “endless screw” accompanied by a rotating sun with angels on its rays.¹⁶⁶ For some time afterwards, it was reported that models of the Virgin's elevator were built by children in the Toulouse region as seasonal expressions of faith akin to the assembling of a Christmas crèche.¹⁶⁷ Even God the Father was included for representation in a mechanized form, as with the “venerable old man” to be seen at the church of Saint-Jacques in Dieppe astride a cloud against the star-studded blue backdrop of heaven's

and portable variety, which sweated before Alexander the Great's departure; whereas the Juno Sospita's weeping was announced by the *pontifex* at Lanuvium in 181 B.C. Bremmer, “The Agency of Greek and Roman Statues: From Homer to Constantine,” 13. Weeping, sweating, and bleeding statues have also been located in Heliopolis (modern Baalbek, Lebanon). See Cohen, *Human Robots in Myth and Science*, 19.

¹⁶¹ Solberg, “Mechanical Miracles and the Statue of Hermione,” 11

¹⁶² Riskin, *The Restless Clock*, 13.

¹⁶³ Vasari, *Lives of the Artists*, trans. George Bull (London: Penguin Classics, 1987), 2:229-32; see also Burckhardt, *The Civilization of the Renaissance in Italy*, 163-65, 212.

¹⁶⁴ Riskin, *The Restless Clock*, 14.

¹⁶⁵ Ibid.

¹⁶⁶ Idem, 15.

¹⁶⁷ Evidenced as late as the mid-seventeenth century recollections of Madame de Mondonville. See *ibid.*

representation in the church's ceiling.¹⁶⁸

Mechanical devils vied with their angelic counterparts for sheer ubiquity in religious displays as well. They occupied church sacristies, howling, making hideous faces, sticking their tongues out, flapping their wings, and generally playing the foil to the mechanized visions of piety. The mechanized tableau of Hell created for a Passion play at Valenciennes of 1547 featured a mechanized monstrous gaping maw with devils and sinners inside, demons, dragons, thunder, and lightning.¹⁶⁹ In at least one example preserved through the nineteenth century at the Musée de Cluny in Paris, one mechanized demon burst out from a cage, roaring, spitting, and making obscene gestures; these effects were the product of a weight-triggered set of bellows which forced air and water through a copper tube in its neck.¹⁷⁰

The surviving fifteenth-century devil automaton of carved and painted wood in the present-day permanent collection of the Museo delle Culture (MUDEC) in Milan¹⁷¹ furnishes a relatively rare opportunity to observe the mechanical underpinnings of an automaton from this era. From the front, the “devil” presents itself as a naturalistic, classically-influenced nude torso of a man, with his arms bound behind him (ostensibly chained, per his description in the museum's labeling, but no actual chains are visible) (fig. 32). From the back, its mechanism presents a preserved, reconstructed appearance (fig. 33), with wheels and a bellow visible, which may have powered pyrotechnics as well as movement of the devil's head, eyes, mouth, tongue and wing-like ears (fig. 34).

The drawings of the Venetian engineer Giovanni Fontana (*ca.* 1395-*ca.* 1455) furnish another rich source of material to illuminate how these early automata worked (figs. 35-36). Unlike many of his peers- including those affiliated with the Church- who promoted the association of automata with superhuman powers, Fontana distinguished himself by laying bare the purely mechanistic operations of his devils and other automata, which included rabbits that farted fire, fire-breathing witches and devils with mobile limbs, wings, and facial features, jet-propelled fish and birds, as well as more sober enterprises like siege engines, measuring instruments, and clocks.¹⁷² In

¹⁶⁸ Ibid.

¹⁶⁹ Idem, 14-15.

¹⁷⁰ Idem, 14.

¹⁷¹ From the collection of Ludovico Settala, *Raccolte d'Arte Applicata*, Castello Sforzesco, Milano (presently housed in the permanent collection of MUDEC Milano); see also Riskin, *The Restless Clock*, pl. 2.

¹⁷² Anthony Grafton, *The Devil as Automaton: Giovanni Fontana and the Meaning of a Fifteenth-Century Machine in Genesis Redux: Essays in the History and Philosophy of Artificial Life*, ed. Jessica Riskin (Chicago: University of Chicago Press, 2007), 52-55. See also Marshall Clagett, “The Life and Works of Giovanni Fontana,” *Annali dell'Istituto e museo di storia della scienza di Firenze* 1 (1976): 5-28; Eugenio and Giuseppa Saccaro Battisti, *Le Macchine Cifrate di Giovanni Fontana: con la riproduzione del cod. icon. 242 della Bayerische Staatsbibliothek di Monaco di Baviera e la decrittazione*

this respect, Fontana was ahead of his time, as magical misgivings about the nature of automata continued well through the next century, such as in England, when the flying beetle carrying a man, engineered by John Dee for a 1547 performance of Aristophanes's comedy *Peace* at Trinity College, still provoked suspicion of black magic.¹⁷³

Another renowned maker of automata whose examples have survived to the present day was also hounded even at the end of his career by the suggestion of sorcery. Extant works attributed to Gianello (or Juanelo) Torriano of Cremona (ca. 1515-1585) include a miniature monk, who ambulates and prays in an act of mechanized devotion (fig. 37),¹⁷⁴ and a lute-player currently housed in the *Kunstzimmer* of the *Kunhistorisches Museum* in Vienna (fig. 38). Torriano impressed Charles V with a reconstruction of a replica of the fourteenth-century *astrarium* of Giovanni De' Dondi and was subsequently assumed into his service and even travelled with him to the *Yuste* convent following the latter's abdication. During this period, we find descriptions of the mechanician employing his talents and automata "to distract his mournful monarch": an animated army in miniature replete with cavalry, infantry, drummers, and trumpeters and wooden flying birds, to the displeasure of the convent Superior who considered them to be sorcery.¹⁷⁵ Another automaton is praised for its grace by a Spanish chronicler in 1575 and evokes comparison to the "ancient statues which moved" as she beats a drum and dances in a circle.¹⁷⁶

However, as Fontana's corpus indicates, animation was not an exclusive privilege of anthropomorphized automata; mechanized animals were also featured in different contexts of religious theater. In different contexts, mechanical bears menaced David's sheep, lions threatened Daniel and knelt at the feet of St. Denis, the ass of Balaam balked in apparent alarm before an angel, a leopard sniffed Saint André, a camel moved its head, lips, and tongue, dragons and serpents spit fire, and at least one serpent was made to twist around the Tree of Knowledge to proffer an apple to Eve.¹⁷⁷ Later ages saw mechanical crayfish, spiders, tortoises, and more realistic fur-covered, drum-playing bears appear.¹⁷⁸ Birds remained an ever-popular trope from antiquity through their decorative function on the ornamental trees of the Byzantine and Muslim East. In Church pageantry,

di esso e del cod. lat. nuov. acq. 635 della Bibliothèque Nationale di Parigi (Milano, Arcadia, 1984).

¹⁷³ Godwin, *The Pagan Dream of the Renaissance*, 120; see also Riskin, *The Restless Clock*, 20-21.

¹⁷⁴ Elizabeth King, *Perpetual Devotion: A Sixteenth-Century Machine that Prays in Genesis Redux: Essays in the History and Philosophy of Artificial Life*, ed. Jessica Riskin (Chicago: University of Chicago Press, 2007): 262-292.

¹⁷⁵ William Sterling-Maxwell, *The Cloister Life of Emperor Charles* (London, 1891), 116, 178; Bedini, "The Role of Automata in the History of Technology," 32.

¹⁷⁶ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 76; see also Riskin, *The Restless Clock*, 21.

¹⁷⁷ For provenances and further examples, see Riskin, *The Restless Clock*, 15.

¹⁷⁸ Particularly the late sixteenth- and early seventeenth-century inventions from southern Germany; see *idem*, 27.

flying white doves were popular representations of the presence of the Holy Spirit, as at Saint Paul's Cathedral in London during the feast of Whitsuntide (which also “breathed” perfume over the congregation).¹⁷⁹ Roosters which flapped their wings and crowed the hour also appeared in profusion, usually associated with clocks, from as early as 1340 at Cluny Abbey (which also featured a mechanized white dove of the Holy Spirit along with the Virgin, the Father, and other fantastic creatures), through the late sixteenth century, on the town clock of Niort and on a grander scale at the Strasbourg Cathedral.¹⁸⁰ Like other roosters, which virtually invariably appeared in the context of a larger choreography of mechanized human and animal figures, the Strasbourg example was never intended as a stand-alone piece but rather belonged to a composition that, after the 1540-1574 refurbishment of the clock by Isaac and Josias Habrecht, featured traditional figures (the Virgin Mary, the Christ child, the three Magi) as well as the pantheon of Roman gods to indicate the day of the week and an elaborate display of the four stages of human life with a baby, a youth, a soldier, and an old man.¹⁸¹ The embrace of the *presepio* tradition by the post-Tridentine Catholic Church also furnished a further stimulus to the crafting of elaborate mechanized scenes. Most relevant to this study is the clockwork *presepio*, or nativity scene, created by Bernardo Buontalenti for Francesco I which featured heavens which opened and closed, flying angels, and figures approaching the manger.¹⁸² Further examination of Buontalenti's *presepio* potentially holds discoveries about the workings and antecedents of the Pratolino automata which are the focus of the present study.

This brief, and by no means extensive, survey underlines what has already been observed as the Church's role as the patron on the largest-scale of mechanical arts, specifically automata-building, during the Medieval period. Another aspect of this patronage was the Church's sponsorship of the translation and printing of what ancient texts on mechanical and hydraulic automata which filtered to Europe by various routes from antique civilization. For example, the appearance of Vitruvius's *De Architectura*, which transmitted designs from the third-century Alexandrian engineer Ctesibius, in the fifteenth century figured prominently in Renaissance popes' project to build a new Christian Rome.¹⁸³

As banal as clock-towers may perhaps appear in comparison to the “living gods” of the

¹⁷⁹ Ibid.

¹⁸⁰ Idem, 16-17.

¹⁸¹ Idem, 17.

¹⁸² Idem, 26.

¹⁸³ Idem, 20.

Classical world, they were the principle bearers of concrete Hellenistic technology amply testified to by thirteenth-century church records and illuminations; a direct line of evolution, with no substantial changes, from Alexandria's water clocks has been demonstrated,¹⁸⁴ and these clocks occasioned the manufacture of automata and biological simulacra in the medieval West from the late thirteenth century onwards, some examples of which we have just encountered above.¹⁸⁵ Initially, these clocks were virtually identical to their counterparts in Byzantium and the Islamic East, but the next century began to conflate this tradition with other lines of development.¹⁸⁶ However, DeSolla Price cautions that as in antiquity, telling time was not the primary concern of these clocks. They performed this function competently, but he underlines that they were above all else a way to model the heavens and God's creation and, in doing so, provide a sense of satisfaction to the community grounded in religious, aesthetic, and intellectual motives.¹⁸⁷

And so can be presumed the parallel satisfaction to be intuited from the creation of devices that simulated animals and humans from antiquity through the medieval period. This impulse has even been recognized in the Black Forest region's traditional craft; the humble cuckoo-clock, as a medieval merging of a cosmological time-marker (the clock) with biological simulacra (the cuckoo).¹⁸⁸ It is within this ideological framework that we must consider the transfer of Alexandrian technology, preserved more or less unmodified for centuries in the East, to medieval Europe; the automaton-as-simulacrum is a key construct underlying the significance which these works possessed for their makers and the societies in which they inhabited.

Heronic antecedents can be observed in rope-driven works, a Heronic Tantalus cup (also called a *chantepleure*), an automaton bird, a mechanical lectern in the shape of an eagle which turned to face the reader, a turning automaton angel which functioned also as a sundial, and a clepsydra-driven bell chime present in the *ca.* 1254 notebook of Villard de Honnecourt.¹⁸⁹ While Euclid and Aristotle remained, largely erroneously, the authorities for many medieval mechanics, two treatises, *Elementa super Demonstrationem Ponderis* and *De Ratione Ponderis*, by a "Jordanus" are also acknowledged to be foundational texts for the medieval Christian school of mechanics, "between Aristotle and Leonardo da Vinci in the history of the discovery of the principle

¹⁸⁴ Bedini, "The Role of Automata in the History of Technology," 29.

¹⁸⁵ See also "How Clocks Became Clockworks" and "Heavenly Automata" in Truitt, *Medieval Robots*, 145-53.

¹⁸⁶ DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 16

¹⁸⁷ *Idem*, 13.

¹⁸⁸ *Idem*, 21-22.

¹⁸⁹ Daston and Park, *Wonder and the Order of Nature*, 95; see also "Early Mechanical Automata in Europe" in Truitt, *Medieval Robots*, 118-22; Riskin, *The Restless Clock*, 21.

of virtual displacements.”¹⁹⁰

Jackwork (jacquemart), animated figures who struck bells or made timed appearances, were stock features of the great astronomical cathedral clocks from the fourteenth century onwards.¹⁹¹ Although clepsydra water clocks and singing birds persisted virtually unmodified in principle from their Heronic and Alexandrian originals, hydraulic power was harnessed in more novel ways by a proliferation of fountains large and small during this time period. A fabled, though plausibly actual, fountain was devised by the Parisian goldsmith Guillaume Boucher in the thirteenth century as a gift-decoration for the Mangu Khan's throne hall and has been described by William of Rubruquis, who visited the Mangu Khan at Karakoum shortly before Marco Polo.¹⁹² It consisted of a large silver tree (the trope is recognized immediately as the same so beloved of Byzantine and Muslim courts), with golden leaves, fruits, and serpents to be found in its branches. An angel with a movable arm holding a trumpet signalled when one of four bowls, ornamented with four large silver lions, rang dry, and at the trumpet's blast, it would be refilled.¹⁹³ The liquids which it dispensed appear to be organized along a social hierarchy, with white mare's milk on the bottom (for the common people), black mare's milk, wine, and honey and rice meads above (for the elite).¹⁹⁴

A surviving example of a table fountain from a century later currently in the Cleveland museum confirms the existence of both the convention and technology; this particular specimen was another gift from a French court to an Eastern potentate (fig. 39).¹⁹⁵ It featured multiple zoomorphic figures which issued water, perfume, or more likely wine which caused wheels to rotate and bells to ring. Its design has been sourced in “problem 12” of Hero's *Pneumatica* as well as to a device which appears in the notebook of Villard de Honnecourt.¹⁹⁶ Yet tales of Eastern automata often carried with them the old prejudice of the diabolical; the levitating cups of Kublai Khan were still products

¹⁹⁰ See Sherwood, “Magic and Mechanics in Medieval Fiction,” 577.

¹⁹¹ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 19. This appellation seems to originate by the familiar names given to this figure with little variation for language differences, such as “Jack” in England, “Jean” in Flanders, “Hans” in Germany, and “Jacquemart” in France. Riskin, *The Restless Clock*, 16.

¹⁹² See *The Journey of William of Rubruck*, ed. and trans. William Woodville Rockhill (London, 1900), 207.

¹⁹³ William of Rubruck, *The Journey of William of Rubruck to the Eastern Parts of the World, 1253-55* *The Journey of William of Rubruck to the Eastern Parts of the World, 1253-55*, ed. and trans. William Woodville Rockhill (London: Hakluyt Society, 1800). See also Bedini, “The Role of Automata in the History of Technology,” 33-34; Daston and Park, *Wonder and the Order of Nature*, 93; “Technology and Trickery at the Mongol Court” in Truitt, *Medieval Robots*, 32-36; Leonardo Olschki, *Guillaume Boucher, A French Artist at the Court of the Khans* (Baltimore, 1946); “Voyage Remarquable de Guillaume de Rubiquis, Envoyé en Ambassade par le Roi Louis IX en Differentes parties de l'Orient, 1253” *Voyages Faites Principalement en Asie dan Les XII, XIII, et XV Siècles*, ed. Pierre Bergeron (La Haye, 1735).

¹⁹⁴ Sherwood, “Magic and Mechanics in Medieval Fiction,” 572.

¹⁹⁵ Specifically, from a son of the Duke of Burgundy to Abu al-Hamid II; Bedini, “The Role of Automata in the History of Technology,” 33; Norman Mosley Penzer, “A Fourteenth-Century Table Fountain,” *The Antique Collector* (1957): 112-17.

¹⁹⁶ Bedini, “The Role of Automata in the History of Technology,” 33.

of *bakshi*, enchanters, in Marco Polo's account, which also possesses an interesting reference to Western "sages of our own country who understand necromancy," suggesting that this was known in Europe as well.¹⁹⁷ The dancing golden peacocks at the imperial palace in Peking are explained by Odoric of Pordenone as works of either "the diabolical art or...a device under the ground."¹⁹⁸

Clepsydra and astronomical clocks, singing birds, musical organs, mechanical simulacra of man and beast, table-fountains, rising thrones and angels, and fabulous trees appear at various courtly contexts throughout Europe as well. Abbot Payson Usher has listed ten or twelve monumental water-clocks known to have existed in Western Europe before 1250, most if not all constructed by Arabs.¹⁹⁹ Only one of these was built in Italy, for Asso Visconti in Milan in 1336. Visconti gardens of the fourteenth century in Pavia and Milan also possessed Heronic singing mechanical birds.²⁰⁰ A passage from the fourteenth-century *Songe du Vieil Pèlerin* preserves the account of an Italian clock-maker whose astronomical, mathematical, and philosophical learning was deemed a requisite, and a well-compensated one, for the construction of spheres and clocks for his wealthy patron:

There is in Italy today a man generally reputed excellent above all others in the three sciences of Philosophy, Medicine, and Astronomy, and alone and an authority in his field: he is called "Master John of the Clocks." He is living at present with the Count de Vertus, who pays him yearly, for his threefold learning, in salary and benefits, two thousand florins or thereabouts. The said Master John of the Clocks has produced, in the three sciences aforesaid, great and authentic works, which are recognized and highly regarded by the great scholars of Italy, Germany and Hungary: among which works he has made a great sphere or clock showing the movement of the firmament (in which instrument are all the movements of the signs and the planets, with their cycles and epicycles and

¹⁹⁷ "There is another marvel performed by those BACSI, of whom I have been speaking as knowing so many enchantments. For when the Great Kaan is at his capital and in his great Palace, seated at his table, which stands on a platform some eight cubits above the ground, his cups are set before him [on a great buffet] in the middle of the hall pavement, at a distance of some ten paces from his table, and filled with wine, or other good spiced liquor such as they use. Now when the Lord desires to drink, these enchanters by the power of their enchantments cause the cups to move from their place without being touched by anybody, and to present themselves to the Emperor! This every one present may witness, and there are oftentimes more than 10,000 persons thus present. 'Tis a truth and no lie! and so will tell you the sages of our own country who understand necromancy, for they also can perform it." *The Travels of Marco Polo*, 3 vols., trans. Henry Yule, ed. Henri Cordier (New York: Dover Publications, 1903), 1: 301-302. See also Daston and Park, *Wonder and the Order of Nature*, 93.

¹⁹⁸ Odoric of Pordenone, *Relatio in Sinica franciscana*, vol. 1, *Itinera et relationes fratrum Minorum saeculi XIII et XIV* (Firenze: Quaracchi, 1929), 473. See also Daston and Park, *Wonder and the Order of Nature*, 93; Truitt, *Medieval Robots*, 35-36.

¹⁹⁹ Abbot Payson Usher, *A History of Mechanical Inventions* (New York: McGraw-Hill, 1929), 148.

²⁰⁰ Miller, *Heavenly Caves: Reflections on the Garden Grotto*, 62.

variations), by a multiplication of wheels without number, with all their parts; and for each planet in the said sphere its own peculiar movement, in such wise that, at all times and at any moment of the day and night, one can see clearly in what sign and degree are the planets and fixed stars of the firmament. And so cleverly is this sphere constructed that, notwithstanding the multitude of wheels, which it would be impossible to count correctly without taking the instrument to pieces, the entire movement of the instrument is controlled by a single balance; which is so great a wonder that leading astronomers from distant parts come to visit the said Master John and the work of his hands, in great respect; and all the great scholars in astronomy, philosophy, and medicine say that there is no record, written or other, of a man who has ever made so delicate and trustworthy an instrument showing the movement of the firmament, as the clock aforesaid. And, in order that the said sphere might be well made and perfect, according to the subtle understanding of the said Master John, he forged with his own hands the said clock, all of brass and copper, without any help of any other person, and he did nothing else for sixteen whole years, according to the information given to the writer of this book, who was a great friend of the said Master John.²⁰¹

Machines were used to confer earthly sovereignty as well in medieval England; during his coronation ceremony in 1377, Richard was offered the crown by a mechanical angel which descended from a castle built for the occasion. The same device appears to have been reused in Richard II's pageant of 1392.²⁰² An early sixteenth-century manuscript illumination commemorating the marriage of Mary Tudor to the King of France has been identified as a depiction of distinctly mechanical contraptions in the guise of flowers: a rosebud revealed a girl and a lily inside which also unfolded to reveal a man.²⁰³ When Henry VII visited York in 1486, the illusion that it was raining rosewater and hailing comfits was deployed.²⁰⁴

Yet if these represent spectacular yet relatively singularistic flourishings of Hellenistic technology in medieval Europe, the château of Hesdin²⁰⁵ was an unparalleled gathering of diverse mechanical works which anticipated the vast hydraulic gardens of the Italian Renaissance, and

²⁰¹ [Abbé Lebeuf], "Notice des Ouvrages de Philippe de Maizières, Conseiller du roi Charles VI et Chancelier du Royaume de Chypre," *Histoire de l'Académie Royale des Inscriptions et Belles-Lettres*,... 16 (1751): 227-28; translated by Sherwood, "Magic and Mechanics in Medieval Fiction," 582-83. Sherwood identifies "Master John" as Giovanni de' Dondi.

²⁰² Mary Flowers Braswell, "The Magic of Machinery: A Context for Chaucer's 'Franklin's Tale,'" *A Journal for the Interdisciplinary Study of Literature* 18.2 (1985): 105; Thomae Walsingham, *Quondam Monachi S. Albini Historia Anglicana*, ed. Henry T. Riley (London: 1863), I.331.

²⁰³ British Museum MS. Cot. Vesp. II, ff. 9 and 9b, as cited by Braswell, "The Magic of Machinery," 105.

²⁰⁴ *Idem*, 104.

²⁰⁵ See Marguerite Charageat, "Le parc d'Hesdin, création monumentale du XIII^e siècle, ses origines arabes," *Bulletin de la société d'histoire de l'art français* (1950): 94-106; see also Riskin, *The Restless Clock*, 27-29.

Pratolino in particular.²⁰⁶ Robert II, Count of Artois (1250-1302) returned to his ancestral seat in Picardy (present day Pas-de-Calais) after going on a crusade to the East and immediately set to work renovating his land to rival the fountain and hydraulic works he had witnessed abroad. While this instance of transmission from East to West in hydraulic garden design is well-known to history, Christopher Pastore has expanded this argument recently, positing sources for the flourishing of Italian Renaissance water gardens in other Islamic-derived models, primarily from Muslim Spain and Sicily.²⁰⁷

However, at Hesdin, with the transmission of this new Eastern-derived technology evolved original innovations and applications that remained distinctly European for centuries to come. The “frolicsome engines” (*engiens d'esbattement*) were reborn.²⁰⁸ Moving wooden statues were animated by cords and water conducted through metal pipes, including hydraulic versions of an elephant, goat, and stag, a carved tree covered with birds spouting water, and mechanical apes covered in real fur which seem to have been taken directly from Islamic models (horns were added to the apes in 1312 though), were present from the earliest times from the close of the thirteenth century through the mid-fourteenth.²⁰⁹ Records of successive Counts of Artois document a concern with maintenance and repair.²¹⁰

Most of these thirteenth- and fourteenth-century *engins* were destroyed when Hesdin was ravaged in the Hundred Years' War by Edward III of England, but when the site passed to Duke Philip the Good of Burgundy, lavish renovations of what was left as well as original inventions brought spectacular developments in the early fifteenth century: fountain jets were hidden under stairs, in the pavement, and in benches, adapted to surprise and soak unsuspecting guests. In a room equipped to create the illusion of thunderstorms with rain, lightning, and even snow,²¹¹ there were eight pipes below for “wetting ladies” and three pipes which “whitened” guests with flour when they stepped in front of them.²¹² If they tried to escape, more jets blocked their exit. Welcoming

²⁰⁶ For a particularly detailed account of its phases of development and works, see “Hesdin: Automata at Court” and “Hesdin in the Fifteenth Century” in Truitt, *Medieval Robots*, 122-137.

²⁰⁷ See Pastore, “Expanding Antiquity: Andrea Navagero, Renaissance Gardens, and the Islamic Landscape.”

²⁰⁸ This phrase is informed by a more or less direct translation from ancient sources; Riskin, *The Restless Clock*, 27.

²⁰⁹ Daston and Park, *Wonder and the Order of Nature*, 95.

²¹⁰ See the summary in Sherwood, “Magic and Mechanics in Medieval Fiction,” 589-90.

²¹¹ According to the account of Colard le Voleur, chamber valet and painter to the duke, which was published in the mid-nineteenth century by the Comte de Laborde. The snow was described by an English translator, William Caxton, sent to Hesdin with Marguerite de Bourgogne in 1470, in the preface to his book *La Vie de Jason*. See Comte de Laborde, *Les Ducs de Bourgogne*, 3 vols. (Paris, 1849-52); *The History of Jason, translated from the French of Raoul Le Fevre by William Caxton, c. 1477*, ed. John Munroe, Early English Text Society, Extra Series, CXI (1913).

²¹² Eamon, “Technology and Magic,” 176; Kieckhefer, *Magic in the Middle Ages*, 101.

visitors into the room was a valet of wood with the ability to speak, although this is virtually certain to have been a human servant hiding somewhere; another automaton sounded a trumpet and cried to guests to leave the room. Still more wonders and a glimpse into the visitor's experience are described in the Duke's account, which is considered to be the most detailed of its kind for documented, realized European automata.²¹³

In 1553, Hesdin's park, its devices, and indeed the entire village were destroyed by order of Charles V, about a generation before the appearance of the works at Pratolino which perpetuated its spirit of mischievous play and were its only rival for sheer numbers and complexity. Yet, even in the seventeenth century Hesdin was remembered sardonically by Bishop Huet of Avranches as a real candidate for the location of the terrestrial paradise.²¹⁴ Certainly within this period, a merging of mechanical traditions- hydraulic as well as pneumatic- introduced into the sphere of automaton-making the enduring association with large-scale water-works. The draining of the English Fens and the Low Countries is the demonstration of the age's flourishing interest in the capabilities of pumps and hydraulic engine on a macro-scale.²¹⁵ Without these advances, as well as original refinements on the water pump and other devices by Buontalenti and others, Pratolino and the other great hydraulic gardens of the Renaissance would not have been possible.

In Italy, the most renowned center for mechanical innovations and scientific learning in the century prior to Pratolino was localized in Urbino under Federico da Montefeltro (1422-1482) and his son Guidobaldo (1472-1508). Francesco di Giorgio Martini was among the team of engineers retained to construct the Ducal Palace and its advanced fortifications, numerous Latin editions of

²¹³ "Item, there is a window, where, when people wish to open it, a personage in front of it wets people and closes the window again in spite of them. Item, there is a lectern on which there is a book of ballades, and, when they try to read it, people are all covered with black, and, as soon as they look inside, they are all wet with water, when one so wishes. And there is another mirror where people are sent to look at themselves when they are besmirched, and, when they look into it, they are once more all covered with flour, and all whitened. Item, there is a personage of wood that appears above a bench in the middle of the gallery and fools [people] and speaks by a trick and cries out on behalf of *Monsieur le Duc* that everyone should go out of the gallery, and those who go because of that summons will be beaten by tall personages dressed like "sots" and "sottes," who will apply the rods aforesaid, or they will have to fall into the water at the entrance to the bridge, and those who do not want to leave will be so wetted that they will not know where to go to escape from the water." excerpted from the full translation in Sherwood, "Magic and Mechanics in Medieval Fiction," 587-89.

²¹⁴ "Some have placed the terrestrial paradise... under the arctic pole; some in Tartary, on the site occupied now by the Caspian; some at the extreme south, in Terra del Fuego; many in the East, as on the banks of the Ganges, in the island of Ceylon, in China, beyond the sunrising, in a orient, under the equator, on the mountains of the Moon. Most have set it in Asia; but of these, some in Armenia Major, some in Mesopotamia, in Assyria, in Persia, in Babylonia, in Arabia, in Syria, in Palestine. Some even would stand up for our own Europe; and some, passing all bounds of nonsense, have placed it at Hesdin in Artois, urging the resemblance to Eden." *P. D. Huetii Episcopi Abrincensis, Tractatus de Situ Paradisi Terrestris, ad Academiae Francicae Socios, nuno primum latinae factus, ab Auctore recognitus, emendatus et auctus...* (Amstelaedami: Henr. & Vid. Th. Bloom, 1698), 4; translated in Sherwood, "Magic and Mechanics in Medieval Fiction," 590-91.

²¹⁵ DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 22.

ancient texts were produced as well as original mathematical works, and the *Collegio dei Dottori* founded by Guidobaldo, which later became the *Officina degli strumenti scientifici*, was an important center for practical learning through the time of Galileo.²¹⁶ Duke Federico cultivated the friendship of Cardinal Bessarion, the founder of the Biblioteca Marciana's collection of Greek texts in Venice and a prolific commissioner in his own right of translations of ancient mechanical texts²¹⁷ Bessarion's own library numbered some 1,100 volumes by 1482. From the Montefeltro court, numerous engineers and scientists circulated the knowledge they came into contact with at Urbino throughout Europe.²¹⁸ As practical and utile that the innovations which emerged from the Urbino courts were, historians nevertheless have continuously struggled to reconcile their scientific pursuits with their “non-scientific,” Platonic leanings of scholars such as Bembo, Bessarion, Angelo Poliziano, and Niccolò Leonico Tomeo.²¹⁹

Another aspect of automata-manufacture which reached a peak of refinement and popularity among rulers in late-medieval and early-modern Europe was the fine clock-work of skilled instrument-makers, which decoupled motion from its former power sources (predominantly the motion of air, water, or steam).²²⁰ Church-clock jacquemarts are the earliest examples of a type that experienced a shift from hydraulic or pneumatic to purely mechanical operation.²²¹ By the turn of the fifteenth century into the sixteenth, Henry VIII possessed an automaton clock at Westminster.²²²

The development of this technology was concentrated mostly within German craft centers; in the late fourteenth century, the art of the clock-maker and that of the jeweler began to merge in southern Germany, laying the groundwork for truly phenomenal works which emerged in the next centuries from Nuremberg, Augsburg, Dresden, and Ulm. Table ornaments, clocks, and related devices incorporating animated figures propelled by (usually) hidden clock-work and encrusted in precious jewels and metals.²²³ The advances in clock-work and fine instrument-making in primarily German centers such as Nuremberg and Augsburg resulted in some of the most sophisticated blendings, of all time, of mechanics and the art of the jeweler; clocks, mariners' compasses, sundials, astrolabes, surveying instruments, and firearms lie at the more prosaic end of the spectrum

²¹⁶ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 37.

²¹⁷ *Idem*, 39.

²¹⁸ E.g. Giorgio Valla, Pietro Bembo, Alessandro Piccolomini, Georg, Peurbach, and Johannes Müller (Regiomontanus); *idem*, 37.

²¹⁹ *Idem*, 38.

²²⁰ Bedini, “The Role of Automata in the History of Technology,” 29.

²²¹ *Ibid.*

²²² Riskin, *The Restless Clock*, 20.

²²³ Bedini, “The Role of Automata in the History of Technology,” 32.

of goods produced.²²⁴

The brothers Habrecht are credited with the first automated manikins *ca.* 1550 whose operation went beyond standard Heronic models: wheelwork replaced levers, gears replaced strings, and organ-barrel programming replaced hydraulically-delayed sequences.²²⁵ This line of development led to the splendid *nefs*, table-ornaments in the shape of ships, triumphal chariot, and other forms which sent utensils, wine, or spices scooting by their own power around the tables of emperors, princes, and prelates. Hans Schlottheim (1547-1625) of Augsburg manufactured in 1585 one such piece for Rudolph II,²²⁶ which today is preserved with others of its type in the *Kunstammer* of Vienna's *Kunsthistorisches Museum* (fig. 40). Schlottheim also was responsible for two automaton crayfish, one that went forwards and the other that went backwards, for the Prince Elector of Saxony in 1587.²²⁷ Another craftsman of Nuremberg, Hans Bullman (d. 1535) is credited with the actual realization of a full-scale, “completely mechanical” android with apparently responsive action, as well as numerous other successful figures of men and women that moved and played musical instruments.²²⁸ Other fantastic automata which are claimed in the annals of Nuremberg's history are an iron fly and a mechanical eagle created by Regiomontanus (1436-1476) which escorted the emperor Maximilian to the city gates.²²⁹ These last works however are generally viewed as apocryphal, of the same stamp as the mechanical fly attributed to a totally fictional Bishop Virgilius of Naples, which we shall return to in the following section.

The city of Augsburg also boasted at this time exceptional works of technical sophistication; a villa of the Fugger banking family boasted a water clock and hydraulic works on the model of its Italian counterparts. At the gate of the city itself, an automated door (1514) opened itself at night to those who qualified; locks worked themselves a great distance from their custodians (who could stay in bed), and tolls were paid in a similarly automated way. Queen Elizabeth of England requested the secret of its operation without success.²³⁰

Among the lavishly unique pieces from this milieu were also ones which blended the

²²⁴ Godwin, *The Pagan Dream of the Renaissance*, 121.

²²⁵ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 22; see also Riskin, *The Restless Clock*, 20.

²²⁶ Bedini, “The Role of Automata in the History of Technology,” 34-45.

²²⁷ Riskin, *The Restless Clock*, 20.

²²⁸ Idem, 31; Johann Gabriel Doppelmayr, *Historische Nachricht von dem Nürnbergische Mathematici und Künstler* (Nuremberg: Monath, 1730).

²²⁹ See Johann Wilhelm Baier and Johann Andres Buhel, *De Aquila et Musca ferrea, quae mechanico artificio apud Norinbergensis quondem volitasse ferentur* (Charleston: Nabu Press, 2012).

²³⁰ Berti, *Il Principe dello Studiolo*, 154-55.

technology of the fountain with the astronomical clock, such as the sixteenth-century *Kaiserbrunnen* (imperial fountain), created by the Nuremberg goldsmith Wentzel Jamnitzer (ca. 1507-1585) and sculptor Johann Gregor van der Schardt for Maximilian II (1527-1576) (though it was completed during the reign of Rudolph II and installed in Prague Castle). Its design is believed to come from the court philologist Jacopo Strada (1507-1588), and it featured complex iconography. This study does not aspire to a thorough description, but its notable features included gilt bronze figures representing the seasons (Flora, Ceres, Bacchus, and Vulcan), and an entablature with animated tableaux: Earth, presided over by Cybele with mountains, mines, a forge, a stamping-mill, flowers, metals, and the four rivers of Europe powering their own millwheels and featuring their own naiad; Water, ruled by Neptune with mechanical shells, seahorses, and creatures cast from life; Air with Mercury descending as if in flight from a golden star and angels, eagles, and the four winds; Fire at the top of the dome, with Jupiter and his eagle (the emperor) at the god's feet. The fountain has been summed up as a “giant automaton,” and in addition to the music of chimes, wheels, and whirring powered by water and clockwork, it featured a hybrid mechanical/hydraulic organ that played the popular tunes *Roland* and *Pickled Herring*.²³¹

Spectacular manifestations of mechanical prowess were also put on display as part of the pageantry of Italian and French courts. At the famous banquet, the “Feast of the Pheasant,” of Philip the Good, Duke of Burgundy, (the same princely patron responsible for revitalizing and re-inventing the automata of Hesdin), a mind-boggling parade of wonders, monsters, and beauties unfolded. One of the stationary *entremets* on the hall's three tables was a forest populated by “a number of strange animals of strange aspect, who moved by themselves, as if they were alive” and a statue of a naked woman spouting mead from her right breast, guarded by a live lion and bearing the motto, “Don't touch my lady.”²³²

When Duke Borso d'Este entered Reggio in 1453, he was met by a mechanical Saint Prospero which appeared to float under a baldachin held up by angels. Below the saint were eight singing cherubs. Two of the cherubs received from the saint the sceptre and keys of the city and delivered them to the Duke, while “saints and angels held forth in his praise.” When the procession arrived at the Church of St. Pietro, all came to a halt, and the saint descended in an aureole with two

²³¹ Godwin, *The Pagan Dream of the Renaissance*, 113-114.

²³² Daston and Park, *Wonder and the Order of Nature*, 106.

angels to place a wreath of laurels upon the Duke's head and “float” back to his original position.²³³ Other ceremonial entries of Alfonso and Borso d'Este featured Alexander the Great standing on a revolving terrestrial globe (1443) and an apparently self-moving car.²³⁴

The entry of French kings to Milan in the fifteenth century was marked by the exhibition of a walking lion-automaton devised by Leonardo da Vinci (1452-1519).²³⁵ Historian Mark Rosheim has presented the case at length for at least two other programmable robots devised and executed during the artist's lifetime for other patrons: a walking knight automaton for Ludovico Sforza and a self-propelled cart for a Medici patron (fig. 41).²³⁶ For another spectacle designed for the Este, Leonardo authored a machine which represented the heavenly bodies and their movements on a colossal scale. Each planet that approached Isabella, whose wedding was being celebrated, the appropriate god or goddess stepped forth from the globe.²³⁷

We are unable to say with certainty whether the deities of Leonardo da Vinci's cosmic tableau were mechanistic, like the St. Prospero or the angels seen in elaborate church plays, whether they were costumed actors, or whether they were costumed actors masquerading as automata or statuary. The third option was not unknown in Renaissance spectacle: masqued individuals would position themselves like statues in niches or on pillars and triumphal arches and would spring to life speaking or singing to show their true nature.²³⁸ The notorious story of the small boy gilt from head to foot in a bid to transform him into a living centrepiece for a fountain²³⁹ belongs to this ambiguity between man and work of art or machinery which was cultivated in the Renaissance. Therefore, it is with caution which we would categorize the planetary deities of Leonardo among his well-researched other automata. However, the planetary device itself, with its simultaneous multiple orbits and rotations, begs further study.

Leonardo da Vinci's assimilation of mechanical engineering from the ancient world and his rearticulation of a staggering number of their principals into original inventions and forms sets him apart in the history of mechanical development from the medieval through the early-modern era: “a

²³³ Burckhardt, *The Civilization of the Renaissance in Italy*, 215.

²³⁴ Godwin, *The Pagan Dream of the Renaissance*, 183.

²³⁵ A great significance in the history of automata is assigned to this lion simulacrum, see Bedini, “The Role of Automata in the History of Technology,” 31. Early descriptions of the work are found in the work of the sixteenth-century artist Giovanni Paolo Lomazzo, *Idea del Tempio della Pittura* (Bologna: Istituto delle Scienze, 1785), 41 and the *Trattato dell'arte* (Milan, 1585) by the same. See also Burckhardt, *The Civilization of the Renaissance in Italy*, 215.

²³⁶ Rosheim, *Leonardo's Lost Robots*.

²³⁷ Burckhardt, *The Civilization of the Renaissance in Italy*, 215.

²³⁸ *Ibid.*

²³⁹ *Ibid.*

link between the Middle Ages and the Renaissance... in every aspect of the history of technology.”²⁴⁰ Volumes have accordingly been written on this facet of Leonardo's biography alone.²⁴¹ This study for the moment must limit discussion of Leonardo's inspiration from Hellenistic as well as Islamic sources to those which bear immediate relevance to Renaissance methods of animating statues, and those at Pratolino in particular. The flying wax birds which Leonardo da Vinci created *ca.* 1515 are believed to have borrowed principles from Archytas's wooden pigeons (or doves), traveling down a cable propelled by a current of air in their bodies. With his documentation of what are thought to be features of the medieval astrological clock of Giovanni de' Dondi (*ca.* 1330-1388), Leonardo da Vinci demonstrates a masterful prowess with Heronic odometers and gear-based planetary clock mechanisms.²⁴² Leonardo da Vinci also mastered the clepsydra, in principle if not in actual construction. That conclusion owes to a plan for a building-sized water-clock with a rotating bell-striker identified among Leonardo's drawings.²⁴³

Other aspects of Leonardo da Vinci's familiarity with Hellenistic and Islamic engineering principles are inferred from his works and library. A water-suction device first illustrated by Al-Jazari reappears in Italian engineering works of Taccola and Francesco di Giorgio Martini. Leonardo da Vinci's annotations in the margins of the Martini *Trattato di Architettura Civile e Militare* have been taken as proof-positive of familiarity with and implementation of Eastern principles in the large-scale engineering he planned and sometimes executed.²⁴⁴ The presence of an extremely rare work on hydraulics by Philo of Byzantium, largely unknown in the West even through the twentieth century, has also been entered as evidence of Leonardo's sophisticated knowledge of Greek engineering.²⁴⁵

Furthermore, Leonardo da Vinci did design a large-scale “garden of wonders” for Charles d'Ambroise which never got built; designs in the massive Atlantic Codex anticipate many of the

²⁴⁰ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 21.

²⁴¹ Mechanical-centric studies can be found within the extensive bibliographies published from the beginning of the twentieth century on the state of Leonardo: Ettore Verga, *Bibliografia vinciana, 1493-1930* (Bologna, 1931); Ludwig Heinrich Heydenreich, “Leonardo Bibliographie 1939 bis 1952,” *Zeitschrift für Kunstgeschichte* (1952); Anna Maria Brizio, *Rassegna degli studi vinciani dal 1952 al 1968 in L'Arte* (Milano, 1968): 107-120; Alberto Lorenzi and Pietro Marani *Bibliografia Vinciana 1964-1979* (Florence: Giunti Barbera, 1982); Mauro Guerrini, “Bibliografia leonardiana,” *Raccolta Vinciana* 22 (1987): 389-573 and *Biblioteca Leonardiana 1493-1989*, 3 vols. (Milan: Editrice Bibliografica, 1990).

²⁴² Derek J. DeSolla Price, Leonardo da Vinci and the Clock of Giovanni de Dondi,” *Antiquarian Horology* 2.7 (1958): 127.

²⁴³ See Windsor RL 12688 and 12716; Rosheim, *Leonardo's Lost Robots*, 120.

²⁴⁴ MS. 282 (Ashburnham 361) in the Biblioteca Medicea Laurenziana, Florence; Vezzosi, “‘Pratolino d'Europa,' degli antichi e dei moderni,” 19-20.

²⁴⁵ Rosheim, *Leonardo's Lost Robots*, 5.

wonders which were eventually realized at Pratolino. Historians Rosheim and Alessandro Vezzosi have drawn connections between Leonardo's colossus and Pratolino's Appennine by Giambologna.²⁴⁶ Mechanical birds, animals, and musical instruments also appear in Leonardo's designs before we witness their popularization in Italian water-gardens and especially Pratolino's.

This section has covered mechanical devices which seem to straddle the Medieval and Renaissance time periods; however, in effect very little changed in the technology of, for example, a “medieval” astronomical cathedral tower and its jacquemart automata and the design for the same type of construction sketched by the “Renaissance” artist Leonardo da Vinci. Likewise, although printed translations of Hero of Alexandria's *Pneumatica* did not appear until the last quarter of the sixteenth century, we find the transmission of simple Heronic devices like the singing birds from Eastern and Byzantine sources to courts of thirteenth-, fourteenth- and fifteenth-century Europe, so we can not say that the hydraulics of the Renaissance water-gardens were uniquely “Renaissance” either. These devices may have been expanded and elaborated to suit the tastes and whims of a different century, but we can observe the same mechanical principles in action in Europe virtually immediately after the Crusaders returned from the East.

Correspondingly, the story of traditional mechanical animation of automata, the art of “bringing statues to life” upon which this study concentrates itself, did not change drastically between the eras which we generally demarcate as “medieval” or “Renaissance.” As De' Vieri wrote in his treatise on Pratolino, one of the mechanical tableaux in the “Grotto of Fame” was operated by the clepsydra mechanism invented in antiquity and rediscovered in the West in the Middle Ages.²⁴⁷ In this tableau, a peasant offered a cup from the pond of water below to a dragon which inclined its neck to drink while above, a winged automaton personifying Fame sounded a trumpet and beat its wings; the last effect we can observe in the thirteenth-century notebook of Villard of Honnecourt, in the automatic tableaux of a number of medieval clock towers, and in diverse instances of church drama and secular pageantry. Had De' Vieri seen fit to include as thorough a description of all of the Pratolino automata's workings as he did for the “antique” mechanism of the Fame tableau's clepsydra, it is highly probable that a working knowledge of the late-medieval ecclesiastical and courtly automata would have been sufficient to penetrate their mechanical mysteries.

²⁴⁶ See Atlantic Codex, fol. 732 v-b, ex. 271 v-a; Rosheim, *Leonardo's Lost Robots*, 120 and Vezzosi, “Pratolino d'Europa, degli antichi e dei moderni,” 20.

²⁴⁷ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 59, 62.

4.5. “Techno-mythology” in Medieval Legend and Literature

Whereas medieval saints’ hagiographies feature talking crucifixes in earnest instances of miracle literature,²⁴⁸ in more secular corners of the age’s culture and alongside the development and refinement of diverse technologies has been observed the rise of a “techno-mythology”²⁴⁹ in response to and inspired by these advances. This phenomenon mingled components ostensibly based upon observation of the possibilities of real technology in the Middle Ages with the ever-present suspicion of a demonological, astral, or otherwise magical operating agent. Merriam Sherman has written about the fine line between Medieval fantasy and the real experience lived, mostly exclusively by those at the loftiest echelons of Church, kingdom, and empire, through encounters with inventive automata such as those just surveyed above. Sherman describes the age’s spirit and experience as:

a land of laughter where machines are playthings, where the march of time is marked, not by a graybeard shouldering a scythe, but by quaint puppet figures that dance away the hours, where golden birds sing and brazen lions supply a never-ending flow of wine for merry-makers, where invisible mechanisms shower the unsuspecting guest with flour or soot or water...²⁵⁰

The profusion of various automata in medieval tales has already been recognized as a symptom of the widespread popularity of automata in Medieval Western European culture, and its analysis illustrates a perceptible psychological shift by a later age from earlier centuries’ enthusiastic mixing of mechanical with the mystical in order to animate beasts, humans, and a hypothesized spectrum of genies, demons, and angels in between. We now turn to this genre next, in its scope of living or otherwise invested statues and vessels in the medieval period beginning with a selection of the automata in fiction and fables, from the French Medieval romances to the brazen-head myths which became attached in later ages to virtually all of the great Scholastic philosophers of the previous age, including Roger Bacon, Albert the Great, Robert Grosseteste, and Gerbert of Aurillac (Pope Sylvester II).

The “techno-mythology” itself becomes symptomatic of a period of both intellectual

²⁴⁸ E.g. Fra Tommaso Agni of Lentino’s life of Saint Peter Martyr or Giovanni Cambi’s *Istorie*. Cited in Paoletti, “Wooden Sculpture in Italy as Sacral Presence,” 90.

²⁴⁹ Higley, *The Legend of the Learned Man’s Android*, 133.

²⁵⁰ Sherwood, “Magic and Mechanics in Medieval Fiction,” 567.

transition as well as reflection upon the activities, pursuits, and understanding of phenomena which persisted on the fringes of possibility. Where else than fictional literature could the Western mind continue to explore the pursuit of the ancients to identify, contain, and manipulate the sidereal forces of the cosmos, natural and divine alike; where else could more perfect robot-servant or demonic-bronze knight be most easily brought to life than within the infinite arena of legend and fable? Nevertheless, however fantastically embellished these automata became in the fantasy of the writers of Medieval fancy, for their audiences, the wonders they described would have seemed all-too-possible, confirmed by even the briefest exposure to the splendid automata which characterized Europe's most splendid courts of the age.

In the centuries where the hours were struck in most European centers by mechanical jacquemart-men or marked by mechanical roosters, it was not a great leap of the imagination to insert mechanical characters into legends and other flights of the imagination. Tales from travellers returning from the East may have struck many as science fiction, factual though they in fact were. Bronze birds that sing when the wind blows perched upon the crenellated wall of the Emir's garden in *Floire et Blancheflor* document existant technology with little embellishment.²⁵¹ The caliph of Babylon's toys and gilded tree with mechanical singing birds in the early thirteenth-century *Aymeri de Narbonne* (ca. 1205-1225)²⁵² echo descriptions brought back by crusaders and ambassadors, such as the tenth-century Palace of the Tree in Samarra and others documented at the courts of diverse Abbasid caliphs.²⁵³ In the tale, the emir controls nature through necromancy, and the tree itself is of cast copper and gold made by enchantment: "The wind is made to enter the flue [of the tree] by necromancy; when the wind blows the birds begin to sing... clearly and gaily."²⁵⁴ In a similar vein of demonological magic, when Narbonne, a Muslim-controlled town in the Languedoc region, is captured in the *chanson* by Charlemagne, the caliph invokes the devil to blow favorable winds for his fleet to arrive and recapture it. Even when an automata's pneumatic operation is described in its mechanical components, such as wind entering the flue, the compulsion of air itself to enter the man-made canal is still attributed to "necromancy"; in this description, we find perhaps a strong indication of how even the simple operations of natural physics which powered these early

²⁵¹ *Floire et Blancheflor*, ed. Felicitas Krüger, Romanische Studien, XLV (1938), vv. 1731 ff.

²⁵² This *chanson de geste* is believed to have been written by Bertrand de Bar-sur-Aube and its plot is linked to the narratives of the *Chanson de Roland*. It is one of twenty-four poems in the William of Orange cycle (also known as the cycle of the Aymerides and the Garin de Monglane). See Truitt, *Medieval Robots*, 30-32.

²⁵³ *Aymeri de Narbonne*, II. 3520-22. See also Daston and Park, *Wonder and the Order of Nature*, 90-91; Truitt, *Medieval Robots*, 32.

²⁵⁴ Truitt, *Medieval Robots*, 31.

automata remained under heavy suspicion that some aspect of the process *must* necessitate some kind of traffic with or compulsion of a demon/spirit.

In two of the earliest great French romances, *Eneas* and the *Roman de Troie*, fantastic machinery is also incorporated into the narrative. Benoît de Saint-Maure (d. 1173) in the *Roman de Troie* describes tombs featuring elaborate mechanical furnishings, as well as Hector's alabaster "Chamber of Beauty," a sick room more accurately described as a jewelbox²⁵⁵ within which were four robotic servants that serve Prince Hector of Troy: one which played every instrument and periodically scattered fragrant flowers on the floor (later cleaned up by a mechanical eagle), another female automaton, a "jongleresse," which "performed and entertained and danced and capered and gambolled and leapt all day long on top of the pillar, so high up that it is a wonder it did not fall," one fumigated the room with odoriferous gums with a censer of topaz, and another held up a mirror and correcting behavior.²⁵⁶

The *Eneas* describes the tomb of the Amazon Camilla in terms reminiscent of some of the Virgilian legends to be detailed shortly below: it incorporated "a hundred marvels," including "defensive magnets, a magic mirror that revealed the approach of enemies, a sarcophagus hermetically sealed with cement made from ground gems moistened with serpent's blood, a cushion for Camilla's head stuffed with Caladrius feathers, an ever-burning lamp made of asbestos, and a metal archer set to loose an arrow and extinguish the lamp should the tomb be disturbed."²⁵⁷ A similar defensive application of technology is described in the magnetized walls surrounding Carthage which incapacitated any armor-clad attacker. A mechanical giant stood guard over the image of Iseut in her memorial chamber Thomas's *Roman de Tristan*.²⁵⁸

In a more demonological key, the early-thirteenth-century Old French prose *Lancelot do lac* (ca. 1220) features the knight defeating several metal guardians of the enchanted castle of Doloreuse Garde; inside, a metal woman holds the keys to a box in which thirty tubes, each crying with a horrible voice, are revealed to be the demons which are animating the castle's

²⁵⁵ It "glistens with Arabian gold and the twelve twin stones... sapphire and sard, topaz, chrysoprase, chrysolite, emerald, beryl, amethyst, jasper, ruby, precious sardonyx, bright carbuncle, and chalcedony... The windows are made of green chrysoprase and sard and fine almandite and the frames are molded in Arabian gold...." Benoît de Sainte Maure, *Le Roman de Troie*, II. 13341-409, 293-98; translated in Daston and Park, *Wonder and the Order of Nature*, 89.

²⁵⁶ Daston and Park, *Wonder and the Order of Nature*, 90; see also Kang, *Sublime Dreams of Living Machines*, 87; Sherwood, "Magic and Mechanics in Medieval Fiction," 568.

²⁵⁷ *Eneas*, II. 7459-818, vol. 2, 49-55; Daston and Park, *Wonder and the Order of Nature*, 89.

²⁵⁸ *Le Roman de Tristan par Thomas*, ed. Joseph Bédier, Société des anciens textes français, XLVI, 2 vols. (Paris, 1902-05), I, 312.

enchancements.²⁵⁹ Again, we witness the conflation of tell-tale mechanical features, such as pipes or tubes, and the convinced suspicion that what flowed through them must mingle demonological *savoir-faire*. Several manuscript paintings have been identified as illustrations of Lancelot's encounter with the automata.²⁶⁰ More demonic automata can be found in the early thirteenth-century prose continuation of Chrétien de Troyes's *Perceval*: a demonically-animated and oracular copper bull in a cursed castle is guarded by copper men guarding the door with hammers. In characteristically medieval Christian fashion, these guards kill everyone in the castle except for the protagonist and thirteen people who agree to believe in God.²⁶¹ This conversion melts the bull, breaking the demon's enchantment.

The genre of courtly romance made stock figures of marvelous artifacts invested with motion and spirit which blur the line between fiction and reality: serving dishes that present themselves, mechanical birds, lions, chessmen, angels, and talking mechanical heads.²⁶² the *Squire's Tale* by Geoffrey Chaucer (ca. 1340-1400) describes a rich array of such items. One historian of magic in the middle ages observed that even explicitly fictional writings preserve certain realities of the day; if not in actual objects or events, then certainly in attitudes and values.²⁶³ Mechanical devices sometimes featured as divine tests of character, such as the goblet which the Fairy King gives to Huon: the wine will vanish if the drinker is unworthy.²⁶⁴ In others there is the implication of the potential to control the weather, such as the act of pouring water from a particular fountain in order to produce a magical storm recounted by Chrétien de Troyes.²⁶⁵ The conjuring of a storm by magicians at the Byzantine emperor's court is witnessed by Girard de Rousillon,²⁶⁶ and the bronze boys that smile at one another in the Palace of Constantinople when wind blows in from the sea described in the *Pèlerinage de Charlemagne* may be a sincere account of the automata included above among the documented automata of Byzantine emperors.²⁶⁷ Elsewhere, two wind-powered

²⁵⁹ *Lancelot do Lac: The Non-Cyclic Old French Prose Romance*, I:183; Truitt, *Medieval Robots*, 59.

²⁶⁰ *Histoire du saint graal*, fifteenth century. Paris, BnF, MS Fr. 113, fol. I; *Lancelot do Lac*, ca. 1470. Paris, BnF, MS Fr. 112, fol. 78 and MS Fr. 118, fol. 200v. The he automata's ubiquitously nude depictions and bestial faces have been observed to be markers indicating them as debased and clearly inhuman. See Truitt, *Medieval Robots*, 59-60.

²⁶¹ *Perceval le Gallois, ou le conte du Graal*, I: 202-4; Truitt, *Medieval Robots*, 60.

²⁶² Kieckhefer, *Magic in the Middle Ages*, 105

²⁶³ *Ibid.*

²⁶⁴ *Huon de Bordeaux*, eds. F. Guessard and C. Grandmaison (Paris: 1860): vv. 3267 ff; see also the discussion of the use of such "testing-cups" (actually the "Tantalus cup" device) as the modernization of a pre-existing ancient practice in Sherwood, "Magic and Mechanics in Medieval Fiction," 574.

²⁶⁵ *Der Löwenritter*, ed. Wendelin Foerster (Halle, 1887), 380.

²⁶⁶ *Girard de Rousillon*, tr. Paul Meyer, Société des anciens textes français, VI (Paris, 1876).

²⁶⁷ *Karle des Grossen Reise nach Jerusalem...*, ed. Eduard Koschwitz, 7. unveränder Abdruck der 5. Auflage (Leipzig,

automata gracing the tomb of Blanche-flor lie in each others' arms with lilies and roses and whisper, "Kiss me, Fair One," kiss, and the other responds, "I love you more than aught else in the world."²⁶⁸ Mechanical representations of the lovers act out the perpetuation of a love well after the death of the lovers they depict.

Sherwood believes that a passage from the *Roman d'Escanor* describes an actual automata, albeit in a somewhat confusing recounting of its features. In the story, this was a small tree which was set at the head of the bed of the fairy Esclarmonde:

It appeared to bear both flowers and fruit continuously, and on every branch were birds which seemed alive and which sang sweetly. A golden pipe was set up inside the tree, on the top of which was an angel holding a trumpet to its mouth. The angel was on a pivot enabling it to turn in any direction. Apparently, when the angel was in position, a pipe inside it connected with the large pipe in the tree. Presumably, also, there were similar pipes inside the birds. The blowing of the trumpet was the signal for the birds to begin to sing. The movements of the angel are not very fully described. It is stated, however, that if the angel turned ever so little to one side all sounds ceased, which would seem to mean that this movement shut off the vent of air from the main pipe. If the angel turned back "towards" the pipe- that is, moved directly over it- the birds began to sing. If it removed the trumpet from its lips the birds stopped singing, but when it held it again to its mouth, the melody broke forth once more.²⁶⁹

Furthermore, Sherwood also identifies the description in the *Eneas* of a hollow vine with flames underneath upon which "ten thousand" golden birds would sing and flutter when a wind blows as a sincere description of how a current of hot air was harnessed and employed in this relatively common and quintessentially "garden-variety" medieval automaton.²⁷⁰ One miniature from Sanct-Blasien identifies itself as a depiction of a specific mechanical tree known from a story, "The tree of cast metal of which the Geste of Alexander speaks when air is pumped from below, sweet and diverse voices issue from the mouths of the birds."²⁷¹ Mary Flowers Braswell has followed in the

1923), 350.

²⁶⁸ Sherwood, "Magic and Mechanics in Medieval Fiction," 568.

²⁶⁹ Idem, 569; *Der Roman von Escanor von Gerard von Amiens*, ed. H. Michelant, Bibliothek des Litterarischen Verein in Stuttgart, CLXXVIII I (1886), vv. 15, 983.

²⁷⁰ Sherwood, "Magic and Mechanics in Medieval Fiction," 570, 579-80; Sherwood compares the description of this fountain to Theorem 16 of Hero's *Pneumatica*. More diverse and elaborate examples are cited by the same however without specific relations to Heronic models, 570.

²⁷¹ Ibid.; reproduced in Adwin Schultz, *Das Höfische Leben Zur Zeit der Minnesinger*; 2 vols. (1899), I, 97, fig. 31.

foot-steps of Sherwood in her analysis of Geoffrey Chaucer's *The Franklin's Tale*, positing that approximately one hundred lines of verse are original and faithful descriptions of technology which the author probably had witnessed in his capacity as the former Clerk of the King's Works and Commissioner of Walls and Ditches, two positions which brought Chaucer into close contact with engineering machines and the "cutting-edge" technology of the day.²⁷² From the same work, new light is shed on the term "tregetour," which finds frequent translation as "magician," but also as "mechanical artisan," in the specific sense of someone who works magic through technology.²⁷³

Whether only in literature or in the proverbial "flesh" (metal, wood, clay, or otherwise), such animated or "living" statues and related pneumatic or hydraulic devices possessed a potent allure for the medieval mind in its presentation of an unknown mechanism or mystery and the allure of mechanics which promised a secret which was, in fact, knowable to a worthy intellect. In the case of several of these literary works, when demonic magic was not employed, their automata's operation relied upon the magical properties of "exotic substances that were already part of the canon of natural wonders."²⁷⁴ The average person in the Middle Ages would have had to go to great trouble to acquire them; not only was he limited by the restricted access afforded to these rare materials, but also rebuffed by the esoteric, by-nature secretive knowledge tradition about their natural powers. Only "wise and learned men, well versed in magic," to quote the twelfth-century author of the *Roman de Troie*, were up to the task.²⁷⁵ When this knowledge was put into action, the operator's potential for total power over nature, over others, and over himself was rendered visible to all by the wonders of art which were produced.

Varied and fantastic tales proliferated not only in romantic works of fiction but in medieval intellectuals' pseudo-biographies as well. Of canonical importance in the medieval imagination is the figure of Virgil, not for the biographical details of his life lived in antiquity, but for the outbreak of legendary tales of his manufacture of automata.²⁷⁶ As with practical approaches to the animation of statues, which varied from the demonic to the purely mechanical, this range can be observed in the medieval Virgilian tales. At the supernatural end of the spectrum was the story that Virgil's powers were given by twelve demons that he released from a bottle; however, of greater interest to

²⁷² Braswell, "The Magic of Machinery: A Context for Chaucer's 'Franklin's Tale,'" 107.

²⁷³ *Idem*, 106.

²⁷⁴ Daston and Park, *Wonder and the Order of Nature*, 90.

²⁷⁵ Benoît de Sainte Maure, *Le Roman de Troie*, II.6668-69.

²⁷⁶ See also Sherwood, "Magic and Mechanics in Medieval Fiction," 567-68; Domenico Comparetti, *Virgilio nel medioevo*, 2 vols. (Florence, 1896).

our study are accounts of the automata he is said to have invented: chief among them was the *Salvacio Romae*, a collection of wooden statues corresponding to each imperial province, housed in a noble Roman palace, which, when threatened, would ring a bell which caused a brass horseman to mount a pediment and turn in the direction of the disorder.²⁷⁷ In a *ca.* 1460 illustration, we see a large cloud of flies ostensibly held at bay by the bronze fly constructed by the philosopher while a trumpet-blowing automaton repulsing the ash from an erupting Mount Vesuvius with the wind he generates.²⁷⁸ Gervase of Tilbury (*ca.* 1150- *ca.* 1228) wrote that this bronze trumpeter was achieved by astral science.²⁷⁹ The magical storm which supposedly could be summoned by exposing the bones of Virgil to the air, according to a letter from Sicily to Conrad of Querfort, Prior of Hildesheim, has been hypothesized to have been a mechanical display.²⁸⁰

Other medieval versions of Virgilian legends recounted how Virgil's magical-mechanical genius would have even granted him immortality, if it were not for the meddling of an ignorant character. In one version, it is a king: Virgil instructs a servant to chop up his body after death and pack the pieces in salt for nine days, after which he will be rejuvenated, Osiris-like, and a mechanical automaton is put in action to guard this arrangement. However, on the seventh day, the emperor, missing his friend the poet, destroys the automaton and interrupts the process, sealing Virgil's mortal fate. In another version, it is the apostle Paul who disturbs Virgil's automated sepulcher; there is no resurrection ritual underway, however. St. Paul sees only the uncorrupted body but is blocked by an automatic mechanism with flails. When the machine is deactivated, everything that St. Paul sees- the body, the books, the automaton, etc.- crumbles to dust.²⁸¹

These accounts are believed to have been twelfth- and thirteenth-century inventions

²⁷⁷ See Neckham, *De natura rerum*, Book 6; Gervase of Tilbury, *op. cit.*, the anonymous *Mirabilia Romae*; cited by La Grandeur, "The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*," 409f; Daston and Park, *Wonder and the Order of Nature*, 92.

²⁷⁸ Jouvenal des Ursins group, *Livre des merveilles du monde*, trans. and comp. Harent of Antioch, Acc. no. MS 461, fol. 15V, Pierpont Morgan Library, New York.

²⁷⁹ "Also there was a bronze image [*ymago*] holding a trumpet to its mouth. Whenever the south wind opposed it and entered [the trumpet], the breath of the wind reversed immediately. Now what benefit did that reversal of Notus [the wind] convey? Listen. A high mountain borders the city of Naples, next to the sea, overlooking the Terra di Lavoro spread out far and wide below it; in the month of May this mountain belches noxious smoke, and occasionally spits out burnt embers the color of coal and burning cinders; because of this, men asert that a vent of terrestrial hell blows from there. Therefore, when Notus blows, a searing dust scorches the cornfields and all the fruit, and thus the most fertile earth is made barren. Because of this, considering the whole region's loss, Virgil erected the statue with the trumpet on the opposite mountain (as we have said), so that at the first breath of wind the horn sounded and the wind, blowing against that same tube [of the trumpet], entered it; Notus, confused and repulsed, would be beaten back by the strength of astral science [mathesis]." Gervase of Tilbury, *op. cit.*, 3.13, pp. 582-85; quoted by Truitt, *Medieval Robots*, 66.

²⁸⁰ See Sherwood, "Magic and Mechanics in Medieval Fiction," 573.

²⁸¹ This and the preceding version are recounted in Butler, *The Myth of the Magus*, 102.

themselves and so belong somewhere in between the automata of fantasy and fact. Their themes are not strictly locatable within the historical Classical legacy, yet they perpetuate many ideas about what could be possible from antiquity in Western European Medieval civilization.²⁸²

In this sense, it has been observed that the Virgilian “techno-myths” at times appear identical to the marvels performed by Apollonius of Tyana at Constantinople.²⁸³ Still further duplications of elements of the Apollonian/Virgilian marvels appear farther east in Indian literature and beyond.²⁸⁴ Some literary influence may be admitted, but historians of automata and magic alike are in agreement that the “wizardization” of the Roman poet Virgil was a medieval phenomenon, possibly due to his status as a great pagan mind and the fact that he came from a culture testified to primarily in this time by mute, life-like ruined statues.²⁸⁵ With the accretion of legends about his supernatural powers, came a status usually reserved for Christian saints; Virgil's bones were believed to protect Naples, the city of his life and tomb.²⁸⁶ Nor was this an isolated case; the philosopher Livy's arm bone was a gift from the Venetians to Alfonso the Great of Aragon and was received with solemn pomp to the city of Naples as well.²⁸⁷ One historian observed of this peculiar case, “...how strangely Christian and pagan sentiment must have burned in his (Alfonso's) heart!”²⁸⁸

Virgilian legend-making persisted for a span of centuries, and reports of a medieval Bishop of Naples, Virgilius, belong to this genre. The historian Silvio Bedini perceives in the Virgilius figure an amalgamation of brilliant pagan personalities, the poet Publius Virgilius Maro to be sure,

²⁸² For a compilation of stories from the twelfth century, see John Webster Spargo, *Virgil the Necromancer: Studies in Virgilian Legends* (Cambridge: Harvard University Press, 1934).

²⁸³ In particular, see the anonymous fifteenth-century *Les faits merveilleux de Virgille*; Cohen, *Human Robots in Myth and Science*, 52.

²⁸⁴ See the eleventh-century Pali text, the *Romavisaya*, which speaks about the *bhuta-vahana-yanta*, the “spirit-bearing engines” of Rome which protected the city much like the *Salvacio Romae* of Virgilian legends. The Indian text is essentially the story of the theft of the technology from Rome with a reincarnation-twist. The would-be thief manages first to die and reincarnate as a mechanic of Rome who, presumably following a long career, sews the secrets into his thigh and leaves instructions for the transport of his body to India before he, too, dies. Vengeful automata from Rome then arrive, and the mechanical conceit ends when it is revealed that they are in fact animated by genies (Higley, *The Legend of the Learned Man's Android*, 133-134). Elsewhere, Sanskrit technical literature of the tenth and eleventh centuries document not only fountains and courtly mechanical devices, but also self-playing musical instruments, artificial animals, and female attendants. See “From Demonic to Astral Divination: Gerbert of Aurillac” in Truitt, *Medieval Robots*, 71-82. Other automaton-legends as well as potential points of origin for some automaton technology can be found farther east. The seventh-century Chinese manual, the *Shui shi tu jing* (“Book of Hydraulic Elegancies”) has been cited as a source of European knowledge about automata; Fliegel, “The Cleveland Table Fountain and Gothic Automata,” 11. The story of King Ta, ch'ouan's jealousy of what is revealed to be an ingenious mechanical man invented by his son is repeated by Cohen, *Human Robots in Myth and Science*, 23-24.

²⁸⁵ Higley, *The Legend of the Learned Man's Android*, 133.

²⁸⁶ Butler, *The Myth of the Magus*, 103.

²⁸⁷ Burckhardt, *The Civilization of the Renaissance in Italy*, 115.

²⁸⁸ *Ibid.*

Hero of Alexandria, and folkloric magic, in a Christian persona. Even more automata are attributed to this medieval incarnation, including a large brass fly which chased away the others and kept the city's meat preserved for eight years.²⁸⁹ However, the phenomenon in medieval culture, which oversaw the transformation in popular perception of the Roman poet Virgil to master-inventor to magical adept to, in some stories, servant of the devil,²⁹⁰ was a reputation destined to be applied to contemporary intellectuals as it was to the great figures from the pagan past.

If the long thirteenth century has been characterized as a time period marked by a “mechanical rebirth” and a popularization within pioneering domains of knowledge, including technology, in fact and fable,²⁹¹ some of its principal embodiments of the age's fantasies, fears, and contradictions were stamped indelibly upon the lives and legends of some of its greatest thinkers. Gerbert of Aurillac (Pope Sylvester II), Roger Bacon, Albertus Magnus, Robert Grosseteste, Arnold of Villanova, and William of Auvergne are the principal scholar-figures to whom a mechanical, often diabolical, legacy becomes assigned. The creation of an automaton or a robot becomes the provenance of the scholar and no longer the demon-conjuring magus. The figure of the learned man, who possessed a mastery of theological, philosophical, and natural works, surpassed even the alchemist in popular suspicion because whereas “alchemy seeks to find nature's secrets that will change baser metals into gold; the android-maker brings metal to life.”²⁹² On a related note, if men of learning were capable of manufacturing androids, did it follow then that they were also capable of manufacturing human souls?²⁹³ To the medieval mind, the presumption of man to aspire to divine powers of creation was dangerous and blasphemous; even the co-opting of miracles by natural explanations and experiments threatened to take power away from God and the Church.²⁹⁴ Reaching for this extreme height was duly attributed to high-flying intellects of the day, whether or not they were actively involved in the manufacture of moving statues.

Historians have come to a consensus that all were brilliant men who tinkered with unorthodox concepts, particularly the occult sciences from Islamic sources, in their rigid and extremely hierarchical ecclesiastical milieus.²⁹⁵ Virtually no recent historian takes the stories of their

²⁸⁹ Bedini, “The Role of Automata in the History of Technology,” 31.

²⁹⁰ Kieckhefer, *Magic in the Middle Ages*, 113.

²⁹¹ Sherwood, “Magic and Mechanics in Medieval Fiction,” 575.

²⁹² Higley, *The Legend of the Learned Man's Android*, 132.

²⁹³ *Idem*, 133.

²⁹⁴ Eamon, *Science and the Secrets of Nature*, 62-63.

²⁹⁵ LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 410-11.

brazen heads at face-value; rather, they are manifestations, usually after the death of the scholar in question, with their roots in political causes of the day: the undermining of the papacy, the discrediting of their other work or their time period in general, and so on. The topos of a brazen (brass) head with the power to speak prophecy mingled the Greco-Egyptian automated idols as well as the shamanistic Mantic heads with which we opened this chapter. We shall now proceed to examine some of the better-known accounts of the manufacture of speaking, mechanical heads in the Middle Ages with this recognition at the forefront of our minds. Even if the scholars in question did not actually produce invested, oracular heads *all'antica*, the stories are ample proof of the persistence of the theme in the Medieval collective consciousness, albeit as “emblems of popular suspicion.”²⁹⁶

Gerbert of Aurillac, who later became Pope Sylvester II (999-1003), lived a life in stark contrast to the stories which circulated after his death. Sources from his lifetime document that he had a reputation for erudition, piety, care of his students, monastic reform, and for being “the most learned man in Christendom.”²⁹⁷ Most biographies credit a sojourn in Muslim Spain, specifically Seville, as the source of his great knowledge of the Islamic occult sciences.²⁹⁸ However, Elly Truitt debunked this perception, establishing that Gerbert made contact with this body of learning through the diverse intellectual community of Muslims and Jews in the nevertheless Christian province of Catalonia, specifically Barcelona.²⁹⁹ Recast in the light of legend, medieval accounts blame pride for inciting Gerbert to leave his monastery to study Saracen magic at the price of his soul. Some versions imagine Gerbert as a kind of lascivious swashbuckler, carrying off both his teacher's daughter and his book of magic in the night after he had become an expert in necromancy and the divination of birds.³⁰⁰ Apart from the famed brazen head, he is also said to have manufactured other inventions; in terms of distinguishing between myth and fact, this is a gray area. We generally credit Gerbert with the importation of the abacus, astral science, as well as the Arabic numerals into the West, and a mechanical clock and steam-powered organ are credited to him by a twelfth-century writer.³⁰¹ One describes the organ *in situ* in the Rheims Cathedral as well as its brazen pipes which

²⁹⁶ Ibid.

²⁹⁷ Eamon, *Science and the Secrets of Nature*, 201-205.

²⁹⁸ E.g. Kang, *Sublime Dreams of Living Machines*, 69-70, 74.

²⁹⁹ Truitt, “Celestial Divination and Arabic Science in Twelfth-Century England: The History of Gerbert of Aurillac's Talking-Head,” 202, 209.

³⁰⁰ Eamon, *Science and the Secrets of Nature*, 62; Cohen, *Human Robots in Myth and Science*, 27.

³⁰¹ William of Malmesbury, *Gesta regum anglorum* 2.172; LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 411; Truitt, *Medieval Robots*, 201.

filled the air with modulated tones from the force of the hot steam created with water below.³⁰²

These would be precocious but not impossible feats, as this technology was certainly known in the East. However, the source must be considered: the *ca.* 1125 *Gesta regum anglorum* by William of Malmesbury also includes the account of the brazen head, which is not explicitly animated by demons *per se* but rather through a well-timed manufacture at an astrologically propitious moment which enabled it to answer “yes” or “no” questions. However, it appears mechanical automata were a bit of a fascination for this medieval author. In other works, William of Malmesbury describes a bridge-automaton of a menacing brass man that menaced from the far side anybody who stepped foot on the near as well as a tale preserving more Classic elements of Hellenistic theurgy: when a groom unthinkingly rests his ring on the finger of a statue of Venus, the spirit inhabiting the statue causes chaos at the wedding proceedings, blocking any consummation with his intended human bride.³⁰³ Therefore we must question how reliable are William of Malmesbury's attributions of mechanical creations to Gerbert: are they factual or rather products of a medieval mind already that already had a taste for the theme? Otherwise, we have no evidence from Gerbert's biography of an acquaintance with Hermetic philosophy or theurgic practices.

In the scope of “techno-mythology” however, we remember that solid facts are only of secondary concern. The brazen head of medieval legend is not a *factual* object in the sense that there is any evidence for its historical creation, but it nevertheless was used to great effect by those who wished to detract from the reputation of Pope Sylvester II. Truitt posits the principal motivation in the Investiture Controversy of the following century as “reformers and reactionaries wrote letters, manifestos, and jeremiads defending their positions and accusing the opposition of every kind of depravity.”³⁰⁴ The earliest writings of Gerbert's trafficking with demons comes *ca.* 1085 from the virulently anti-reformationist Cardinal Beno, who places him as the first in a line of sorcerer-popes who corrupted the papacy.³⁰⁵ Other historians look to schismatic circles of the late fourteenth and fifteenth centuries as well as Lutheran writers for the propagation of “scandalous legends of nigromantic popes” and the Catholic Church's gradual loss of spiritual prestige.³⁰⁶

In addition to this doctrinal-political facet to the brazen head legend of Pope Sylvester II, there is another socio-cultural thread which can be followed in virtually all of the medieval legends

³⁰² See Sherwood, “Magic and Mechanics in Medieval Fiction,” 585.

³⁰³ Cohen, *Human Robots in Myth and Science*, 28-29.

³⁰⁴ Truitt, *Medieval Robots*, 210.

³⁰⁵ *Ibid.*

³⁰⁶ Butler, *The Myth of the Magus*, 94; Higley, *The Legend of the Learned Man's Android*, 138.

about the manufacture of brazen heads or automata by daring intellects of the day. Anxiety about the influx of knowledge from the East and the creation of new categories of knowledge, for example, the slow integration around the thirteenth century of specifically natural magic within a schema which previous had been divided between Christian religion/pagan (forbidden) magic,³⁰⁷ manifested itself in a debate over *curiositates* which climaxed in the thirteenth century. The battle lines have been framed thusly: orthodox theologians grounded in “dour Augustinianism” viewed curiosity itself with suspicion and moral condemnation; proponents of this view held that God did not intend for natural mysteries to become known, and occult and unintelligible things were that way for a reason, namely to keep them obscure from the minds of man.³⁰⁸ This negative conception of curiosity associated with a characteristically medieval outlook has been a well-observed phenomenon, invoked by modern philosophers³⁰⁹ and historians alike. Pushing back, Scholastics countered that alleged “marvels” produced by magic and even, controversially, miracles were “secrets” only in the sense that their operating principle (presumed to be natural) had not yet been understood.³¹⁰ Orthodoxy answered that *all* events proceed from God, are therefore intrinsically miraculous, and essentially that man was not too look to closely at their workings. There were clear lines drawn between licit sciences- arithmetic, geometry, music, and even astrology to certain degrees- and the illicit- divination, necromancy, and other areas forbidden by the Church;³¹¹ magic was the paradigmatic example of forbidden knowledge, as the boundary separating natural from demonic operations was subject to continuous shifting.³¹² Theurgy fell squarely within this category and was held by Augustine and reiterated by Hugh of St. Victor and others to be especially perverse because he perceived it not only as idolatry, which comprised the cooperation of demons, but also the employment of these demons to “circuitously win the favor of deities.”³¹³

While there is no evidence that the historical Gerbert of Aurillac, or indeed any of the great Medieval intellectuals with which he has in common a posthumous brazen-head legend, indulged in the actual animation of statues (by methods mechanical, theurgic, or otherwise), their extraordinary thirst for knowledge was sufficient grounds in itself for the later legends which attached themselves

³⁰⁷ Kieckhefer, *Magic in the Middle Ages*, 37.

³⁰⁸ Eamon, p. 59.

³⁰⁹ See Michel Foucault, *The Masked Philosopher in Foucault Live (Interviews 1966-84)*, ed. Sylvere Lotringer (New York: Semiotexte, 1989), 302-307.

³¹⁰ Daston and Park, *Wonder and the Order of Nature*, 63, 353.

³¹¹ Truitt, *Medieval Robots*, 201-203.

³¹² Eamon, *Science and the Secrets of Nature*, 61.

³¹³ *Idem*, 59-63.

to these figures; in an era where this trait was suspect, it naturally followed that any great intellect fell subject to the same medieval moral scrutiny and was transformed, to varying degrees, from respected scholar to suspected magus.

Compared to the exaggerated stories about Gerbert of Aurillac, the automaton-legends which swirl around the figure of Albert the Great stand out among modern historians for the faint ring of possibility. Among his peers indicted for the manufacture of brazen heads, Albert stands alone in contemporary legend as the manufacturer of a full automaton³¹⁴ and other mechanical wonders. Indeed, in European literature we encounter one of the earliest uses of the term *android* (from the Greek *andro-eides*, like a man) in a seventeenth-century text describing Albert the Great's automaton.³¹⁵ Certainly, as one of Europe's most famous intellectuals, legends of a talking head animated by necromancy and black magic inevitably have been attached to his life,³¹⁶ and no automata or any devices are positively documented in association with the Dominican scholar. However, as DeSolla Price points, out automaton-making had by Albert's lifetime recovered a level of sophistication,³¹⁷ and other scholars have noted the pains some medieval writers took to emphasize the astrological and mechanical, instead of demonic, nature of his attributed marvels. A 1373 moral treatise by Matteo Corsini, the *Rosaio della Vita*, is one of these works which present the Albertine automaton as a product of astrology, rather than necromancy. When it is destroyed by another, anonymous monk, it is lamented that whoever would attempt to produce another one would have to wait 30,000 years before the stars aligned properly again.³¹⁸ This lament of the astrological image-maker appears again in another story about the manufacture of a similar image by the thirteenth-century astrologer Guido Bonatti: the story goes that he gifted a poor apothecary with a wax image of a ship which would bring him wealth, provided he kept the image and secret. However, fearing demonic influence, he destroyed it, but then regretting the poverty in which he once again found himself, asked Bonatti for a replacement. Bonatti admonished the apothecary for destroying an image which was wholly natural in function, but told him that that there would not be

³¹⁴ See LaGrandeur, "The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*," 409; Joachim Sighart, *Albert the Great, of the Order of Friar-Preachers: His Life, and Scholastic Labours* (London 1876, repr. 1974), 127.

³¹⁵ Gabriel Naudé, *Apologie pour tous les grands personages faussement soupçonnez de magie* (Paris: 1625, 1653, 1669, 1712); Higley, *The Legend of the Learned Man's Android*, 130.

³¹⁶ E.g. the 1600 text *Disquisitionum magicarum libri sex* of Martin Delrio; see LaGrandeur, "The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*," 409f.

³¹⁷ DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 20.

³¹⁸ See *Rosaio della Vita, Trattato Morale, attribuito a Matteo de' Corsini e composto nel MCCLXXIII*, ed. David Passigli (Firenze: Società Poligrafica Italiana, 1745); Higley, *The Legend of the Learned Man's Android*, 141.

another favorable alignment for fifty years (a drop in the bucket compared to Bacon's!).³¹⁹

Another source has been proposed in a commentary by Alfonso de Madrigal, also known as El Tostado, from the fifteenth century, which has been hypothesized to have been a copy of the earlier legend about Gerbert of Aurillac.³²⁰ Tostado's commentary inserts Albert the Great's pupil Thomas Aquinas into the role of the monk that destroyed the work out of interchangeable fear or piety.³²¹ The actual writings of Thomas Aquinas do suggest a familiarity with mechanisms if not some implementation of mechanistic philosophy. DeSolla Price highlighted a sentiment in Thomas's *Summa Theologia* which anticipates classic Cartesian philosophy by centuries: "animals," Thomas Aquinas asserted, "show regular and orderly behaviour and must therefore be regarded as machines, distinct from man who has a rational soul and therefore acts with reason."³²² We may speculate about whether Thomas Aquinas had seen first-hand the mechanized simulacra of animals- Heronic birds or even the realistic, fur-covered ape automata imported from Islamic lands to medieval French courts-, but the writings of Albert the Great furnish another avenue of inquiry.

For the first time since antiquity, we find mention of experiments with steam and, tantalizingly for the study of brazen-head legends, the description of a blower or sufflator, also called an aeophile, in Albert the Great's work *De meteoris*.³²³ Such vessels probably derive from Vitruvian accounts of steam bellows or whistling tea-kettles, and in the middle ages, frequently were crafted in the shape of human heads, which whispered or whistled with the pressure of the steam.³²⁴ One such medieval anthropomorphic example is housed in the Kunstkammer of Vienna's museum (fig. 42), in the same room as the automaton attributed to Turriano. Perhaps these devices provide us with another point of inspiration for medieval legends conflating experiments with mechanical technology with the creation of "speaking" heads. The oracular element we may still presume to be inherited from older magical traditions, but the existence and persistence of steam-powered technology inherited from antiquity in medieval Europe certainly is deserving of consideration on par with literary and philosophical traditions.

As with the other great intellectual figures of his day, the biographical and factual details of

³¹⁹ Klaassen, *English Manuscripts of Magic, 1300-1500*, 4.

³²⁰ Riskin, *The Restless Clock*, 115, note 8.

³²¹ Higley, *The Legend of the Learned Man's Android*, 141; Deanne Williams, *Friar Bacon and Friar Bungay and the rhetoric of temporality in Reading the Medieval in Early Modern England*, eds. David Matthews and Gordon McMullan (Cambridge: Cambridge University Press, 2007), 31-32.

³²² Thomas Aquinas, *Summa Theologia*, Qu. 13, Art. 2, Reply obj. 3, Pt. II; DeSolla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy," 20.

³²³ Truitt, *Medieval Robots*, 93.

³²⁴ Higley, *The Legend of the Learned Man's Android*, 140.

Albert's life and writings are weighted more or less evenly in his legacy with the popular perception of his work held by later generations. In Albert's case, as with the others, a reputation for magic is predominant for the latter category and thus, Albertus Magnus becomes a figure in the dual history of mechanics as well as magic. A popular legend which mingles these identities recounts how Albert played the host to William, Count of Holland, for an outdoor meal in the dead of winter in Cologne which was catered by metal attendants and miraculously heated with warm air.³²⁵ Along with other thinkers like Thomas Aquinas and William of Auvergne (*ca.* 1180-1249), Albert defended in his authentic writings the principles of magic on the basis that these ideas were both common and well-respected in the works of ancient philosophers. The magus and the philosopher were recognized to share the same lexicon.³²⁶ Some of these minds, like William of Auvergne, felt compelled to caution their students about the pernicious influence of magical works after they themselves had devoted themselves to the subject, but that does not appear to hold true at all for Albert the Great.³²⁷

Yet, in the case of the latter, an entire book of experimental magic was attributed, spuriously, to him and his Dominican's school at Cologne: the *Secreta Alberti* or the *Experimenti Alberti*.³²⁸ We must however temper the statement just made. Some components appear to derive directly from authentic Albertine works, such as the *De mineralibus* (for the lapidary section), and other parts are cribbed from ancient authorities like Pliny, and Pseudo-Aristotelian works. This book was the most famous of the magical books in the Middle Ages and has been hailed by recent historians as the most illustrative work of the assimilation of the occult sciences in the Latin West,³²⁹ which at this time was experiencing a vogue for *libri secretorum* and the popularization among intellectuals of esotericism stretching back to the Hellenistic era.³³⁰ A shift however from Hermetic and Classical antecedents has been recognized in the book's author's dissatisfaction with accepting marvels as merely miraculous; instead, the principles of scholastic science are employed to explain what would have been left unquestioned in earlier ages. What emerges is a medieval rational theory of magic, and it has been summarized as a “treatise on employing the 'secret' or marvelous virtues of plants, stones, and animals.”³³¹ For the present study of astral magic's

³²⁵ Cohen, *Human Robots in Myth and Science*, 30.

³²⁶ LaGrandeur, “The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*,” 411.

³²⁷ Eamon, *Science and the Secrets of Nature*, 66.

³²⁸ *Idem*, 71-72.

³²⁹ *Idem*, 71.

³³⁰ *Idem*, 43-44; see also “The cult of secrecy and books of secrets” in Kieckhefer, *Magic in the Middle Ages*, 140-44.

³³¹ Eamon, *Science and the Secrets of Nature*, 71.

application to theurgic operations, the self-same unseen, or occult, virtues of natural materials were what was held to invest the statues of antiquity with spirit, or demons in later ages. For our purposes, we must recognize the *Secreti Alberti* as a text which preserved some of the theoretical framework in which Neoplatonic “magical” theurgy was developed and in which it would resurface in the Renaissance.

In the life of Roger Bacon (*ca.* 1220- *ca.* 1292), we see an amplification of the treatment of Gerbert of Aurillac. On the one hand, Bacon was not the target of anti-papal propaganda, but on the other, he documented his thinking which explored natural and magical philosophy, emphasized the value of experiments, and speculated on the feasibility of fantastic inventions. Ironically, with this extensive treatment, he provided his detractors with reams of talking points. Bacon however was explicit in his treatise *Of the Secret Operationsof Nature and Art and of the Nullity of Magic* that magic was not necessary to work wonders; art and nature could be quite sufficient.³³² His prolific writings and unorthodox opinions (particularly on the importance of Classical philosophy) led to his incarceration for twelve years by Pope Bonaventure; once free, new criticisms of the Church landed him back in imprisonment.³³³ Whereas Bacon faced opposition during his lifetime, his works have nevertheless been recognized as among the most influential to emerge from medieval western civilization and anticipatory of modern modes of thought.³³⁴

One of Bacon's principal, precocious legacies was his endorsement of experimentation, often at the risk of his contemporaries' perception that it was magic. Indeed, Bacon's *Scientia experimentalis* set out to test the claims of magic and to provide a method to distinguish false from true knowledge. On the subject of the supernatural animation of statues, Bacon concluded generally, “Even if nature is powerful and marvelous, art using nature as an instrument is more powerful,”³³⁵ and specifically, “Thus animate and inanimate will be seen to concur with Nature, not because of the virtue of magic symbols and characters.”³³⁶ Bacon was unequivocal in his condemnation of

³³² *Epistola Fratris Rogeri Baconis de Secretis Operibus Artis et Naturae, et de Nullitate Magiae* in *Fr. Rogeri Bacon Opera quaedam hactenus inedita*, ed. J. S. Brewer, *Rerum Britannicorum Medii Evi Scriptores*, XV, 3 vols. (1859), I, 542-43.

³³³ *Idem*, 33.

³³⁴ *Idem*, 47; Stewart Easton, *Roger Bacon and his Search for a Universal Science* (New York: Russell & Russell, 1952), 78.

³³⁵ Roger Bacon, “Concerning the Marvelous Power of Art and of Nature and Concerning the Nullity of Magic,” *Roger Bacon's Letter*; trans. Tenney L. Davis (Kila, MT: Kessinger Publishing Company: 1992), 523; Eamon, *Science and the Secrets of Nature*, 51.

³³⁶ Bacon, “Concerning the Marvelous Power of Art and Nature and Concerning the Nullity of Magic,” 14.

magic, both as a practice in general.³³⁷ He also condemned books that were in circulation during his lifetime, whose ascriptions to famous authors he debunked as new inventions of “seducers.”³³⁸ In spite of the clear anti-magical position which Bacon adopts in his writings, there is a rueful irony to be savored that these did not in any way inhibit legends about his magical activity which sprung from later centuries.

The legend of Bacon's brazen head, and indeed his conflation in the popular imagination with a medieval stock-character as a bumbling, buffoonish friar and thwarted magician, finds its fullest expression in two sixteenth-century English works, a *ca.* 1555 *Famous Historie of Fryer Bacon* and a *ca.* 1587-94³³⁹ stage-play *Friar Bacon and Friar Bungay* by Robert Green. The latter drew upon themes of the former and expanded them, ultimately becoming what the historian Deanne Williams characterizes “a near-comprehensive collection of popular images of the Middle Ages.”³⁴⁰ Friar Bacon's character in both works is definitely not the erudite philosopher or the revolutionary early scientist we encounter in scholarly works of medieval intellectual history; rather, he assumes the role of a “common-or-garden-variety magician,” “a trivial comic figure” in a “clunky, anti-clerical satire.”³⁴¹ In the earlier version, Bacon's mechanical head is defective, and he must resort to theurgy, invoking a spirit to come inhabit it.³⁴² In Green's play, Friar Bacon pronounces a more triumphant outcome in verse: “I have contrived and framed a head of brasse,/ I made Belcephon hammer out the stuffe/ And that by art shall read Philosophie.”³⁴³

However, as with all of the legendary brazen heads, its existence is not long-lived; the denouements of these stories, which in some of the legendary tales about Gerbert of Aurillac brought about a grisly death and dismemberment by demons, are by and large uniformly unhappy endings for magician and mechanism alike.³⁴⁴ However, the particulars of the Baconian brazen head in the English sixteenth-century works are less important than what has been observed about the function of the tale itself in this later society, distanced from the historical Bacon's lifetime by three

³³⁷ Bacon's view is summarized as “illicit and sinful because it is either fraudulent, as in the deceits perpetrated by jugglers and ventriloquists, or else it is accomplished with the aid of demons... Whatever is beyond the operation of nature or of art either is not human or is a fiction and accomplished by fraud.” Eamon, *Science and the Secrets of Nature*, 67.

³³⁸ *Idem*, 66.

³³⁹ The date varies among different scholars; see Williams, *Friar Bacon and Friar Bungay and the rhetoric of temporality*, 31.

³⁴⁰ *Ibid.*

³⁴¹ *Idem*, 31-32.

³⁴² Cohen, *Human Robots in Myth and Science*, 31.

³⁴³ Robert Green, *Friar Bacon and Friar Bungay* (London: 1594), 2.53-55.

³⁴⁴ A review of the other stories' endings can be found in Williams, *Friar Bacon and Friar Bungay and the rhetoric of temporality*, 31-32.

centuries.

Williams delineates how the writers in sixteenth-century England were aware of being in a time period that was distinct and somehow disjoined from medieval era; the Bacon-character and indeed the learned medieval “android-makers” in general were invested with the negative values which this new time period, we shall call it the Renaissance as Williams does, projected onto the the age as a whole. This is a critical difference which distinguishes Bacon's brazen-head legend from Gerbert and his medieval contemporaries: whereas we see observe the projection of values of medieval society onto the former- a brazen-head legend is symptomatic of medieval intellectuals who challenged orthodox attitudes to *curiositas* and who were nurtured fledgling natural and experimental sciences-, we make no distinction between the culture that produced the scholar (or magician, for the sake of argument) and the culture which crafts unsavory legends in response to it. Gerbert or Pope Sylvester's detractors were a later group of men which recognized themselves to be on the opposing side of issues such as monastic reform and the Investiture Controversy, but they did not conceive of themselves as belonging to a time period distinct from the one in which Gerbert lived; this was not so with the case of the Baconian brazen head legend. By the sixteenth century, a brazen head in literature or theatre was not necessarily a marker of a culture which felt threatened by natural and mechanical curiosity in its most brilliant minds; it had become, demonstrably at least in English literature, a short-hand for a misguided magical mindset of the preceding age. In newly-Protestant England, their break with the medieval Catholic past was manifest; there were clear social and political motivations as to why the past should be made to look foolish and superstitious.³⁴⁵

In 1530, we still encounter an English woodcut which depicts Roger Bacon in a typical and unremarkable pose of moral probity and religious devotion;³⁴⁶ a generation later, he pays the magician-buffoon, “a cardboard cut-out” of a stock character populating the Renaissance popular vision of the Middle Ages. Just as the character of Gerbert was transformed as a result of the changing politics of the papal court of successive centuries, so too appears to have been the case of Roger Bacon and England's history with the Church.

Nor was Roger Bacon an isolated figure from medieval history whose brazen-head legend resurfaced in the sixteenth century. Robert Grosseteste (1175-1253) also was a medieval monk and

³⁴⁵ Idem, 31-32, 36-37.

³⁴⁶ Idem, 35.

philosopher to whom became attached a similar legend about a bronze head in fourteenth-century³⁴⁷ and sixteenth-century sources alike, with the expected variations in detail. For example, in the 1503 account by the monk Richard of Bardney, we learn that Grosseteste's brazen head spoke only on Saturdays.³⁴⁸ Grosseteste and Bacon shared correspondence, friendship, and a degree of similarity to their troubles. Like Albert the Great and Roger Bacon, Grosseteste was another scholastic philosopher who advanced Aristotelian philosophy through translations, such as Aristotle's *Ethics* with its commentary by the twelfth-century Byzantine Eustratius into Latin. Although this work was never printed, it nevertheless circulated widely in manuscript. Albert the Great left his own commentary on this work and was the first to comment on virtually all of Aristotle's writings.³⁴⁹

In the later case of Arnold Villanova (1240-1311), we find in one legend the figure of a monk creating a speaking head of bronze with the aid of drugs hidden in a pumpkin.³⁵⁰ By this point in the study, the existence of a brazen-head legend might well be read as a mark of a profound and influential mind which lived in a peculiar era which produced a recognizable icon- a speaking brazen head- to stand in for their own iconic achievements in the popular light.³⁵¹

We may conclude that the brazen-head legends of the great medieval minds do not belong to the same narrative of the survival of theurgic philosophy or actual automaton-manufacture, rather we are in the realm of examining *how* these themes were employed in popular literature and culture. Williams even cautions in her study how a Renaissance work like Green's may lead to confusion between an honest or a stylized rendering of the past.³⁵² Indeed, the brazen head itself was a symbol even to the Renaissance viewer of how ultimately uncontainable was the enigma of history. Like the brazen head, history demands pain-staking steps and definitions to formulate or construct, and it is destined to defy attempts to contain and control it, usually exploding in a spectacular fashion.³⁵³ However although the brazen-head legends do not testify to a historical theurgic practice among the medieval intellectuals, the importance of this trope in the later popular imagination must not be

³⁴⁷ John Gower, *Confessio Amantis* in *The Complete Work of John Gower*; ed. G. C. Macaulay (Oxford: 1899-1902, repr. 1968), Bk. IV.II.234-53.1; LaGrandeur, "The Talking Brass Head as a Symbol of Dangerous Knowledge in *Friar Bacon* and in *Alphonsus King of Aragon*," 409.

³⁴⁸ Richard of Bardney, *Tempore Saturni loquitur Saturnia*; see Henry Wharton, *Anglia Sacra* (London: 1691), 333.

³⁴⁹ Lines, "Rethinking Renaissance Aristotelianism: Bernardo Segni's *Ethica*, the Florentine Academy, and the Vernacular in Sixteenth-Century Italy," 842.

³⁵⁰ Williams, *Friar Bacon and Friar Bungay and the rhetoric of temporality*, 32.

³⁵¹ Higley, *The Legend of the Learned Man's Android*, 129.

³⁵² Williams, *Friar Bacon and Friar Bungay and the rhetoric of temporality*, 37.

³⁵³ Indeed the fungibility and imprecision about the past is a conscious theme exploited even by the Renaissance author; specific instances, such as the confusion of Classical names and mythology are argued in idem, 32, 45.

discounted, especially when we arrive to the question at the end of the same century as to what extend different concepts of the supernatural animation of statues influenced the production of actual automata.

Nevertheless, methods of animating statues and man-made vessels not only continued, but also proliferated and multiplied in the Medieval period and became subject to the dawning awareness of scientific scrutiny. The twelfth and thirteenth centuries have been characterized as an epoch in which “the sum of contemporary scientific knowledge, world history, philosophy, was set forth for all who could read.”³⁵⁴ If medieval flights of fancy brought the common man to a dream-destination of mechanical wonders, those who frequented the international courts of the period might have first-hand encounters with the same technology. Depending on their own understanding of the mechanisms and natural forces at play, real automata became candidates for demonic intervention whether they depended upon air, water, steam, or astral influences. The medieval mind would not be surprised to encounter a moving statue, a singing image, or other known mechanical devices such as the Tantalus cup's disappearing wine, but the debate over what methods were truly capable of realizing such feats continued well into the Renaissance and Early-Modern period.

As we have seen above, to distinguish between “Medieval” and “Renaissance” automata is not necessarily a question of mechanical operations; in many instances, the original principle remained unchanged but found inventive new applications. Because of this mostly seamless transition in “Medieval” or “Renaissance” mechanics themselves, the next chapter's examination of the “Renaissance revolution” in this field shifts its focus to the large developments which reintroduced the idea of theurgy to learned circles: the translation, commentary, and circulation of Hermetic and Neoplatonic philosophical works from the early fifteenth century, the rise of the Renaissance magus and magical philosophy, and the work of the preternatural philosophers. The reception of such devices followed lines laid out from deepest antiquity; Edwyn Bevan laid out these two categories in his discussion of Horace's attitude to idols in antiquity, and it remains relevant through the early modern period:

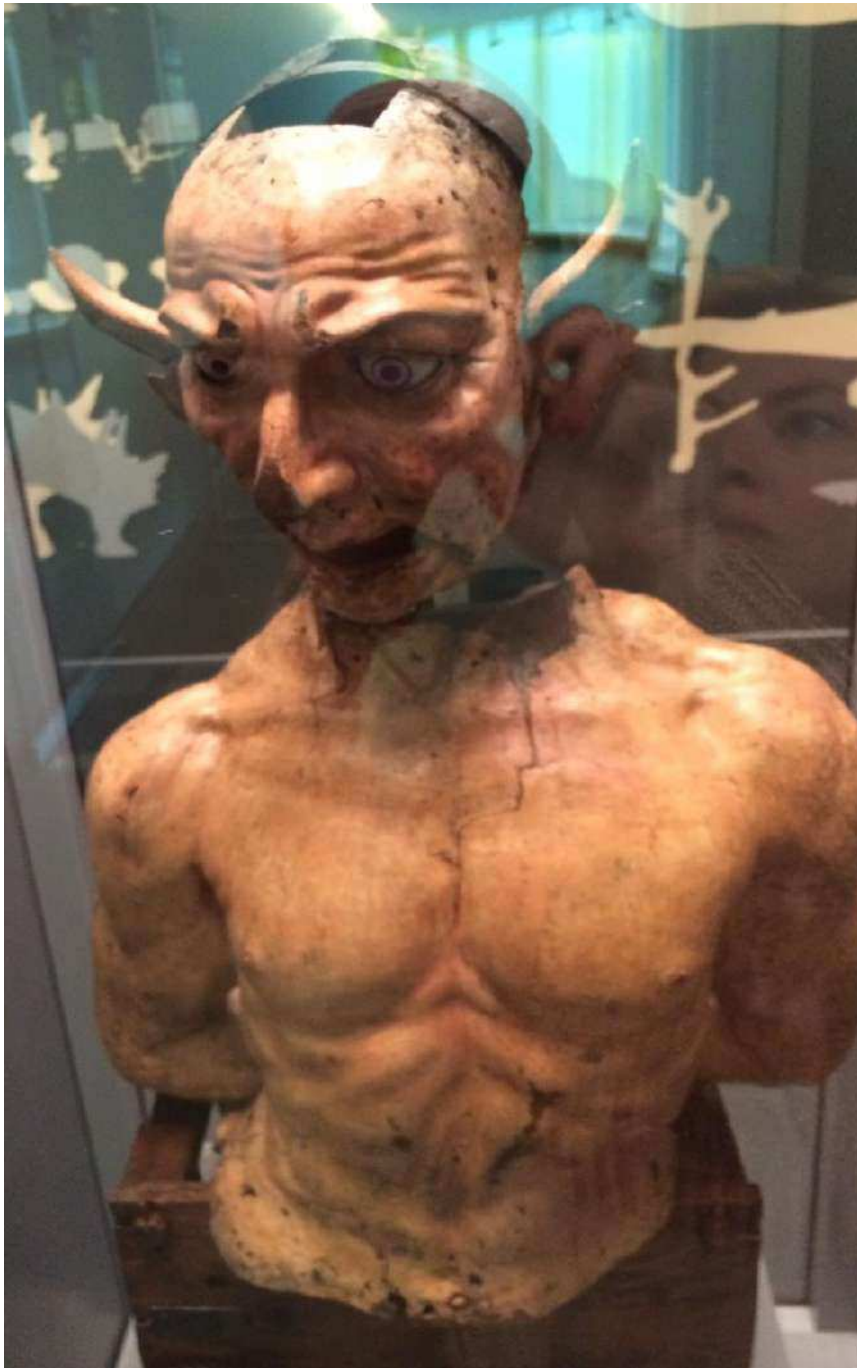
Between the belief of the peasant, who took the animation of the idol in its most gross realistic sense, and the belief of the educated man, who regarded the ceremonies of worship as only expressing in a symbolic way that there was some unseen power somewhere, who liked to receive the homage of

³⁵⁴ Sherwood, “Magic and Mechanics in Medieval Fiction,”

men, there may have been any number of intermediate shades...³⁵⁵

The works of other historians on this aspect of Renaissance intellectual history are legion; yet, the question of whether Renaissance philosophers and alchemists actually attempted the Hermetic and Neoplatonic technique of theurgy, bringing down astral influences to animate early-modern automata specifically, has to my knowledge not been fully explored, in spite of parallels present in the Hermetic “god-making” and Neoplatonic theurgic texts. The following overview of these large developments proceeds with that question at the fore in order to prepare the ground for this study's ultimate question: could the late-sixteenth-century automata at Pratolino have been material objects within which we can perceive the influence of this ancient and esoteric belief resurrected with the corpus of Hermetic and Neoplatonic literature in the Renaissance? Are there perhaps other candidates for consideration as practical counterparts to the theurgic theory swirling in the fifteenth and sixteenth centuries?

³⁵⁵ Edwyn Bevan, *Holy Images, An Inquiry into Idolatry and Image-Worship in Ancient Paganism and Christianity* (London, 1940), 31.



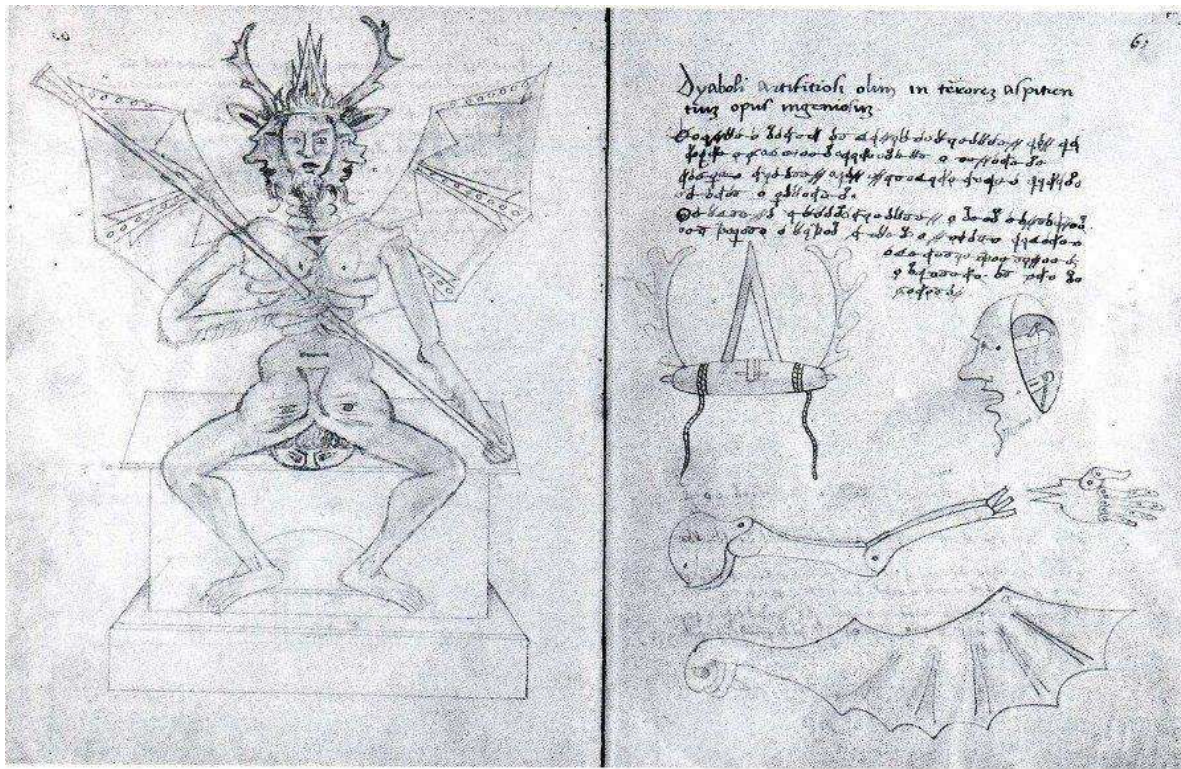
32. *Chained Devil* (front), Comodato delle Civiche Raccolte d'Applicata, Castello Sforzesco, actually at MUDEC, Milano, Permanent Collection, ca. 15th-16th c.



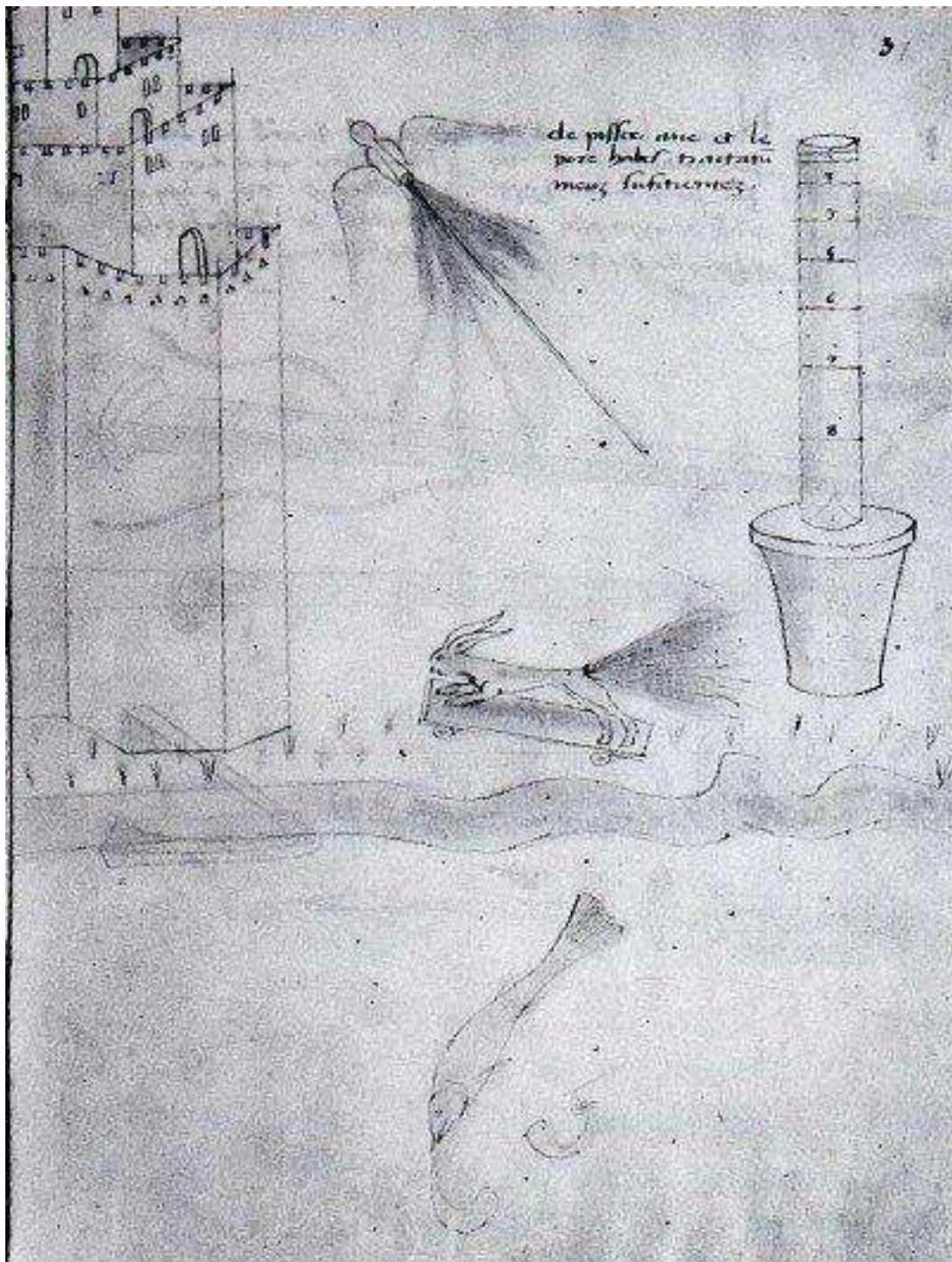
33. *Chained Devil* (back).



34. *Chained Devil* (head).



35. Giovanni Fontana, *Bellicorum Instrumentarum Liber*, Bayerische Staatsbibliothek, Munich, ca. 1420-30. Fols. 59V and 60r.



36. Fontana, *Bellicorum Instrumentarum Liber*, fol. 37r.



37. Juanelo Turriano, *Monk Automaton*, Smithsonian Institution, Washington D.C, ca. 1560.



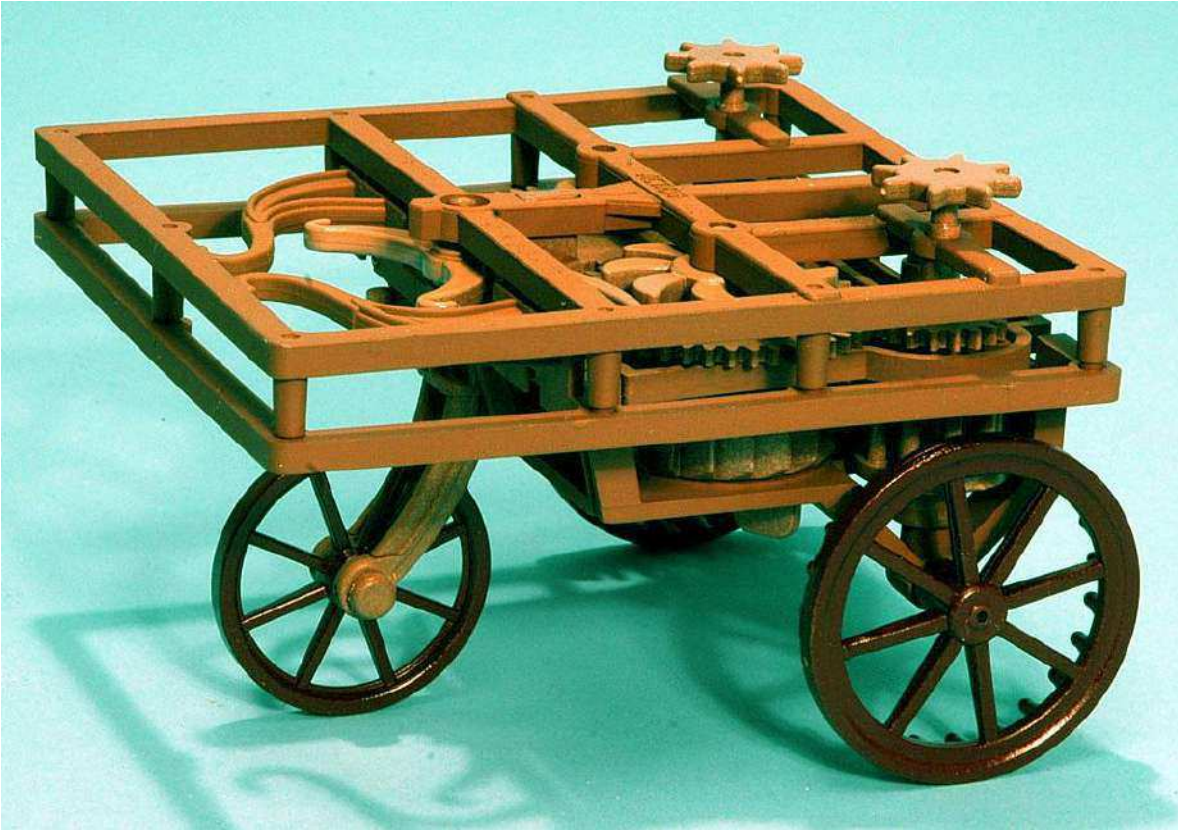
38. Juanelo Turriano, *Lady with a Lute Automaton*, Kunstkammer of Kunsthistorisches Museum, Vienna, ca. 1560.



39. *French Gothic Fountain Table*, Cleveland Museum of Art, ca. 1320-40.



40. Hans Schlottheim, *Galleon Table-Nef*, Kunstkammer of Kunsthistorisches Museum, Vienna, 1585.



41. Leonardo da Vinci, *Self-Propelled Cart*, Commercial To-Scale Model created by Academy and Italeri, 2011.



42. *Anthropomorphic sufflator*, Kunstkammer of Kunsthistorisches Museum, Vienna, 13th - 15th c.

5. The Renaissance Rehabilitation and Revival of Theurgy and Its Material Culture

In the dark recesses of our mind, we all believe in image magic.

Not even the primitive, on the other hand, believes in its sole efficacy.

In the history of European though this duality of attitudes is somehow reflected in the continuous, co-existence of Neo-platonic mysticism and Aristotelian intellectualism. The tension between these two modes of thought, their interpenetrations, conciliations, and divisions make up the history of religious philosophy throughout the Middle Ages and the Renaissance.¹

Moving ever-forward in our present study of the theurgic, “god-making” strains in medieval, Renaissance, and early-modern Western European civilization, this next chapter addresses the question of theurgy primarily in the Italian Renaissance through the shifting attitudes that fell within a wide spectrum of intellectual history. This evolution of ideas is traced first through general cultural attitudes towards such crucial factors as curiosity, wonder, and magic, and then in a detailed overview of the fifteenth- and sixteenth-century philosophers whose works produced a coherent theory by which the “god-making” animatory theurgy could be understood to operate. We discover a close relationship with the astral image-making which the Middle Ages had begun to articulate, and the inquiry into theurgy ultimately becomes a splitting of hairs about the final application of a relatively uniform and predictable astrological science.

Earlier investigations have been conducted about this science's incorporation into medicines, talismans, jewels, frescoes, architecture, and urban planning, all the subject of dedicated studies, yet invested statues or automata in the early modern period have so far resisted inclusion within this larger scope of the Renaissance's practical use of astrology. By now, the appellation of astrology as a true and proper science in the minds of ancient, medieval, and Renaissance practitioners should not require elaborate justifications; that work has already been accomplished by historians Franz Cumont,² Otto Neugebauer,³ Francesca Rochberg,⁴ David Pingree, Joan Evans, Mary Quinlan-McGrath and others. No longer do we feel compelled to put the label “pseudo-

¹ Ernst Gombrich, “Icones Symbolicae: Philosophies of Symbolism and their Bearing on Art,” *Journal of the Warburg and Courtauld Institutes* (1948): 182-83.

² Franz Cumont, *L'Égypte des astrologues* (Brussels: Fondation Égyptologique Reine Elisabeth, 1937).

³ Otto Neugebauer, “The Study of Wretched Subjects,” *Isis* 42 (1951): 111.

⁴ Francesca Rochberg, *The Heavenly Writings: Divination, Horoscopy, and Astronomy in Mesopotamian Culture* (Cambridge and New York: Cambridge University Press, 2004).

science,” in the convention of Lynn Thorndike, as a disclaimer upon astrology.⁵ Nevertheless, for all of these great strides in opening our modern horizons to include astrology and other pursuits we would perceive as “magical” today in the science of past ages, such effort would have been unnecessary for early-modern minds.

Francis Bacon (1561-1626) apprised these disciplines as scientific even at the dawn of Enlightenment philosophy in *The Advancement of Learning* (1605):

The sciences themselves, which have had better intelligence and confederacy with the imagination of man than with his reason, are three in number; astrology, natural magic, and alchemy: of which sciences, nevertheless, the ends or pretences are noble. For astrology pretendeth to discover that correspondence or concatenation which is between the superior globe and the inferior: natural magic pretendeth to call and reduce natural philosophy from a variety of speculations to the magnitude of works: and alchemy pretendeth to make separation of bodies which in mixtures of nature are incorporate.⁶

This chapter aims to communicate how primarily Greco-Egyptian-derived “god-making” theurgy, often through the lens of Byzantine and Arabic manuscripts, stirred not only the Renaissance imagination but also stimulated rational scientific discourse about the nature of the cosmos in the process. The first four sections of this chapter trace the intellectual history primarily of such theurgic techniques' theory in Neoplatonic, Christian, and Jewish philosophers of the fifteenth and sixteenth centuries, while the final section examines what practical components of this theurgy have been and can be further identified in the literary and visual culture of the age.

5.1. Defining Boundaries in Time with Paradigm-Shifts: Wonder, the Preternatural, and Magic in the Renaissance

In the mold of many previous studies, we pause at this junction when it appears that a line must be drawn between the medieval era and “the Renaissance,” or the “proto-Scientific Revolution” as it is sometimes called. Lorraine Daston and Katharine Park challenged traditional historiographies by using the quality of “wonder” and society's relationship to this emotional quality

⁵ Thorndike, *A History of Magic and Experimental Science*, I, 2.

⁶ Francis Bacon, *The Advancement of Learning* in *The Works of Francis Bacon*, 14 vols., eds. James Spedding, Robert Leslie Ellis, Douglas Denon Heath (London: Longman, Green, Longman, & Roberts, 1857-74), I, 4.2.

in their 2001 book, *Wonder and the Order of Nature*.⁷ The study of how “living” and animated statues were understood and produced in the Medieval and Renaissance periods certainly belongs to this wonder-working cultural subcategory, as there was no reliable or clear boundary enforced between mechanical knowledge and knowledge derived from ritual, or revelatory experience or literature. The making, and subsequent breaking, of boundaries and classifications (“sacred and profane; natural and artificial; animal, vegetable, and mineral; sublunar and celestial”) has been described as “the Ur-act of cognition,” and to register a breached boundary was to participate in the emotion of wonder.⁸ The manufacture of “living” vessels, whether in the theurgic, ritual mode or with bronze pipes designed to channel “spirits” of heat and air, belongs to this contradictory and often transgressive category outlined by Daston and Park. In this section, we will examine the changing attitudes towards the wondrous, the “preternatural,” and magic as all three assumed new mantles of respectability in centuries to come.

Breached boundaries between the natural/licit or the demonological/illicit characterize the study of statue animation through the early modern period, and any approach which seeks to understand animated statues' operations, whether astral, demonic, pneumatic, or hydraulic, must examine the development of the discipline of natural philosophy and its understanding of “wonders.” Labeled as *praeter naturam*, outside or beyond the course of natural, both natural and artificial wonders were marginalized or excluded to some degree by academics who were seeking to establish the “habits” or “rules” of the natural order. Daston and Park have raised the special problems which this distinction posed, being a “negative category, furthermore, whose limits were defined in practical terms by a pair of unstable criteria both of which depended on the experience and knowledge of the viewer... the preternatural consisted of a stratigraphy of heterogeneous phenomena, built up in layers from several traditions with no internal coherence except their awkward relationship to *scientia* in the Aristotelian sense.”⁹

Whereas thirteenth- and fourteenth-century philosophers agreed on the importance of supplying natural causes for preternatural effects, the resulting analyses were subject to wide-ranging variation, especially with the expansion of Latin materials with the influx of Arabic writings' new repertoire of causal mechanisms, some of which, such as Ray Theory, we have

⁷ Regarding traditional divisions of historical epochs “...these narrative conventions, imported into intellectual history from eighteenth- and nineteenth-century political historiography, only distort the nonlinear and nonprogressive cultural phenomena we describe.” Daston and Park, *Wonder and the Order of Nature*, 17.

⁸ *Idem*, 14.

⁹ *Idem*, 126.

explored in some detail above. Whether these causes were the force of wind or water in conduits or astral influences harnessed in sympathetic materials, either operating system to the medieval and early natural philosopher was not perceived to be beyond the human intellect's capacity to understand (versus humanity's acknowledged inadequacies in matters theological, wherein the operations of demons were relegated beyond the pail in the realm of the supernatural). Operations which were rooted in substances perceived to be natural (wind, water, or astral emanations) were assimilated into the universal framework of knowledge.

Another shift which has been marked as a measurement of cultural change in the perceived transition from Medieval to Renaissance is the social or moralistic cachet, or lack thereof, which wonder held for Latin Christendom between the fourteenth and fifteenth centuries, roughly. Wonder felt as an emotion was perceived at the close of the old epoch to be unseemly, an acknowledgement of an unknown cause. The advantage of this position was that phenomena which could only be met with awe by earlier periods became objects of consideration which diverse minds, to varying degrees of success, attempted to insert into existing systems of thought. Although discussion of god-making theurgy is relatively rare in comparison to mechanical literature, this same process can be inferred in the literature of both.

With the exception of experimental minds like Roger Bacon, the prerogative of the natural philosopher was by and large not first-hand observation, testing of hypotheses, and the formulation of new explanations; rather, the universal truths which he encountered in authoritative books were to be refined, distilled, and transmitted. It has been noted that for much of society, long-standing prejudices about manual labor and the knowledge of subordinate groups like midwives and artisans precluded the value of knowledge gained through experience. Similarly, proven recipes for medical and magical preparations or craft formulae which exploited occult properties of natural substances were excluded from natural philosophy because they were phenomena accessible only through experience.¹⁰ *Doctrina* was the legitimate the path to acquiring this guarded knowledge passed down through authoritative institutions (increasingly the universities) and generations of commentators. However, some room for wonder was made in Albert the Great's commentary on the *Metaphysics*, which acknowledged that Aristotle identified wonder as the impetus behind the philosopher's inquiry into cause and that the study of philosophy is *doctrinalis*, the "teaching by

¹⁰ Idem, 129.

cause, and it must begin with causes.”¹¹ And yet the *De mirabilibus mundi* emphasized that the wise man was in effect blind to wonders, having understood even the rarest display as the effect of familiar and universal causes.¹²

The relationship of this wonder to another emotion, curiosity, has also been used to demarcate what we may term a medieval mindset from its evolution in the proceeding centuries. Whereas in the High Middle Ages, the emotions could exist apart from one another, their intermingling was a phenomenon of the sixteenth and seventeenth centuries. As curiosity came to be reevaluated and transformed into a virtue, the emotion of wonder was subject to a similarly mixed assessment; some scorned wonder as the marker of the ignorant, while others followed Aristotle's characterization that wonder was “the beginning of philosophy.”¹³ This latter concept prevailed in spite of the contrary attitudes of some philosophers who promoted Aristotelian philosophy in the twelfth and thirteenth centuries.

Adelard of Bath (*ca.* 1080-1152) vehemently adhered to the former, rejecting the shadow of Augustine's pious wonderment, which he recognized as holding back the intellectual advancement which he encountered in works of Plato, Aristotle, and Arab authors among the “flood” of works he translated into Latin, some of which treated astrology and astral magic.¹⁴ In the *Quaestiones naturales*, the ideal of rational explanation is already articulated.¹⁵ Roger Bacon disdained wonder roughly a century later in a series of exposition of Aristotle's *Metaphysics*. Whereas Adelard may have been unaware of Aristotle's opinion on the merit of wonder because of the scarcity of original works in Latin (and if we generously forgive his overlooking of the Arabic authors' repetition- such as Avicenna's-¹⁶ that wonder led to the investigation of causes), Bacon minimized Aristotle's commentary, explaining that “Aristotle had not meant to say that wonder was in any strict sense the cause of philosophy but only its 'occasion,' moving the philosopher to flee from it as a frightened

¹¹ Albertus Magnus, *Metaphysica* in *Opera omnia*, ed. Bernhard Geyer, 40 vols. (Cologne: Aschendorff, 1951-), 16, 1.26.

¹² [Pseudo-] Albertus Magnus, *De mirabilibus mundi*; translated in Daston and Park, *Wonder and the Order of Nature*, 120.

¹³ Aristotle, *Metaphysics*, 1.2, 982b10-18.

¹⁴ Kieckhefer, *Magic in the Middle Ages*, 118.

¹⁵ See Adelard of Bath, *Die Quaestiones naturales des Adelardus von Bath* [1111-16], ed. Martin Müller, Beiträge zur Geschichte und Philosophie des Mittelalters 31, Heft 2 (Münster I. W.: Aschendorff, 1934).

¹⁶ “...the ignorance of the causes of the effects of the virtue in the magnet is not more marvelous than the ignorance of causes disposing a thing to redness or yellowness or body or soul. But wonder [*admiratio*] falls, indeed, from ordinary things [*consuetis*] and the soul neglects to inquire about them; but what rarely exists does excite wonder and induces inquiry and speculation about its causes.” Avicenna, *De viribus cordis* (Venice: per Paganinum de Paganinis, 1507), 1.10, 66; translated in Daston and Park, *Wonder and the Order of Nature*, 111-12.

man flees from a battle.”¹⁷ More thorough endeavors to “historicize the passions” have already been accomplished by Daston and Park, and the phenomenon of statue animation must also be localized within the context of these passions. Medieval minds such as Roger Bacon and Albert the Great applied themselves to the conceptualization, if not realization, of “wonders”, which were fruits of an unbothered curious mind pushing the boundaries between the magical and the mechanical. As wonder and curiosity acquired social and intellectual cachet, modern automata could flourish, and with this shift came the laying of a new intellectual foundation for the age.

Certain treatises have been used as signposts to measure this shift in attitude to wonder and the objects which occasioned this sentiment. Giovanni Dondi (1330-1388) rehabilitated the concept of wonder within Latin natural inquiry in a *ca.* 1382 treatise about the natural hot springs in the vicinity of Padua. Dondi was not an academic philosopher but rather a writer with natural philosophical training working in a related field of inquiry. In the following two centuries, others of this same professional stamp were the vanguard of a movement which saw the merging of natural philosophy with the wondrous, and which distinguished itself from the preceding age. The 1584 catalogue written by the physician Giovanni Battista Olivi which documents the natural collection of the apothecary Francesco Calzolari of Verona reserved its strongest expressions of wonder for objects with occult powers; these appear to have been elevated in the taste of the day above the simply unusual or monstrous.¹⁸ Men whose professions had a strong practical component, and in particular the field of medicine, which encompassed some aspects of alchemy, pharmacology, and magic, encountered- and documented- natural phenomena in the animal, plant, and mineral worlds which brought “down to earth” the natural philosophers’ high contemplations of universal causal arguments. By the sixteenth century, those aspirations of a necessary and universal causal explanations had eroded, and objects which shattered simple classifications interested collectors of naturalia far more than a rigorous taxonomy.¹⁹

Italian medical writers, some of them with an alchemical interest, combined in their persons and works (usually) a philosophical university education with the particular demands of princely patrons, who often held views divergent from Scholastic orthodoxy and were in possession of a refined taste for the wondrous. Thus, the therapeutic applications of particular marvels were explored, and explanations and systems were formulated when the need arose; as several scholars

¹⁷ Daston and Park, *Wonder and the Order of Nature*, 112.

¹⁸ *Idem*, 155.

¹⁹ *Idem*, 159.

have underlined, early-modern physicians in Europe were the best-trained in the study of nature.²⁰ Daston and Park recognize that the result of their work was the slow integration of wonder and wonders into natural philosophy; by the mid-sixteenth century, these intellectual motives lay at the heart of philosophical writing.²¹ This new attitude underwrote the evolution in magical theory during the Renaissance, and as we will see in the pages to come, it occasioned the refinement of astral science, with dramatic implications for the theory and practice of theurgy in the fifteenth and sixteenth centuries.

The Renaissance magus was often indistinguishable from the Renaissance doctor or the Renaissance philosopher. Beginning with humble, traditional, and defensive claims, the early “preternatural” medical writers who made use of purportedly “magical” or wonderful qualities of natural substances derived their legitimacy from the patronage of illustrious courts. Medicine’s association with astrology and mineralogy had long been intertwined since distant antiquity. From the Babylonians came the tradition of associating the signs of the Zodiac with particular parts of the human body and assigning each planet a particular metal, based the brilliance of the former and the luster of the latter.²² At this early date, man’s potential to affect his world through the manipulation of sidereal properties or at least to be able to consciously tailor his actions or avoid misfortune in keeping with predictable astrological conditions was already inherent in a system where each part connected with another and greater part. In Greek texts, there is a range of opinions about any inherent connections between properties of natural materials (e.g. stones) and celestial influences. Pliny’s mineralogical lapidary is skeptical of the examples of magical properties he communicates for certain stones, but the fifth book of Dioscorides’s *Materia Medica* (ca. 50-70 A.D.), which considers the medicinal uses of some two hundred “stones,” (which was a much more fluid category in antiquity than it is today) has been identified as the first instance where the use of gems as medicinal amulets was recognized in a scientific capacity and whose influence stretched through the early modern period.²³ The Alexandrian lapidary *Kyranides*, attributed to also inspired medieval imaginations.²⁴

²⁰ Idem, 172.

²¹ Idem, 133.

²² Evans, *Magical Jewels of the Renaissance*, 11.

²³ Idem, 16.

²⁴ In addition to being the source of the imagery of the pelican’s spilling its own blood to feed its young (later Christianized) and descriptions of the rhinoceros (which became the unicorn of fables), it is also a deeply idiosyncratic text grouped within the Hermetic corpus which mingles medicine and magic with roots in astrological tradition as well as common folklore. See idem, 19.

Correspondences between natural materials and planetary deities were also gathered from later Neoplatonic texts. Proclus in his commentary on the *Timaeus*²⁵ as well as Olympiodorus include gold's affinity with the sun, silver's with the moon, lead's with Saturn, iron's with Mars, tin's with Jupiter, and so on.²⁶ These and similar traditions were present in astrological and alchemical philosophy through Middle Ages, but the infusion of Greek texts to Italy in the fifteenth century revitalized this ancient system of correspondences in Western culture. Philosopher-astrologer-physicians multiplied, prospered, and moved fluidly throughout Renaissance society, and their ideas radiated wherever printed copies of their works travelled. In an age whose nascent market for literature had only begun to stir, their captivating treatments of wondrous phenomena reached virtually every European court. This was after all the “age of wonder” coined by Daston and Park.²⁷ By the mid sixteenth-century, ambition and courtly airs marked these works which “reclaimed wonder as a philosophical emotion ...[and] rehabilitated wonders as useful objects of reflection.”²⁸ Learned men who would have been familiar with Hermetic and Neoplatonic theurgy by the late-sixteenth century included not only princes, but engineers, scholars, and others with access to esoteric wisdom traditions.

For the history of magical philosophy, the Renaissance was its watershed moment of acceptance and transformation. The Renaissance magus was unlike his medieval counterpart in that he could invoke both natural as well as, in some cases, supernatural forces to work wonders.²⁹ The perception of Nature no longer as an impenetrable mystery, but as a quantity knowable through the human intellect was one of the Middle Ages' great evolutions in thought, and magic responded in step with this new and optimistic climate in Western Europe. Therefore, although magic was already a fluid classification in the Medieval period, encompassing aspects of astrology, mineralogy, medicine, demonology, and necromancy.

In Jacob Burckhardt's estimation, by the time of Boccaccio (1313-1375), the spiritual and social dangers of contact with Classical thought had been mitigated: “...true religion was strengthened, paganism destroyed, and the victorious Church in possession of the hostile camp.”³⁰ Although magical philosophy and practice was rife in the Medieval period, in the Renaissance we

²⁵ Proclus, *Timaeus*, 14.6.

²⁶ Evans, *Magical Jewels of the Renaissance*, 25.

²⁷ Daston and Park, *Wonder and the Order of Nature*, 172.

²⁸ *Idem*, 137.

²⁹ Kieckhefer, *Magic in the Middle Ages*, 150.

³⁰ Burckhardt, *The Civilization of the Renaissance in Italy*, 105.

can observe its transition from the purview of necromancers and the superstitious (this could include a range of people and social classes: monks, parish priests, physicians, surgeon-barbers, midwives, folk healers, diviners, etc.³¹) to a quasi-respectable activity fit for the philologist and, later, natural philosopher. Magic in the Middle Ages had accrued a negative reputation, but the newly-empowered Renaissance magus held himself to be in a category apart. In reality, these social distinctions in fifteenth- and sixteenth-century magic revived a hierarchy implemented by the original Neoplatonists in late antiquity; in both eras, theurgists and philosophers believed themselves far superior to adepts of lower magic, or “goetia.”³² In the larger context of the Renaissance revival of Neoplatonism belong the social prejudices and distinctions within magical philosophy which also manifested themselves in the fabric of early-modern culture.

These magicians as “preternatural philosophers” belong within the eponymous category of intellectual history christened by Daston and Park. Its standard-bearers are Marsilio Ficino, Heinrich Cornelius Agrippa, Pietro Pomponazzi, Girolamo Cardano, and Giambattista della Porta, whose contributions will be explored in more detail in the following section. The aim of these philosophers was to establish specific explanations for individual phenomena deemed unknowable or supernatural to earlier ages.³³ This goal was their novelty, not their methods. On the whole, these philosophers employed causal systems which had been in existence for centuries: the action of “spirits,” occult qualities, sympathy/antipathy, human and celestial intelligences, and other operations unintelligible to the senses but nevertheless legitimate instruments in the preternatural philosopher’s arsenal of causal explanations.

The intuition of a more animistic world-view in the Renaissance is also necessary to understand how natural materials were understood by the preternatural philosophers. The Renaissance magus or philosopher did not see inert, lifeless rocks or insensate plants; he saw in every facet of the universe the all-pervasive *spiritus* or *animus mundi*. A consequence of this perspective is a shift in the familiar distinction between natural and supernatural causation. It becomes “fatally anachronistic” to set “material” and “spiritual” in opposition or exclusion to each other.³⁴ In the Renaissance, magic’s intersection with emerging natural philosophies charted new conceptions and theories about the unseen or “occult” forces. We witness in isolated religious

³¹ Kieckhefer, *Magic in the Middle Ages*, 56.

³² *Idem*, 27.

³³ Daston and Park, *Wonder and the Order of Nature*, 160-61.

³⁴ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 12.

iconographies of the age wherein a holy “spirit,” formerly represented by figural angels or traditional depictions of winged or flaming seraphim (for example, figs. 43 and 44), is painted in a more naturalistic key (figs. 45 and 46).³⁵ We see the idea that the vessel or form of a definedly incorporeal spirit can reside in air, smoke, and light, the latter which we perceive in a variation of the holy mandorla motif in a sixteenth-century altarpiece (fig. 47). Spirit and nature are not only coming to be re-imagined and fused in new systems of thought, but the potential of man to penetrate past the mysteries of both has dawned in the age's consciousness.

Understanding this climate of experimentation within what we would deem today as magical, unorthodox, and unscientific systems is critical to reading De' Vieri's relation of the Pratolino Pan and Galatea automata to the magically-animated Venus of antiquity and the antique Mercury of Pasone. Some cameos from antiquity and other “marvelous” images, which it seems likely the Mercury of Pasone may have been, were considered along with fossils to be preternatural objects formed by occult processes and belonging to the same class of philosophy as the occult operations which powered “living statues” of old. In an age where the most daring philosophers were richly rewarded by patrons avaricious for occult knowledge which promised god-like powers of creation and subjugation of the natural world, De' Vieri's claim that Pratolino's automaton surpassed the Venus brought to life by Daedalus was no idle literary exercise in Classical philology. Rather, as this study makes as its central argument, that comparison alluded to the influence of esoteric, Hermetic, and Neoplatonic philosophy in the production of art and objects at the court of Francesco I de' Medici.

5.2. The Philosophy of Marsilio Ficino: Hermeticism, Neoplatonism, and Theurgy in Fifteenth-Century Florence

The primary motor behind many of the great cultural changes which manifested themselves through re-evaluated attitudes towards wonder, the preternatural, and the magical were inextricably tied to the same phenomenon driving the evolution of the whole of Renaissance culture in Italy and beyond: the rediscovery of Classical works and especially the flood of Greek texts, many previously

³⁵ My thanks to Dr. James Bradburne for facilitating my visit to the Pinacoteca Brera which precipitated this observation. For further scholarship on these two works see Arthur E. Popham, *Correggio's Drawings* (London: Oxford University Press for the British Academy, 1957); Luisa Arrigoni, Emanuela Daffra, Pietro C. Marani, *The Brera Gallery: The Official Guide* (Milan: Touring Editore, 1998), 173.

unknown to the West, after the second half of the fifteenth century. Many of these texts arrived via Arabic philosophers and writers who made significant contributions in turn to the Greek wisdom tradition, which their writings preserved and transmitted to the West. However, in broad strokes, the rediscovery and circulation of Greek texts by Italian humanists of the fifteenth century is *the* event which defines the rebirth of knowledge in the period which call the Renaissance.

This phenomenon was the direct result of the Ottoman encroachment upon Byzantine lands culminating with the conquest of Constantinople in 1456. Greek monks and other learned men sought refuge and patronage in the West, bringing their manuscripts, many which were unknown to the Latin world, with them. Cardinal Basilios Bessarion (1403-1472) and Gemistus Plethon (1355-*ca.* 1455), through their collections of texts and their involvement with the Councils of Ferrara and Florence (1438-1439), are recognized as the most influential figures among the flood of refugees to arrive from Byzantium.³⁶ The effects were both immediate and long-standing.

Plethon greatly impressed Cosimo de' Medici (1389-1464) with his notion of a *prisca theologia*, an ancient universal theology.³⁷ Joscelyn Godwin asserts that Plethon's private religion seems to have harmoniously synthesized solar worship, mystical Christianity, Zoroastrianism culled from the *Chaldean Oracles*, and the theurgy of the Neoplatonists. The *Laws* which Plethon published in his old age delineate a utopian society within pagan parameters, including worship of the Greek gods.³⁸ Plethon's contact with Cardinal Nicholas Cusanus (1401-1464) and the appearance of such themes as the divinely creative human mind, the reconciliation of different faiths, the omnipresence of God, and the unity of being (and its effect upon Scholasticism's rigid hierarchies) in the latter's philosophy, is recognized as the "metaphysical revolution" which made possible the later absorption of Platonism, Neoplatonism, and Hermeticism by Ficino and his followers.³⁹

Plethon also called for a return to the original works of Plato and maintained that Aristotle erred when he departed from the wisdom of his teacher. In the preceding age, the works of Plato were known only in fragmentary form and sometimes falsely attributed to Aristotle by Western medieval commentators. Plethon's effect upon Cosimo de' Medici is evident in the decision to have all of Plato's works translated; however, the era of pure Platonic influence was to be short-lived, as

³⁶ See Karl H. Dannenfeldt, "The Renaissance and Pre-Classical Civilizations," *Journal of the History of Ideas* 13.4 (1952): 436-7.

³⁷ Godwin, *The Pagan Dream of the Renaissance*, 10-11.

³⁸ *Idem*, 11.

³⁹ *Ibid.*

the Hermetic and Neoplatonic texts once brought to light eclipsed the brief ascendancy of Plethon's Platonic revival.

The momentum from the texts brought to the European continent by Plethon, Bessarion, and their compatriots passed to the a new generation of philosophers whose synthesis of this new received knowledge within pre-existing systems of thought overturned the status quo, distinguishing the Renaissance as a unique and identifiable cultural phenomenon apart from its predecessors and successors. The preternatural philosophers who advanced these philosophical systems each made contributions to how the age understood esoteric sciences, including theurgy. Their works possess implications for how theurgy would have been understood by the “magi” of the time immediately preceding the realization of the Pratolino automata.

The key figures to this watershed moment in Western philosophy and its reverberations throughout Renaissance culture are not so much the bearers of these texts nor their interested patron, but the translator and commentator who bequeathed these works to the Latin-literate fifteenth century. The pervasive legacy of Marsilio Ficino (1433-1499) can not be understated, and it was no hyperbole when Noel Cobb asserted that no writing, no thought which came after was devoid of the influence, no matter how indirect, of Ficino's philosophy.⁴⁰ Cobbs's extended description in appropriately celestial terms accurately and eloquently traces the arc of this phenomenon:

The brilliant comet of Ficino's genius showered sparks of inspiration all through the fertile skies of late *quattrocento* psyche, leaving countless seed-fantasies to sprout into rare Neo-Platonic blooms in succeeding generations, but disappearing out of common view as the flames of the inquisition rose up to snarl at any sign of pagan enthusiasm.⁴¹

Marsilio Ficino ascended to this position of influence via his initial role as the first translator of the newly recovered texts of Plato and his late-antique followers. Although Cosimo de' Medici was taken with the Platonic philosophy advocated by Plethon and others, he caused the translation of these works to be interrupted and precedence given to the Hermetic works; Ficino's efforts were immediately diverted, and a sense of urgency can be felt in Cosimo's desire to know what esoteric wisdom they possessed. The trove of knowledge which fell to Ficino to translate revealed key texts;

⁴⁰ Noel Cobb, *Preface* in Moore, *The Planets Within: The Astrological Psychology of Marsilio Ficino*, ii.

⁴¹ *Ibid.*

among these works was the *Corpus Hermeticum*, the assortment of Greek philosophical works which were believed in the Renaissance to date to Egyptian antiquity. For the history of Hermeticism and Neoplatonic philosopher, a long-corroded gate was opened between the early modern era and the texts of antiquity. Yet this statement bears a caveat: that formerly-closed gate can be imagined however as a wrought-iron one with plenty of gaps and spaces from which medieval minds could peer at incomplete pictures of antiquity's knowledge. In the preceding chapter, we have seen how seeds of Greco-Egyptian and Neoplatonic “god-making” traditions continued within medieval magical, ritual, mechanical, and proto-scientific traditions. These seeds however made their way to Latin Europe widely dispersed in the Arabic and Greek matrices of isolated manuscripts which had found their way piece-meal and spread out among the monastic libraries and royal courts.

Ficino's translations inspired his own original philosophical treatises which integrated the Neoplatonic philosophy he encountered within the medieval medical edifice based on astral influences. This tradition of medicine appears to have had its immediate antecedents in the “angelic” ritual magic which proliferated in magical manuscripts of the middle ages. This “Christianized” form of astral magic, which relied on intelligences believed to inhabit the celestial spheres, anticipated and countered objections which Ficino's magical system eventually ran up against as well: angelic magic, like Ficino's, held itself to be most holy, to do the practitioner only good, to have no demonic components, and to make contact only with benign beings which served the will of God.⁴² At the same time, Ficino's writings belong to the long association between astrology and medicine present in the Medieval period. Passages from his original philosophy have been described as “almost a bowdlerized version of the controversial *Picatrix*.”⁴³ Ficino was by no means the only Renaissance or early-modern physician whose philosophy relied on astrological magic as a central pillar to its method. Rather, for the time period, texts of image magic are found side-by-side with (and sometimes in the total absence of) more conventional *materia medica*. In 1489, Ficino could write confidently to the King of Hungary that his healthcare be entrusted to astrological doctors using “science and common sense.”⁴⁴

⁴² See Claire Fanger, *Medieval Ritual Magic: What It Is and Why We Need to Know More About It in Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park, P.A.: Pennsylvania State University Press, 1998), vii-xviii; viii. See also by the same author, *Invoking Angels: Theurgic Ideas and Practices, Thirteenth to Sixteenth Centuries* (University Park, P.A.: Pennsylvania State University Press, 2012).

⁴³ Quinlan-McGrath, *Influences*, 155-57.

⁴⁴ Marsilio Ficino, *Three Books on Life* [1489], ed. and trans. Carol V. Kaske and John R. Clark (Binghamton NY:

At the same time, Ficino's philosophical legacy was the inauguration of a new strand of Latin philosophy synthesizing Classical Neoplatonism with the Christian Aristotelianism produced by Thomas Aquinas and other medieval writers.⁴⁵ The pedigree of the astral magic described in his books was far more extensive than his predecessors in the West; he was one of the first since late antiquity to know Plotinus's works first-hand, and he was also familiar with the later Neoplatonists such as Porphyry and Iamblichus.⁴⁶ The legacy which Ficino transmitted from these sources is immense and has been related in a profusion of ways to the intellectual and cultural development of the Renaissance through the early-modern era. The discussion here will limit itself relatively narrowly to Ficino's themes and ideas which are of immediate utility to understanding the rationalization and rise of theurgic techniques to animate statues.

The historian of Renaissance theurgy Wouter Hanegraaff summarized Ficino's involvement with Neoplatonic ritual succinctly: the “problem of Hermetic idolatry” is evident in the very title of his foundational book on magic, *De Vita Coelitus Comparanda* (“On Obtaining Life from the Heavens,” also translated as “On Making Your Life Agree with the Heavens,”⁴⁷ Book III from the *De Vita Libri Tres* (1489)). Ficinian magic was principally concerned with the alignment of one's life with heavenly bodies and their attendant celestial “gifts,” and the procedures for attracting these ineffable qualities were brought into immediate connection by Plotinus,⁴⁸ upon whose works Ficino's *DVCC* presents itself as a commentary (witness the subtitle: “In What, According to Plotinus, the Power of Attracting Favor from the Heavens Consists, Namely, That Well-adapted Physical Forms Can Easily Allure the World-soul and the Souls of the Stars and the Daemons”). The “Well-adapted Physical Forms” were the *imagines* or talismans, distinguished from amulets (objects that transmit celestial influences) by their artificial marks (pictures, signs, words).⁴⁹ Although the former was tolerated to some extent by ecclesiastical authorities, the latter was construed as communication from one intelligence (the human maker) to a demonic recipient; in Ficinian magical philosophy, these talismans have been recognized as “the portable counterparts” to

Medieval and Renaissance Texts and Studies, 1989), 236-37 (proem to Book 3).

⁴⁵ Daston and Park, *Wonder and the Order of Nature*, 161.

⁴⁶ Kieckhefer, *Magic in the Middle Ages*, 147.

⁴⁷ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 10.

⁴⁸ “And I think that the wise men of old, who made temples and statues in the wish that the gods should be present to them, looking to the nature of the All, had in mind that the nature of soul is everywhere easy to attract, but that if someone were to construct something sympathetic to it and able to receive a part of it, it would of all things receive soul most easily.” Ennead 4.3.11; translated in Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 10.

⁴⁹ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 10.

Hermetic idols.⁵⁰

Ficino's synthesis of Hermetic and Neoplatonic works was original in the sense of its unparalleled access to previously-unavailable complete works from late antiquity; however, Ficino also built upon the preternatural and proto-scientific theories of the Medieval Scholastics who inherited and developed Al-Kindi's Ray Theory, based as it was upon a Neoplatonic metaphysics of emanations in a Ptolemaic cosmos. Nevertheless, Ficino's philosophy sounded the horn of magic's legitimization and ascendancy in the Renaissance.

Ficino's works advocated for the efficacy of invested images and furnished later makers of images and talismans with the authority of a philosophical tradition and the legitimacy of what was for the time "cutting-edge" natural philosophy over the older reliance on demonic agency to explain how "magical" images functioned. The planetary associations of objects and ingredients used in a medicinal or therapeutic capacity assumed primary of place; the Ficinian method "required its practitioners to master the properties of a world of wonderful plants, animals, and minerals as they appeared in encyclopedias, treatises, of *materia medica*, and hermetic texts."⁵¹ For example, solar influences (the sun was included within the planetary scheme of Renaissance cosmology) could be found in gold, carbuncles, balsam, cantharides, and crocodiles. Also, carved or inscribed gems were especially efficacious for their capacity to attract and retain celestial influences. All such objects Ficino described as possessed of "occult and wonderful powers."⁵²

What's more, Ficino's works effectively expanded the definition of what could qualify as an artificial, astrological image.⁵³ No more was this efficacy confined to the traditional figures of wax or inscribed sheets of metal or parchment as in magical traditions throughout antiquity and the middle ages. Virtually any kind of art medium, properly conceived and in some way invested, could be (and was) adapted to Ficino's astral-image philosophy in the Renaissance. Ficino followed in the footsteps of his predecessors in his outlook that any desired effect could not be calculated with the incoming celestial qualities in mind alone. The sun's rays, after all, effected different changes in the different substances it touched: ice became wet, whereas mud became dry under the sun. More

⁵⁰ Idem, 11.

⁵¹ Daston and Park, *Wonder and the Order of Nature*, 145.

⁵² Ibid.

⁵³ The types Quinlan-McGrath identifies are (1) forms conspicuous to the eye, (2) imaginable forms, e.g. hybrid and mythological creatures, that copy the celestial entity's radiating Idea, (3) written characters of the signs and planets, or sigla, commonly found on gemstone and strongly associated by the orthodoxy with demonic communication, and (4) figures created by the movement of the heavenly bodies, e.g. the astronomical clock, armillary sphere, and celestial vault. See *Influences*, 155-57.

different natural materials' receptivity to these rays were considered individually, in the tradition of Albert the Great's mineralogical treatise and Roger Bacon's theories about astral radiation. For Bacon as for Ficino, denser materials like stone or lime were deemed capable of retaining celestial images and influence on an astronomical time-scale, in which one astronomical year could consist of 10,000 human years.⁵⁴ In the same way, the individual natures of human beings and localities were taken into consideration as factors in any astrological calculation from Ptolemy, through the Medieval Scholastics and Ficino.⁵⁵

Like Al-Kindi and the medieval Scholastic philosophers, Ficino's philosophy relied upon an eclectic blend of Aristotelian and Platonist elements. Also as Al-Kindi had found before him in ninth-century Baghdad a wealth of Greek texts of science and philosophy at the House of Wisdom, Ficino under the rich patronage of Cosimo de' Medici had access to, produced translations of, and penned original philosophy heavily influenced by more complete, earlier versions of Neoplatonic and Hermetic philosophy preserved in the Byzantine tradition. Many of his works were dedicated to answering questions raised by the medieval Scholastics (and no less of concern to philosophers in the fourteenth and fifteenth centuries than in the thirteenth) about the radiation of stars, and how this radiation could be harnessed for the health and benefit of humanity. In this pursuit, he followed closely on the heels of Albert the Great, Grosseteste, and other philosophers who had proposed natural models for the efficacy of astral image-making, a branch of the religious/magical tradition stretching back to antiquity. As with his predecessors, Ficino held up artificial figures, still associated with the magical tradition in the medieval and early modern periods perhaps no less closely than in antiquity, as the best instruments by which mankind could hope to catch and manipulate celestial qualities.

The important distinctions suggested by Albert the Great and Thomas Aquinas between Aristotelian and Neoplatonic concepts of Form have been observed to be reduced to semantic differences by Ficino. For example, the interconnectedness of the heavens and the cosmos was an integral part to the development of radiation theory in the Middle Ages through the early modern period, although it violated Aristotle's vision of separate and untouchable realms of heaven and

⁵⁴ E.g. stones were perceived to be of a higher caliber than metals, while both were perceived to retain celestial influences for longer periods of time than plants or wood. See Ficino, *Three Books on Life*, 356-57 (3.21).

⁵⁵ Ptolemy, *Tetrabiblos*, 1.1; Al-Kindi, *De radiis stellarum*, eds. E. Albrile and S. Fumagalli, trans. E. Turri (Mimesis: Milano, 1995), 221; Robert Grosseteste, *Concerning Lines, Angles, and Figures in A Source Book in Medieval Sciences*, ed. Edward Grant (Cambridge: Harvard University Press, 1974), 386-88; Bacon, *Opus majus*, 1,267; Marsilio Ficino, *Scritti sull'astrologia*, ed. Ornella Pompeo Faracovi (Milano: Biblioteca Universale Rizzoli, 1999), 96. See also Quinlan-McGrath, *Influences*, 47.

Earth. For Ficino, although the words aether and quintessence were deployed in his discourses, they did not bring much resemblance to original Aristotelian cosmology with them. This material essence was what carried along qualities as they traveled along their line segments in the contemporary understanding of ray theory.

In Ficino's model, this radiating Spiritus was closer to the material Stoic *pneuma* and functioned as both convector of heavenly qualities and unifying fabric of the cosmos or World Soul.⁵⁶ With this model, Ficino proposed a solution to what had been a philosophical dilemma of his predecessors: the heavens had the power only to impress upon or activate existing forms, and how Form was moved from its original divine or metaphysical state remained a mystery. The Third Book of *De Vita* tackled this state of affairs head-on in its opening, invoking Plotinus and the Neoplatonists in order to provide a model for how metaphysical Ideas were transitioning continuously through Form in physical matter.⁵⁷

The manipulation of this effable World Soul through its planetary and astral channels is referred to collectively by scholars as the astral magic pioneered by Ficino. More specifically, ties between natural materials and heavenly bodies (or spheres as they were conceived of in the Ptolemaic model) forged lasting cosmic imprints from the moment of the material's creation. This lasting, intrinsic link justified a complex system of astral correspondences. Armed with knowledge of these occult sympathies, the operator could be effect infinite operations, including the binding of a spirit to a man-made statue.

The conceptual models of magical animation of statues with which the Renaissance became familiar, the Hermetic and Neoplatonic (astral) as well as the Aristotelian-Democritan (sympathetic) which we find articulated by De' Vieri, belonged to the "secret web of hidden links" which connected all that happened on Earth to the higher strata of celestial spheres and intelligences.⁵⁸ The philosophy of sympathies or affinities finds its earliest clear expression in the presocratic Empedocles, though it is undoubtedly more ancient. Aristotle further commented on the nature of affinities, and by De' Vieri's time, it was as basic to the doctrine of macrocosm and microcosm as it

⁵⁶ Quinlan-McGrath, *Influences*, 55-56, 68-69; Ficino, *Three Books on Life*, 242-45 (3.1), 254-57 (3.3), 322-32 (3.16).

⁵⁷ See Quinlan-McGrath, *Influences*, 129-30.

⁵⁸ *Idem*, 161. For the latter, although it appears not to have harnessed any celestial energy, in the Aristotelian-Democritan concept of theurgy, the shared motive quality between the atoms of mercury and the human soul was sympathetic enough to rationalize the subsequent animation of the wooden body by the mercury atoms, as the human soul's effect upon its vessel.

had been in Hellenistic times.⁵⁹ In 1546, Girolamo Fracastoro published a book on sympathies and antipathies dominated by Peripatetic philosophy,⁶⁰ and well into the modern era, we may detect vestiges of Aristotelian and Democritan iterations of sympathies between atoms in the work of the French atomist J. C. Magnen.⁶¹

Further inroads were made into the territory of natural philosophy with Ficino's treatment of another ineffable substance: light. The nature of light came to be reevaluated against a newly pluralistic conception of natural rays. The laws of radiation in Ficino's philosophy were uniform for both visible rays (like those of the sun and planets) as well as the invisible, or occult, forces held to be equally effective. For the latter, Ficino employed mirrors to prove their existence, in spite of the human eye's capacity to perceive them or not.⁶² Ficino effectively removed light as a requisite for the astral image to function; the operation of celestial rays continued regardless of their visibility to human beings.⁶³ On the nature of light, Ficino finds himself largely in agreement with Grosseteste, who viewed light as the "essential corporeal Form" of all entities in the universe: heavenly, terrestrial, or elemental. Light constituted the active Form and transportational vehicle of images which sprang in the divine intellect of the highest sphere and which radiated through everything in the cosmos.

In many instances, Ficino rehearses with little modification the ray theory of Al-Kindi and Roger Bacon in relation to astral images.⁶⁴ Visual rays, in the tradition of Al-Kindian optics and other advocates of extromission, were still maintained to leave the body, to shine through bodies, meet these celestial rays, and bring back "marvelous gifts" from the heavens to the personal spirit along conduits of Spiritus.⁶⁵ However, an original development from Bacon's concept of radiation has also been observed in the works of Ficino: whereas Bacon's construct imagined celestial qualities passing through all matter ("borrowing" temporarily different media which constituted their materiality), Ficino gave to rays their own proper material constitution, the Spiritus, which was

⁵⁹ Aristotle wrote about the aptitude of 'things' for interaction and concluded that an agent and a patient could not be either absolutely 'like' or absolutely 'unlike,' but must be in one sense identical and in another unlike one another. See Multhauf, *Origins of Chemistry*, 299-300.

⁶⁰ See Girolamo Fracastoro, *De sympathia et antipathia* (Venice: Junta, 1546).

⁶¹ Multhauf, *Origins of Chemistry*, 300.

⁶² Quinlan-McGrath, *Influences*, 61.

⁶³ Idem, 75; see also Marsilio Ficino, *Icastes: Marsilio Ficino's Interpretation of Plato's Sophist*, ed. Michael J. B. Allen (Berkeley: University of California Press, 1989), 274-75.

⁶⁴ Quinlan-McGrath, *Influences*, 136-42.

⁶⁵ Ficino, *Three Books on Life*, 322-23 (3.16).

inherent to and constantly moving within the terrestrial as well as heavenly spheres.⁶⁶ Celestial rays were *directly* transmitting their qualities.⁶⁷ Ficino even theorized that the volcanic fire of the Earth's interior owed its energy to all-present, all-penetrating celestial rays.⁶⁸ Not only were rays of celestial light (visible or not) theorized to penetrate all matter, from the writings of Grosseteste, Bacon, Pecham, and others, the standard belief in Scholastic circles was that these rays could enter into sense as well and were a source of influence and transformation to humans and all living things (this concept was also extended to man-made, built objects which were otherwise inert).

The combination of light, vision, and the action of these rays formed the foundation of how the efficacy of visual artworks as astral images was understood to function.⁶⁹ For the medieval Scholastic philosophers, Ficino, and their successors, human beings were capable of manipulating the diverse and differentiated qualities which showered down from the heavens (whose presumed characters derived from antique astrological texts, such as those of Ptolemy and Manilius) with materials available on Earth by copying the divine, mathematical Form of the celestial original. Ernst Gombrich has described the Neoplatonic significance of an image that through its symbolism communicates a revelation or proposition in a flash; these sacred characters from the esoteric tradition embodied, for the initiated, the “true nature and essence of concepts contain[ing] wisdom, as it were, in a highly concentrated form.”⁷⁰ More specifically, the astral images of Ficino are argued not to be mere representations of demons or the planetary symbols; instead they represent the essence of the star's power itself.⁷¹ If the proper form, following tenets set out by ancient lore through the Neoplatonist, could be given (constructed or assembled) for its proper celestial body, that form, image, character, statue, and so on would by its composition partake in the essential nature of the celestial or planetary spirit or deity.

⁶⁶ Quinlan-McGrath, *Influences*, 56-57.

⁶⁷ Ficino, *Three Books on Life*, 266-67, 274-75 (3.6); 288-89 (3.11); 298-301 (3.12).

⁶⁸ Idem, 320-321 (3.16).

⁶⁹ Quinlan-McGrath, *Influences*, 14. Here I also insert a semantic distinction employed by Quinlan-McGrath about Ficino's use of the term “astronomical image” over “astronomical figure”: the former was composed of base material and was the receptacle of astral/planetary radiation. The image was often marked with the astronomical figure in a way to essentially target the desired celestial qualities to be received. This figure, on the other hand, was the controversial, human-made contribution to the image (either marked upon it or inscribed into its surface) which was believed to possess a correspondence to the actual celestial figure, an image which was believed to be transmitted along with the celestial ray itself. See idem, 121.

⁷⁰ Gombrich, “*Icones Symbolicae*,” 171-72.

⁷¹ Idem, 176. However, Gombrich includes this caveat about the limited capacity which “representation” or “symbol” applied to these kinds of images: “...the Neo-platonic conception favoured not only a removal of the distinction between the representational and the symbolizing functions of the image, but also the confusion of these two levels with what we have called the expressive function. All the three together are seen not simply as various forms of signification but rather as potential magic.” Idem, 178.

A true *imago* was the goal of artificial image-makers, and it was one which was designed to share in the desired celestial's Form, Qualities, and light, the last being the medium of transfer for the original's *virtus* or power. Mary Quinlan-McGrath described this theoretical process as a “light match” which, when the image was properly executed, would activate the celestial ray beaming directly from the divine Idea with the artificial figure, permitting what Ficino and the great Scholastic philosophers maintained was a wholly natural process unfold: “the heavens perfect it by that power with which they had also begun it.”⁷² As a consequence of this fusion, the material image would become invested with not only the transient quality from the passing ray, but a “synergistically greater” concentration of this force.⁷³ In other words, the astral image became a source of emission in its own right of the celestial energy it was believed to have lured into its material being, and Ficino maintained that this secondary radiation was of greater benefit to human beings, performing a cleansing function upon the individual spirit (an idea which is present in Plato's *Timaeus* and *Sophist* commentaries).⁷⁴ To do this, celestial image-rays transmitted from their artificial replicas were understood to physically enter the imagination of nearby persons, either through the eyes or other senses, and affect the mind.

We close this survey of the aspects of Ficino's philosophy which rendered possible both theoretical as well as practical theurgy with the observation that the effect just described above, of images upon the imagination, was no one-way street. Another revolutionary component of Ficino's vision was the capacity of the human mind and imagination to effect marvels on its own. As with the actions of celestial influences, the material action of the soul was effected by intermediaries in the form of vapors, “spirits,” or for Avicenna, sub-celestial intelligences.⁷⁵ The magical animation of statues belongs among the marvels the human soul or imagination could produce without divine assistance by appealing to this unseen network of relations and correspondences which were central to the Ficinian universe. Correspondingly, “god-making” theurgic techniques must be placed in the context of the Ficinian “thrust...to use late Platonic ideas to revivify elements in the thirteenth-century magical tradition that had fallen under philosophical and theological disapproval.”⁷⁶ From Ficino's writings, the animating *spiritus* could be seen as a wholly positive force, and the use and

⁷² Ficino, *Three Books on Life*, 326-27 (3.16); see also Quinlan-McGrath, *Influences*, 158.

⁷³ Quinlan-McGrath, *Influences*, 157.

⁷⁴ See Ficino, *Three Books on Life*, 3.19. See also the following chapter titled “What Great Power Images Are Thought to Have Over Spiritus, and Spiritus Over Images. And concerning the Emotional State of the User and Operator.”

⁷⁵ Kieckhefer, *Magic in the Middle Ages*, 161-62; see Ficino, *Theologica Platonica de immortalitate animorum*, 13.4, in *Opera omnia*, I, 328.

⁷⁶ Kieckhefer, *Magic in the Middle Ages*, 162.

manipulation of it likewise as a natural process:

...paraphrasing Hermes Trismegistus, [Plotinus] says that the ancient priests or Magi used to capture in statues and material sacrifices something divine and wonderful. He holds, moreover, with Hermes Trismegistus that through these materials they did not, properly speaking, capture divinities wholly separate from matter but deities who are merely cosmic....- cosmic, I say, that is a life or something vital from the Anima Mundi and the souls of the spheres and of the stars or even a motion and, as it were, a vital presence from the daemons. Indeed, the same Hermes, whom Plotinus follows, hold that daemons of this kind- airy ones, not celestial, let alone any higher- are themselves present all along in the materials and that Hermes himself put together statues from herbs, trees, stones, and spices, which had within themselves, as he says, a natural force of divinity. He added songs resembling the heavenly bodies; he says the divinities take delight in such songs and so stay a longer time in the statues and help people or harm them.⁷⁷

Yet, Ficino constantly hedged his advocacy of the pagan philosophy with the deference demanded by the Church in his day. Only by repeated disclaimers that he was merely reporting the opinions of others could Ficino proverbially “get away with” publishing virtually explicit endorsements of what the Church considered unequivocally to be demonic magic and idolatry. In the the final chapter of the *DVCC*, Ficino concludes by siding with Thomas Aquinas. Regarding the marvels which the human soul could work he asserted, “that we have taken from the opinions of the Platonists...only so far as Christian theologians approve.”⁷⁸ In order to advance this positive, naturalistic vision of how some material essence of heavenly bodies might be manipulated by human beings, it was necessary to mitigate the uncompromising position sanctioned (and sanctified) by the Church of Thomas Aquinas and farther back to Augustine. In order to show the natural essence of astral images without a direct confrontation, Ficino argued that the metaphysical Idea descended naturally as Form into Matter. In doing so, he attempted to demonstrate how an artificial figure participated in the descent of this Ideal Form at a higher level than merely elemental Form, and at the same time Ficino maintained that in spite of this elevated position of the astral figure in the hierarchy of being, it still was composed of natural Form joined to natural Matter.⁷⁹ For the

⁷⁷ Ficino, *De Vita Coelitus Comparanda*, 26, 77-89; translated in Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 14-15.

⁷⁸ Quinlan-McGrath, 163; Ficino, *Theologica Platonica*, 13.5 in *Opera Omnia*, I, 335.

⁷⁹ Quinlan-McGrath, *Influences*, 136.

former, Ficino answered the Dominican-Aristotelian objection to the Platonic Idea with an explanation of the relation between Idea and Form in the beginning of the *DVCC*.⁸⁰ The solution to the second and third approaches resided in the mathematical essence of the figure and the presumption that this correctly-discerned mathematical figure (indebted to Albert the Great's thoughts on the numerical nature of figures and celestial rays) constituted its essential Form. Chapters fifteen through seventeen of the *DVCC* have been recognized as the reversal of Aquinas's denigration of the artificial figure as an impotent mathematical construct.⁸¹ The mathematical forms precede physical ones and therefore, in Ficino's strongly Platonist reasoning, a higher, more dignified nature is indicated to accompany the elevated place of the mathematical Form in the cosmos. Since Form was understood to bestow the power of action, this became Ficino's method for understanding the real power of an astral image.⁸²

Although Ficino acknowledges in writing the conclusion of Aquinas,⁸³ Quinlan-McGrath has recently detailed some of the instances in which Marsilio Ficino's works gently-but-firmly refutes aspects of Thomas Aquinas's stance on astral images, while throwing up enough literary ambiguities to err on the safe side of the Inquisition. For example, the *DVCC* uses Plotinus's philosophy as a "shield" in order to effectively challenge Aquinas's position; chapter nineteen invokes Ptolemy, Thabit, and Albert the Great on the efficacy of large-scale astronomical images. When he did not opt to indirectly refute Aquinas's views through an ancient proxy, Ficino also simply omitted Aquinas's position that any characters or letters constituted demon worship when underling Aquinas's acknowledgement of the power of such images.⁸⁴

This was not the only aspect of Ficino's philosophy which posed problems to orthodox thought; when he asserts that the twelve signs of the zodiac's tutelary deities influenced the soul as their planetary bodies determined earthly bodies under their sign, as he does in his *Commentary* on Plato's *Symposium*,⁸⁵ this ran counter to the Church's position that astral influence could not touch the soul.⁸⁶ Carol Kaske interprets in Ficino's writings a belief that the heavens are alive and a conviction that the planetary gods of the Zodiac, following the scheme laid out by Manilius's first-

⁸⁰ Idem, 127.

⁸¹ Idem, 159.

⁸² Idem, 148.

⁸³ Ficino, *De Vita*, 3.18.

⁸⁴ Quinlan-McGrath, *Influences*, 124-26.

⁸⁵ Carol Kaske, "Marsilio Ficino and the Twelve Gods of the Zodiac," *Journal of the Warburg and Courtauld Institutes* 45 (1982): 195.

⁸⁶ Idem, 201.

century astrological treatise *Astronomica*,⁸⁷ were real (in common with Plato and the Neoplatonists before him). This reverence for the Olympian gods went well beyond his contemporaries' penchant to insert them into personifications of virtually limitless possible themes but stopped short of idolatry.⁸⁸

Ficino himself was the first to abjure the scent of idolatry and to take pains to underline that the “gods” were only philosophical conventions for angels, divine or superhuman celestial souls subordinate, like the whole of creation, to the one Supreme God. Nevertheless, if Ficino regarded the planetary intelligences associated with the Olympian gods of the Zodiac as potential operative agents rather than mere symbols,⁸⁹ they were not specified even in the practically-oriented *De Vita*,⁹⁰ nor have historians been able to identify any empirical component associated with his astrological medicine.⁹¹ We may speculate that spiritually as well as socially, it would have been dangerous for Ficino to practice the invocation of celestial or planetary intelligences that he preached, but he advanced a major accomplishment for magical philosophy, its legitimization and respectability among learned audiences, which in turn laid the theoretical foundation upon which subsequent Renaissance astrological works were built.

Ficino also lived at a time in Florence when the Dominicans were on the ascendant as Savonarola's influence grew, so the appeal in his text for protection against those who would “savage” him brings to mind associations with the “dogs of God” (*domini canes*), as they were known and with which they were identified in specialized iconography.⁹² Therefore Ficino's “delicate and deliberately obscure handling” of certain instances where his position exceeded the boundaries of orthodoxy (his more materialist vision of the soul, for example) has been perceived as a deliberate strategy for his historical climate.⁹³ The exact process by which astral rays affected the soul was kept necessarily vague and inexact since addressing the question of whether it or the mind was of a material nature in whole or in part affected a pillar of the Christian religion: if when the

⁸⁷ See *idem*, 196-201.

⁸⁸ *Idem*, 200-201.

⁸⁹ Frequently alluded to, as in the *Timaeus* commentary, as “the souls of the stars”; see *idem*, 201.

⁹⁰ *Ibid.*

⁹¹ Daston and Park, *Wonder and the Order of Nature*, 145.

⁹² The classic example is the fourteenth-century fresco by Andrea di Bonaiuto in the convent chapter room (“Spanish Chapel”) of Santa Maria Novella in Florence. Other examples of the black-and-white dog motif can be seen in an illuminated Antiphonary (Florence, S. Maria Novella, MS. 1354, fol. 151), a Passional (Rome, Vatican, Bib. Apostolica, MS. 8541), a panel by Pere Nicolau (Valencia, Mus. B.A.), and another panel by Pedro Berruguete (Madrid, Prado). Hourihane, Colum, ed. *The Grove Encyclopedia of Medieval Art & Architecture*, 2 vols. (Oxford: Oxford University Press, 2012), II, 308; for Ficino's passage see, *Three Books on Life*, 3.18.

⁹³ Quinlan-McGrath, *Influences*, 124.

mind died so too did the rational soul, the hope for any immortal soul or afterlife was nil. Ficino's philosophy offered a revolutionary alternative construct to connect the immaterial mind, via *Spiritus*, to the physical cosmos, both the natural, terrestrial world, as well as the heavens above.

And yet, in spite of Ficino's scrupulous prudence in his discussion of the workings of his astral magic, the fundamental impossibility of distinguishing between personal spirits of planetary spheres and demons by their identical function tacitly opened a door to such gray areas of magic in the coming age.⁹⁴ In this way, even though no one talisman furnished the exact collection of material objects whose planetary correspondences would cause a statue precisely to “come to life,” Ficino nevertheless did provide detailed instructions to manufacture astral images which were invested with cosmic *spiritus* and a kind of “life” or “sense” of their own. What's more, Ficino bestowed an elucidation of a magical system which permitted and resurrected ritual theurgy, whose theory became an invitation to practice by later Renaissance minds.

Daston and Park identify Ficino as the first Renaissance philosopher to place a set of occult causal mechanisms in the foreground and to elaborate upon them as a group. Most of these boasted an Aristotelian pedigree, such as the one De' Vieri' cites in the magical animation of Daedalus's wooden Venus in antiquity, and thus derived a virtually indisputable legitimacy in an intellectual climate derived from late-medieval Scholasticism. When referred to collectively, this exploration of these hidden causal mechanisms assumes the mantle of preternatural philosophy. Although Ficino did retain and utilize basic features of traditional cosmology, a network of occult correspondences now underlay the visible fabric of the universe. Marvelous sympathies imperceptible to the senses—such as the relationship between the soul's atoms and the movement of mercury atoms in the Aristotelian view or the sympathetic relationship between astral and planetary intelligences and the material objects formed under their imprint (animal, vegetable, and mineral) were signposts to illuminate the natural world's hidden order. The existential inquiries into how the world works, which continue to propel modern scientific understanding forward, were answered by Ficino and the later “preternatural philosophers” of the Renaissance through the esoteric and occult operations which they had gleaned from the rediscovered Greek texts and which lay at the heart of ancient mystery cults. The idea of a cosmic spirit or world soul of the Neoplatonists (and as far back as the Stoics), that the cosmos is infused with a sensible spirit relatable to the human soul, is the “energy reserve” upon which Ficino and the Renaissance magus drew their theoretical power. The stars and

⁹⁴ Eamon, *Science and the Secrets of Nature*, 196.

the planets beam the world soul's energy in their different channels down to Earth, and the key to harnessing this energy is the knowledge of how to properly manipulate those channels. The ends and means that this were accomplished varied, and they ranged from the material (stones and metals for example) to the spiritual (words, songs, and ritual).⁹⁵ The mystical ritual animation of statues exemplifies this kind of inherited endeavor; it was not enough to merely know *how* Daedalus, for example, or the ancient cults brought idols to life with magical combinations of materials, but *why* this technique would have worked and to understand the presumed natural system it manipulated.

5.3. After Ficino: Theurgy, Astral and Image Magic in the Early-Modern Period

The reverberations of Ficino's philosophy were not felt only by philosophers, “magi,” and artists, and Proclus's relevancy to Renaissance philosophy in particular did not end with the theurgic elements popularized by Ficino's writings. Bartolomeo Zamberti (1473-1543), a student of Giorgio Valla, printed in 1505 Proclus's commentary on Euclid's *Elements*, which further blurred distinctions between mathematical and physical being, and, unlike Plato, Proclus recognized the utility and dignity of the applied sciences and the art of wonder-working.⁹⁶ The overlapping of the mystical and the mechanical can also be observed elsewhere at the close of the fifteenth century and the beginning of the sixteenth. Two of Ficino's well-known disciples mingled the mechanical with the spiritual to a certain extent in their philosophies. Angelo Poliziano (1454-1494), besides being a poet and a philosopher, was also a scholar of mechanics. Poliziano's 1497 *Panepistemon* constructed an organization of knowledge wherein mechanics possess a tripartite nature as part rational science, part manual art, and part a magnification of strength, which has been related to the Neoplatonic tradition of cosmic, stellar, or planetary image-making.⁹⁷ Giovanni Pico della Mirandola (1463-1494) particularly embraced the spiritual, rather than the material, manipulation of the world spirit, and his orphic hymns are cited as a form of magic; although Pico defended Ficino's astral magic, he distinguished his own brand of mysticism by his mastery of the Hebrew language and the word-magic of the Kabbalah.⁹⁸ Pico della Mirandola's scholarship bequeathed to Europe a

⁹⁵ Ibid.

⁹⁶ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 41-42.

⁹⁷ Angelo Poliziano, *Angelo Politiano praelectio: cui titulis Panepistemon* in *Omnia Opera Angeli Politiani, et alia lectu digna* (Venice: Aldus Manutius, 1498), Z2v; see also Wolfe, *Humanism, Machinery, and Renaissance Literature*, 38.

⁹⁸ See Kieckhefer, *Magic in the Middle Ages*, 147-149; Zika, “Reuchlin's *De verbo mirifico* and the magic debate of the late fifteenth century,” *Journal of the Warburg and Courtauld Institutes* 39 (1976): 104-38. I am unaware however of any

sophisticated and integrated treatment of diverse branches of philosophy which did include a distinct component of 'magical' statue-animation. In his second proem, the correspondence of the elements between the earthly, celestial, and supra-celestial spheres reflect the integrated system which permits astral effects and by analogy, theurgy:

Truly, whatever is in the lower world is also in the higher ones, but of better stamp; likewise, whatever is in the higher ones is also seen in the lowest, but in a degenerate condition and with a nature one might call adulterated.... [A]mong us there is the fire which is an element; the sun is fire in the sky; in the ultramundane region the fire is the seraphic intellect. But see how they differ. The elemental fire burns, the celestial gives life, and the super-celestial loves.⁹⁹

Heinrich Cornelius Agrippa von Nettesheim (1486-1535) wholeheartedly took up the banner of ancient and Neoplatonic philosophy which Ficino had bequeathed to the Renaissance. His *De Occulta Philosophia Libri Tres* (1533) is considered the great *summa* of Renaissance magic; however, his 1515 discourses on Hermes Trismegistus had previously earned him the degree of doctor in the faculties of medicine and law at the University of Pavia.¹⁰⁰ Daston and Park identify Agrippa out of all his contemporaries as the preternatural philosopher whose invocations of celestial intelligences veered perilously close to explicit demonology.¹⁰¹ He also put forward a three-part division of the world of magic into the elemental (comprising medicine, natural philosophy, or “science”), the celestial (astrology and mathematics), and the intellectual (holy ceremonies of religion).¹⁰² Of interest for this study, when Agrippa wrote about the moving statues of Daedalus, he did not connect his ideas about either theurgy or demonology; although Agrippa advocated for the invocation of “good” demons and openly discussed how to compel even the evil demons to assist in magical operations, they do not figure at all into this case of statue animation. Rather, he asserts that the works of Daedalus are examples of the wonderful operations that can be produced from

explicit contribution which Pico's learning may have made to the subject of magical statue-animation, either through Neoplatonic, astral methods or through the Hebrew tradition, which animated its golems by the inherent magical properties of its written characters and which will receive its own analysis in the following section.

⁹⁹ Pico della Mirandola, 2nd Proem; reproduced in Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 13.

¹⁰⁰ Karl H. Dannenfeldt, “The Renaissance and the Pre-Classical Civilizations,” *Journal of the History of Ideas* 13.4 (1952): 445.

¹⁰¹ Daston and Park, *Wonder and the Order of Nature*, 163.

¹⁰² Higley, *The Legend of the Learned Man's Android*, 142.

mathematics, “without any natural virtue.”¹⁰³ However, the living statues of the *Asclepius* text are explicitly cited as an example of the possibility of drawing down 'celestial, vital, intellectual, and divine' influences.¹⁰⁴ Celestial influences upon man-made vessels however garner further albeit, implicit reference, in Agrippa's work, as does the distinction between an uninitiated artisan and the enlightened magus demonstrating his power over nature:

But know this, that such images work nothing, unless they be vivified in such a way that either a natural, or celestial, or heroic, or animastical, or demonic, or angelic virtue is in them or adheres to them. But who will give a soul to an image and make a stone to live, or metal, or wood, or wax, and 'raise out of stones Children of Abraham.'¹⁰⁵ Certainly no insensitive sculptor will come into the possession of this *arcanum*, nor will he be able to give what he does not have: nobody has [such powers], but he who has gained control over the elements, has overcome nature, has transcended the heavens and the nagsels, and attains to the Archetype itself, as a cooperator of which he can indeed do anything, as will be discussed later.¹⁰⁶

Shortly after, Agrippa underlines that only a “perfect” magus can give a soul to an image and life to statues as manifest proof of the magus's soul's perfect union with the Archetype (enlightenment, ascension, full self-realization by any other name). In this regard for the ritual purity of the operator of astral images, Agrippa is anticipated by the thirteenth-century magical text the *Sworn Book of Honorius*, which affirms the necessary spiritual cleanliness of the magus in order to overmaster spirits and demons.¹⁰⁷

Wouter J. Hanegraaff also observes a fundamental distinction Agrippa makes in theurgical operations: the ascended magus who imparts soul to a statue is not an example of magic as a means for practical ends, but magic as a mystical religion. “The former works with created powers, while

¹⁰³ Cornelius Agrippa of Nettesheim, *De Occulta Philosophia libri tres*, ed. V. Perrone Compagni (Leiden: E. J. Brill, 1992), II.i; see also Daston and Park, *Wonder and the Order of Nature*, 163

¹⁰⁴ Agrippa, *De Occulta Philosophia*, I, 38; see also Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 8.

¹⁰⁵ This is a reference to the book *Sepher Izira* in which Abraham describes how “new humans” can be made. “One must go to a lonely mountain where no cattle grazes, and from the middle of it take *Adama*, i.e., red virginal earth; from this, one must make the form of a man, on the members of which letters must be applied in the correct manner.” Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 24-25.

¹⁰⁶ Agrippa, *De Occulta Philosophia*, I, 50; translated in Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 8-9.

¹⁰⁷ On the *Sworn Book* see Robert Mathiesen, *A Thirteenth-Century Ritual to Attain the Beatific Vision from the Sworn Book of Honorius of Thebes in Conjuring Spirits*, ed. Claire Fanger, 148.

the latter works with the power of the Creator himself.”¹⁰⁸ Following this vein, Hanegraaff perceives in the conclusion of Agrippa's *De Occulta Philosophia*'s discussion of ecstatic experiences that enable the magus to receive divine wisdom a shared metaphysical motivation and goal as Neoplatonic theurgy.¹⁰⁹ In this, Agrippa inherits the Iamblichan mantle which linked ecstatic mystical experience to the animation of statues. In this respect, earlier scholars have recognized Agrippa's great work to be more a “neoplatonic credo” than a manual or handbook for magical practices, in the mold of Ficino's writings. Also like Ficino, there is no evidence to suggest that Agrippa practiced any of the magic about which he theorized at length; Hanegraaff also observed that in this respect, he may have differed from some of the Italian magi.

Before Agrippa, Lodovico Lazzarelli (1447-1500), considered to be one of the many minor Italian humanists of the period, already had dedicated an entire treatise, written sometime around 1494, to the process of mystical rebirth and regeneration in which the Hermetic “god-making” technique figures prominently. The *Crater Hermetis* remained unpublished until 1505, when it was included in an edition of the *Pimander* and *Asclepius* by LeFèvre d'Étaples,¹¹⁰ and Hanegraaff observes that many of his works are still accessible only in manuscript.¹¹¹ It has also been suggested that Lazzarelli was an acolyte of sorts to the mysterious figure of Giovanni “Mercurio” da Correggio (b. ca. 1451), who called himself Pimander and entered Rome on Palm Sunday in 1485 declaring himself to be the hermetic Christ; a crown of thorns, blood-stained linen robes, and first a black horse and then a donkey transporting him to the Vatican were also part of the spectacle this, and the description of this event in an anonymous *Epistola Enoch* has been attributed to Lazzarelli.¹¹²

The reliance on hermetic texts for not only content but also style in Lazzarelli's *Crater Hermetis* is self-evident: Lazzarelli is styled as Hermes or Asclepius, while his pupil is King Ferdinand of Sicily and Aragon (d. 1494).¹¹³ At the apex of the mystical experience outlined in the text, the supreme mystery of manufacturing living gods is revealed openly and explicitly. Much of the *Asclepius* text finds its way into Lazzarelli's treatise, as does Kabbalistic philosophy.¹¹⁴ Yet,

¹⁰⁸ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 9.

¹⁰⁹ Ibid.

¹¹⁰ Walker, *Spiritual and Demonic Magic*, 170; see also Kieckhefer, *Magic in the Middle Ages*, 147-148.

¹¹¹ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 22.

¹¹² Ibid.

¹¹³ Idem, 23.

¹¹⁴ See the summary of scholarship on Lazzarelli's hermeticism in Matteo Soranzo, *Conjecture and Inspiration: Astrology, Prophecy, and Poetry in Quattrocento Naples* (Ph.D. Thesis: University of Wisconsin-Madison, 2008), 173-77.

Hanegraaff observed that there is no trace of astral magic in Lazzarelli but plenty of its derivative mysteries. The *Crater Hermetis* interprets the gifts of Abraham to his concubines in Genesis as the *Scemoth Sceltoma* and his gift to Isaac as the divine secrets that made up the Kabbalah. Hanegraaff theorizes that Lazzarelli's theurgy was intended as a superior, Christian theurgy to that of pagan Egypt because whereas the latter needed to lure divine souls to inhabit vessels because the secret of creating souls eluded them, only the Abramic tradition revealed the method. It is theorized that Lazzarelli became familiar with Jewish mysticism through Pico della Mirandola's Jewish teacher R. Yohanon Alemanno (ca. 1435- ca. 1504), who was living in Northern Italy during the same time period. Alemanno's *Collectanaea* included a commentary on *Sepher Yezira*, a foundational text for the manufacture of a golem in Jewish tradition, written in the early thirteenth-century by Elazar of Worms which solved one of the riddles of Lazzarelli's writings.¹¹⁵ Before this commentary was located, known versions of the *Sephir Yezira* did not match Lazzarelli's peculiar interpretation of the "golem passage" as a kind of spiritual rebirth. The combination of the manufacture of an artificial being, the creation of souls, and an ecstatic mystical brand of Kabbalah was uniquely present only in the *Collectanaea*, which combined Elazar of Worms's commentary as well as extensive quotes by Alemanno of Abraham Abulafia's thirteenth-century *Life of the World to Come*, which furnished the latter two elements.¹¹⁶ We will return to Alemanno's unique brand of mystic Judaism in the section to follow.

The *Crater Hermetis* elaborates upon the *Asclepius* with dramatic deviations, and these differences appear to owe to Lazzarelli's personal philosophy of theurgy. The most apparent deviation is the contention by Lazzarelli that man can manufacture divine souls, versus the *Asclepius* which precludes the possibility of our ancestors to make souls and instead details how they attracted the souls of angels and demons into statues. Daniel P. Walker explores how Lazzarelli "made" his demons through operations consisting mainly of words sung in some special manner and whose sounds became the soul. In the *Crater Hermetis*, when the god-making secret is revealed to King Ferdinand, it is sung in the "hymn of divine generation," of which couplets 11-13 have been

¹¹⁵ See Walker, *Spiritual and Demonic Magic*, 68, note 5; Francois Secret, *Les Kabbalistes Chrétiens de la Renaissance* (1964, repr. Paris, 1985), 74; Allison Coudert, *Some Theories of a Natural Language from the Renaissance to the Seventeenth Century in Magia Naturalis und die Entstehung der modernen Naturwissenschaften*, eds. Albert Heinekamp and Dieter Mettler (Wiesbaden: Franz Steiner Verlag, 1978), 78, note. 91.

¹¹⁶ Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 28; see also Moshe Idel, "Hermeticism and Judaism," *Hermeticism and the Renaissance*, eds. J. Merkel and A. Debus (Cranbury, N.J., 1988), 68.

recognized for their close adherence to the *Asclepius's* chapters 23-24.¹¹⁷ Although no link can be demonstrated between Lazzarelli and Ficino, scholars Walker and Hanegraaff have quoted Ficino's passage about the living, animate properties of music in *De Vita Coelitus Comparanda* as a potential basis for Lazzarelli's theurgy:

Now the very matter of song, indeed is altogether purer and more similar to the heavens than is the matter of medicine. For this too is air, hot or warm, still breathing and somehow living; like an animal, it is composed of certain parts and limbs of its own and not only possesses motion and displays passion but even carries meaning like a mind, so that it can be said to be a kind of airy and rational animal.¹¹⁸

Furthermore, Gombrich's articulation, among others of the Neo-Platonic theory of music, underlines the long-standing magical identity of music, and its parallelism with Ficino's theory of the image, for Renaissance Platonists in the fifteenth century and beyond.¹¹⁹ The implications for a reading of Neoplatonic theurgy in the Pratolino automata increase exponentially when musical instruments become equated with bodies for a kind of living, motive soul. The hydraulic organ in the Mount Parnassus, the self-playing musical instruments in the Grotto of the Deluge, the shepherd automaton in the later scene of the "Samaritana," and ofcourse the Pan automaton which De' Vieri explicitly cites in connection with animated statues of antiquity all possessed this musical dimension, which historians have demonstrated to be intertwined with Renaissance Hermetic and Neoplatonic theurgic philosophy.

Significantly, Lazzarelli also writes that theurgy was being actively practiced by Renaissance magicians.¹²⁰ What's more, Lazzarelli asserts that his knowledge of this *arcanum arcanorum* comes not only from ancient authorities (not only Hermes, but also Enoch and Abraham in the *Sepher Izira* as well as Christ in the New Testament¹²¹) but from direct personal experience.¹²² Here we have a corroboration of the survival of antique theurgic practices which Dodds inferred well into the medieval period in Europe. Dodds cites the papal bulls of the early fourteenth century

¹¹⁷ *Idem*, 24.

¹¹⁸ Ficino, *De Vita Coelitu Comparanda*, 21.81-85; quoted in Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 26-27.

¹¹⁹ See Gombrich, "Icones Symbolicae," 177-78.

¹²⁰ Lazzarelli, *Crater Hermetis*, fos. 57vo-58vo; quoted in Walker, *Spiritual and Demonic Magic*, 170.

¹²¹ Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 25.

¹²² Lazzarelli, *Crater Hermetis*, 28.1; quoted in Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 24.

against the practice¹²³ put forward by Pope John XXII, who was (or believed himself to be) the target of real magical assaults.¹²⁴ Lazzarelli's treatise appeared a little more than a century after these bulls and a century prior to De' Vieri's allusion to magical animation of statues in connection with the automata of the Villa Pratolino, lending weight to the idea that this esoteric practice was a continuous, if underground, filament in Renaissance culture which found expression in material culture as well.

Another thread can be traced in the evolution of how celestial influences were perceived to operate upon the sublunar world in a different branch of Ficinian disciples. Francesco da Diacceto (1466-1522) was Ficino's pupil, apparently beginning after Ficino had published *De Vita*, and is considered to be his most direct successor.¹²⁵ However, it has also been observed that Diacceto did not have the theological facility or subtlety of his master, and as a consequence, his most important work, the ca. 1496-1499 *De Pulchro*, has been called "much less discreet, and hence more informative, than Ficino on the subject of Neoplatonic magic and astrology."¹²⁶ Hanegraaff has analyzed this fragment of Diacceto's manuscript as a ritual involving the proper hierarchy of senses and intellectual capacities as articulated by Ficino: that is, (1) touching (2) tasting (3) smelling (4) hearing (5) seeing (6) imagination (7) reason.¹²⁷ Diacceto's ritual to attract and infuse himself with solar influence required an image of the sun engraved when the sun was ascending in the house of Leo, ie. when its rays were deemed to be at the peak of their strength and influence.¹²⁸ Hanegraaff notes however that there is no implication that this image was a receptacle that become "possessed by" the sun-god. Instead, he writes that the evidence suggests that its proper and timely execution and its physical presence rendered the power of the sun physically present in a way that was actual and real rather, than merely symbolic.¹²⁹

¹²³ Dodds, *Greeks and the Irrational*, 63.

¹²⁴ See Richard Kieckhefer, *The Devil's Contemplatives: The Liber Iuratus, the Liber Visionum and Christian Appropriation of Jewish Occultism*, 253; for key documents, see Joseph Hansen, ed., *Quellen un Untersuchungen zur Geschichte des Hexenwats und der Hexenverfolgung in Mittelalter* (Bonn: Georgi, 1901), 2-15.

¹²⁵ Quinlan-McGrath, *Influences*, 188.

¹²⁶ Walker, *Spiritual and Demonic Magic*, 31.; see also Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 18.

¹²⁷ Ficino, *Three Books on Life*, II, 15; Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 16-17.

¹²⁸ Hanegraaff remarked upon the extraordinary preparation and time this would require of the magician and mused that perhaps the magus would have access to prefabricated materials and that this would imply an organized business of manufacturing astral magical tools in Florence could have existed. With no evidence of this arrangement, Hanegraaff surmised that rituals must have been extraordinarily time-consuming in their preparation and thus infrequently carried out. See "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 20.

¹²⁹ *Ibid.*

Here Hanegraaff makes a key point which distinguishes Renaissance theurgy from its Greco-Egyptian models and which has been sometimes used by scholars to create shaky distinctions between “demonic” versus “spiritual” magic but which Ficino himself often blurred.¹³⁰ The animation and possession of statues in the *Asclepius* by Egyptian deities is not the goal of the Ficinian magus. What appears to be happening is a different kind of manipulation of universal sympathies to transfer a particular brand of celestial radiation present in not only the engraved image but also the clothes worn by the operator, the music played which reached the ears, the flowers whose odor reached the nose, etc. to the soul and person of the magus enacting the ritual. Through setting up the many facets and objects required of Renaissance Neoplatonic theurgy, the operator sought to attune himself to a carefully chosen “star.”¹³¹

The engraved talisman in this ritual was one of a host of objects to stimulate all of the senses listed above in order to receive “solarian gifts.” The image or talisman corresponded to the highest bodily sense for Ficino, sight, superceded only by imagination and reason. Unlike the Iamblichan framework of theurgy, within which engraved talismans and ritual were sufficient by themselves, for Ficinian magical/astrological operations, the imagination oriented “inward” (vs. the “outward” nature of ritual) became a necessary bridge between the sensible world and the intellectual sphere and its non-material, intelligent inhabitants.¹³²

The capacity of the human intellect to work wonders is one which can be found in Al-Kindi's ninth-century treatise on rays,¹³³ but it has become emblematic of Ficino's philosophical impact on Renaissance culture. Further theorizing in this vein was later taken up by Andrea Cattani (originally from Imola, dates of birth and death are unknown) in a ca. 1504 treatise *De intellectu et de causis mirabilium effectuum*. Like Ficino, Cattani was both a physician and philosopher in practice, and later a teacher at the Florentine *studio*.¹³⁴

Pietro Pomponazzi (1462-1525) expanded on the ideas of both Cattani and Ficino in his 1520 *De incantationibus*, re-asserting the human soul's capacity to work wonders on its own, but

¹³⁰ See Gary Tomlinson, *Music in Renaissance Magic: Toward a Historiography of Others* (Chicago and London: University of Chicago Press, 1993), 125-127; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 21.

¹³¹ Or in the Ptolemaic Renaissance cosmological perspective, a planetary sphere wherein the sun was also counted.

¹³² Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 18.

¹³³ “...when man, using his imagination, conceives of some corporeal thing, this thing acquires an actual existence according to the species in the imaginative spirit.” Al-Kindi, *De Radiis*, IV, 231.

¹³⁴ Eamon, *Science and the Secrets of Nature*, 406f; see also Cattani, *Opus de intellectu et de causis mirabilium effectuum* (N.p., n.d., but thought to be Florence, ca. 1502); Eugenio Garin, *Medioevo e Rinascimento* (Bari: Giuseppe Laterza, 1961), 42-45.

breaking with his predecessors by eliminating any demonic agency from both the general operations of “occult causes, subtle spirits, and the powers of the imagination” and anomalous phenomena, such as the appearance of an image of St. Celestine in the skies above Aquila.¹³⁵ This was a sea-change for the time. At the margins of preternatural philosophy constantly lurked the spectre of demonology, the discipline's “alter ego,” since demonic forces were believed by Christians of the time period to be equally capable and willing to work marvels as they were to cause mischief. Pomponazzi's treatise however stands out for its lucidity in an age where preternatural philosophy and demonology mingled most notoriously in Europe's witchcraft trials. Its major effect upon Renaissance theurgy, astrological science, and the production of its associated material culture was that demons were banished from the unseen architecture of sympathies and astral correspondences, and celestial radiation was underlined as a purely natural phenomenon.¹³⁶

In the later writings of Girolamo Cardano (1501-1547), *De subtilitate* and *De rerum varietate*, celestial influences are invoked among his natural explanations for wonders and chance phenomena, which would in a previous age have prompted demonic or supernatural explanation.¹³⁷ By the mid-sixteenth century, preternatural philosophers perceived the astral influences and their imprints upon earthly matter as natural albeit unseen phenomena (ergo, “occult”) and a part of Cardano's class of subtle things “that reason, by which things sensible to the senses and intelligible to the intellect are to be comprehended with difficulty.”¹³⁸ Bernardino Telesio (1509-1588) based his anti-Peripatetic system put forward in *De natura rerum* (1565) on the idea of interaction between the incoming celestial heat upon the terrestrial cold; this work was influential in the further and more radical cosmologies proposed by Francesco Patrizi (1529-1597), Giordano Bruno (1548-1600),¹³⁹ and Tommaso Campanella (1568-1639).¹⁴⁰

¹³⁵ Daston and Park, *Wonder and the Order of Nature*, 162; Pietro Pomponazzi, *De naturalium effectuum causis sive de incantationibus* (Basil, 1556), 94-101, 124-55; Giancarlo Zanier, *Ricerche sulla diffusione e fortuna del “De incantationibus” di Pomponazzi* (Firenze: La Nuova Italia, 1975).

¹³⁶ Daston and Park, *Wonder and the Order of Nature*, 163

¹³⁷ Idem, 164-65.

¹³⁸ Idem, 240; Girolamo Cardano, *The Subtilitate of Girolamo Cardano*, ed. and trans. John M. Forrester (Tempe, Arizona: The Arizona Centre for Medieval & Renaissance Studies, 2013), 1.

¹³⁹ Regrettably, the works of Giordano Bruno's portent for theurgistic studies by Renaissance philosophers is a book unto itself which the present paper has overlooked due to considerations of time and space. I recognize the body of works on Giordano Bruno's philosophy notably by Simonetta Bassi, including in descending chronological order: *L'incanto del pensiero. Studi e ricerche su Giordano Bruno* (Roma: Storia e Letteratura, 2014); *La magia in Giordano Bruno in Storia d'Italia. Annali 25. Esoterismo*, ed. G. M. Cazzaniga (Torino: Einaudi, 2010); *Metamorfosi della magia di Giordano Bruno in La magia nell'europa moderna. Fra antica Sapienza e filosofia natural*, 2 vols., ed. F. Meri (Firenze: Istituto Nazionale di Studi sul Rinascimento, 2007).

¹⁴⁰ Multhauf, *Origins of Chemistry*, 245.

These currents fit within the larger directive of preternatural philosophy of the age to understand “all that slipped through the meshes of traditional epistemology- the subsensible, the variable, the rare.”¹⁴¹ Daston and Park recognized another important contribution of Cardano to the landscape of Renaissance preternatural philosophy: a marked refinement in the social identity of wonder and the “secular version” of the kind of wonder previously reserved for religious experiences.¹⁴² For Cardano, wonder was elevated to the “aristocracy” of natural phenomena, being “difficult, occult, and very beautiful.”¹⁴³

For the following century well into the reign of Francesco I, this refined concept underlay much of the elites' model of knowledge that marked the works of the preternatural philosophers and the courtly milieu alike. Their approach underlined both the exclusive nature of its material and its audience alike, an elite defined socially as well as intellectually. There was demand for ever-more subtle phenomena to satisfy these rarefied intellectual heights, and the possession of esoteric wisdom was a mark of distinction. Natural causes and processes on the margins of human understanding acquired a social and intellectual cachet. Neoplatonic theurgy and the magical animation of statues was one of these extreme pursuits, like the creation of a homonculus, which was present in the intellectual atmosphere of the Renaissance but has so far not yet received a similarly dedicated study, such as William Newman's for the latter. By lauding the automata at Pratolino and comparing them to ancient works achieved by this method, De' Vieri articulation of this concept is itself a winning response to the “gauntlet thrown down to the man who could explain not only particulars, but extraordinary particulars, thus proving himself a wonder in his own right.”¹⁴⁴ By this time, wonder was a hotly-traded currency in the highest echelons of Renaissance society.

Finally, no other Renaissance preternatural philosopher-cum-magus embodied the courtly, aristocratic persona of his field more than Giambattista della Porta (*ca.* 1535-1615). He was acknowledged as Italy's most distinguished natural philosopher and “scrutinizer of natural secrets,” and he dominated scientific discourse during his lifetime and well after.¹⁴⁵ Della Porta conscientiously nurtured his relationship to princes, using his brand of “natural magic” not only to

¹⁴¹ Daston and Park, *Wonder and the Order of Nature*, 240.

¹⁴² E.g. the wonder of Abbot Suger before the Crista: “the wonder of the connoisseur, so familiar with a multiplicity of extraordinary phenomena that he knew which truly deserved his amazement... a finely graduated register of response that only the best-informed and the most philosophically sophisticated could deploy.” *Idem*, 167.

¹⁴³ *Ibid.*; quoted and translated from the title page of the first edition (1550) of the *De subtilitate*.

¹⁴⁴ Daston and Park, *Wonder and the Order of Nature*, 170.

¹⁴⁵ *Idem*, 221, 227.

fashion nature according to human desires, but also as an instrument to fashion himself at courts as well.¹⁴⁶ Magic mingled with natural philosophy could be “sold,” as in the Medieval period, to any prince desiring to apply the secrets of the universe to those of government. The Holy Roman Emperor and the Dukes of Florence sent embassies to the recognized “master magus.” Cosimo II de' Medici (1590-1621) perpetuated his predecessors' interest in alchemical and magical secrets, not only of Francesco I but those of his son Don Antonio, who left behind eighteen written volumes of his own experiments.¹⁴⁷ Cosimo II sent the aged Della Porta a gold necklace in the hopes of extracting some equally valuable gem of wisdom.¹⁴⁸

In the presentation of his “natural magic,” Della Porta took full advantage of aristocratic modes which he also adapted to his work, e.g. the fanning of science as a hunt, or *venatio*, for new secrets of nature,¹⁴⁹ and cultivating a histrionic character within his experiments; Sergius Koderá gives as example the magnetized “army” of iron soldiers whose battle was staged by a hidden lodestone to inspire wonder.¹⁵⁰ Della Porta's strong identification with the aristocratic milieu also seems to have functioned, wittingly or not, as a protective mechanism against the ever-vigilant inquisition, which dragged him before their tribunal at least twice, in 1574 and 1580, under the charge of having written about the marvels and secrets of nature. The Church was alarmed by Della Porta's activity beyond the potential for the magician's consort with any demons; while natural magic itself posed unsavory associations with pagan superstitions in itself, a bigger threat which the Church perceived was its potential success, if it did succeed in rendering the miraculous merely natural. If that were to occur, the Church would loosen its monopoly on access to supernatural experiences, miracles, and the like through religion.¹⁵¹

The Neopolitan nobleman's social standing and means have been recognized as the critical factors which permitted his continued works.¹⁵² Taking into account as well that Naples had its own

¹⁴⁶ Idem, 227.

¹⁴⁷ Idem, 270; see also Riguccio Galluzzi, *Motivi Paracelsiana nella Toscana di Cosimo II e di Don Antonio dei Medici in Scienze, credenze occulte, livelli di cultura*, ed. Giancarlo Garfagnini (Florence: Leo Olschki, 1982), 31-62; Pierfilippo Covoni, *Don Antonio de' Medici al Casino di San Marco* (Firenze: Tipografia Cooperativa, 1892).

¹⁴⁸ It has been noted as well that Cosimo II's court functioned as a “magnet for every sort of experimenter,” including Galileo and followers of Paracelsus. See Eamon, *Science and the Secrets of Nature*, 222, 228, 271.

¹⁴⁹ Idem, 199. The discovery of a new secret of nature was the very criterion upon which entry into Della Porta's Accademia de' Secreti rested. The research program of this informal academy was however prescient of a later age: “to seek out 'secrets' from books and from savants, to put them to the test of experiment, and to 'register only those proved true.’” Idem, 200.

¹⁵⁰ Koderá, “Giambattista della Porta's Histrionic Science,” 5.

¹⁵¹ Eamon, *Science and the Secrets of Nature*, 195, 204-5.

¹⁵² Idem, 202; Koderá, “Giambattista della Porta's Histrionic Science,” 1.

civic tradition of venerating a “sorcerer” (Bishop “Virgilius”),¹⁵³ Della Porta seems to have reaped the benefits of his social and civic circumstances. Still, a certain circumspection was required by the times, and Della Porta was no fool. His reticence to construct large systems, to openly get involved with politics (let alone theology), and his apparent decision to leave the Aristotelian establishment alone have been identified as prudent moves which no doubt prolonged his career and perhaps his life.¹⁵⁴ During the course of his life, Della Porta produced more than a dozen books on various facets of natural magic and was considered the age's expert on such matters.¹⁵⁵ Nevertheless, an unpublished work of his, the *Cryptologia*, took on the Church's conception of popular magic head-on, examining “the most hidden secrets,” in other words particularly stubborn beliefs and “superstitions,” which natural principles or probable explanations had failed so far.¹⁵⁶

Within Della Porta's work, magical principles such as occult sympathies were put into practice unquestioningly however. In the 1591 *Phytognomonica*, physical similarity between the shape of a particular plant's leaves bind these two together in this Renaissance study of the preternatural. For Della Porta, the crescent-moon shape of the *sferracavallo* herb's leaves betrayed the clear and apparent bonds of sympathy and influence which tied them to the lunar realm of influence and its traditional planetary deity (fig. 48).¹⁵⁷ Because they bore the image of the moon in their natural form, the leaves and the plant by extension might be able to operate through the unseen channels of lunar radiation which connected the the earthly sphere to the ascending levels of the heavens, since at this time most scientists were still faithful to the old Ptolemaic cosmology. Renaissance intellectual and humanist culture subscribed enthusiastically to this organization of planetary deities and their relationships to every material in the natural world. Recent authors have remarked that in Della Porta's construction of a hierarchic edifice in which each deity reigns over recognized components of the natural world, and equally an edifice into which all matter can fit, he was also mirroring his own experience within prevailing models of Italian Renaissance politics and patronage.¹⁵⁸

Nevertheless, we see evidence in Della Porta's “lunar” herbal leaves the stamp of the same idea which we encounter in Aristotle's citation of Democritus. In the case of the latter, that the

¹⁵³ See Butler, *The Myth of the Magus*, 103; Bedini, “The Role of Automata in the History of Technology,” 131.

¹⁵⁴ Kodera, “Giambattista della Porta's Histrionic Science,” 3.

¹⁵⁵ Eamon, *Science and the Secrets of Nature*, 196.

¹⁵⁶ *Idem*, 206.

¹⁵⁷ Giambattista Della Porta, *Phytognomonica* (Frankfurt: Ioannem Wechelium & Petrum, 1591), 486.

¹⁵⁸ Daston and Park, *Wonder and the Order of Nature*, 170.

atoms of quicksilver mercury, in their penchant for motion, share a quality and therefore sympathy with the constantly-moving atoms of the human soul. Thus, when Daedalus introduced the mercury into his wooden Venus, the inherent sympathy between the atoms of both moving quantities, mercury and human souls, were able to establish an occult connection or channel of influence endowing the mercury-infused Venus with spirit and life. In a relatable way, we encounter the “lunar signature” of that celestial sphere and its radiation, or more controversially, divine intelligence, in the natural form of the leaves.¹⁵⁹ If the leaves were to be placed inside of a vessel, as one does with the quicksilver, would it follow from the same operative principles that some kind of celestial influence or spirit would be imparted to that vessel from the lunar sphere via its shared form with the leaves, as the shared motion of the mercury was bound, in another such occult sympathetic relationship, to the atoms of soul? Della Porta's books promised a previously inaccessible kind of power for those who would learn their secrets, “keys to an invisible network of sympathies and antipathies that gave its master nearly unlimited power.”¹⁶⁰ The stimulating and encouraging effect which Della Porta's writing had on Renaissance magi of all ambitions, not only the artificially narrow distinction this study makes for theurgy and magical statue animation, molded the culture of his day, taken up with enthusiasm by princely patrons, physicians, professors, and artisans.¹⁶¹

While incorporating occult sympathies and influences into his edifice of natural science, Della Porta further eroded religious or spiritual taboos which may have prevented earlier experimentation with supernatural and astral entities (or their radiating influences). This adherence to causal explanations rooted in the natural world followed in the footsteps of Cardano and Pomponazzi before him. Della Porta particularly adhered to the tenets outlined in the latter's *De incantationibus* (also condemned by the Inquisition) that rites and rituals were essentially superstitious accretions upon what was at the core a natural magic. However, Della Porta further veered off into dark waters which Agrippa, Ficino, and others always held at arm's length. Unlike his predecessors, he never disavowed a necessary commitment to the practice of “magical” operations as his principal means to discover the natural principle he believed was really at work, including works considered to be explicitly demonic. As a consequence, by classifying demonic

¹⁵⁹ I have encountered the “sferra cavallo,” “lunaria,” and “securiduca” all in reference to apparently the same plant; this I believe corresponds to the modern genus *Securidaca*. Source: Victor Hugo, *The Man Who Laughs* (London and New York: George Routledge & Sons, 1889), 27.

¹⁶⁰ Daston and Park, *Wonder and the Order of Nature*, 171.

¹⁶¹ *Ibid.*

magic as natural, the doors to experimental inquiry were flung open upon practices and phenomena the Church would not hesitate to label diabolical. Indeed for the Church and magus alike, the demons' knowledge of the virtues of heavenly bodies, plants, metals, stones, and animals was unrivalled and undiminished from their fall from grace.

In the first chapter of this work, we encountered a Renaissance recipe for boiling a severed head to produce a kind of mantic vision that found inclusion within Della Porta's work on miracles. Della Porta defended this “serious, experimental study of necromancy” as a necessary and convincing way to expose the fraud of demons and the superstitions of popular magic by producing equivalent marvels naturally.¹⁶² By investigating even the darkest corners of nature's secrets, Della Porta actively sought out “the most hidden secrets” and even, he thought, the recovery of a lost ancient science.¹⁶³ At no point was Della Porta's natural philosophy barred from the realm of experiment; for the foremost and most fashionable of the Renaissance magi, any scientific inquiry did indeed begin in the library, but it matured only when put to the test.¹⁶⁴ In his words, “In our Method, I shall observe what our Ancestors have said, then I shall show by my own experience whether they be true or false.”¹⁶⁵

Historians of medieval magical rituals have related a literature generated over the past two centuries of published accounts of magical and occult experiments to similar formulae and rituals from the thirteenth century through the Renaissance; the conclusion has been that these older texts described real experiments undertaken and real experiences, at least to the operator's perception.¹⁶⁶ The question of both theoretical and practical theurgy in the Renaissance we can hypothesize to be a phenomenon in step with the complimentary zeitgeist for experimentation and emerging preternatural philosophies. With Della Porta's underlining of the inherently natural causes of even the most blatantly demonic-seeming magic (though stripped of its ceremonial trappings), his contemporary readers (among whom the Medici are known to have counted), would have been emboldened perhaps more than ever to plunge into experiments which similarly may have been unthinkable for a Christian a generation prior. As Isabella Cortese (d. 1561) wrote in her dedication

¹⁶² Eamon, *Science and the Secrets of Nature*, 209-10.

¹⁶³ *Idem*, 210.

¹⁶⁴ *Idem*, 217.

¹⁶⁵ Giambattista Della Porta, *Natural Magick*, trans. Richard Gaywood (London, 1658), preface.

¹⁶⁶ Mathieson, *A Thirteenth-Century Ritual to Attain the Beatific Vision from the Sworn Book of Honorius of Thebes*, 156. See also Marghanita Laski, *Ecstasy in Secular and Religious Experiences* (Los Angeles: Tarcher, 1989); Andrew Neher, *The Psychology of Transcendence* (New York: Dover, 1990); Jess Byron Hollenback, *Mysticism: Experience, Response, Empowerment* (University Park, P.A.: Pennsylvania State University Press, 1996).

to her book of alchemical secrets,

...man is not content with investigation, but strives to put everything into works, to make himself the ape of nature, indeed to supersede nature, as he tries to do what to nature is impossible. And that this might be true, he is able to dig up secrets that every day are seen being put into execution.¹⁶⁷

The Renaissance's revival of antique methods of bringing life to man-made statues, tainted as it was by the shadow of demonic idolatry, nevertheless belongs to the same class of “magical” operations which were rapidly being reevaluated as their natural causes were revealed. Hydraulic and pneumatic devices certainly can be connected to the way in which Della Porta proposes advances in natural philosophy and knowledge. His experimental method has been recognized as being not designed for the testing of general hypotheses, but rather the inquiry into Nature via the construction of imitative forms,¹⁶⁸ within which we may read the automata and their tubes of air and fluid as an imitation of human anatomy, to a point.

From Ficino's eclectic philosophy, which established a framework in which magical images could be understood naturally but remained deliberately ambiguous on many facets about the shift of this theory into practice, Della Porta's *Natural Magick* further developed experimental methods designed to reveal the occult but intrinsically natural aspects of a philosophy which was experiencing a marked shift from demonic or otherwise non-human agency to the realm of preternatural speculation. Overall, like Ficino, Della Porta's works construct a philosophy informed by a wide spectrum of sources that were not necessarily always in agreement: aspects of Aristotelian thought, Renaissance Neoplatonism, ideas about natural metaphysics taken from his rough contemporary Bernardino Telesio (1509-1588), and “a poetic fancy mainly his own.”¹⁶⁹ In order for Della Porta's philosophy to function coherently (as with Ficino's before him), Aristotelian authority had to be tacitly refused or selectively applied, in the tradition of Al-Kindi, Bacon, Albert the Great, Ficino, and others whose theories broached the Stagirite's impenetrable divide between the heavenly and earthly spheres. Della Porta adopts the Platonist-derived model of emanating forms

¹⁶⁷Isabella Cortese, *I segreti de la Signora Isabella Cortese, ne'quali si contengono cose minerali, medicinali, arteficiose, & Alchimiche, a ogni gran Signora. Con altri bellissimi Secreti aggiunti* (Venice: Giovanni Bariletto, 1565), 2; translated in Eamon, *Science and the Secrets of Nature*, 195.

¹⁶⁸ Eamon, *Science and the Secrets of Nature*, 221.

¹⁶⁹ Quinlan-McGrath, *Influences*, 211.

directly from the divine First source above all.¹⁷⁰ In the same way articulated by Ficino and the medieval Scholastic philosophers, Della Porta maintained that this direct causal nexus between divine powers and created forms accounted for objects' ability to operate in miraculous or wonderful ways while still within the channels of nature. Form proceeded from God, before it descended into celestial intelligences, who occupied their traditional role as mediators between the human and the divine. Whether these intelligences were planetary gods, angels, daemons in the Neoplatonic sense or demons in the orthodox position remained as ever increasingly a question of semantic precision. They nevertheless remained the governors of how form came to be allocated in the elemental world, stamping upon all created matter their intrinsic properties. The impressed sympathies, antipathies, and correspondences upon all matter in the natural world which Della Porta examines in his works are taken directly from classical and medieval sources

What is distinctive of Della Porta's philosophy compared to his predecessors' is the superiority of this emanating form over matter. Form was the repository of all transmitted qualities from the celestials and the divine First Cause. Matter, he conceded, was not deprived of all force in determining the distribution of occult properties, but for Della Porta, elemental matter and its qualities were the matrix upon which was impressed a form which determined its properties of concord/discord, attraction/repulsion, love/hate (the occult sympathies and antipathies underlying ancient and medieval natural philosophy).¹⁷¹ For Della Porta, Aristotle's material cause was rejected in favor of a more powerful formal cause with implications for the magus as a kind of artisan rooted in his ability to select appropriate material, manipulate the power of form, and thus have nature do his bidding.

Della Porta's conceptualization of the inherent power and possibility of the production of material art as image-magic effectively overthrew the traditional Aristotelian conception of the relation between nature and art. For Aristotle, art could well imitate nature, but the absolute separation between their modes of operation was as immutable as the division between celestial aether and the four elements of the earthly sphere. In this respect, Roger Bacon had begun the process of clearing away the obstacle of Aristotelian authority, arguing that this classical view was responsible for a premature despair on the part of humanity and denouncing those that saw in the

¹⁷⁰ "...in the strict hierarchical order of Creation, the transcendent forms are directly affiliated with God; they are projected into the world in various manifestations, first into the Angels (or daemons) subsequently into the soul, and ultimately into qualities via the elements, again of celestial origin, as their instruments shape mater." Della Porta, *Natura Magick*, I; translated in Kodera, "Giambattista della Porta," 8.

¹⁷¹ Eamon, *Science and the Secrets of Nature*, 211-13.

difficult and subtle works of nature only mere marvels (*magnalia*) with no hope of imitating.¹⁷² This reversal from Aristotle's position led Della Porta and other natural philosophers of his day to devote themselves to giving preference to studying the unseen properties impressed by form (articulated as the sympathies/antipathies just encountered above) over the manifest, visible qualities. Preternatural philosophy and “natural magic” of Della Porta's day had become essentially the science of manipulating these occult qualities, almost to the exclusion of the elemental qualities within the matrix, as it was understood, upon which formal qualities were believed to impress themselves from their long descent along rays through the celestial spheres.

Whatever doctrinal objections there were to Ficino and his successors' works from philosophers and clergy, they did not hamper the widespread diffusion and influence of his works through the next century and beyond. An explosion in printed handbooks made simplified astronomical calculations possible for the non-specialist, from doctors, farmers, and navigators to artists and engineers.¹⁷³ Whether or not we agree with Aquinas that astrological figures are indeed arbitrary, man-made symbols with no special power to attract and keep celestial radiation, Ficino's work represents a “stunning upset” to the old order and introduced the possibility that an authority like Aquinas had gotten it all wrong: “To be a mathematical shape of light and color was to be a great deal. This was a powerful entity operating within nature. No demons required.”¹⁷⁴

In the age teetering at the brink between the Medieval and the Early-Modern (proto-scientific, yet pre-Enlightenment), the study of the stars suffused every aspect of cultural production; an interchangeable astrology and astronomy was in this respect all-permeating, as in the model of how earthly matter was invested with astral radiation. During the course of the inquiries of a preternatural philosophy which set out to understand by what physical processes the astrological images of antiquity, magical talismans and invested figures (which could range from small men of wax to the cult statues in Egyptian temples), derived their power. This power remained unquestioned through the Medieval-Renaissance lens. The question was not whether they worked; authorities on that point were unanimous. As has been underlined elsewhere, the best “serious” scientists of the age concerned themselves intimately with how artificial images could theoretically

¹⁷² Idem, 310.

¹⁷³ E.g. the *Ephemerides* of Regiomontanus, printed in Venice in 1481. Others commonly featured directions and worked examples intended to bring astronomical calculations down from their heights to anyone with a basic grasp of mathematical calculations. See idem, 31.

¹⁷⁴ Quinlan-McGrath, *Influences*, 159.

hold and exhibit powers that had been reported and observed.¹⁷⁵ And from there, a theoretical physics and protochemistry was developed in order to relate the Earth to the heavens- even the poetic plural we may employ today for the sky is an inheritance from the earlier age which ordered and numbered their speculated heights. These inquiries brought along with them an entire body of magical philosophy and image-making formulae which, prior to the Scholastic and preternatural philosophers in the Renaissance, in many cases explicitly relied upon the invoking, binding, and coercion of demonic intelligence. In the revolutionary proposal that celestial influences were natural, non-demonic, knowable, and subject to natural laws, mathematical astronomy was applied to new proposed protochemical and physical connections between two spheres. The strict division of Heaven and Earth, which for Aristotle were by nature forever distinct and separate from one another, had largely been dissolved in favor of Platonist and Neoplatonists' models of divine, Ideal emanations from the highest (the First Mover conceived to be at the peak of a physical hierarchical celestial order) to the lowest and most material (the terrestrial Earth). In the course of the search for natural and physical models which would confirm this essentially metaphysical and theological position, any theory put forward required rigorous scrutiny against the same Aristotelian and Neoplatonic authorities before its integration into the edifice of natural philosophy could be considered.

Aristotelian philosophy continued to lose ground in the course of the next century for these “new philosophers,” who deemed many of its aspects fundamentally incapable of addressing unseen, unperceived, and otherwise occult qualities due to its emphasis on the importance of sensation. There could be no reconciliation between classic science, based on sensory perception, to agencies which were by their definition subtle and insensible.¹⁷⁶ Through the seventeenth century, the acceptance of occult qualities, and man's ability to manipulate them, became a badge of distinction from older, orthodox philosophies rooted in Aristotelian authority which the new philosophers wore with pride as they occupied themselves with mechanical explanations for phenomena once argued to be unknowable.

5.4. Neoplatonic Theurgy and Judaism in Renaissance Italy

¹⁷⁵ *Idem*, 120.

¹⁷⁶ *Idem*, 292.

From the medieval period, the figure of the Jew in the Western Christian imagination came to be associated with sorcery and necromancy, a reflection perhaps moreso of a negative “othering” than what is reflected in the Jewish texts themselves. As one historian of magic summarized the climate, “all sorcerers were held to be Jews; and worse still, all Jews were suspected of sorcery.”¹⁷⁷ Medieval hagiographies used the Jew as a stock figure to mediate between the curious Christian monk and Satan. The life of St. Theophilus particularly illustrates this trope: the monk Theophilus lived as a magician of the worst kind, entering into explicit pacts with the Devil with the aid of his Jewish “fixer.” Theophilus sank to the lowest depths imaginable; his soul was long-ago relinquished, signed over to the Devil. Perdition seemed sure, but the miracle of St. Theophilus was his successful appeal for intercession to the Virgin Mary, which lifted him out of the pits of hell to the exalted ranks of the saintly redeemed.¹⁷⁸ The popularity of this saint-legend lay in the appeal which its promise of salvation held to the numerous medieval clerics dabbling in one kind of magic or another; compared to the feats of Theophilus, virtually every medieval “magus” could feel comforted that his sins would be forgiven. However, it encapsulated and underlined the prejudices of the day about Jewish identity and mystic tradition, seen through the dark lens of an explicitly demonic *savoir-faire*.

This assessment was not entirely baseless propaganda; there is some evidence which suggests that early Christian exorcism rituals molded themselves off of Jewish practices, including the later use of holy names to compel demons,¹⁷⁹ and the manipulation of demons was a prominent feature in the case of mysticism in Spain shortly before the Jewish expulsion. R. Joseph della Reina (1418-1472) and the anonymous author of the *Sephar ha-Meshiv* [Book of the Responding (Entity)] advocated magical rituals, similar in form and scope as the visionary ritual magic of the *Liber visionum* of the Monk of Morigny, to extract knowledge from archangels, angels and demons alike.¹⁸⁰ A legend exists that R. Joseph della Reina, in a séance organized with his ten disciples, purposefully invoked Samael and Ammon of No, the two heads of the demons. The two devils descended and were bound and sealed by letters, but they slipped out of their magical knots due to

¹⁷⁷ Butler, *The Myth of the Magus*, 92.

¹⁷⁸ *Idem*, 92-93.

¹⁷⁹ Kieckhefer, *Magic in the Middle Ages*, 165.

¹⁸⁰ Moshe Idel, *Jewish Magic from the Renaissance Period to Early Hasidism in Religion, Science, and Magic: In Concert and in Conflict*, eds. Jacob Neusner, Ernest S. Frerichs, Paul Virgil McCracken Flesher (Oxford: Oxford University Press, 1989), 86.

Della Reina's willingness to incorporate Christian forms into his conjuring.¹⁸¹ All of this was done in order to hasten the advent of the Messiah, which belongs to the larger context of the total reform and renovation sought by the Jews living in the highly oppressive climate in fifteenth-century Spain. Moshe Idel's assessment of Spanish Kabbalah, that is was "a failure of nerves, which pushed Kabbalists to resort to magic as a major way to solve problems,"¹⁸² echoes Dodds' conclusion about the Greeks' pivot to "irrational" magical ritual in post-Classical antiquity.

By the early fourteenth century, malicious magic from Jews and Christians alike had become a real concern among the clergy, whether it involved explicitly demonic dealings or not. The Bishop of Cahors was executed in 1317 for an incident in which, together with a Jewish magician and other shadowy figures, he was accused of trying to kill the Pope by bringing in magical images with inscriptions to papal palace concealed in loaves of bread.¹⁸³ Pope John XXII passed a bull a decade later which denounced those that magically imprison demons in images or other objects.¹⁸⁴ The same Pope had earlier passed a similar bull condemning alchemy, whose net effect was that alchemists were forced "underground" and to conceal their identities through pseudonyms.¹⁸⁵ Baptizing images is also another phenomenon of this period which carries the suggestion of theurgic magic,¹⁸⁶ since we must particularly remember at this time that the term *imago* was at times interchangeable with statues, as is the case in Albert the Great's *De Meteoris*.¹⁸⁷ There is ample evidence that the art of fabricating oracular images was indeed passed from the pagan world to medieval magicians, and even more commonly the practice of *envoûtement*, or investing a vessel with spirit,¹⁸⁸ yet there remains a significant parallel phenomenon in Renaissance Judaism which has only begun to be explored.

¹⁸¹ Idem, 95.

¹⁸² Idem, 90; cf. Kee's opposing view that belief in sorcery "is not the consequence of confusion or of the decay of traditional religions or of any general atmosphere of misery and insecurity. Instead, 'accusations against sorcerers occur precisely in those areas and classes which we know to have been the most effectively sheltered from brutal dislocation—the senatorial aristocracy, for instance, and the great professors of the Mediterranean cities.'" Howard Clark Kee, *Magic and Messiah in Religion, Science, and Magic: In Concert and in Conflict*, eds. Jacob Neusner, Ernest S. Frerichs, Paul Virgil McCracken Flesher (Oxford: Oxford University Press, 1989), 124.

¹⁸³ Kieckhefer, *Magic in the Middle Ages*, 97.

¹⁸⁴ Dodds, *The Greeks and the Irrational*, 294.

¹⁸⁵ Eamon, *Science and the Secrets of Nature*, 116. See also William Newman, "Technology and Alchemical Debate in the Late Middle Ages," *Isis* 80.3 (1989): 423-445; Bruce T. Moran, "The Alchemical World of the German Court: occult philosophy and chemical medicine in the circle of Moritz of Hessen (1572-1632)," *Sudhoffs Arch Z Wissenschaftsgesch Beih* 29 (1991): 1-193. For a more critical look, see James J. Walsh, "Pope John XXII and the Supposed Bull Forbidding Chemistry," *Medical Library and Historical Journal* 3.4 (1905): 248-263. The bull in question is the "Decretal Super Illius Specula."

¹⁸⁶ Kieckhefer, *Magic in the Middle Ages*, 157.

¹⁸⁷ Higley, *The Legend of the Learned Man's Android*, 130f.

¹⁸⁸ Dodds, *The Greeks and the Irrational*, 294.

This method is not *per se* the well-worn golem motif, found in Kabbalistic and later Hasidic tradition, of which much has already been written,¹⁸⁹ as the mingling of Judaism with Neoplatonic and Hermetic philosophy in Renaissance Italy precedes the rise of Hasidism and the subsequent prominence of the golem in Kabbalistic legends. The relationship between Jewish and Christian theurgic traditions appears to have been one of mutual influence in Renaissance Italy. Pico della Mirandola is the most well-known exemplar of a fifteenth-century Christian influenced by Jewish mysticism, but we also encounter Hebrew traditions in the works of Lazzarelli and Agrippa; Hanegraaff has brought to light both of these authors' familiarity with Abraham's description from the *Sepher Izira* how "new humans" could be made, by going to a desolate mountain and making the shape of a man from the red, virginal earth (*adama*).¹⁹⁰ The animation subsequently depended upon the correct application of the correct sequence of Hebrew letters on this earth-Adam.

The golem-tradition is one which stretches back into the medieval period and late-Antiquity, with a degree of variation in its method. Out of several golem-accounts,¹⁹¹ one in particular stands out for its allusion to a mechanical operation of some kind. Solomon ibn Gabriol (1021-1058) was brought before the King of Spain on charges of sorcery for the creation and animation of a female golem; to protest his innocence, he dismantled the work in front of the king. The historian of robots Cohen believes these accounts hint at a device other than the mystic power of Hebrew characters.¹⁹² The well-known golem-legend which attached itself in seventeenth-century Prague to Rudolph II, R. Yehudah Loew (*ca.* 1520-1609) may be read as a variant of the "legend of the learned man's android" which followed the most daring and brilliant minds of the day, as has been discussed above in conjunction with Albert the Great, Gerbert d'Aurillac, William d'Auvergne, and Roger Bacon. Nevertheless, the utilization of Hebrew characters is the archetypal feature of Kabbalistic golem manufacture, and they were either written on the golem's brow or written on parchment and placed under the tongue or some other place on the body, as with the Biblical *teraphim* mentioned

¹⁸⁹See Cohen, *Human Robots in Myth and Science*, 38-43; Butler, *The Myth of the Magus*, 92-93; Higley, *The Legend of the Learned Man's Android*, 143-45; Moshe Idel, *Golem: Jewish Magical and Mystical Traditions on the Artificial Anthropoids* (New York: State University of New York, 1990); Gershom Scholem, "Die Vorstellung vom Golem," *Eranos Jahrbuch* 22 (1954); Golem," *Encyclopedia Judaica*, eds. Jacob Klatzkin and Ismar Elbogen (Berlin: Verlag Eschkol, 1931): 502-8; "The Golem of Prague and the Golem of Rehovot," *The Messianic Idea in Judaism* (London: George Allen & Unwin, 1971): 335-40; "The Image of the Golem," *Elements of the Kabbalah and its Symbolism*, trans. Joseph ben Shlomo (Jerusalem: Mossad Bialik, 1976).

¹⁹⁰ Hanegraaff, "Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols," 24-25.

¹⁹¹ E.g. The golem of Nehemiah Brüll in *Jahrbücher für jüdische Geschichte und Literatur* 9 (1880), 29; the golem of Elijah Baal Shem, Rabbi of Chelm (d. 1583) as well as the more well-known legends of Rabbi Loew and Samuel the Pius. For full citations and others, see Higley, *The Legend of the Learned Man's Android*, 144.

¹⁹² Cohen, *Human Robots in Myth and Science*, 38-39.

in Chapter Three. This tradition harnessed the power of the Creator with esoteric knowledge of language and the Word, mimicking Biblical accounts of the creation of the first humans. In thirteenth-century Kabbalistic texts, the creation of a golem belonged to the mystical experience of the practitioner.¹⁹³ Ultimately, it would become conflated in the popular imagination, as evidenced by a passage in the early twentieth-century horror classic *The Golem* by Gustav Meyrink (1868-1932), with the same astral-derived animation which was the hallmark of Neoplatonic and Hermetic theurgy and “god-making” rituals.¹⁹⁴

Astral magic mixed with Jewish mysticism it appears from at least the third- or fourth-century C.E., as evidenced by the *Sepher-ha-Razim*, a collection of magical material.¹⁹⁵ In one magical formula to destroy an enemy, water from seven springs is proscribed to be “exposed” beneath the stars for seven nights, indicating that some theory of stellar or planetary radiation was in play.¹⁹⁶ Another text collects instructions for creating the *lamella*, a talisman written on a metal sheet which enjoyed widespread popularity in Palestine, Syria, and Asia between the fourth and seventh centuries; besides being closely related to Greek and Egyptian practices, the inscriptions for these talismans betray an explicit cross-over in magical philosophy by the deities which they invoke: the Greek Hermes, the Syrian Beli, Nereq, Nanai, Shamish, Dhibat, and Mot, the Iranian Anahid, Darahish, Bagdona, and others, as well as Yahweh and the angels of Judaism.¹⁹⁷

Yet, it was not until the Renaissance in Italy that strains of Neoplatonic and Hermetic philosophy fully permeated Jewish mysticism, and this phenomenon has been contextualized within the larger reevaluation magic was undergoing during this time period. As with their Christian counterparts who embraced Neoplatonic and Hermetic magical philosophy in the fifteenth century, this “new magic” was held distinct from conventional medieval magic which sought pragmatic solutions to material, worldly problems. Instead, knowledge itself of the universe, as revealed by

¹⁹³ Idel, *Jewish Magic from the Renaissance Period to Early Hasidism*, 100.

¹⁹⁴ “(The Golem) led a kind of semi-conscious, vegetable existence, and that only by day, so it is said, through the power of a scrap of paper with a magic formula that was placed behind its teeth, attracting free stellar energy from the cosmos.” Gustav Meyrink, *The Golem*, trans. Mike Mitchell (Cambs: Dedalus, 1995). 56. Whether or not Meyrink’s work of fiction preserves any shred of true folk memory of the legend about the notorious Golem of Rudolphine Prague is not for this study to say; however, another passage hints at ideas about the importance of man’s imagination to the process of magical works, a noted historical development in Marsilio Ficino’s Renaissance Neoplatonism and magical philosophy: “He believes the unknown figure that haunts the district must be the phantasm that the rabbi in the Middle Ages had first to create *in his mind* before he could clothe it in physical form. It reappears at regular intervals, when the stars are in the same conjunction under which it was created, tormented by its urge to take on physical existence.” Idem, 61.

¹⁹⁵ This, along with the *Book of Mysteries* and *Amulets and Magic Bowls: Aramaic Incantations of Late Antiquity*, became available in English translations since the 1980’s; for full citations see Kee, *Magic and Messiah*, 128.

¹⁹⁶ Idem, 129.

¹⁹⁷ Idem, 130.

Hermes Trismegistus or Iamblichus and other in their orbit, was the scaffolding upon which the new magic was built, and its goal was the perfection of the human soul- with mastery of natural forces being attendant upon this state.

Above, the link drawn by Wouter Hanegraaff between Ludovico Lazzarelli's theurgy and the commentary of R. Yohanon Alemanno on the golem-making text *Sepher Yezira* by Elazar of Worms as well as on *Life of the World to Come* by Abraham Abulafia has been noted for its potential explanation of some of the distinctive features seen in Lazzarelli's theurgic process. Moshe Idel has further elaborated on the identity of Alemanno's interpretation of Judaism "as the highest form of magical behavior."¹⁹⁸ Specifically, the identity of this magic was precised to be "the perfection of causing the descent of the spiritual powers by the means of statues and preparations of mixtures of qualities," and this was explicitly ranked by Alemanno to the highest attainment, above the perfection of moral and intellectual virtues, divine worship, and the development of divinatory powers.¹⁹⁹ Alemanno refers to these objects as *Teraphim*, as we have encountered in early Hebrew practice, and another Hebrew term, *Ruhaniut*, is given to the magic which causes the descent of powers that are invested with magical and divinatory powers from above.

Alemanno's exaltation of what is essentially a virtually identical method to Hellenistic theurgy stands out as exceptional in the history of Jewish mysticism. For Alemanno, the golden calf was built by Moses as a vessel to receive this stellar, planetary, or otherwise supernal influence.²⁰⁰ In fifteenth-century Italy, Neoplatonic and Hermetic philosophy, with its god-making theurgy center-stage, have pervaded Jewish mysticism and elevated to the highest pursuit of religious life. In the following century, R. Abraham Yagel took up Alemanno's banner, writing that: "

Whoever knows how to direct a form against another form and to cause the descent of the supernatural influx through its degrees and planes....will be loved on high and cherished below, and will be capable to change the natures and the constellations, according to his will, just as the prophets and sages [of old] were doing.²⁰¹

Whether it is of Kabbalah or Hermetic and Neoplatonic philosophy, the knowledge of the natural structure of the universe is what enables the Christian or Jewish magus to work wonders, including

¹⁹⁸ See Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 84-85.

¹⁹⁹ *Hei ha-'Olamim*, MS, Mantua, Jewish Community 21, fol. 51a; see idem, 84.

²⁰⁰ Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 85.

²⁰¹ *Beit Ya'ar ha-Levanon*, MS, Oxford, Neubauer Catalogue 1304, fol. 10b; see *ibid.*

the animation of statues by drawing down some kind of celestial influence. Further compounding links to Renaissance Neoplatonism in the stamp of Ficino and Diaceto, in the *Pardes Rimmonim* of R. Moses Cordovero (1522-1570), the imagination, visualization of colors, and even the dressing in certain colors is recognized as an effective means to draw down the supernal influence. Idel has recognized that the planetary rulers seem to have been exchanged for the Sefirot, but much of the associations between colors and attributes remain virtually identical.

There is no doubt that the colours can introduce you to the operations of the Sefirot and the drawing down of their overflow. Thus, when a person needs to draw down the overflow of Mercy from the attribute of Grace, let him imagine the name of the Sefirah with the colour that is appropriate to what he needs, in front of him. If he [applies to] Supreme *hesed*, [let him imagine] the outmost white... Likewise when he will operate a certain operation and he will be in need of the overflow of [the attribute of] Judgement, let him then dress in red clothes and imagine the form [of the letters of] the Tetragrammaton in red, and so on in the case of all the operations causing the descent of the overflows... Certainly in this manner [we may explain] the meaning of the amulets. When a person prepares an amulet for the [Sefirah of] *hesed*, let him imagine the [divine] name in a bright white, since then the operation of that name will be augmented.²⁰²

Furthermore, Cordovero acknowledges a common and legitimate source for both pagan magical talismans as well as the rituals described above; namely, that the pagan amulet-makers received true *gnosis* about the colors and attributes of the powers the operator wished to invoke.²⁰³ The important distinction observed by Idel is that these ritual procedures with a distinctive Neoplatonic, even Ficinian flavor within Jewish observance were directed towards impersonal powers presiding over astronomical entities, natural powers which could be manipulated through knowledge of the universal order, rather than demonic intelligences.²⁰⁴ In later Hasidic Kabbalah, the understanding that spirituality could be attracted from above and onto the letters or the sounds of prayer developed directly from Cordovero, and was later explicitly articulated by the founder of Hasidism, R. Jacob

²⁰² Gate 10, chap. 1; Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 91.

²⁰³“All these topics are known and conspicuous to those who write amulets and we have no part in their labor. But we have seen someone who designed amulets, which refer to the [attribute] of [stern] judgement [using the colour of] red, and those which refer to Grace in white and those which refer to Mercy in green, and everything [was done] in accordance with what [was revealed] by true [angelic] mentors, which taught him the preparation of the amulets. All this [was done] in order to introduce him to the subject of the colours and the operations which derive from the above.” Ibid.

²⁰⁴ Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 89.

Joseph of Polnoye.²⁰⁵ Cordovero diverged slightly from Alemanno and Yagel's more classical articulation of this model with the standing-in of the Sefirot for the planetary spirits, but the core action of drawing down some influence remained the same. According to Idel, "the Kabbalistic activity was supernatural, not because it intruded into the regular course of events, but because its orderliness was of a superior order."²⁰⁶

This Italian school of Jewish mysticism stood in contrast to their contemporaries in Spain, who embraced a demonological outlook and rejected all philosophy received from the Greeks pagan tradition as "the artifact of demons."²⁰⁷ For adherents of this Spanish branch of mysticism, only knowledge received by revelation possessed true legitimacy, and everything else- astronomy, physics, and mathematics- was to be abolished. The demonic and angelic realms remained highly anthropomorphized, with distinct appearances and attributes which apparently continued traditions from antiquity, and their interaction with humans relied upon incantations to appeal to what was perceived to be fickle, human-like personalities.²⁰⁸ In other words, Spanish Kabbalah not only remained far from the sphere of the natural, it refuted the very concept of natural knowledge as it existed in the Greco-Latin tradition.

Meanwhile in Italy, mystic philosophy and traditions of statue animation conformed evermore closely to Neoplatonic, Hermetic, Aristotelian, and atomistic philosophy, of the stamp referenced by De' Vieri in *Delle Maravigliose Opere di Pratolino*. Italian magic as understood by both Christians and Jews of the period, considered itself to be a perfection of and progression beyond Aristotelian physics and metaphysics.²⁰⁹ *Magia naturalis* is not found exclusively in the texts of Renaissance Christians like Pico della Mirandola, but was also employed by R. Yagel as well; its function was inherently mechanistic, predicated on an orderly, if unseen, universe. This leads us to an attendant consideration: if for Pico magic constituted the practical branch of natural science,²¹⁰ what was the degree of practice into which this Jewish mysticism was put? Idel observes that whereas in Christian texts of the Renaissance, the performance of magical ritual deriving from

²⁰⁵"The quintessence of the [mystical] intention [of the prayer] is that the person who prays should direct his intention to cause the descent of the spirituality from the supernal degrees to the letters which he pronounces, so that these letters will be able to ascend to the supernal degree, in order to perform his request." *Ben Porat Yoseph* (Lemberg n.d.), fol. 17C; idem, 94.

²⁰⁶ Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 92.

²⁰⁷ Idem, 87.

²⁰⁸ Idem, 89.

²⁰⁹ Idem, 88.

²¹⁰*Magia est pars practica scientiae naturalis; Conclusiones sive Theses DCCCC*, ed. Boghdan Kieszowski (Geneva, 1973), 78.

Jewish sources can be found, but no parallel relation of performance per se in Jewish texts can be located.²¹¹ However, the observation of an absence of any indication of the manufacture of a golem or similarly invested vessel from the Jews who were contemporary to Christians who did undertake this practice serves to underline the very real engagement with not only the theory but also the practice of “god-making” derivative from Hermetic, Neoplatonic, and other sources in the Renaissance.

4.6. Theurgy in Literary and Visual Culture of Fifteenth- and Sixteenth-Century Italy

As with the “techno-mythology” examined at the close of the last chapter, the signature of what may be related to be a parallel contemporary fascination with the “god-making” theurgy resurrected from Hermetic and Neoplatonic texts appears in the guise of literary fantasy throughout Renaissance Europe. Perhaps most emblematically for the day's taste are the cosmic cycles and harmonies- Zodiacs, Planets, Elements, as well as stones and flowers with well-known relationships to celestial bodies- which figure prominently in descriptions of fantastic buildings throughout the fictional dreamscape of Francesco Colonna's *Hypnerotomachia Poliphilo* (1499), considered to be a tour de force of the Humanist aesthetic imagination rather than a literary masterpiece in the traditional sense.²¹²

In a more narrative-driven work, the Pygmalion myth receives a distinctly Ficinian, astral twist; the *Pentamerone*, written by Giambattista Basile (1575-1632), is a product of the same age and climate which produced the Pratolino automata. Among its tales is the story of a maiden, Bertha, who by assembling materials with a sympathy to those she desires in her ideal man, entreats Venus to breathe life and make speak and move the man she has constructed from sugar, almonds, scented waters, musk, ambergris, amber, pearls, sapphires, garnets, rubies, and gold thread.²¹³ These were all materials invested with astrological significance and planetary affinities in Ficino's writings and other similar works.

Leon Battista Alberti's *Momus* (1446) has been included by the historian Anthony Grafton in his discussion of Renaissance thinkers who derided the theurgic animation of statues.²¹⁴ In the

²¹¹ Idel, *The Jewish Magic from the Renaissance Period to Early Hasidism*, 86.

²¹² See “The Strife of Love in a Dream” in Godwin, *The Pagan Dream of the Renaissance*, 21-37.

²¹³ Cohen, *Human Robots in Myth and Science*, 56.

²¹⁴ Grafton, “The Devil as Automaton: Giovanni Fontana and the Meaning of a Fifteenth-Century Machine,” 57-58.

Momus, animated statues certainly have a role in Alberti's political and social satire; the fifteenth-century work was modelled in part after Lucian, and an off-color episode involving a statue of a divinity recalls the *Satires* of Horace: whereas in Horace, when a statue of Priapus is offended by the presence of hags, he expresses his indignation by explosive flatulence, in the *Momus*, a vulgar peasant sets about desecrating a statue of Jupiter by urinating, defecating, passing wind, and mocking the idea of a sentient cult statue, "Don't you know how much the gods like the smell of burnt offerings?"²¹⁵

Here we can see Grafton's rationale for using Alberti to illustrate theurgy as the butt of Renaissance satire, but its apparent theurgy is, upon closer inspection, not the 'true' theurgy which is the focus of the present study. In Book Four, the gods assume the guise of statues in a theatre to watch mortals' spectacles. The gods did not enter into man-made vessels as a result of mortal agency; rather, when they decided to masquerade as statues, they moved existing statues from their niches and, in one case, disposed of them in the woods.²¹⁶ The "living statues" of the *Momus* are not examples of theurgic animation, but within the normal framework of capacity of divinities to transform themselves into anything.

However, in other passages, Alberti's text alludes to prevailing ideas about the generation of artificial life; in one passage, it is a homonculus which is described, but its method of construction recalls more the assembly of an automaton:

This painter used to say that the artificer of a great work had been selecting and purifying the material from which he was to create man. Some said the material as clay mixed with honey, others said warm wax. Whatever it was, people said that he should mold two bronze seals upon man, one on the chest, face, and the other parts seen from the front, and a second one on the back of the head, the back, the buttocks, and the parts seen from behind.²¹⁷

Another passage which contemplates the definition of motion emphasizes the union of a form to contain the natural force, which brings to mind the construction of the artificial forms which harnessed natural motive forces such as wind and water:

²¹⁵ Leon Battista Alberti, *Momus*, eds. Virginia Brown and Sarah Knight; trans. Sarah Knight (Cambridge: Harvard University Press, 2003), IV.19, 289.

²¹⁶ *Idem*, IV.10, 281-83.

²¹⁷ *Idem*, IV.43, 309.

...motion has to do either with imparting forms to the original and unchanging structure of nature, or with changing the mutability of forms, because some people hold that the artfulness of nature consists of joining accidents to substance.²¹⁸

With these two passages in mind, I would argue that contrary to Grafton's assertion that Alberti's *Momus* derides the topic of theurgy by the satirical plot and the antics of the Olympian gods in the guise of statues, Alberti nevertheless also alludes more seriously to the contemporary manufacture of mechanistic automata. In an essay by Poggio Bracciolini written only a year or two after Alberti's satire, *Against the Hypocrites* (1447-1448), the topic of ancient theurgy is again brought up, derisively too, and the author begins to compare pagan temples' use of fraudulent oracles to manipulate the masses with religious awe to the Catholic Church's use of theatrical pretense;²¹⁹ the subversive link between the two however would remain implied, until Machiavelli in the next century.

A fascination with practical astral magic and practical theurgy diffused throughout the European courts: the occult tradition in English literature and theatre has been the focus of study by John S. Mebane, and he highlights the influence which the magic of the Hermetic *Asclepius* text appears to exert upon William Shakespeare's play *The Winter's Tale*. Mebane perceives a modelling upon the account of the magical animation of statues in the Hermetic tradition in the final scene wherein Paulina exhorts Leontes to awaken his faith by calling for music and restoring to him his lost queen.²²⁰ Maggie Solberg on the other hand addresses the animation of the statue in *The Winter's Tale* within the larger tradition of animated statues in the context of the English Reformation; in this reading, the animated statue of Hermione becomes both performance of idolatry and iconoclasm.²²¹ In her study, Solberg points to early miracle plays which juxtapose contrasting aspects of the medieval church's doctrine on living statues: in a nutshell that sacred icons "remain respectfully still and silent" in the face of others who appear to come to life through evil spirits. In the case of the Cornish *Beunans Meriasek*, the static image of the Virgin Mary and Child which was "kidnapped" from its chapel provokes the action of an actor animating the "real"

²¹⁸ Idem, IV.37, 305.

²¹⁹ Greenblatt, *The Swerve*, 150.

²²⁰ Mebane, *Renaissance Magic & the Return of the Golden Age*, 193.

²²¹ Solberg, "Mechanical Miracles and the Statue of Hermione," 1-2. Solberg's argument for a Janus-like simultaneous existence of two contradictory principles, idolatry and iconoclasm, details a Christian mystery rooted in aspects of the late-antique world.

Virgin Mary in heaven.²²² In a French early miracle play, a gilded actor played the three-dimensional, animated Saracen idol Tervagant whereas Saint Nicholas was represented by a two-dimensional static image.²²³ Solberg observes that although miracle plays had disappeared from the scene by the time *The Winter's Play* premiered, but suggests that Shakespeare might have been able to have observed some civic biblical drama before these were suppressed in 1579. In any case, the survival of medieval theatrical conventions with little modifications through the early seventeenth century allows for the reading of Shakespeare's Hermione statue as a classical identity superimposed on medieval religious staging technologies and conventions.²²⁴

Elsewhere in the magical references of Shakespeare's corpus, we glean a passage from *King Lear* which articulates the informing philosophy of astral influences.

If that the Heavens do not their visible spirits
Send quickly down to tame [these] vild offenses,
It will come,
Humanity must perforce prey on itself,
Like monsters of the deep.

(*King Lear*; IV.ii.46-50)²²⁵

The prevalence of this system of astral influences, somewhere between nature and magic at the dawn of the early-modern era is also testified to by the dramatic play *The Alchemist* by Ben Jonson, himself a court iconographer who managed to blend highly learned symbolic masques with biting satire elsewhere on the subject of magic.

A townes-man, borne in *Taurus*, gives the bull;
Or the bulls-head: In *Aries*, the ram.
A poor deuce. No, I will have his name
Form'd in some mystick character; whose *radii*,
Striking the senses of the passers-by,

²²² The way that this was staged according to Solberg was so that heaven and earth were two separate areas of the amphitheater. Idem, 3-4.

²²³ Idem, 4; see also *Le jeu de saint-Nicholas de Jehan Bodel*, ed. and trans. by Albert Henry (Brussels: Presses Universitaires de Bruxelles, 1962; Reprint, Geneva: Librairie Droz, 1981).

²²⁴ Solberg, "Mechanical Miracles and the Statue of Hermione," 6; see also A. Schreyer, *Shakespeare's Medieval Craft: Remnants of the Mysteries on the London Stage* (Ithaca: Cornell University Press, 2014).

²²⁵ Mebane, *Renaissance Magic & the Return of the Golden Age*, 175.

Shall, by a vertuall influence, breed affections,

That may result upon the partie ownes it:...

(*The Alchemist*, II.vi.10-25)²²⁶

In contrast, an apparently sincerely held view of the age's natural philosophers that unrelenting "Astrall seeds" coupled with the seeds of the elements to produce matter found its enactment in the 1613 *Lords' Masque* by Thomas Campion (1567?-1620).²²⁷ This masque destined for a small royal and aristocratic audience combined the magic of living statues with the astral magic of Neoplatonic ritual: stars are drawn to Earth as fiery spirits by Orphic song.²²⁸ Eight "stars" were engineered for the stage play by Inigo Jones whose mechanisms exhausted the writer's descriptive capacities.²²⁹ Shortly thereafter, "four noble women- statues of silver" are transformed into living women by a sung invocation:

Powerful Jove, that of bright stars,

Now hast made men fit for wars,

Thy power in these statues prove

And make them women fit for love.²³⁰

The statue-women are destined for eight men which Prometheus had crafted from clay immediately

²²⁶Idem, 159-60. The speaker of these lines is Subtle, a working-class character who uses a passing familiarity to construct an absurd magical sign and curry social currency among his peers of wretches. This satirical attitude to traditional magical operations can be observed in the court masques as well, such as the passage, "Lay you an old Courtier o' the coales like a sausedge, or a bloat-herring, and after they ha' broiled enough, blow a soule into him with a paire of bellowes,..." from *Mercury Vindicated*, 90-104; see also idem, 163.

²²⁷Thomas Campion, *The description, speeches and songs, of the Lords' Masque, presented in the banqueting-house on the marriage night of the high and mighty Count Palatine and the royally descended the Lady Elizabeth in English Masques*, ed. Herbert Arthur Evans (New York: Scribner's Sons, 1898), 72-87.

²²⁸ The interlocutor Prometheus announced their appearance:

"...View these heav'n-born stars,

Who by my stealth are become sublunars ;

How well their native beauties fit this place,

Which with a choral dance they first shall grace ;

Then shall their forms to human figures turn,

And these bright fires within their bosoms burn.

Orpheus, apply thy music, for it well,

Helps to induce a courtly miracle." Campion, *The Lords' Masque*, 77.

²²⁹ "According to the humour of this song, the stars moved in an exceeding strange and delightful manner, and I suppose few have ever seen more neat artifice than Master Inigo Jones shewed in contriving their motion, who in all the rest of the workmanship which belonged to the whole invention shewed extraordinary industry and skill, which if it be not as lively exprest in writing as it appeared in view, rob him not of his due, but lay the blame on my want of right apprehending his instructions for the adorning of his art." Idem, 78.

²³⁰ Idem, 80.

prior, and their numbers are shortly doubled to provide each clay-man with a match; this was, after all, a masque for the royal nuptials of Princess Elizabeth Stuart, Prince Henry's sister, and Frederick V, Elector Palatine. The dancing couples onstage at one point even included the royal groom and his bride. Although Henry did not live to see their wedding, Campion's masque is testament to the court's fascination with the seemingly-supernatural power to bring statues to life.

Renaissance writers and thinkers with some exposure to magical philosophy, and particularly the astral-derived method of statue animation, seem to be in a comparable process of assimilation as the ancients were to this phenomenon, whether it was acknowledged to be magical, miraculous, or (increasingly) preternatural. We may hazard to relate the mythologizing of a theme that rose to the fore of cultural consciousness, as mechanical and enchanted automata had in the Middle Ages, to the magical binding of celestial influences to man-made vessels alongside the widespread diffusion of Neoplatonic and Hermetic texts and philosophy post-Marsilio Ficino. As we saw in the previous chapter, the synthesis of brazen heads within the narrative fictions of a later age created a kind of distance and auto-awareness from the claims of the previous ages' most renowned philosophers; similarly, when we encounter in drama and literature the manufacture of astrological images or other kinds of vessels which were intended as receptacles to retain some measurable sidereal influence (the increasingly naturalistic vision of the ancients' heavenly divinities), we must perceive in a parallel vein the cultural assimilation and indeed digestion of an equally problematic current of thought in the fifteenth and sixteenth centuries.

However, if the analysis of literature can be used indirectly to infer the presence and diffusion of the theurgic motif in the consciousness of Renaissance culture, the visual arts provide enduring material "proof" of this practical component. Whereas historians have mostly written around the idea of magical statues in the Renaissance, such as Joscelyn Godwin's characterization of sculpture as the classical medium *par excellence* for the revival of pagan philosophy in Renaissance culture,²³¹ I have not encountered any dedicated collection of the diverse mentions of an actively theurgic theme in Renaissance art and literature; Wouter J. Hanegraaff's unique essay on the subject did not hazard any identification in any one specific work. However, Hanegraaff did stress, per Gombrich, the necessity of perceiving images and artworks not only as representations or conventional symbols, as we do today, but also as "a starting-point for contemplation of ideal truths

²³¹ "...because of the sense of living presence that only a sculpture gives. It carries the weight of millennia of idolatry, of wonder-working images, of sacred statues fallen from the sky, and of three-dimensional forms so beautiful that, like Pygmalion's *Galatea*, they ought to speak and make love." Godwin, *The Pagan Dream of the Renaissance*, 14-15.

which are beyond verbal expression...Symbols did not 'stand for' abstract concepts, but somehow embodied supreme realities”, often with magical implications.²³²

This image-as-embodiment also implies a fundamental interchangeability between the visual symbol and the celestial essence, a centrality to magic recognized by Gombrich which renders moot the distinction between symbolization and representation.²³³ This reading comes from Neoplatonic sources, particularly the influence of Pseudo-Dionysius Aeropagita, and has been proposed as a helpful explanation of the close connection between magic and pictorial art in the Renaissance.²³⁴ The profusion of planetary deities which the Renaissance produced are not to be understood as “neither conventional symbols of the planets, nor literal representations of demonic beings;” these images were understood to possess- in *realiter*, not *idealiter*-²³⁵ the essence and power of that planet or star. In this respect, astral images were understood to be able to derive efficacy not from demonic intervention or from a causal medium (though at times the *spiritus mundi* and Neoplatonic “subtle bodies” were invoked as causal explanations),²³⁶ but rather from their own embodiment, “*form as such*.”²³⁷ The system of astral influences and their corresponding materials in nature suffused virtually every medium of material culture, and this “systematic ambiguity” which characterized Renaissance visual culture was fed abundantly by the philosophical currents the Hermetic and Neoplatonic philosophers' texts generated.²³⁸ Several historians have advanced solid identifications of astrology and Hermetic themes throughout Renaissance art and architecture; we turn now to an overview of their variety and forms before the final section of this chapter analyzes Renaissance and early-modern automata as practical exercises in the theoretical theurgy of the time period.

On the most general range of this spectrum of Neoplatonic-Hermetic influence can be found Joscelyn Godwin's theory that pagan iconographies were all potentially “a discreet form of

²³² Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 13. See also Will-Erich Peuckert, *Pansophie: Ein Versuch zur Geschichte der weißen und schwarzen Magie*, 2nd ed. (Berlin, 1956), 106-107; Coudert, “Some Theories of a Natural Language from the Renaissance to the Seventeenth Century,” 67.

²³³ Gombrich, “Icones Symbolicae,” 176; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 13.

²³⁴ *Idem*, 12.

²³⁵ Pierre Deghaye, “realiter und idealiter: Zum Symbolbegriff bei Friedrich Christoph Oetinger,” *Pietismus und Neuzeit: Ein Jahrbuch zur Geschichte des neuen Protestantismus* Bd. 10 (1984): 66-89.

²³⁶ “Spirit is a very tenuous body, as if now it were soul and not body, and not soul,” Ficino, *De Vita Coelitus Comparanda*, 3, 31-33; translated in Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 14).

²³⁷ Ficino, *DVCC* 17; Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 14.

²³⁸ Gombrich, “Icones Symbolicae,” 166.

sympathetic magic without treading on the sensitive toes of the Church,”²³⁹ as well as a potential Neoplatonic reading in every erotic or stimulating Renaissance artwork. Whereas the uninitiated would see cavorting, lust-provoking nudes that would (or should have) shocked common Christian sensibilities (for example, the German Protestant visitor to Cardinal Bibbiena's bathroom who had “no doubt that these (bronze nudes) are touched with great devotion”²⁴⁰), the insider would be privy to Neoplatonic doctrine that earthly eros was necessary to arouse the soul's energy for the flight to its higher, sublimated form.²⁴¹ On this same general level, sleeping goddesses of nymphs which commonly adorned grottoes, such as the antique Ariadne installed in the Belvedere in Rome (fig. 49), have been perceived as allusions to the Ficinian notion of sleep as the portal to higher states which allow the soul to regain its original condition and join in mystic union with the godhead.²⁴²

The Tempio Malatestiano in Rimini (fig. 50) has been proposed as an illustration of the Neoplatonic doctrine of the soul's journey as described by Porphyry's text *On the Cave of the Nymphs*.²⁴³ The zodiacal program of the Chapel of the Planets and specifically its inclusion of baskets, fruit, poles of stone, pierced red and white balustrades, putti, seraphs, olive wreaths, and the sign of Cancer have been interpreted as allusions to markers of the soul's descent to the material world in Porphyry's text. Because of its early date, a full two decades before Ficino's translation of the text in question, the Tempio Malatestiano is defended by Godwin as possibly “the supreme monument to an early enthusiasm for the Neoplatonists,” on the basis of the documented Hellenophilia of its patron Sigismondo Malatesta (1417-1468).²⁴⁴ The same text by Porphyry has also been proposed by Emanuela Kretzulesco-Quaranta as the key to a series of later grotesques and a fresco cycle (*ca.* 1589) by Cesare Baglione in the Rocca di Soragna near Parma (fig. 51) featuring what she identifies as the Cosmic Egg, the Dionysiac Vase, and the Fount of Living Water.²⁴⁵ The grotesqueries of this room also feature great toothed wheels, which, as with other esoteric readings of the iconography of machinery, have been theorized to be representations of the metaphysical

²³⁹ Godwin, *The Pagan Dream of the Renaissance*, 71.

²⁴⁰ Journal of Johannes Fichard, quoted in Godwin, *The Pagan Dream of the Renaissance*, 130.

²⁴¹ Godwin, *The Pagan Dream of the Renaissance*, 130.

²⁴² *Idem*, 164; see also Maria Luisa Madonna, *Il Genius Loci di Villa d'Este: Miti e misteri nel sistema di Pirro Ligorio in Natura e artificio. L'ordine rustico, le fontane, gli automi nella cultura del Manierismo europeo*, ed. Marcello Fagiolo (Rome: Officina Edizioni, 1979), 190-213.

²⁴³ Godwin, *The Pagan Dream of the Renaissance*, 39-44; see also Maurice Shapiro, *Studies in the Iconology of the Sculptures of the Tempio Malatestiano*, 2 vols. (Ph.D. Thesis, New York University, 1958).

²⁴⁴ Godwin, *The Pagan Dream of the Renaissance*, 44-45.

²⁴⁵ *Idem*, 132-33; see also Nicola Kretzulesco and Emanuela Kretzulesco-Quaranta, *Giardini misterici: Simboli: Enigmi, dall'Antichità al Novecento* (Parma: Silva Editore, 1994).

origins of cosmic movement.²⁴⁶

Moving ever closer to the possibility of statues or automata invested with some kind of planetary or celestial influences, Mary Quinlan-McGrath's study identifies frescoes, architecture, and urban planning for which she argues a conscious design meant to attract specific celestial rays beneficial for their patron at the time of their constructions. Cardinal Alessandro Farnese, later to be Pope Paul III, was a student of Marsilio Ficino whose commissioned fresco cycle in the audience hall of Caprarola, and in particular its celebrated astrological vault (fig. 52), have been analyzed in detail,²⁴⁷ as has the Sala dei Pontefici's astrological vault created by Medici pope Leo X, whose rise to the papal crown had been foreseen, according to legend, by Marsilio Ficino in his natal chart.²⁴⁸ The Sala di Galatea in the Villa Farnesina of Rome (fig. 53) built by the papal banker Agostino Chigi (1465-1520) has also been recognized for its astrological significance, and the Hall of the Months in the Palazzo Schifanoia (fig. 54) decorated under Borso d'Este (1413-1471) communicates a perception of time dominated by the twelve zodiac signs and their characters in the mold of Manilius favored by Renaissance Neoplatonists.²⁴⁹

In Filarete's *Treatise on Architecture*, astrological civic-foundation ceremonies which he writes about feature life-giving substances (like water, wine, oil, grain, and honey) and sometimes effigies of important men being buried in the “womb” of the Earth under the foundation stone.²⁵⁰ Here we may observe an apparently analagous practice to the investment of statues by the incorporation of significant materials within their body as well. The ancient statue of Mars which stood in Florence until it was swept away by a flood of 1333 was received with the psychological distress of the population which would have been out of proportion to a simple work of art, but instead it can be interpreted more accurately as the emotional reaction befitting the loss of an astral image which had until then been perceived to contribute its beneficial celestial rays for the public good (in this specific case, of the war god and patron of Florence's bellicose “birth sign” Aries).²⁵¹

²⁴⁶ Godwin, *The Pagan Dream of the Renaissance*, 134-35.

²⁴⁷ Quinlan-McGrath, *Influences*, 190-194.

²⁴⁸ Quinlan-McGrath has also proposed an identification of components of its original iconography (it was altered ca. 1800) with preparations found in the *Picatrix*. Idem, 180-89; see also Godwin, *The Pagan Dream of the Renaissance*, 66.

²⁴⁹ The assignation of twelve distinct deities instead of the traditional seven planetary gods has been sourced in Manilius, particularly the inclusion of non-planetary figures into the schematic: Minerva for Aries, Ceres for Virgo, Vulcan for Libra, Vesta for Capricorn, and Juno for Aquarius. See Godwin, *The Pagan Dream of the Renaissance*, 60.

²⁵⁰ Antonio Averlino Filarete, *Filarete's Treatise on Architecture*, trans. John R. Spencer (New Haven, CT: Yale University Press, 1965), 1.8-15

²⁵¹ We recall that Albert the Great had argued for the legitimacy of the idea that the properly made artificial figure of Mars held the actual Rays of the planet Mars, and Quinlan-McGrath connected this conception of the astral image with the defunct Florentine monument. See Quinlan-McGrath, *Influences*, 130-31.

It has also been suggested that image-magic made its way into the most minute and domestic aspects of Renaissance cultural production more than we may at present realize. Michael Camille identifies in the frame decoration of a thirteenth-century Florentine *cassone* panel (presently at the Musée des Beaux Arts in Tours) visual references to the magical figures (*notae*) which circulated in manuscripts of the *Ars Notoria* (he is careful to distinguish these from the common use of faux-Kufic Arabic script as a decorative motif).²⁵² The tradition of image-magic circulated widely and has elsewhere been acknowledged to be the object of frequent quotation in romanticized, courtly contexts. The description of an antique engraved ring, repeated by one source to be at one point the property of Michelangelo, also suggests the incorporation of magical objects among the personal details of those at the highest echelons of culture.²⁵³

Meanwhile, the inclusion of Hermes Trismegistus among Christian saints and prophets has been well-documented for itself and even offered by one study as the basis for the prototype for portraits of Leonardo da Vinci, the quintessential Renaissance ambassador of a new knowledge which blurred magic and science.²⁵⁴ The most well-known example of the archetype is the pavement panel of the Siena Cathedral (fig. 55). Some of the most overt expressions of Hermetic and Egyptian mysteries can be observed in Pinturicchio's fresco cycles in Pope Alexander VI's apartments, featuring Osiris, Hermes Trismegistus, and the Bull of Apis,²⁵⁵ but Hermetic ideas, particularly the "god-making" technique that is the subject of our study, appear to have been widespread in less-rarefied milieus as well. This is attested to by the depiction of Hermes Trismegistus showing an animated statue to Hercules in the Florentine Picture Chronicle, now in the British Museum (fig. 56). Its author is not certain; attributed previously to Maso Finiguerra (1426-1464) and more recently to Baccio Baldini (d. 1487), the tell-tale marks of goldsmith or metal-worker's training as well as the substitution of "C" with "H" (e.g. "Deuhalion" instead of "Deucalion") typical of spoken Florentine dialect do not give the impression that the FPC's author possessed any special esoteric knowledge; Godwin characterizes its author as barely literate.²⁵⁶ Rather, we can only conclude that the ability to animate inert, man-made objects was among the most famous attributes, if not the primary, of Hermes Trismegistus's fame through virtually all

²⁵² Camille, "Visual Art in Two Manuscripts of the *Ars Notoria*," 135; see also Kieckhefer, *Magic in the Middle Ages*, 95.

²⁵³ "...the engraving is two thousand years old, on which there are the figures of seven women. You must have the aid of a glass to distinguish the forms at all." Wendell Philips, *The Lost Arts* (Boston: Wendell Philips Hall Association, 1892), 15.

²⁵⁴ See D. J. Gordon and Stephen Orgel, "Leonardo's Legend," *ELH* 49.2 (1982): 300-325.

²⁵⁵ Godwin, *The Pagan Dream of the Italian Renaissance*, 187.

²⁵⁶ *Idem*, 59.

levels of literate society.

5.6. Divine Models: Renaissance Automata in the Context of Marsilio Ficino's Philosophy

This study proposes a reevaluation of the Pratolino automata described by De' Vieri, and indeed of the Renaissance hydraulic and pneumatic automata in general which dotted princely gardens and villas, as practical essays on some level of “god-making” theurgy which had come to light through the Neoplatonic and Hermetic texts translated by Ficino and incorporated into the intellectual edifice of the Renaissance by subsequent philosophers and artists. While this key of reading artworks has its own historiography, particularly from the founders of the Warburg and Courtauld institutes, the early-modern automata have largely escaped inclusion within this construct. Theurgy has been an otherwise overlooked aspect of both Renaissance Neoplatonism as well as its visual and literary culture, but other examples of practical theurgy can be gleaned from previous studies of astral images as well as early-modern technology. The present and final section of this chapter will subsequently detail the significance which models and simulacra held in the system of magical philosophy indebted to Ficino and the other “Magi” of the Renaissance we have discussed above.

Models of the heavens (and other systems otherwise perceptible only from a higher vantage point, among which is included the animating motor of life itself) were recognized as aids to a study which promised beneficial effects to those who undertook them. Not only were such models held to effect physical, intellectual, and philosophical changes in the soul, artificial images which captured some quality or qualities from the vast heavens were curative in nature to what was diagnosed as an inherently fragmentary state of the human psyche.²⁵⁷ By compensating for stellar influences which may be lacking or rather in overabundance (this was dependent upon tailored preliminary astrological analyses of the particular individual seeking the curative benefits of Ficino's astrological philosophy), taking in different qualities of celestial radiation (emitted through invested artificial images) was done in the pursuit of unifying the fragmented human psyche in order to bring it into harmony with the higher and divine spheres. The heavens, even in the form of an artificial simulacrum, promised the possibility of a closer union to the All. This was contemplation of

²⁵⁷ Quinlan-McGrath, *Influences*, 33; see also the “astrological psychology” and the constellation of the soul in Moore, *The Planets Within: The Astrological Psychology of Marsilio Ficino*.

artwork with a highly specific purpose: the conscious mental habit of conceiving of the psyche in constellations of traits and replenishing or banishing these traits as desired through the absorption of different quantities which were perceived to be showering down upon the Earth from the celestial spheres beyond. Taking in the sight of a precisely-executed model of the heavens or astral image, such as the armillary sphere, astrological vault-frescoes, and planetary clock explicitly recognized as viable constructs by Ficino,²⁵⁸ was the proscribed activity in order to receive beneficial celestial radiation most directly (via the eyes) into the mind and soul. It was not even necessary to gaze upon the astral image at all; the invested image “both conceives in itself the celestial gift, and gives it again to someone who is in the vicinity or wearing it.”²⁵⁹ Style or medium were not determinants of the efficacy of an astral image. To the contrary, it was not important whether such “figures of the universe” were two- or three-dimensional. Instead, what mattered was how successfully they recreated the original Idea of the desired celestial quality in the figure.²⁶⁰

The entire edifice of Ficino's medicine rested upon the manufacture of personally-calibrated astral images; after all, celestial rays from antiquity onwards were acknowledged to have different effects upon different materials on Earth, and this was no less true for the individual human beings Marsilio Ficino's philosophy addressed.²⁶¹ These rays' effects were deemed superior to the direct, haphazard absorption of celestial rays (perceived as a constant background radiation). In other words, the influx of unique and variable celestial rays of a material Spiritus into the equally unique and variable Spiritus contained and circulating in the human being (and all natural life) was a traffic whose regulation was of primary concern to Ficinian astrological medicine. The human Spirit could be purified by taking in rays directly (such as gazing at celestial light, which Ficino counseled), but the ability of constructed images and objects to retain and transmit specific celestial qualities which had been advocated by Al-Kindi, Bacon, Ficino, and others gave the operator an advantage to pick and choose and otherwise manipulate this energy.²⁶² Rays entering through the senses, not only the eyes, were believed to alter the organs receiving them, and consequently possessed the potential to alter the mind.²⁶³ For Ficino, the title “Magus” was reserved for those who were capable of

²⁵⁸ See Ficino, *Three Books on Life*, 3.18-19.

²⁵⁹ Idem, 3.17; Quinlan-McGrath, *Influences*, 58.

²⁶⁰ Quinlan-McGrath, *Influences*, 157.

²⁶¹ On the continuation of the variability of celestial rays' effects upon different terrestrial materials, see Ptolemy, *Tetrabiblos*, 1.1; Al-Kindi, *De radiis stellarum*, 221; Grosseteste, “Concerning Lines, Angles, and Figures,” 386; Bacon, *Opus majus*, 1:267; Ficino, *Scritti sull'astrologia*, 96. See also Quinlan-McGrath, *Influences*, 47.

²⁶² Quinlan-McGrath, *Influences*, 56, 66.

²⁶³ For example, breathing in vapors or ingesting materials which were recognized as vehicles for astral influences.

influencing people through the manipulation of these celestial qualities: specifically, astrological-medical doctors who crafted artificial images.²⁶⁴

Going beyond the curative effects of the properly-made astral image upon its viewers and even those in its proximity, the maker of such an image was hailed by Ficino as “semidivine”:

...who can deny that he is nearly of the same genius as the author of the spheres, and that he could, in a certain sense, make the heavens if he could obtain the instruments and the celestial matter? Because now he is able to produce them, though of a different matter, but in a similar order.²⁶⁵

Man's ability to create functional models in miniature of life and the cosmos was tied to his ability to understand their most intricate workings. Mircea Eliade has written about the magician as maker:

...the artisan is a connoisseur of secrets, a magician; thus all crafts include some kind of initiation and are handed down by an occult tradition. He who “makes” real things is he who *knows* the secrets of making them.²⁶⁶

While a distinction between “simulacra,” devices that simulate, and “automata,” devices that move, has been precised,²⁶⁷ in many cases, they were both. In this respect, the Pratolino automata, Ficino's planetary models, and other similarly imitative mechanisms possess a “special and nodal role” for the histories of technology and philosophy of the time period.

The contemplation of the workings of a mechanical object cleaves congenially to Renaissance Platonism. The significance of the figure of a man with angel wings on the face of an astrolabe created by Regiomontanus for Cardinal Bessarion in 1462 has been suggested to be an exaltation of the dignity of practitioners of the worldly discipline of mechanics while their spirit was similarly elevated not only through contemplation, but also through the production of material,

Another method counseled by Ficino, that of revolving slowly in dance to the movements of the spheres, seems at first glance to rely on sympathetic principles rather than the direct-transmission through the senses of the other methods. See *idem*, 70, 80.

²⁶⁴ *Idem*, 71; on the tradition of Magi of antiquity to effect these works, see Ficino's commentary on Plato's *Timaeus* and the *Sophist* commentary no. 46.

²⁶⁵ Translated in Paul Oscar Kristeller, *The Philosophy of Marsilio Ficino*, trans. Virginia Conant (Gloucester, MA: Peter Smith, 1964), 119. Kristeller subsequently comments, “Finally, when he [the individual] understands the laws of the universe by his thought, he proves himself as an equal and worthy companion of the divine creator.” *Idem*, 120. Original passage from Marsilio Ficino, *Opera Omnia*, 2 vols. (Basel, 1576; repr. Turin: Bottega d'Erasmus, 1959), 1:297.

²⁶⁶ Eliade, *The Forge and the Crucible*, 102.

²⁶⁷ DeSolla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” 9.

tangible effects in the physical world.²⁶⁸ Later, Francis Bacon likened the construction of such objects to removing nature's veil, "because the method of creating and constructing such miracles of art is in most cases plain, whereas in the miracles of nature it is generally obscure."²⁶⁹

Ficino's philosophy of astral images has been tied by historians many times over to both art theory in the Renaissance with numerous practical examples, some of which we have just encountered above. The technical sense of Ficino's artificial figures relied on a mathematical figure that replicated in color/light the same essential radiation of the desired celestial rays and their qualities. The great significance which colors, figures, and numbers consequently had in preparing materials to receive celestial qualities provides virtually infinite possibilities for analysis in Renaissance artworks.²⁷⁰ In that body of scholarship however, the production of early-modern automata has largely been left outside of this consideration. However, although the manufacture of hydraulic and pneumatic mechanical was only beginning to pick up momentum in the fifteenth century, Ficino's passages would have found an ideal application in the artificial, wind- and water-powered simulacra of humans and animals which appeared in the following century.

The most immediate fulfillment of Ficino's philosophy in these later Renaissance automata follows from his commentary on the *Timaeus* that astronomical images should possess something of the watery or the earthy in order to best retain celestial qualities

...the celestial light then available is instantly acquired, and also may be stored up, in case where there is along with this light either fiery heat as in flame, or where there is something airy or water and at the same time glutinous, as in lanterns, lamps, carbuncles, and perhaps in a way, in camphor.²⁷¹

Elsewhere, Ficino repeats that the material selected as the vessel for celestial qualities must possess something elemental (Fire, Air, Water, or gluten), and heat possesses a crucial role as a catalyst in

²⁶⁸ Idem, 39.

²⁶⁹ Francis Bacon, *Novum Organum* in *The Works of Francis Bacon*, 14 vols., eds. James Spedding, Robert Leslie Ellis, Douglas Denon Heath (London: Longman, Green, Longman, & Roberts, 1857-74), IV, 172.

²⁷⁰ For the original articulation of this idea, see Ficino, *Three Books on Life*, 330-31 (3.17). The replication of a celestial figure artificially through color and light on a given surface and its resulting implication as an intersection of a higher set of light rays undergirded the theory of perspective in art in Renaissance Florence especially. Leon Battista Alberti's pre-Ficinian *De picture* and works of Filippo Brunelleschi used the same concepts for their optical principles as Ficino did later for his artificial figures, and the works of Ghiberti, Masaccio, Donatello, Uccello, and others have been analyzed for their conformity with Ficinian astral image theory. See Quinlan-McGrath, *Influences*, 148-53.

²⁷¹ Ficino, *Opera Omnia*, 2.1463; Quinlan-McGrath, *Influences*, 153.

the production of a medium that will trap and retain celestial radiation.²⁷² It becomes an easy feat to perceive a direct fulfillment of these stipulations in the manipulations of air, water, and heat which powered automata in the Renaissance as in the Classical world and some corners of the Latin Medieval West and the Islamic Medieval East. Furthermore, Ficino's passage just cited above requires further research into the composition of the Renaissance automata to answer whether some "glutinous" quality was also incorporated and to respond to other considerations about the material composition of similar astral lures.

De Vita Coelitus Comparanda is substantially dedicated to a learned explanation of the practice and construction of these images. At its basic level, the material substrate of the astral image must be consonant with the desired celestial ray. Many of the materials which Ficino names have been connected by historians to the craft materials used in Renaissance art production: charcoal, pigments ground from plants and animals which participated in the universal model of planetary influences, varnishes, gesso, and lime, to name a few.²⁷³ Special significance is given to transparent substances: the gesso and the lime just mentioned, in which celestial rays were believed to be suspended, as well as water, oil, and certain resins. In a step removed from simple ground pigments, this last category was made from plant materials exposed to the catalyzing power of heat; by similar reasoning, lime, which became hot when mixed with water in preparation as a ground for frescoes and other applications, was included as a potent medium in which celestial rays and qualities could be suspended.²⁷⁴ How can what is known about the material mediums used in the production of early-modern automata be related to Ficinian theories about these materials' capacity to retain celestial influences? To answer this question, we might look to Ficino's discussion of the planetary clock as astrological image as the forerunner to the automata which became more common in the following century.

As mentioned above, the planetary clock was included with the armillary sphere and vault paintings as potential figures of the universe in Chapter Nineteen of *De Vita Coelitus Comparanda*.²⁷⁵ The planetary clock, like the later hydraulic and pneumatic automata, possessed a form that was inherently mathematical and depended upon the correct replication of shapes, ratios, and motions observed in nature (in the case of a planetary clock, "an archetypal form of the whole

²⁷² See Ficino, *Three Books on Life*, 3.15-18.

²⁷³ Quinlan-McGrath, *Influences*, 154.

²⁷⁴ Ibid.

²⁷⁵ Specifically, the contemporaneous Florentine example by Lorenzo della Volpaia.

world”/ “a sphere equipped with its own motions,” versus the biological systems represented by automata).²⁷⁶ The materials used in the construction of the planetary clock were invested with astrological significance (bronze, silver, and gold all possessed planetary associations), as were the colors deemed appropriate for its decoration (green for Venus and the Moon, gold for the sun and to a lesser degree, Jupiter and Venus, and sapphire-blue for Jupiter and for its curative properties specific to black bile²⁷⁷). Primarily in its capacity for independent motion and secondarily for its material components, Ficino's analysis of the planetary clock provides the model for any subsequent relation of self-moving automata to astral theory in the following century.

However, to perceive as automata as simple channels for air, water, or even celestial influences would be to miss the point of their greater significance as models of life as it was understood. Ficino perceived a commonality and communion between the human spirit and the World Soul: both were, for him, the same Spiritus. Ficino's exhortation to study the Spiritus contained in the immediate self underlines the significance of the earliest models of artificial humans and animals.

(Philosophers) seem wholly to neglect that instrument with which they are able in a way to measure and grasp the whole world. This instrument is the spirit, which is defined by doctors as a vapor of blood, pure, subtle, hot, and clear. After being generated by the heat of the heart out of the more subtle blood, it flies to the brain; and there the soul uses it continually for the exercise of the interior as well as exterior senses.”²⁷⁸

Early automata were considered to model the secret processes by which life existed in an animate state; these were the material instruments by which the heirs to Ficino's philosophy would have studied the effects of heat and other variables upon the animating fluids; whether that fluid was water, blood, or Spiritus, seems to have been of secondary concern.

²⁷⁶ Ficino, *De Vita*, 344-47 (3.19).

²⁷⁷ Ibid.

²⁷⁸ Idem, 110-11 (1.2).



43. Andrea Solario, *Madonna and Child with Saints Joseph and Simon*, Pinacoteca Brera, Milan, 1495.



44. Ambrogius di Perugia, *Madonna and Child with Choir of Cherubs*, Pinacoteca Brera, Milan, 1475.



45. Antonio Allegri Correggio, *Adoration of the Magi*, Pinacoteca Brera, Milan, ca. 1515-18.



46. Bernardino Ferrari, *Two Kneelt Faithfuls*, Pinacoteca Brera, Milan, ca. 1500-10.



47. Bergognone (Ambrogio da Fossano), *Coronation and Assumption of the Virgin*, Pinacoteca Brera, Milan, 1522.

Stirpes, quae luna quandam formam referunt, Lunares esse;

CAP. XIV.

SVNT & herbae, quae falcatis lunatisve foliis, siliquis, aliisque partibus, Lunaris virtutis compotes sunt.

SENAM primo, mox herbam ssetta cauallo vocatam, tertio minorem lunariam appinximus, ut Luna imaginem eorum folia contineat.



48. Giambattista della Porta, *Phytognomonica* (Frankfurt: Iannem Wechelum & Petrum, 1591), 486.



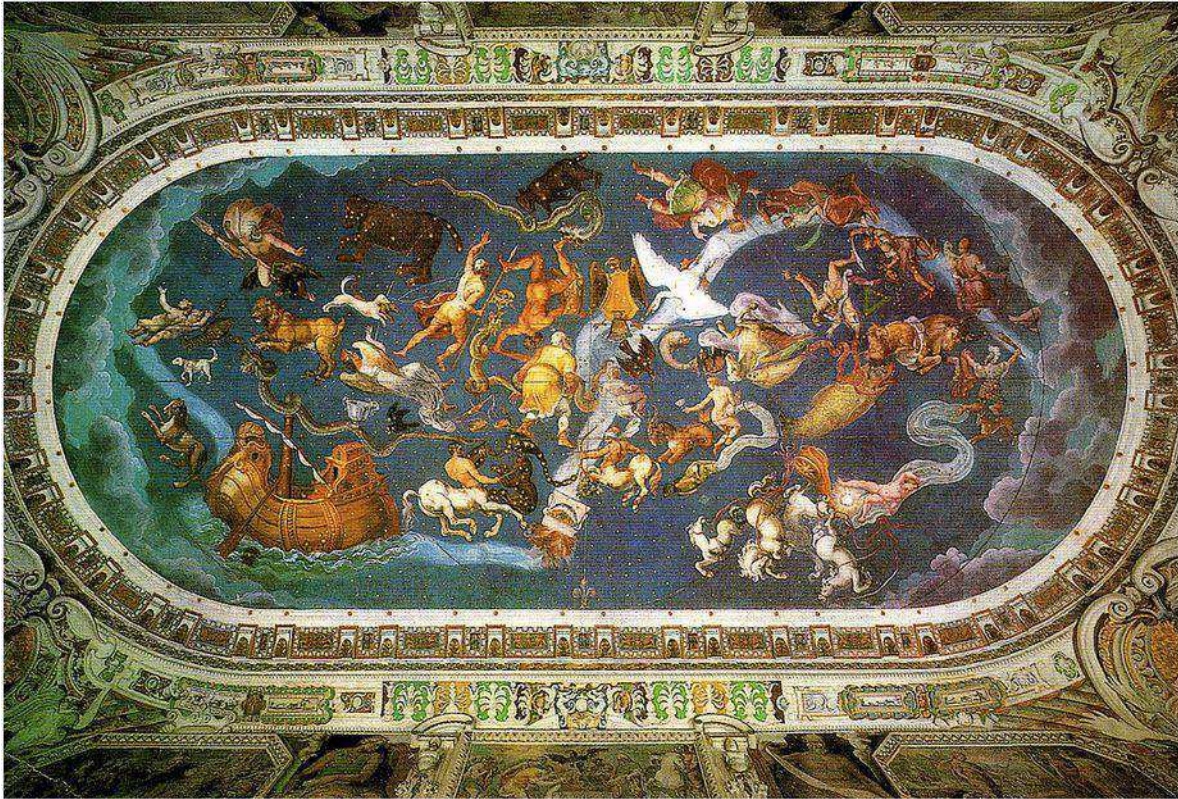
49. *Sleeping Ariadne*, Roman Copy of a Hellenistic Sculpture, Vatican Museums, Vatican City.



50. Leon Battista Alberti, *Tempio Malatestiana*, Rimini, unfinished; completed 1468.



51. Cesare Baglione, *Hall of the Grottoes*, Rocca di Soragna (Rocca Meli Lupi), Parma, ca. 1588.



52. *Astrological Vault*, Room of the Maps, Villa Farnese, Caprarola, 1574.



53. Baldassare Peruzzi, *Astrological Vault*, Room of Galatea, Villa Farnesina, Rome, ca. 1518.



54. Cosme Tura and Francesco del Cossa , *Hall of the Months*, Palazzo Schifanoia, Ferrara, 1476-84.



55. Giovanni di Maestro Stefano, *Hermes Trismegistus Pavement*, Siena Cathedral, 1488.



56. Maso Finiguerra or Baccio Baldini, *Mercurius Re Degitto*, Florence Picture Chronicle, British Museum, ca. 1470-75.

6. The Intersection of Science, Magic, and Power at the Court of Francesco I

*Sic sapis, O Medices, omnia sicque potes*¹

In this chapter, the patronage patterns and interest of Francesco I de' Medici and his court are examined in their chronological context as successors to the artistic and literary tradition just discussed as patrons of potentially theurgic automata in theory, practice, or even as symbols of Neoplatonic and Hermetic initiation in the late-Renaissance. We have just seen how the fifteenth and sixteenth centuries brought new texts to light and in turn how these texts influenced the formation of magical and mechanical philosophies which permeated the fabric of Latin Christian Europe and even Judaism in Renaissance Italy as well. As we approach the Pratolino automata closer chronologically, we will see that assigning them an initiatic, magical identity within the context of Francesco I's other created works is not out of place. To the contrary, recognizing this aspect which these hydraulic and pneumatic automata in all likelihood possessed for their makers permits a vastly greater depth of significance beyond mere amusements for an autocrat, displays of technical prowess, or innovations in representing narratives from mythology and literature, though they were also these simultaneously.

6.1. The Prince of the Laboratory: Renaissance Experimentation and the “Proto”-Scientific Revolution

Powerful ruling families were the main engines in the Renaissance behind innovations in art, technology, and the budding sciences as we know them today. Within these elite family, social, and governmental networks, discussion and writings about “new” or rediscovered subjects were kept in brisk circulation; these included medicine, mathematics, astronomy, and mineralogy as well as philosophical or explicitly magical texts. Not by coincidence was it within these milieus that the earliest experiments of the modern era were conducted. Exacting standards for what we now consider to be “proper” experiments (forming a hypothesis, testing it, objectively reporting its results, and repeating the process) were a long way from becoming standard, yet classical

¹See Eamon, *Science and the Secrets of Nature*, 223; Alison Brown, “Platonism in Fifteenth-Century Florence and its Contribution to Early Modern Political Thought,” *The Journal of Modern History* 58.2 (1986): 395.

knowledge in the hands of Renaissance natural philosophers already was being used in ways dramatically different from those of Medieval theologians. Whereas formerly, knowledge was preserved and passed down with reverence for the original source, notwithstanding considerable cultural accretions reflective more so of the mores of its “custodian” civilizations than any objective truth, the Renaissance began to question the ancient writers. The ways that their “truth” was scrutinized and that knowledge (particularly their technological expertise) came to be expanded occurred primarily through the patronage of experiments. Exceptional medieval minds began the process, such as Roger Bacon and Albertus Magnus; the stern, medieval attitudes which demonized intellectual curiosity were crumbling away, and in the age to come, inquisitiveness became valorized in the ideal prince. As we shall see in the coming pages, Francesco I, more than any of his immediate predecessors or successors in Tuscany, embodied the late-Renaissance embrace of the experimental method as well as its attendant fascination for all aspects of the visible and invisible natural world.

This experimental model relied on a truly industrial level of organization and the resources of one of the wealthiest territories of the day. At the apex of every development was Francesco I: patron, ideator, and supreme demiurge within a domain wherein every detail sprang from his creative will. The realization of such grandiose visions however required brilliant collaborating architects and artists at court² as well as the toil of entire villages conscripted into labor (in the case of Pratolino). Nevertheless, ultimately to Francesco I belonged the glory and the accolades. De' Vieri's treatise, which celebrated Pratolino's completion along with a host of other works, musical and poetic, elevates Francesco I as both patron and inventor,³ and it is to the biographical details of this *Dux mechanicus* which the present study now turns.

Growing up, Francesco received an international education worthy of a prince, in harmony with the monarchical ambitions of his father. Historians have commented about the lasting effect of his sojourn at the Spanish court of Philip II upon his manners, costume, imperial pretensions, and even upon the scale of his building projects; however, the formative effect of the young prince's upbringing in Florence certainly prepared the mind which would later devote itself so enthusiastically to alchemical and esoteric pursuits. In the book by Giorgio Vasari (1511-1574) of

² Bernardo Buontalenti and Giambologna, are among the most well-known artists, but mid-level engineers and fontaniers, whose names are recorded with Pratolino's works are: Bonaventura da Orvieto (or da Bagnoregio), Gocerano da Parma, Tommaso Francini, and Maestro Lazzaro delle Fontane. See Zangheri, “Lo splendore di Pratolino e di Francesco I de' Medici,” 16-17.

³ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 66.

instructive conversations with the young prince Francesco, the rare iconography of the *Castration of Ouranos by Saturn* (fig. 57) which appears on the ceiling of the Room of the Elements in the Palazzo Vecchio, is articulated in Aristotelian terms, which recall the approach used by De' Vieri to legitimate the apparently “magical” automata of Pratolino: “Cutting of the heat as form, and its falling into the sea as matter, gave rise to the generation of earthly things that are fallen, and corruptible and mortal, generating Venus from the sea foam.”⁴ The ten Sephiroth of the Kabbalah have been identified as the basis for the exegesis Vasari then offers the young prince on the peripheral figures in the fresco. If this dialogue is any indication, Francesco's education prepared the young prince's mind for a lifetime of investigation into the farthest corners of philosophy and science. We must not preclude any doctrine, no matter how esoteric (for the purpose of our study, specifically Neoplatonic and Hermetic theurgy), as being so recondite as to be unfamiliar to this profoundly learned man.

Francesco I's personality gravitated above all towards the emerging sciences, “both pure and experimental.”⁵ Historians have liberally described his interests in natural philosophy, mathematics, natural history, cosmography, and most notoriously chymistry/alchemy as “obsessions.”⁶ Great leaps of historical psychoanalysis notwithstanding, a portrait has emerged of a young man who preferred the laboratory to the chambers of government, first-hand experimentation to textual authority, and his own counsel to traditional authorities of church and antiquity. On the European stage at the end of the sixteenth century, few rulers were more zealous than he in the pursuit of alchemical, magical, and technical secrets.⁷ Joscelyn Godwin sensed in Francesco I “...the shadow of a technocrat obsessed with experiment for its own sake, and detached from any ethical or ecological considerations.”⁸

Indeed Francesco I's enduring fame is for his preoccupation with alchemical and technological experiments in which he took an active role in the laboratories he created in the Ducal palace and elsewhere in Florence.⁹ This state of affairs was peculiar to a sovereign and elicited much comment from his contemporaries. The Venetian ambassador Andrea Gussoni in 1576

⁴ Vasari, *Le Opere con nuove annotazioni e commenti*, VIII, 19-20.

⁵ Scott Schaefer, *The Studiolo of Francesco I de' Medici in Palazzo Vecchio in Florence* (Ph.D. diss., Bryn Mawr College, 1976), 175; Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 10.

⁶ After all, as Burckhardt observed, peculiar characters and modes of life did tend to emerge among the despots with absolute power! Burckhardt, *The Civilization of the Renaissance in Italy*, 4.

⁷ Eamon, *Science and the Secrets of Nature*, 270.

⁸ Godwin, *The Pagan Dream of the Renaissance*, 177.

⁹ E.g. the *fonderie* in the casino of San Marco and at the Palazzo Vecchio. See also “Il Principe in Fonderia” in Berti, *Il Principe dello Studiolo*, 75-97.

remembers that Francesco “arrived there early in the morning and left late at night, sometimes even carrying on government business” so as not to lose time from his studies.¹⁰ While there, Francesco I “worked at this, then that artefice, always making some experience, and many things of his own hand.”¹¹ We can infer how shocking the prince's labors at the workbench must have been to some of his peers and his court from the breathless letter of a Florentine ambassador in Prague describing the identical penchant of Rudolf II. By 1609 when the letter was composed, Francesco I had been dead for some time, but his identical inclinations remained a fresh memory to his successor's court.

For he himself tries alchemical experiments, and he himself is busily engaged in making clocks, which is against the decorum of a prince. He has transferred his seat from the imperial throne to the workshop stool.¹²

This is the position in which Francesco I is depicted in the oft-cited panel from the Studiolo known as “The Alchemists” by Johannes Stradanus (1523-1605, italianized Giovanni Stradano), plainly dressed and engaged in his work (fig. 58).

So far in the context of this study, the “spirits” to theurgy or the antique god-making process were primarily astral quantities, Neoplatonic emanations, or more metaphysical conceptions of the soul, angels, and demons. However, alchemy furnishes another reading into the nature of the “spirits” which occupied Francesco I's experiments generally and the Pratolino automata specifically. Mercury, sulphur, and the arsenic sulfides had been corresponded in antiquity with the Aristotelian “agent” and as distillable materias, they also became “spirits” equivalent to the Stoic pneuma.¹³ Zosimos, an Egyptian alchemist of about 300 A.D., is the author of the earliest surviving works on the subject which mix in equal parts the divine and mundane nature of sulphur water, and his distinctions between the crucial role of the spirits (πνεύματα) -mercury, sulphur, and arsenic- from the soul (ψυχή) anticipate what would become their prominent position in later Arabic

¹⁰ Schaefer, *The Studiolo of Francesco I de' Medici*, 187; Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 11.

¹¹ “Qui vi si spoglia, e vi sta a far lavorare hora questo, hora quell'altro artefice, facendo sempre qualche esperienza, e molte cose di sua mano.” Gussoni, quoted by Berti, *Il Principe dello Studiolo*, 94.

¹² Paula Findlen, *Cabinets, Collecting and Natural Philosophy* in *Rudolf II and Prague: The Court and the City*, ed. Eliska Fuciková et al. (London and New York: Thames and Hudson, 1997), 216; alternately quoted with a final exclamation mark, see Godwin, *The Pagan Dream of the Renaissance*, 124.

¹³ Multhaupt, *Origins of Chemistry*, 110. “Spirit” transitioned from a largely theoretical entity to a class of substance among the Arabs; idem, 174.

alchemy.¹⁴ By definition, spirits are also substances which are entirely vaporized by fire.¹⁵ This alchemical interpretation of the “spirits” of mercury and other chemical agents presents an entirely new reading, one which would only be clear to a reader already in possession of a familiarity with alchemy and its language, of De' Vieri's passage on the automata of antiquity animated by mercury as well as the late-Renaissance automata which incorporated heat, air, and water. A “favorite notion of Arabic alchemy” is the idea, prior to the time of Al-Razi and the Jabirian authors, that metals derive from a mix of mercury and sulphur, though after a brief exploration, this had been contested in the Renaissance by Cardano.¹⁶ Is this a round-about way of explicating the production of “living” automata with mercury? Furthermore, by citing Aristotle's invocation of Democritus, this name would have evoked the other Democritus known to alchemists: the Greek philosopher and mystic who authored the ideology of “Greek” alchemy, identified by historians as Bolos of Mendes.¹⁷ This alchemical Democritus was revered as “a pioneer not in the science of matter, but in the mystic science of the human soul.”¹⁸ Another tentative trait-d'union can also be drawn between the theurgist's perfection of the human soul and the alchemist's perfection of these other kinds of “divine” spirits. The late-Renaissance physician Daniel Sennert (1572-1637) even located mercury as the spiritual principle of the brain on account of its “aetherial character.”¹⁹ More telling for the mindset of the age perhaps, is Sennert's assertion elsewhere that “all bodies which have spirit may be said to live.”²⁰ Although modern historians have drawn a distinction between “esoteric” alchemy, which aligned itself with the theurgist's spiritual ambitions, and “exoteric” alchemy, which concerned itself with the science of matter,²¹ no such divide could be drawn with certainty in the late Renaissance.

Although we tend to associate alchemy primarily with the quasi-magical process of transmuting lead into gold, a 1531-32 German alchemical craftsbook documents its associated

¹⁴ Idem, 85, 111f.

¹⁵ Idem, 137.

¹⁶ Idem, 126; For the assertion about the composition of metals from sulphur and metal, see the twelfth-century Latin manuscript of the *Secret of Creation*, BN Latin MS 12951, fol. 12V reproduced in F. Nau, “Une ancienne traduction latine du Belinoux arabe,” *Revue de l'Orient Chretienne* 2.12 (1907): 99-106. Cardano followed this train of thought, positing the sulphurous fumes and silvery liquids from the smelting process could be the raw materials, but ultimately he concludes that metals are not made of the two substances, though he concedes their similarity. Multhauf, *Origins of Chemistry*, 317; Girolamo Cardano, *De la subtilité*, trans. Richard le Blanc (Paris: Ch. L'Angelier, 1556), 124v-126.

¹⁷ Multhauf, *Origins of Chemistry*, 112-13.

¹⁸ Idem, 116.

¹⁹ Idem, 235; Daniel Sennert, *De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu liber* (Wittebergae: Schüreri, 1629).

²⁰ Sennert, *De chymicorum*, 109. Reproduced in Multhauf, *Origins of Chemistry*, 289.

²¹ Multhauf, *Origins of Chemistry* 112.

mechanical, practical activities, such as artificial amber and pearls as well as instructions on gilding, tinning, and silvering metals, assaying ores, separating gold from alloys by liquidation and aquafortis, cementation, cupellation, and softening gold so that it could be coldworked to goldleaf.²² However, in Italy, alchemical operators catered even moreso to aristocratic audiences than their German counterparts, an audience which Francesco I both exemplified and surpassed.²³

Francesco I appears to make similar appearances in other experimental milieus in the panels lining the close confines of his Studiolo: in the “Glassworks” (“*La Vetreria*”) by Giovanni Maria Butteri (fig. 59) and the “Bronze Foundry” by Francesco detto Poppi (fig. 60). Whereas these panels certainly testify to the Grand Duke's personal involvement in all varieties of industry and experimentation (other activities depicted are: collecting amber, processing wool, pearl fishing, gold and diamond mining, mineral baths, gunpowder factories, and goldsmithing²⁴), the last one presents a temptation for the present study to intuit the circumstances in which the Pratolino automata were manufactured. Indeed, in Poppi's panel there appears to be a cultivated ambiguity between human and artificial forms; in a scene teeming with motion, what part of that is illusionistic, owing to naturalistic sculpture, and what part is truly human? Are the beautiful, partially nude females in the panel's left side human, or artefice wrought by humans? Activity swirls around other idealized forms- the fully-nude female form in the center and the two masculine forms of heroic proportions which flank her on either side- which seemingly marks them as artificial works of art. More than a disquieting work of Mannerist virtuosity, the “Bronze Foundry” panel of Francesco I's Studiolo speaks to the climate from which the “magical,” “proto-scientific” automata of early-modern Europe emerged.

The Grand Duke's experimental zeal is explicit in his personal motto, AMAT VICTORIA CURAM, which was lettered in gold at Pratolino under a niche-grotto containing an allegorical tableau of a weasel beneath a serpent.²⁵ It has been translated as “victory favors those who take pains” and related to this marked dedication to scientific experiment.²⁶ The fruits of the Grand Duke's first-hand labor, it seems, received a place of honor: a mountain of artificial pearls credited to Francesco I's hand remained on display in the Tribuna of the Uffizi from 1591 through the late

²² Eamon, *Science and the Secrets of Nature*, 116.

²³ Idem, 165.

²⁴ Berti, *Il Principe dello Studiolo*, 104.

²⁵ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 40. No iconographical analysis of this niche has yet been attempted by a modern historian.

²⁶ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 11.

seventeenth century.²⁷ It is intriguing to wonder how many of the “pearls” which covered Pratolino's many grottoes were similarly manufactured or “sophisticated”!²⁸ It remains an open question to what further extent the successful products Francesco's experiments were displayed. The princely past-time of making artificial pearls also included the counterfeiting of jewels and metals in the Renaissance and has been linked by the historian Pamela Long to metallurgy, its related alchemies, and the pressing need for a sovereign to promote experimentation in mining and ore extraction in his territories.²⁹ Under the reign of Francesco I, documents testify that jewels were indeed counterfeited which fooled even the most expert jeweller.³⁰ Certainly, other seemingly opulent furnishings around the Grand Duke were in fact clever counterfeits. The lavishly ornate balustrade which encircled the theatre of the villa's piano nobile was testified by Baldinucci to have been of fake marble.³¹ Although the destruction of this theatre along with the rest of the villa and most of the parks insures that we will never know for sure exactly how much of Pratolino's sumptuous decoration was in fact “fake,” we may speculate that its garden grottoes, like those of similarly-minded Renaissance Humanist patrons, may have functioned as a kind of exhibition space for the *Dux mechanicus*'s handiwork. This appears to be the case with some of the stucco statues gracing the nymphaeum of the Villa Barbaro which were made by its patron Marcantonio Barbaro (fig. 61); while not “incompetent,” they are nevertheless manifestly amateurish in comparison with a true master's command of proportions.³²

In a similar vein, Francesco I's experiments with porcelain, china, enamel, and majolica earned Florence primacy of place in ceramic production and trade for their success at imitating the coveted wares from the East. At Francesco I's court, a man was salaried to continually make new experiments to further refine and perfect Medici ceramic production to rival or exceed the quality of “Indian” porcelain.³³ Examples of the blue-and-white Medici ware, which was the closest European

²⁷ Francesco Bocchi and Giovanni Cinelli Calvoli, *Le Bellezze della città di Fiorenza* (Florence, 1677); see also Zangheri, *Pratolino: Il giardino delle meraviglie*, 24; Berti, *Il Principe dello Studiolo*, 93.

²⁸ The “sophistication” of pearls, precious stones, and metals for use in the visual arts was considered in the Renaissance to be one of the “good” ends of alchemy; see Newman, *Promethean Ambitions and the Quest to Perfect Nature*, 116.

²⁹ Pamela Long, *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600* (Corvallis, Oregon: Oregon State University Press, 2011), 107-110.

³⁰ E.g. the 1576 letter from the Venetian ambassador Andrea Gussoni, quoted in Berti, *Il Principe dello Studiolo*, 94.

³¹ Mastrarocco, *Le Mutazioni di Proteo*, 118.

³² Godwin, *The Pagan Dream of the Renaissance*, 152.

³³ “Ha di più ritrovato modo di fare la porcellana d'India, e riesce a tutte le prove, della medesima qualità che quella dell'Indie, cioè nel trasparire, al getter il fuoco, nella leggerezza, nella sottigliezza, ed in tutte le altre condizioni, e mi disse S.A. esservi stato attorno dieci anni prima che l'abbia potuta ritrovare, poi n'ebbe un poco di lume da uno venuto di Levante, e di poi ordinariamente vi ha S.A. fatto lavorare un uomo salariato per questo, facendo ogni giorno nuova

approximation of Chinese porcelain for its time, survive as rarities (fig. 62). Due to the technical difficulty and production costs, with the death of Francesco I came too the end of the brief life of Medici porcelain. The successful negotiation with Venice for glass-workers from Murano resulted in the establishment of an industrial-scale furnace in Florence; the Venetian ambassador Gussoni even that the vases “made by the prince's hand” came out beautifully.³⁴ Technology related to glass and hardstone-cutting however flourished and was even exported from Florence to Rudolph II's court in Prague in the early seventeenth century.³⁵

Perhaps no other technological innovation was as emblematic of Medici power as their prowess in cutting hardstone and the subsequent development of *pietre dure* artworks. Although Francesco I's brother and successor Ferdinand vaunted himself as the inventor of this technique,³⁶ credit truly belongs to Francesco I's incubation of artists and the experimental method. Under Francesco I's father Cosimo I, the secret to cutting and sculpting the notoriously hard stone porphyry came to light: it was a new tempering formula of herbal liquor, discovered by experiment, in 1555 by either Cosimo de' Medici or the sculptor Tadda.³⁷ One of the most visible, if under-recognized applications of this technological feat was the porphyry statue of Justice still seen on top of the column of Santa Trinità today (fig. 63). Meanwhile, the *pietre dure* technique, the method of cutting and arranging pieces of hard-stone on a two-dimensional surface, was begun in Florence around 1568, the same time as the start of the project of the Princes' Chapel in San Lorenzo (fig. 64). Under Francesco's guidance, *pietre dure* works seem to have been exclusively geometric affairs; while under Ferdinando, more elaborate figural scenes designed by painters such as Cigoli and Bilivert were incorporated in the chapel.³⁸

Joscelyn Godwin however reminds us that for all of the statements which the San Lorenzo burial chapel made about wealth, dominance, and technical mastery, to the minds which conceived it,³⁹ the *pietra dura* interior was just as much informed by motivations and associations now

esperienza, e incredibile pazienza, guastandone le migliaia prima che ne sia venuto in cognizione.” Ibid.

³⁴“Questi vasi, e per la materia in se molto nobili, e vaghi, e tanto più desiderabili, quanto, che sono fatti dalla mano del pincipe, e anco per il lavoro riescono molto belli.” Ibid.

³⁵ See Lily Filson, “Rudolph II's Grotto and Francesco I de' Medici's Pratolino: New Observations,” *Studia Rudolphina* 15 (2015): 141-2. A letter dated July 25, 1587 from Giovanni Gargioli to Francesco I informs the Grand Duke of the emperor's happiness upon receiving stone-cutting and polishing devices sent from Florence; Guido Carrai, “I Fiorentini al castello: il progetto di Bernardo Buontalenti e Giovanni Gargioli per la nuova galleria di Rodolfo II,” *Umèni* L1 (2003): 373.

³⁶ Berti, *Il Principe dello Studiolo*, 293.

³⁷ Godwin, *The Pagan Dream of the Renaissance*, 110.

³⁸ Idem, 293.

³⁹ It was designed by Francesco I's heir Don Giovanni de' Medici (1566-1621).

alienated by the passage of time. In this instance, Godwin cites the medieval lapidary tradition, which functioned as an early encyclopedia of the healing and magical virtues of stones, and the desire to imitate the antique Pantheon's surviving interior of colored marble were sixteenth-century concerns that we can discern in the Medici's burial chapel at San Lorenzo.⁴⁰ It is this secondary level within Medici technology and commissioned work, the level which corresponds to currents in philosophy, natural science, and our modern catch-all category of "magic," which underlay many Medici experiments and the new kinds of art works which they produced.

Reports also exist that the Grand Duke learned how to melt rock-crystal and recast it; although, as with so many of his varied creations, surviving material evidence is lacking.⁴¹ However, at one point, a fountain consisting of a mountain of transparent rock crystal executed by Giovanni del Tadda in 1589 spurted water in a niche directly behind the Venus statue within the third room of Grotta Grande of the Boboli Gardens (fig. 65).⁴² Calcification over the ages has rendered it today indistinguishable from the sponge-like encrustations covering other areas of the grotto.

Refinements in the distillations of medicine and poisons also appears to have been an avid pursuit attested to by the thousands of scorpions which were required for the latter enterprise.⁴³ In this field, there was also ample room for overlap with esoteric philosophy, per the interpretation by Italian naturalists of how "quintessences" could be captured via distillation. William Eamon wrote that during this time period, the products of distillation were thought to be identical to the celestial spirits radiating from the heavens and "thus alchemy, and in particular distillation, was a way of investigating, directly and empirically, the celestial virtues at work in the terrestrial world."⁴⁴ The extension of this philosophy of distillation to the Neoplatonic and Hermetic methods of investing man-made statues with life through natural materials invested with such celestial virtues is tantalizing for the present study. Might these distillations be the key to unlocking how the Medici court understood astral influences to be captured, and later activated?

Francesco I certainly was enthusiastic about taking his meals with distilled waters and a range of food whose esoteric ingredients defy a simple classification, as Berti does, as merely a

⁴⁰ Godwin, *The Pagan Dream of the Renaissance*, 109.

⁴¹ *Idem*, 101.

⁴² Access to the innermost grotto in Boboli was not permitted, and the placement of this fountain behind the central Venus fountain is a further impediment to both its visibility and any further analysis of material.

⁴³ *Ibid.*

⁴⁴ *Idem*, 158.

“Mannerist menu,” and rather beg an analysis within the edifice of Ficinian astral medicine. Consider the impressions of a contemporary of Francesco I's diet in his final days:

Everything was caused by old disorders owing to too much continuous drinking of the *Elisir Vitae* and its waters, and water hardened by alchemically-worked and altered minerals, and from immoderate and noxious familiarity with essences of vitriol oil, and too frequent distilled-cinnamon water; from eating meals made up by their own natural warmth, cakes with all kinds of spices, ginger, nutmeg, carnations, pepper and *macis*, mashed capons (castrated roosters), pheasant, *francolini*, partridges and *starne* minutely ground up, filled with egg yolk, with bran of sugar and saffron-infused flour; to sip continuously at meals and after meals, egg with a pesto of long Spanish peppers, (he would) fill always fill himself fatty and 'trivial' foods and vile stuffs, hard to digest, garlic from India, with black pepper, onions, leeks, shallots, small garlicks, even raw onions, branches, roots, German horseradish, *raperonzoli*, artichokes, *cardonni*, *gobbi*, celery, nasturtium-flower and rocket from India, chestnuts, pears, mushrooms, truffles, and in jaw-dropping quantities every kind of cheese...⁴⁵

We may speculate that beyond simple (over-)nourishment, Francesco I may have been trying to ingest planetary influences through the foods and natural materials which the Ficinian system of medicine had assigned to particular planets and their corresponding presiding deity. Sugar, saffron, roosters, and carnations were all materials with solarian properties; in other words, by ingesting them, you were taking into your body substances invested with the rays from the Sun (considered at the time as a planetary sphere) and Apollo by association. We might speculate that these astrologically-charged foods and distilled waters and oils were another potential avenue in which planetary influences may have been extended by Francesco I to his own person.

Regardless of his own personal views about the ingestion of planetarily-charged substances, The Venetian ambassador Andrea Gussoni wrote that the Grand Duke possessed a deep knowledge and delight for distillation and its resulting waters and medicinal oils, and that he had an oil for

⁴⁵ My translation. “Ma tutto era causato da vecchi disordini di troppo continova beuta d'Elisir Vitae e suo acquerello, e acqua arzente da mezzi minerali alchimiata e alterata, e da immoderata e nociva familiarità di spirito d'olio di vetriolo, e troppo frequente acqua di cannella stillata; dal mangiar paste di composizioni calide, torte con tutte sorte di spezierie, giengiovo, noce moscada, gherofani, pepe e macis, polpe di capponi, fagiani, francolini, pernici e starne minutissamente grattugiate, intrise con rossi d'uova, con crusca di zucchero e farina inzafferanata; dal sorbire a pasto e dopo pasto continuamente uova con pepe lungo di Spagna pesto, empirsi sempre di cibi grossi e triviali et di vil robaccia, dura a smaltire, agli d'India, con pepe nero, cipolle, porri, scalogni, aglietti, cipolle maligie crude, ramolacci, radice, rafano tedesco, raperonzoli, carciofi, cardonni, gobbi, sedani, ruchetta e nasturzio indiano, castagne, pere, funghi, tartufi, e in strabochevole quantità ogni sorta di formaggio...” Soderini, quoted in Berti, *Il Principe dello Studiolo*, 45.

nearly every ailment.

And amongst the others an oil of such an excellent virtue, that applying drops to the wrists, the heart, the stomach, and the throat, it cured every type of poison, cured the plague-stricken,...and every kind of malignant fever, and I've been told that to test it against poison, persons condemned to death are made to drink poison and then cured of everything by this oil, of which he wanted to give me some in a little ampoule.⁴⁶

We have in this passage not only an extraordinary testament to the lengths that experimentalism of Francesco I was taken with condemned prisoners as human test subjects, but we also see that the pursuit of the extreme powers of alchemy Benedetto Varchi, a prominent Aristotelian, had warned “good princes and well-ordered republics” against in his *Questiones sull'Alchimia* (1544) were being utterly ignored.⁴⁷ We might surmise that the disregard Francesco I and his experiments in distillation demonstrated for the cautionary words of Varchi implied that the pursuit of knowledge through experiment was paramount, regardless whether it veered into spiritually dangerous territory.

Other awe-inspiring projects overseen by Francesco I de' Medici included the raising of silkworms as well as the production of incendiaries and ballistics. The latter category included the grenade-bomb, dubbed the “devil-chaser” (“*Scacciadiavoli*”⁴⁸) and another device which belonged to a fireworks display can be seen in the sky above the Loggia dei Lanzi, documented in a fresco by Stradano in the Palazzo Vecchio (fig. 65).⁴⁹

Still more “wonderful” inventions reveal further attempts to penetrate the secrets of life and the cosmos. Francesco I's unsuccessful attempts to artificially incubate eggs⁵⁰ may be interpreted as stemming from the same desire to know the secrets of life which informed experimentation with bringing “life” (movement, per Aristotelian and Platonic definitions) to inert sculpture. There is also

⁴⁶ My translation. “Delle buone ne ha molta cognizione, ma soprattutto ha gran diletto di lavorare di lambicchi, formando molte acque, e olii sublimati atti al medicamento di molte infermità, e n'ha quasi per ognuna d'esse. Et fa fra l'altre un olio di sì eccellente virtù, che con ungersi di fuori li polsi, il cuore, e lo stomaco, e la gola e' guarisce d'ogni sorte veleno, sana gl'appetati,...ad ogni sorte di febbre maligna, e mi ha detto averne voluto far l'esperienza quanto al veleno, in persone condannate alla morte facendoli bere del veleno, e guarendogli poi del tutto con detto suo olio, del quale ha voluto farmi parte di una piccola ampollina.” Gussoni, quoted in Berti, *Il Principe dello Studiolo*, 94-95.

⁴⁷ Varchi wrote that while some forms of alchemy, such as those practiced by artisans, were well and good, to be avoided at all costs was “sophistical” alchemy, the kind that claims to transmute gold or make marvelous drugs that restore youth and cure all diseases. See Eamon, *Science and the Secrets of Nature*, 159

⁴⁸ Berti, *Il Principe dello Studiolo*, 93.

⁴⁹ Eamon, *Science and the Secrets of Nature*, 270.

⁵⁰ Berti, *Il Principe dello Studiolo*, 93.

evidence supporting the pursuit of, and apparently success to some degree in making, a perpetual motion device in tandem with Buontalenti, more than twenty years before Cornelius Drebbel presented his own version of the device to King James in 1607,⁵¹ which incorporated the four elements of fire, earth, air, and water. A rather opaque Latin epigraph stands in testament to Francesco's and Buontalenti's accomplishment, but offers little clarification:

Occultas aperit res Belli dextra Talenti,
Perpetuoque iugem pondere librat aquam.
Nam velut arteria, stomacho [sic] ceu vita fovetur
Sic opus motu fistula bina fovet.
Magno parta duci laudis pars detur hetrusco,
Qui non dux operis sed velit esse comes.⁵²

Even more mystery-machines were conceived, and apparently realized at Pratolino, by Francesco I and Bernardo Buontalenti, such as a cloud-making apparatus testified to by Baldinucci's description of an *Intermedio* performed in the theater of Pratolino's villa: "In the first *intermedio* appeared a cloud of such exquisite artifice, which had never been seen before or since."⁵³ Another description of a machine at Pratolino defies modern comprehension. Apparently, using only water and colored iron filaments, images were made to appear therein of a fully-rigged ship, a small garden with a stream, a palace with windows and smoke from the chimney, a bird extending its wings to take flight, and flowers- tulips, daffodils, jasmine, roses, and lilies- true to their natural colors.⁵⁴ Three centuries later, descriptions of the experiments of the Irish physicist John Tyndall

⁵¹ More has been written about Drebbel's device as a "working model of Jacobean political mystery, one that both appropriates and transforms its key concept of the *arcana imperii*, or mysteries of state." Certainly, this reading can be seamlessly applied to the politics of power and mystery which must have surrounded Buontalenti's device for Francesco I. The account by Thomas Tymme of the 1612 demonstration of Drebbel's machine shrouds it in hermetic and political secrecy, much as the Latin epigraph does for Francesco I's. See Wolfe, *Humanism, Machinery, and Renaissance Literature*, 66; Thomas Tymme, *A Dialogue Philosophicall. Wherein Natures Secret Closet is Opened... Together with the wittie invention of an Artificiall perpetuall motion, presented to the Kings most excellent Maiestie* (London: Printed by T.S. For Clement Knight, 1612), 60-62.

⁵² P.F. Assirelli, quoted by Berti, *Il Principe dello Studiolo*, 93-94.

⁵³ My translation from Baldinucci, quoted in Mastroiocco, *Le Mutazioni di Proteo*, 119.

⁵⁴ Here I translate Zangheri's description: "Because of small mechanisms placed over an aperture, water formed 'the most curious and miraculous things. I won't say a lily, arms of Florence, or the balls or arms of the Medici, as common representations. But placing in the middle a hull and the water formed the sails, the ropes, and the flags of a ship. Now a small garden, and the water formed the streams, the leaves of the trees, the hoar-frost of the herbs. Now a palace and the water imitated the crystal of the windows, and the smoke from its chimneys. Now a bird, and the water makes it extend its plumes to take flight, raising its neck and moving its eye, as if looking towards the sun. Now a bunch of flowers, and the

with directed light and water vapor furnish strikingly similar effects,⁵⁵ but not enough is known about Francesco I and Buontalenti's methods to make any further comparison.

In the paragraphs above, we have mentioned Francesco's patronage of a wide range of activities, but by no means is this section meant to be a comprehensive list either. Nevertheless, all of these diverse activities served the ultimate purpose of advancing the Tuscan Grand Duchy's prominence on the European stage either through breakthroughs in industrial and commercial activity or through the direct enhancement of Francesco I's sovereign image and reputation. For the latter, wonderful machines which appeared to harness powers reserved only to a divine creator, such as the manufacture of weather phenomena or the mastery of every element in the perpetual-motion machine just mentioned, were perhaps the most potent statements about the extraordinary capabilities of the Grand Duke, and within this category belong the Pratolino automata which straddled definitions of magic and mechanics at the close of the sixteenth century.

6.2. The Machines of Power

The wonderful machines and processes whose invention Francesco I oversaw were the tip of the iceberg of the Medici's massive power structure in sixteenth-century Florence. Politically, Francesco I also had the benefit of inheriting a variety of entities created and supported by his father Cosimo I (1519-1574). These included the transformation of previously independent academies into what were effectively apparati of state (in the case of artistic production, the transformation of the moribund Compagnia San Luca, started by Vasari, into the Compagnia del Disegno (1563); for letters, the Accademia degli Umili, preceded by the Accademia Platonica,⁵⁶ became the Accademia

tulips, the daffodils, the jasmine, the roses, and the lilies appear in their natural colors made by water, an effect achieved by very fine threads of colored iron." Zangheri, *Pratolino: il giardino delle meraviglie*, 44).

⁵⁵ "The vapors of certain nitrites, iodides, and acids are subjected to the action of the light in an *experimental tube*, vying horizontally, and so arranged that the axis of the tube and that of the parallel beams issuing from the lamp are coincident. The vapors form clouds of gorgeous tints, and arrange themselves into the shapes of vases, of bottles and cones, in nests of six or more; of shells, of tulips, roses, sunflowers, leaves, and of involved scrolls. 'In one case,' he tells us, 'the cloud-bud grew rapidly into a serpent's head; a mouth was formed, and from the cloud, a cord of cloud resembling a tongue was discharged.' Finally, the cap the climax of marvels, 'once it positively assumed the form of a fish, with eyes, gills, and feelers. The twoness of the animal form was displayed throughout, and no *disk, coil, or speck existed on one side that did not exist on the other.*" Blavatsky, *Isis Unveiled*, 72-73.

⁵⁶ The meetings of the Accademia Platonica in the Rucellai Gardens between 1502-1506 are documented by Giovan Battista Gelli (1498-1563); see Armand L. De Gaetano, "The Florentine Academy and the Advancement of Learning through the Vernacular: The Orti Oricellari and the Sacra Accademia," *Bibliothèque d'Humanisme et Renaissance* 30 (1968): 22.

Fiorentina in 1542).⁵⁷ The effect of the incorporation of these new academies has been analyzed as a promotion of the sister arts of letters and design on the surface, while effectively functioning as a “disciplinary apparatus” designed to systematically implement the Medici programme of cultural politics in the works of the writers and artists which they produced.⁵⁸ The elite groups which headed the academies derived their authority from and owed their allegiance to the Duke; in turn, they were invested with authority over their respective academies which in the Florentine Republic had been self-regulating. Cosimo I has been recognized as a master of the art of nullifying potential sources of opposition by employing them.⁵⁹ No greater threat to the Duke's image could exist than dissenting thought expressed either in writing or the arts, and the seizure of control of what, in the Renaissance, could be dubbed the “media” has been advanced as the critical context for understanding the motivation of the creation of the two academies.

Cosimo I's patronage set a tone which resounded throughout his reign and in many scholarly works which analyze the political function of his commissioned works.⁶⁰ Notable examples among them are the marriage entry of Eleonara of Toledo in 1539,⁶¹ Benvenuto Cellini's *Perseus* and the competition for the Neptune fountain,⁶² on a macro-level, the entire transformation of the Piazza della Signoria from one invested with Republican associations to an open-air Ducal

⁵⁷ Charles Dempsey also relates the foundation of the latter with Cosimo I's revival of the University of Pisa and its College of Scholars, the context in which Francesco de' Vieri's career both flourished and by which his Platonist lectures were stymied. See Dempsey, “Some Observations on the Education of Artists in Firenze and Bologna during the Later Sixteenth Century,” 555.

⁵⁸ Ibid; Sang Woo Kim, “Historiography of Duke Cosimo I de' Medici's Cultural and Politics and Theories of Cultural Hegemony and Opposition,” *The Michigan Journal of History* (2006): 4; see also Barzman, *The Florentine Academy and the Early Modern State* (Cambridge: Cambridge University Press, 2000).

⁵⁹ Dempsey, “Some Observations on the Education of Artists in Firenze and Bologna during the Later Sixteenth Century,” 555.

⁶⁰ See Sang Woo Kim, “Historiography of Duke Cosimo I de' Medici's Cultural and Politics and Theories of Cultural Hegemony and Opposition,” *The Michigan Journal of History* (2006): 1-70; Eric Cochrane, *Florence in the Forgotten Centuries 1527-1800*; Eisenbichler, *The Cultural Politics of Duke Cosimo I de' Medici* (Chicago: University of Chicago Press, 1973); Paul Richelson, *Studies in the Personal Imagery of Cosimo I de' Medici, Duke of Florence* (New York: Garland, 1978).

⁶¹ Kim, “Historiography of Duke Cosimo I de' Medici's Cultural and Politics and Theories of Cultural Hegemony and Opposition,” 11-30; Mary A. Watt, *Veni, sponsa. Love and Politics at the Wedding of Eleonora di Toledo* in *The Cultural World of Eleonora di Toledo*, ed. Konrad Eisenbichler (Aldershot: Ashgate, 2004), 18-39; Andrew C. Minor and Bonner Mitchell, *A Renaissance Entertainment. Festivities for the Marriage of Cosimo I, Duke of Florence, in 1539* Columbia: University of Missouri Press, 1968).

⁶² Kim, “Historiography of Duke Cosimo I de' Medici's Cultural and Politics and Theories of Cultural Hegemony and Opposition,” 30-45; Randolph Starn and Loren Partridge, *Arts of Power: Three Halls of State in Italy, 1300-1600* (Berkeley: University of California Press, 1992); Rossi, *Sprezzatura, Patronage, and Fate: Benvenuto Cellini and the World of Words in Vasari's Firenze: Artists and Literati at the Medicean Court*, ed. Philip Jacks (Cambridge: Cambridge University Press, 1998), 55-56.

gallery of masterpieces,⁶³ the Uffizi's new facade,⁶⁴ the triumphal entry *all'antica* of Joanna of Austria (Francesco I's bride) in 1565, and the funeral of Michelangelo in 1564.⁶⁵ This model of patronage as a means to assert political and cultural dominance, along with the creation of academies of arts and letters mentioned above, continued well after his death, through the works of his son through the end of the sixteenth century. Collecting instruments, sponsoring mechanical treatises, and employing spectacular machinery were another tactic of the Renaissance sovereign not only to underline the superior role and capacities of the ruler, but through the use of machinery to clarify, justify, test out, and reproduce the principles of political instrumentalism.⁶⁶

Francesco I continued to exploit these channels to express in letters and the arts the perennial theme of Medici domination, and with compelling reason: although Francesco I was handed the reins of government in 1564, he inherited the title of Grand Duke when Cosimo I died in 1574.⁶⁷ The subsequent funeral which Francesco I staged has been called a “landmark in the political and artistic history of Florence;” it was self-consciously modeled off of the imperial funeral staged by Philip II for his father Charles V, all “spanish solemnity merged with pagan splendor.”⁶⁸ Although the title of Grand Duke had been granted to Cosimo I in 1569 by Pope Pius V, there were still rumblings of illegitimacy throughout the European establishment; Philip II had opposed further elevation from the original ducal diploma issued by Charles V, and Maximilian of Austria never recognized the title during Cosimo's lifetime. Therefore, as Eve Borsook has underscored, the funeral and other displays of magnificence addressed very real insecurities present within the Medici power-front on the continent. Two years after Cosimo's death and the magnificent “imperial-esque” funeral staged by Francesco I, Maximilian of Austria recognized the Grand Ducal title.⁶⁹

Not only letters and arts were instruments of asserting power and supremacy, mechanical

⁶³ John Shearman, *Only Connect...: Art and the Spectator in the Italian Renaissance* (Princeton: Princeton University Press, 1992), 52.

⁶⁴ See Roger Crum, “Cosmos, the World of Cosimo: The Iconography of the Uffizi Facade,” *The Art Bulletin* 71 (1989): 249.

⁶⁵ Kim, “Historiography of Duke Cosimo I de' Medici's Cultural and Politics and Theories of Cultural Hegemony and Opposition,” 46-63; Rudolf and Margot Wittkower, *The Divine Michelangelo: The Florentine Academy's Homage on His Death in 1564* (London: Phaidon, 1964).

⁶⁶ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 21.

⁶⁷ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 9; Godwin, *The Pagan Dream of the Renaissance*, 100.

⁶⁸ Eve Borsook, “Art and Politics at the Medici Court I: The Funeral of Cosimo I de' Medici,” *Mitteilungen des Kunsthistorischen Institutes in Florenz* 12 Bd., H. ½ (1965): 31.

⁶⁹ Idem, 35-36.

“wonders” held a special place in this program. Mechanical artifice could both create and overthrow political authority; perpetual motion devices and awesome scenographic effects were much more than entertainments and trifles for the court, though it was certainly fashionable to dismiss them as such.⁷⁰ These were the vehicles, symbolic as well as tangible, to enact unconstrained displays of power seemingly beyond the limits of ordinary human subjects.⁷¹ Mechanical models also possessed a particular significance for the ruler who possessed them: a prince examining miniature ships, clocks, or even models of the planetary spheres explores not only divine mysteries but his own *corpus mysticum* and nature as demiurge, which shall be explored shortly below.⁷² This latter class of models, as we have seen in the previous chapter, shares aspects of transcendent Neoplatonic philosophy with immediate analogies to the Pratolino automata. Collectors and users demonstrated “almost the same genius as the Author of the heavens,” legitimating by analogy notions of kingship and rule.⁷³ Wolfe calls these planetary models “corporeal by nature but divine by analogy.” Automata which simulated humans, animals, and gods, and by this same analogy demonstrate command of the secrets of manufacturing artificial life as the planetary models did for mastery of the divine heavenly order, round out the impressive arsenal of absolutist artworks commissioned by both Francesco I and his father Cosimo.

One of the most innovative practical applications of machinery was as non-human labor, which dramatically underscored Francesco's I's expression of absolute power while providing the luxury of solitude for his particular personality. At Francesco I's Pratolino, automata acted out elaborate theatrical tableaux of myth and allegory, but they also supplanted human labor as well, whether symbolically or functionally. Pratolino was “populated” with artificial common laborers, which was yet another novel stylistic feature observed by historians; the statue of the Laundress and its adjacent fountain of the little boy urinating, the peasant sculpture near the Fountain of the Salamander, and the peasant automaton in the Grotto of Fame's tableau which proffers a cup of drinking water to a dragon are the principle examples of this genre at Pratolino. To the north, we see this taste for the “vulgar and humorous” manifest itself in sculpture for Archduke Ferdinand I's Schloss Ambras near Innsbruck; mercenaries, Hungarians, Jews, beggars, fools, and gypsies

⁷⁰ See William Bourne, *Inventions or devises very necessary for all generalles and captaines, or leaders of men* (London: Thomas Woodcocke, 1578); Thomas Hill *A Briefe and Pleasant Treatise, entituled, Naturall and Artificiall Conclusions* (London: John Kyngston, 1581); see also Wolfe, *Humanism, Machinery, and Renaissance Literature*, 71, 74.

⁷¹ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 68.

⁷² *Idem*, 188.

⁷³ *Ibid*; Marsilio Ficino, *Platonic Theology*, tr. Burroughs, 235.

populated his lavish hydraulic garden.⁷⁴ Another aspect to this theme can be found in Pratolino's miniaturized automata which mimicked the mill and the forge, which were sketched in partial form by Giovanni Guerra (fig. 66). However, Pratolino's ultimate achievement in the translation of the common man's labor to an automated task could be witnessed in the "Grotto of Food," the innermost vestibule within the complex of grottoes beneath the villa. A marble page poured water from a pitcher and appears also to be holding a towel in its only surviving image, also by Guerra (fig. 67). Medieval literature had dreamt of artificial servants serving great princes, such as the *Roman de Troie's* two non-human automata which surveille Prince Hector's visitors and correct any unseemly behavior.⁷⁵ Daston and Park articulated the power of such automata, although in the context of those encountered in literature,

Automata functioned as ideal servants: beings useful for the discipline and surveillance of others, and over whom their owners could have in turn perfect control. Finally, they helped their noble (and not-so-noble) readers and hearers to internalize increasingly stringent standards of courtly conduct intended to elevate them above the rest of society.⁷⁶

Would the gaze of the non-human page have been intended to have a similar effect upon Francesco I's visitors to his inner sanctum? In the more extreme guise of the automata which wetted and dirtied visitors to the medieval Chateau d'Hesdin (and by extension, the analogous water tricks of Pratolino and other Renaissance hydraulic gardens which came a century later), Daston and Park have recognized that regardless of the "bumptious" form which they assumed these were other forms of mechanical surveillance and discipline which reinforced the power of their owner.⁷⁷ In addition to the page, in the center of the same grotto was a monumental table of jasper, also seen in Guerra's drawing and in early plans of the villa's ground floor, with eight places settings filled by a

⁷⁴ This vogue was apparently not the only taste exchanged between Archduke Ferdinand and Francesco I; in 1581, Francesco sent a sallet belonging to his grandfather Giovanni delle Bande Nere and a suit of armor belonging to Cosimo I to the growing collection at Ambras, still renowned. Godwin, *The Pagan Dream of the Renaissance*, 115-117; see also Luigi Zangheri, "Curiosities of the Sixteenth Century Garden," *The Architecture of Western Gardens: A Design History from the Renaissance to the Present Day*, eds. Monique Mosser and Georges Teyssot (Cambridge: M.I.T. Press, 1991), 67.

⁷⁵ One holding a mirror so that the visitor may perceive himself any imperfections not only in their dress and appearances, but also in attitude and manners, and the automaton with the censor which watched and conveyed by discreet signs to the guests what was required of their behavior so that "no one could be irresponsible or foolish or uncourtly or senseless there, for the statue very cleverly kept them all from any uncourtly action [*vilanie*]." Benoît de Sainte Maure, *Roman de Troie*, II, 14685-710; see all Daston and Park, *Wonder and the Order of Nature*, 91.

⁷⁶ Daston and Park, *Wonder and the Order of Nature*, 91.

⁷⁷ Idem, 100.

stream of water flowing from the center, all carved from the hard stone. A hidden wheel corresponded to the palace kitchens, located behind the grotto's rear wall, ensuring that Francesco and his guests (seven, at the maximum) would never have to lay eyes upon a human servant, and vice versa. With these innovations, we can read the introverted and socially-exclusive personality of Francesco I writ large.

Although the details of much of the machinery credited to Francesco I and Buontalenti leaves us with perhaps more questions than when we started (How were clouds created? How did they form images from just water and colored filament? Did the marble page just described really pour the water? The textual and visual documents remain mute on these points and many more), the singular certainty to be gleaned from these investigations is that Francesco I was, in the words of his contemporary Antonio Giacomini, one who “summarily delighted in notice of the most admirable things of art or nature [and] investigating in them the occult reasons and recognizing the excellence of human ingenuity.”⁷⁸ Or, in the words of Montaigne, Francesco was the “Prince who dreamed a bit of alchemy and the mechanical arts.”⁷⁹

Francesco I had many locations where he could immerse himself in his experiments and other esoteric pursuits, but Pratolino alone possessed the special requisites that made it unique among his holdings. Joscelyn Godwin called Pratolino “ultra-modern, and all the more so since it was a testing ground for the latest in technology”,⁸⁰ Eugenio Battisti likened it to Francis Bacon's vision of utopia, New Atlantis,⁸¹ and Mila Mastrococco designated Pratolino “at the center of (an) atmosphere of extreme experimentation that characterized the reign of Francesco I” and an “index of the new interests that intellectuals experienced in problems of the material and scientific order,” with an emphasis upon the unusual animation of forms.⁸² Pratolino, in other words, was a kind of proving-ground and a laboratory with virtually unlimited funding for the currents of thought which coursed through Francesco I's court at the end of the sixteenth century. Additionally, Pratolino represented a large-scale world in miniature, and it was destined to be “populated” with the artificial life engineered by Francesco I and his engineers.

The image of Francesco I as the embodiment of the ideal Renaissance prince circulated as his fame for grew throughout Europe from descriptions like Giacomini's or Montaigne's. Francesco

⁷⁸ My translation from Giacomini, quoted by Berti, *Il Principe dello Studiolo*, 96.

⁷⁹ My translation of “Prince souignieus un peu de l'alchemy et des ars mechaniques.” Montaigne, quoted by *ibid.*

⁸⁰ Godwin, *The Pagan Dream of the Renaissance*, 175.

⁸¹ Battisti, *L'antirinascimento*, 277.

⁸² My translation from Mastrococco, *Le Mutazioni di Proteo*, 122.

I's interest in wonders which defied human understanding belonged to the continent-wide vogue among the elite for amassing collections of the most wonderful objects which could be had. Francesco I's patronage tendencies were in good company; in many respects the Habsburg emperor Rudolph II, his contemporary and nephew through marriage (Joanna of Austria was the sister of Rudolph's father Maximilian II), was a kindred spirit whose collecting patterns have received more study. Rudolph II was a collector, alchemist, astrologer, protector of science, maecenas to art and culture, and overall an introverted recluse who shrugged the reins of government in favor of his laboratories; however, the historian Luciano Berti writes that Francesco I never quite reached the extremes of his Bohemian counterpart.⁸³ This also holds true at first glance for the size and scale of their respective collections of curiosities, the *Wunderkammern*, which aspired to be a complete and representative encyclopedia of the cosmos. In comparison to these great collections farther north, in Prague⁸⁴ or the similarly vast collection of Archduke Ferdinand at Ambras Castle in Austria, the Studiolo of Francesco I in the Palazzo Vecchio was a modest affair: what it lacked in size, it made up for in sheer levels of iconographical complexity concealing a nevertheless thorough representation of the cosmos in miniature.⁸⁵ However, several historians have submitted Pratolino as a kind of large-scale, open-air *Wunderkammer*, and in this endeavor, Francesco I surpassed all of his peers. We now turn to an examination of how these highly-personalized space were inhabited and understood by the Medici *dux mechanicus*.

The Studiolo and the villa and parks at Pratolino were begun in the same year and make up two sides of the same proverbial coin; both were intended to be private spaces of refuge for the Grand Duke, and both were decorated with artworks informed by the same mythological symbolism. However, whereas the Studiolo was confined, perhaps claustrophobic, Pratolino was expansive and sprawling; whereas the Studiolo was intended for solitary contemplation of the painted panels concealing cabinets of curiosities, Pratolino offered different and varied milieus (garden grottoes, fountains, and fantastic constructions) to be discovered and experienced in diverse ways. Although the Studiolo's measurements may have matched those of a monk's cell, a critical

⁸³ Berti, *Il Principe dello Studiolo*, 97.

⁸⁴ See Rotraud Bauer and Herbert Haupt, "Das Kunstkammer Kaiser Rudolf II, 1607-1611," *Jahrbuch der kunsthistorischen Sammlungen in Wien* 72 (1976); Thomas DaCosta Kaufman, "Remarks on the Collections of Rudolf II: the *Kunstkammer* as a Form of *Representatio*," *Art Journal* 38 (1978): 22-28; Eliška Fucíková, "The Collection of Rudolf II in Prag," *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe*, eds. Oliver Impey and Arthur MacGregor (Oxford: Oxford University Press, 1985), 47-53.

⁸⁵ See Schaefer, *The Studiolo of Francesco I de' Medici in the Palazzo Vecchio in Firenze*; Bredekamp, *The Lure of Antiquity and the Cult of the Machine*, 21; Brown, "Francesco I de' Medici and the Renaissance Microcosm"; Bardeschi et al., *Lo Stanzino del Principe in Palazzo Vecchio*.

difference in function has been identified: whereas a monastic cell or other area for contemplation, and particularly the images that adorned it, were intended to bring its inhabitant *out* of the material world through meditation, the Studiolo and its images were intended to situate its inhabitant *within* the world, mirroring his qualities, aspirations, and knowledge and placing them within a “historical, moral, Hermetic, or cosmic context.”⁸⁶ Yet, despite their differences in scale, several historians have proposed a reading of Pratolino as a sprawling variation on the studiolo: a microcosm built on a grand scale, with earthly and cosmic correspondences.

Clare Brown observes that whereas the figure of Prometheus is painted prominently in the central ceiling lunette of Francesco's Studiolo in the Palazzo Vecchio, there is no trace of Prometheus anywhere in any of Pratolino's assorted artworks.⁸⁷ With this reading in mind, she proposes that the role of Prometheus, the bringer of civilization to mankind and the founder of technology, was embodied by Francesco I himself when he was in residence at Pratolino.⁸⁸ Such a position is not without precedent in Italian Renaissance garden and villa scholarship: Maria Luisa Madonna advanced a theory that Cardinal Ippolito d'Este identified personally with the Tiburtine Sibyl of ancient Rome- through their priestly vocation and requisitely chaste lifestyle- which informed the creation of the miniature “Rometta” at his Villa d'Este.⁸⁹

The historian Horst Bredekamp has also analyzed the significance that the Prometheus myth held for the princely Renaissance collectors in Europe and particularly in Italy, citing the Studiolo of Francesco I specifically.⁹⁰ Bredekamp's analysis takes into account another tradition of the Prometheus myth since the time of Pliny: that Prometheus possessed the ability to work with nature's hardest and most valuable metals and gems, that he taught man the practice of wearing ring's, the first collectibles, and in some versions, that even as he was chained to the mountain where the eagle pecked at his liver, he continued to apply himself to working with diamonds and other precious stones.⁹¹ From this tradition developed the association of Prometheus not only with

⁸⁶ Godwin, *The Pagan Dream of the Renaissance*, 85.

⁸⁷ See Brown, “Francesco I de' Medici and the Renaissance Microcosm.”

⁸⁸ “(Francesco I) believed he was in direct contact with Nature when carrying out his experiments and when he was working with water, clay, chemicals, minerals, or metals; he was the creating, civilising and divine Prometheus...by striving to understand the mysteries of the divine and creating these worlds in Florence and at Pratolino, it fulfilled a desire within him to be a god; designing, constructing, and bringing forth life into his own cosmos. After all this was the ultimate aim of the Renaissance natural philosopher- and the garden and by association the studiolo can really only be understood in this context.” Ibid; see also Mastroiocco, *Le Mutazioni di Proteo*, 91-129.

⁸⁹ Godwin, *The Pagan Dream of the Renaissance*, 166; see also Madonna, “Il Genius Loci di Villa d'Este: Miti e misteri nel sistema di Pirro Ligorio.”

⁹⁰ See “The Collector as Prometheus” in Bredekamp, *The Lure of Antiquity and the Cult of the Machine*, 19-27.

⁹¹ Idem, 21; see also Caius Plinius Secundus, *Naturalis historia*, XXXIII, 4, 8; XXXVII, 1, 2; Olga Raggio, “The Myth of

collecting but also with technology, and from this chain can be extended the framework of man's attempt to control nature in the Renaissance via a link between the assembling of a microcosm (the collection) and technological, mechanical factors.⁹² Bredekamp's refinement of the identification of the collector-prince as Prometheus equates the *Kunstkammer* (or in the case of Francesco I, the *Studiolo* and by extension, on a macroscopic scale, *Pratolino*) with the universe in microcosm, and the prince as the demiurge, wherein a sense of "play" accompanied the omnipotent powers of creation that the demiurge-prince wielded.⁹³ In other words, "for a human to craft a swimming duck was at once a triumph ingenuity and a dismissal of utility."⁹⁴ Bredekamp does not specify Francesco I in connection with this phenomenon,⁹⁵ but in the late-sixteenth century, this principle found no greater or more elaborate expression than in the profusion of automata at *Pratolino*.

Within Bredekamp's construct, cited by later historians including Joscelyn Godwin,⁹⁶ automata are the final ingredient he lists of four components to the ideal *kunstkammer*. Renaissance automata, and particularly their purposeless independent movement, underlined the demiurgic nature of their production and were indeed sought-after components of princely collections. Automata reigned supreme not only on account of their intricate craftsmanship (ornate clocks and mathematical instruments also shared this quality), but also because they seemed to possess their own internal principle of motion, the critical criterion of the "living" state set forth by Aristotle and Plato: "Renaissance taste was attracted to them because it seemed wondrous and inexplicable when manmade objects moved as though they were alive."⁹⁷

Nevertheless, this particular niche which the *Pratolino* automata occupied as "created life" has remained on the margins of *Pratolino* scholarship. Brown's discussion of Francesco I's works do allude to artificial life, but it is limited to the theme of spontaneous generation other iconographers have pinpointed throughout the Buontalenti grottoes (e.g. The Grotto of Moses in the courtyard of the Pitti Palace, the *Grotta Grande* in Boboli Gardens with its forms emerging from the primordial

Prometheus: Its survival and metamorphoses up to the eighteenth century," *Journal of the Warburg and Courtauld Institutes* 21 (1958): 50-53.

⁹² Bredekamp, *The Lure of Antiquity and the Cult of the Machine*, 27.

⁹³ See "The *Kunstkammer* as Playroom" in *idem*, 69-80. ...the urge to collect in order to form one's own world in miniature was attributed the character of emulating divine playfulness. In order for the demiurge to be able to become the absolute God, he had to create something playful and lacking in any use, since having followed any purpose whatsoever would mean having acted as an agent of a higher power, performing a given task. Humanity could only become a true emulation of God when having attained the highest category of play." *Idem*, 72.

⁹⁴ Daston and Park, *Wonder and the Order of Nature*, 287.

⁹⁵ Bredekamp, *The Lure of Antiquity and the Cult of the Machine*, 74-75.

⁹⁶ Godwin, *The Pagan Dream of the Renaissance*, 120.

⁹⁷ *Ibid.*

“mud”). Yet the critical context for understanding the symbolic significance of the automata and the particular role they played in reinforcing Medici power ideologies is to understand the automata as created beings in their own right. Brown acknowledged this quest to alchemically manufacture artificial life: “For one looking to imitate the divine, the ultimate creation would be to produce a being made from flesh and blood. As such another aspect of the natural philosopher's work was the creation of the *homonculus*, an artificial human.”⁹⁸

Indeed, the quest to manufacture artificial life was the proverbial holy grail of the Renaissance alchemist, the natural philosopher, the magus, or in sixteenth-century reality, the men whose characters and interests encompassed elements of all three. William Newman has made the creation of a *homonculus*, an artificial human in miniature *in vitro*, through primarily bio-chemical recipes the primary subject of his recent study which invokes Promethean imagery in its title.⁹⁹ Early makers of automata have been invested by historians of technology with a double identity of both shaman and technician; John Cohen writes, “...the history of automata reveals the duality in man's never-ending struggle to achieve, first, a technical mastery of his surroundings, which now include the boundless space of the cosmos and, second, to become as one of the gods himself, by transcending both matter and himself...”¹⁰⁰ Silvio Bedini positions the creation of automata as the first step toward man's “dream to fly through the air like a bird, swim in the sea like a fish, and to become ruler of all nature.”¹⁰¹ However, by the time these historians reach the automata of the Renaissance, their discussions turn exclusively to the mechanical and technical principles responsible for their animation; although even in connection to these mechanical works of these early-modern machines, Bedini wondered,

It is interesting to speculate how many among the countless number of mechanics who worked to produce automata for whatever purpose may have secretly nurtured an ambition to go a little beyond. Certainly the temptation was always at hand to attempt to create life in giving birth to these lifeless figures by a combination of alchemy and mechanics.¹⁰²

However, about Pratolino's famed automata, Brown writes in general terms without evoking theurgy

⁹⁸ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 44.

⁹⁹ See Newman, *Promethean Ambitions and the Quest to Perfect Nature*.

¹⁰⁰ Cohen, *Human Robots in Myth and Science*, preface.

¹⁰¹ Bedini, “The Role of Automata in the History of Technology,” 24.

¹⁰² *Idem*, 40.

or other ideas percolating in the Renaissance about the animation of statues, “Perhaps a further example of Francesco perceiving himself as divinely inspired; designing, building and breathing artificial life into natural materials in such a way, that civilised, fully functional machines were created.”¹⁰³ Mila Mastroco's treatment of the Pratolino automata, in contrast, recognizes more explicitly the power (little distinction or importance can be made however whether that power was magical or technological) which the Pratolino automata embodied:

The myth of the animation of inert forms, the investigation of material properties taken to its extreme consequences of metamorphosis, the obsession of the acquisition of a power both magical and scientific with which to dominate the essences of things- constant theme of Pratolino and predominant characteristic of the duke- found here an interpreter capable of realizing dream to reality, artifice and psychological urge , sensory involvement and intellectual fascination coincide. The automata are simultaneous images of the real world and emblems of the dominion of man over matter; the moment in which inextricably the real and surreal become intertwined.¹⁰⁴

The present study aims to pick up the thread which Brown and Mastrocco have dropped. Whereas Brown theorizes about “such a way” Francesco might have breathed artificial life into his automata and Mastrocco references general classical mythology, I submit that a highly specialized method was indeed known to Francesco I and his contemporaries, not only in the mechanical, hydraulic, technological wisdom inherited from antiquity, but also in primarily Hermetic and Neoplatonic texts from the same time period which were rediscovered by Italian humanists in tandem with mechanical texts. However, so far these texts have not been connected at any depth to Renaissance efforts to create life. De' Vieri's Renaissance panegyric couches reference to this magical practice from antiquity in references to Aristotle's monopolistic authority of the day (and there is further evidence that astral science was understood in Aristotelian terms at this time period), but the Hermetic and Neoplatonic “god-making” method culled from the *Asclepius* text (and others of Plotinus, Porphyry, and Iamblichus) was very much known to Renaissance philosophers, as we have seen in the previous chapter. This knowledge would have been too tempting to the

¹⁰³ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 43-44.

¹⁰⁴ Mastrocco, *Le Mutazioni di Proteo*, 111-12. Mastrocco is also one of the few authors who makes explicit the link between classical myths of animated statues and the Pratolino automata, though collectively as a medium rather than highlighting any particular instance: “From the classical myths relating the animation of statues, from the esoteric speculations of the world of alchemy, came the automata. Identical to nature, as much as it was also a perfectly connected mechanism, (the automata) competed (with nature) on the same plane but it was its superior in ingenuity.” Idem, 112.

experimental spirit of the age *not* to garner some practical application. After all, the natural or preternatural philosopher, the ancestor to our “scientist,” lived at the zenith of an age in which spirits in bottles, mandrakes, and bells for summoning spirits could be found at the most brilliant courts; in the case of Rudolf II's collection, they have survived through the present day. If we posit that these items may have been similarly used for experiments, binding a spirit within a vessel also endowed with the capacity for independent movement would not have been far off.

The odds that the technique which the Hermetic and Neoplatonic texts preserved of bringing the cult statues of ancient temples to life was *never* the object of experiment in the Renaissance are rather unfavorable. The “enormous impact” which the Hermetic works, and particularly the *Asclepius* with its “god-making passage,” had upon Renaissance magic has been absorbed by scholars.¹⁰⁵ To quote the maxims of Jacob Burckhardt, “The appeal to antiquity was no mere phrase.”¹⁰⁶ Add the words of W. R. Laird, “contemplation is valuable only to the extent that...it ends in action”,¹⁰⁷ and we are left with a large gap between the known theorizing about Neoplatonic theurgy and its next logical progression in the Renaissance into practice. The impact which this philosophy, and specifically the theurgic technique, had upon documented works of art is, excepting the brief survey of the preceding chapter, still uncharted. We encounter hermeticism “grounded in useful, even commercial, ends” in Dee's scientific writings in the wake of his encounter with Commandino,¹⁰⁸ but no parallel or preceding phenomenon in the Italian peninsula has been submitted for equivalent consideration. The Platonic strains in Dee's *Monas Hieroglyphica* and *Heptarchia Mysteria* may not be, as some authors have determined, at odds with his worldly interest to “finde out, and devise, new workes, straunge Engines, and Instruments: for sundry purposes in the Common Wealth.”¹⁰⁹ Instead, we can perceive these same impulses at work at the court of Francesco I de' Medici, wherein no knowledge was excluded from experimentation in the pursuit of interests both personal and commercial.

So far, the light that has been shed on the practical accomplishments of Francesco I's “proto-Scientific” experiments must not be too distanced from the esoteric traditions and

¹⁰⁵ Higley, *The Legend of the Learned Man's Android*, 130.

¹⁰⁶ Burckhardt, *The Civilization of the Renaissance in Italy*, 32. Or the echo, “...the relationship to antiquity was proposed anew, investigated as a depository of keys with the power to open the door of true consciousness, recoverable by attentive research and exceptional divinatory powers,” Mastrorocco, *Le Mutazioni di Proteo*, 113.

¹⁰⁷ Walter Roy Laird, “Archimedes Among the Humanists,” *Isis* 82 (1991): 630.

¹⁰⁸ Wolfe, *Humanism, Machinery, and Renaissance Literature*, 59.

¹⁰⁹ John Dee, *The Mathematicall Preface to Elements of Geometrie of the most ancient Philosopher Euclid of Megara* (London: John Dove, 1570), A4v; Wolfe, *Humanism, Machinery, and Renaissance Literature*, 59.

philosophies which informed and prompted these early-modern investigations into the natural and preternatural world. In the context of the Renaissance garden, it has already been noted that today the modern scholar struggles to see their numinous qualities beyond our admiration for their achievements in engineering and industry.¹¹⁰ The automata which are the focus of this study illustrate this marriage of arcane mystery with cutting-edge technology that emerged from this era. Pirro Ligorio (1514-1583), who is credited with the design of the Villa d'Este water gardens and a role at the Villa Lante at Bagnaia, alluded to the “varied and strange concepts drawn from a variety (of sources)” that lay at the heart of these created works whose object was to cause “miserable mortals” to marvel and to communicate at “the gravity and the fullness of the intellect and its imaginations.”¹¹¹ By uncovering the sources of methods which promised to imbue a man-made statue with some kind of life or spirit (Neoplatonic, Hermetic, Aristotelian, atomist, astral, mechanical, or some combination of these) which were known to Renaissance philosophers, we can appreciate more fully the intellectual spectrum which early-modern automata would have evoked in their contemporary, invariably elite audiences. Furthermore, we can place this tradition within the history of the “proto”-Scientific Revolution, and recognize the method of theurgy, as it was understood in the Renaissance, as a branch of astral science which would have been subject to the climate of experimentation characteristic of the age.

6.3. Medici Magical Philosophy and Ritual in Plain View

In the sections above, we have ample evidence that Francesco I did not shy away from patronizing and even participating directly in experiments which mingled natural and esoteric philosophy, but the argument may be taken further that the Florentine Grand Duchal court at the close of the sixteenth century openly embraced explicit magic in its entertainment and associated arts. For centuries throughout the Middle Ages, magic had found a safe haven and a bustling market at princely courts; this is attested to by documented sorcery trials of the thirteenth and fourteenth

¹¹⁰ John Dixon Hunt, *Garden and Grove: The Italian Renaissance Garden in the English Imagination, 1600-1750* (Princeton, New Jersey: Princeton University Press, 1986), 233.

¹¹¹ “simboli et cose industrie, non fatte senza misterio, non ritrovate a caso, né a fantastico fine, né per mostrare cose vitiose et pazze, né per accomodare con la loro varietà et invaghire gli alloggiamenti ma fatte per recare stupore et maraviglia, per così dire, ai miseri mortali, per significare quanto sia possibile la grandanza et pienezza dell'intelletto et le sue immaginazioni... et per mostrare l'accidenti, per accomodare l'insatiabilità delli vari et strani concetti cavati da tante varietà che sono nelle cose create.” Mastrocco, *Le Mutazioni di Proteo*, 125.

centuries which illuminate how magic was often on the frontline of power struggles.¹¹² In spite of the dangers from Church and society, the court magician became an influential figure, whose rise was witnessed with alarm from an early date. John of Salisbury, writing in 1159, established an early date for this phenomenon which would endure through the successive centuries. Divination and the conjuring of demons, whether by sincere necromancy or otherwise through illusionistic craft,¹¹³ were standard features of the court magician (or cleric, in some cases), but what about “god-making” theurgy? Historians of magic have dedicated relatively little investigation to this particular magical practice, but Eliza Marian Butler wrote that although the powers of artificial creation “did not bulk large in the equipment of the ancients; it was one of the supreme ambitions of medieval sorcerers.”¹¹⁴

These sorcerers flourished at Italian courts perhaps more than anywhere else in Latin Europe: John Cohen highlights Italy's exceptionalism as owing to its preservation of medieval alchemical-astrologer legends which were associated with monuments and palaces, thereby guaranteeing their lasting prosperity.¹¹⁵ The position taken by Burckhardt however minimized the role of magic, going so far as describe it “markedly on the decline at the beginning of the sixteenth century- that is to say, at a time when it first began to flourish vigorously out of Italy.”¹¹⁶ From our current vantage point though with the benefit of nearly a century's worth of research has reversed that outlook. Interest in magic continued, rather than diminished.¹¹⁷

However, we should also consider that for any discussion of magic in this time period, and especially as the Renaissance progressed, “magic” is so often a category imposed subjectively by modern scholars to a range of philosophies and activities which often obscured how they were viewed by practitioners in the past. Daniel Pickering Walker's “General Theory of Natural Magic” perceived magic “to be “always on the point of turning into art, science, practical psychology, or,

¹¹² These “politically-motivated” trials involved royal servants, papal prelates, and public officials facing the accusation that whatever influence they had acquired was due to illicit magical means. This has been interpreted as symptomatic of the disruption of established political relationships and challenges to the nobility's customary role as office-holders at court; many charges were brought by such nobles against their low-born rivals who had risen to power. Eamon, *Science and the Secrets of Nature*, 68; see also Edward Peters, *The Magician, the Witch, and Law* (University of Pennsylvania Press, 1978), 93, 117.

¹¹³ See “Magicians at Court” in Kieckhefer, *Magic in the Middle Ages*, 96-100; Laura H. Loomis, “Secular Dramatics in the Royal Palace, Paris, 1378, 1389, and Chaucer's 'tregetoures',” *Speculum* 33 (1958): 242-255.

¹¹⁴ Butler, *The Myth of the Magus*, 8.

¹¹⁵ Cohen, *Human Robots in Myth and Science*, 50.

¹¹⁶ Burckhardt, *The Civilization of the Renaissance in Italy*, 285.

¹¹⁷ Eamon, *Science and the Secrets of Nature*, 67.

above all, religion.”¹¹⁸ This view has been deconstructed by Hanegraaff, who points out that Walker does not say how he demarcates magic from religion and adds that this distinction becomes particularly untenable in the case of idols and images.¹¹⁹ The conclusion drawn by the latter is to subject to increased scrutiny the basis with which we assume Ficino's ritual practice, and by extension, Ficinian-derived astrological “magic” of the later Renaissance, should be referred to as magic at all. A compromise rooted in the discernment of the goal is proposed: if the ritual is mystical ecstasy or the attainment of *gnosis*, as is the general framework of Agrippa for instance, then it is religion; for pragmatic, short-term ends, such as the charms for health in Ficino's *De Vita*, then it is magic.

The problem, Hanegraaff writes, lies both in the frequent multiple layers of meaning Renaissance ritual and objects possessed as well as scholars' treatment of them: “The pragmatic aspect oriented toward short-term goals may get a lot of attention, but in the end it is always subordinate to the long-term goal of mystical attainment.”¹²⁰ With this tension in mind between the religious, the “magical,” what is pragmatic on the surface, and what mystical rationale lies underneath, we now progress to exploring how Francesco I de' Medici and his court coded “magic” significance into artworks, objects, and ritual.

By the late sixteenth century, although Francesco I surpassed all Medici rulers before and after him in his disquieting reputation for magic at his court, he certainly did not emerge from a void. Medici rulers of Florence, from Cosimo il Vecchio in the fifteenth century through Cosimo I in the sixteenth, notwithstanding years of exile and the plunder of the Medici library in 1494,¹²¹ are recognized by historians for their patronage of and close associations with esoteric philosophies. To the trained eye, these philosophies manifested themselves in the artworks which they commissioned. Godwin makes this suspicion explicit, “If the tradition of Ficino and Poliziano, Pico della Mirandola, and Lazzarelli survived anywhere, it was in Florence and in the Medici family that had been educated, so to speak, at their feet... There is an old rumor of a secret tradition of esoteric wisdom handed down in the Medici and other noble families.”¹²²

However, the caveat to these assertions is that this “rumor” has remained just that in the

¹¹⁸ Walker, *Spiritual and Demonic Magic from Ficino to Campanella*, 75-76.

¹¹⁹ Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 21.

¹²⁰ *Ibid.*

¹²¹ After the late fifteenth-century sack of the Medicean library, its recovery was begun piecemeal by Cardinal Giovanni, later Leo X; see Burckhardt, *The Civilization of the Renaissance in Italy*, 99.

¹²² Godwin, *The Pagan Dream of the Renaissance*, 71, 74.

absence of sufficient evidence to satisfy the demands of the most rigorous standard of scholarship, but as Godwin also notes, “such is the nature of esotericism: if it were open, documented, and given to all to see, it would no longer be esoteric, but exoteric.”¹²³ A good number of convincing readings to Medici artworks however have been brought to light by those who have sought to identify the “magic” in dynastic Medici culture. In addition to a wider history of early-modern science, the present study's investigation of theurgic philosophy and the Pratolino automata belongs to this context as well. The Pratolino automata risk being mistaken for merely particularly diverting decorations within the rarefied confines of the grottoes of Francesco I's summer retreat, but we recall that their significance as created “life,” whose criterion as defined by Plato and Aristotle was the capacity for independent motion, made a strong statement about the power of their maker. That these early automata emerged in such unprecedented profusion under the patronage of a ruler so heavily invested in esoteric and alchemical studies raised the likelihood that they were created in conscious imitation of the “living statues” described in the *Asclepius* text of the Hermetic works. Although several historians have brought forward the identification of diverse Medici-commissioned artworks with Hermetic or Neoplatonic associations,¹²⁴ the animated automata of the Villa Pratolino have so far escaped inclusion within this grouping.

In order to understand Francesco I's esoteric leanings, let us begin by looking at those which have been read in the patronage of his father, Cosimo I, who seems to have promoted his family's association with the terrestrial gods.” This is supported not only by Vasari's panegyrics but also by the renovation of the Palazzo Vecchio from the seat of a public, Republican government to the private residence of the rulers and particularly in the assignation of each new room to a particular god identified with an illustrious Medici (for example, Saturn for Pope Clement VII, Hercules for Giovanni delle Bande Nere, Jupiter for Cosimo I, Ops/Rhea/Cybele for Lorenzo the Magnificent, and Ceres for Cosimo il Vecchio).¹²⁵ Furthermore, it has been observed that “Cosimo's and Francesco's knowledge impregnated with their secret the rooms in which they lived,”¹²⁶ and in this vein, Godwin highlights a Hermetic reading of panels painted by Francesco Salviati (1510-1563) which were commissioned by Cosimo I for the Sala d'Udienza or the Sala Dipinta of the Palazzo

¹²³ Idem, 74.

¹²⁴ See also Julius Evola and the UR Group, *Introduction to Magic*, trans. Guido Stucco (Rochester: Inner Traditions International, 2001). Other spokesmen of this modern Italian tradition of esoteric paganism with purportedly unbroken ancient ties include Arturo Reghini and Giuliano Kremmerz.

¹²⁵ Godwin, *The Pagan Dream of the Renaissance*, 75.

¹²⁶ Giulio Cesare Lensi Orlandi, *La grande opera in Palazzo Vecchio in Lo stanzino del principe in Palazzo Vecchio. I concetti, le immagini, il desiderio*, ed. Marco Dezzi Bardeschi (Firenze: Le Lettere, 1988), 145.

Vecchio which lie well beyond the typical iconographies of power: Cosimo I is posited to be both an alchemist and an initiate by virtue of the puzzling depictions and distorted attributes of the seven single-figure panels.¹²⁷ The concluding hypothesis is that the figures in these panels correlate to the stages of the alchemical path, or the Great Work, starting with the Cave of Mercury and finishing in the Androgyne of Fire, represented by the Mithraic divinity Phanes Protogonus as the sun.

Further support of Cosimo I's interest in and overt expression of Hermetic philosophy can be found in the dedication to Cosimo's major-domo and secretary of the Italian translation of the *Corpus Hermeticum* published in Florence in 1545,¹²⁸ as well as in the pageantry associated with the wedding festivities to Eleanor of Toledo in 1539. Pierfrancesco Giambullari (1495-1555), the court humanist responsible for the research informing the "Pageant of the Muses," sourced his visions in Ficino's *De Vita Coelitus Comparanda*, Kabbalah, magical philosophy, and the late-antique writings of Martianus Cappella (active between ca. 410-420) which equated the Muses with the seven planetary spheres, the Fixed Stars, and the "Sphere beyond the stars."¹²⁹ Regarding this pageantry and its potential application in a fixed medium to the decorative program of the Palazzo Vecchio, Claudia Rousseau wondered,

Why, it may be asked, did the authors of this program go to so much trouble? Their precision was motivated, it would appear, by the intention to invoke or replicate the celestial spheres through sympathetic magic. In this way, once the Muses were gathered together the group would visually, and in a magical sense, literally have represented a sort of microcosm of the entire cosmos.¹³⁰

Godwin reinforces the Medici's activities with no room for ambiguity:

...the Medici were actually practicing magic, both of the celestial, Ficinian kind, and the subtler Cabalistic variety... This magic was done not in the spirit of piety and petition- that was the business of religion- but in a scientific spirit; or to be more precise, in a spirit somewhere between "science"

¹²⁷Idem, 138; Janet Cox-Rearick, *Dynasty and Destiny in Medici Art: Pontormo, Leo X, and the Two Cosimos* (Princeton: Princeton University Press, 1984), 273; Godwin, *The Pagan Dream of the Renaissance*, 73.

¹²⁸Although the translation dated to 1463 by a pupil of Ficino's, its dedicatee was Pierfrancesco Ricio and it was reprinted in 1547, 1548, and 1549; see Godwin, *The Pagan Dream of the Renaissance*, 269f.

¹²⁹Idem, 193; see also Claudia Rousseau, *The Pageant of the Muses at the Medici Wedding of 1539 and the Decoration of the Salone dei Cinquecento* in *Theatrical Spectacle and Spectacular Theatre*, eds. Barbara Wisch and Susan Scott Munshower (University Park: Department of Art History of the Pennsylvania State University, 1990), 420.

¹³⁰Rousseau, *The Pageant of the Muses at the Medici Wedding of 1539 and the Decoration of the Salone dei Cinquecento*, 419.

and “art,” given that art in the sixteenth century functioned as a cause with calculable effects.¹³¹

These scholars clear the way for the argument that Pratolino's automata would have been understood also as magical experiments in science and art, intersections between Neoplatonic theurgy as revived by Ficinian astral magic and mechanical *savoir-faire*. Neoplatonic theurgy, Hanegraaff writes, is by its nature effective only through its practice; if it were not, the theurgist could connect with divine beings through intellectual theorizing alone, but this is not the case. Rather, the construction of “idols” and the execution of ritual are essential to the pursuit of the spiritual union with the Godhead the practitioner seeks.¹³² The symbols function independently, being recognized by the gods as their own images, with no further thought or action required. If Neoplatonic theurgy, particularly Iamblichan theurgy, was innately practical, where is the material culture which would corroborate this activity? Perhaps hiding in plain sight, located philosophically in otherwise fully mechanical objects.

Turning to Francesco, a taste for secrecy was decidedly pronounced. In his dedication to Francesco I of a book of six hundred *impres*e (heraldic and enigmatic emblems), Ottavio Strada (1550-1606) wrote that no explanations were included, since princes valued their secrets.¹³³ Vasari invoked the Medici's fascination by Egyptian ideas about immortality through monuments in stone when he was describing the granite columns of the Princes' Chapel in San Lorenzo:

...in the same time in which all thing disappear from the Earth, not only from destruction, but neither from changing their color. For this phenomenon, the Egyptians used for the dead their writings with strange characters the lives of their greats to maintain the nobility and virtue of these men.¹³⁴

This fascination with Egyptian hieroglyphs belongs to a much broader cultural trend in the Renaissance which intuited in the illegible, mysterious characters no less than the key to the entire body of ancient wisdom and its promised revelations.¹³⁵

¹³¹ Godwin, *The Pagan Dream of the Renaissance*, 194.

¹³² Hanegraaff, “Sympathy or the Devil: Renaissance Magic and the Ambivalence of Idols,” 6-7.

¹³³ Godwin, *The Pagan Dream of the Renaissance*, 115.

¹³⁴ My translation, “ed il tempo istesso, che tutte le cose caccia a terra, non solamente non le ha distrutte, ma neppur cangiato loro il colore. E per questa cagione gli Egizi se ne servivano per i loro morti, scrivendo in queste aguglie coi caratteri loro strani la vita de' grandi, per mantener la memoria della nobiltà e virtù di quelli.”; Vasari, quoted by Berti, *Il Principe dello Studiolo*, 292.

¹³⁵ See Dannenfeldt, “The Renaissance and the Pre-Classical Civilizations,” 449.

In Francesco I's Studiolo in the Palazzo Vecchio, there is not a single image of a Christian subject, while themes of magic and metamorphosis dominate in the panels "Medea rejuvenates Jason" by Girolamo Macchietti (fig. 68) and "Ulysses and Circe" by Stradano (fig. 69). In the first panel, the presence of dynamically-posed Classical figures on pediments in the background suggest the "living" cult statues of antiquity and potentially allude to Francesco's revival of the theme at Pratolino. Their presence side-by-side with more earthly concerns such as mining and fishing and realistic depictions of working spaces such as the laboratory, the foundry, and the glass-works is testament to the equal weight they must have carried for the Grand Duke's worldview. Even today, historians continue to invoke mystical themes when describing the close spaces of the Studiolo and its uses; "the center of a magical labyrinth," according to one historian, "wherein one remains as if conquered and subject, but also a little oppressed."¹³⁶ Another historian observed elsewhere that the clear rationalism of the "solar Renaissance of Burckhardt" did not penetrate these dark corners, of neither the palace nor the experimental philosophy of Francesco I. As Albert the Great had also advised, to attain to knowledge of the elements, silence, isolation, and secrecy were paramount; "a quasi-mystic preparation was indispensable, a true and proper initiation to remake the self piece by piece."¹³⁷ We are approaching, as close as perhaps we may hope, an understanding of the magical function of Francesco I's highly personal Studiolo.

Esoteric methods of statue animation from their earliest inception were classified by their practitioners- temple priests in Egypt, Greece, and it appears Babylon and Mesopotamian at even earlier periods- as mysteries for only the most elite initiates. For an ancient wonder-worker, a medieval magician, or his Renaissance counterpart, knowledge not only brought power, it was power; as the historian of magic Richard Kieckhefer wrote, "knowing mysterious things in itself was valuable, even if the knowledge was never put to effect in action."¹³⁸ The "technical" secrets of theurgy, whether its operations were understood to be astral or purely the result of physical mechanics- were of an immense value to the priest or craftsman as well as to the larger institute making use of its phenomenon; this technical knowledge eclipsed the value of the materials or the labor involved, and Renaissance scientists, engineers, and polymaths of the day were mostly cognizant of the practical benefits of secrecy. Although Giovanni Fontana disseminated illustrations of the inner workings of his automata to dispell belief in demonic agency, he also at time adopted

¹³⁶ My translation of Bucci, *Lo Studiolo di Francesco I*; quoted by Berti, *Il Principe dello Studiolo*, 108.

¹³⁷ My translation of Battisti, *L'Antirinascimento*; quoted by idem, 109.

¹³⁸ Kieckhefer, *Magic in the Middle Ages*, 142.

the use of mirror-writing to preserve secrecy, as had Leonardo da Vinci.¹³⁹ Filippo Brunelleschi warned Mariano Taccola about sharing his inventions too widely, yet Taccola's works were still repeatedly plagiarized by others who promoted his inventions as their own, as was Francesco di Giorgio Martini.¹⁴⁰ In Florence, which was the origin of the earliest known patent (issued in 1421 by the Council of Florence for Brunelleschi's design for a cargo ship¹⁴¹), we may reasonably speculate that the blending of esoteric philosophy and mechanical physics by Francesco I and Buontalenti were never intended to be widely understood. Even through the seventeenth century, technological, alchemical, medical, and other esoteric secrets were still quantities of value to be exchanged as gifts or commodified on the market, and publication presented a very real devaluation for those who possessed esoteric knowledge.¹⁴²

Francesco I's proclivities for proto-Scientific experimentation and magical philosophy were widely talked about, far beyond the Medici laboratories, palaces, and villas. Among his subjects, rumors swirled of sorcery at court, of orgies and every depravity and heresy imaginable. We will address the ramifications of this reputation and the treatment of his memory by his successors after his death in the following section devoted to the “damning of the memory” of certain aspects of his legacy, including all memory of his long-time mistress and eventual Grand Duchess Bianca cappello. However, it appears that these rumors did not constrain the exuberant pageantry of Francesco I and Bianca Cappello, which vindicated to some degree the accusations of magic and demonic associations.

Clelio Malespini (1531-1609) left a description of one feast organized by Bianca cappello in 1578 in the Orti Oricellari to honor her brother Vittorio. I have translated and abridged this description- I believe for the first time-, as it was related piece-meal by the nineteenth-century historian Luigi Passerini (*Degli Orti Oricellari*, 1875); certain words which exhausted all of my resources for translation have been relayed in italics below.

A certain Camillo, organizer of tricks, had imagined the program, but the direction again must have been by Buontalenti. At first nightfall, Francesco and his courtiers were strolling through

¹³⁹ Eamon, *Science and the Secrets of Nature*, 88.

¹⁴⁰ Ibid.

¹⁴¹ See Frank Prager, “Brunelleschi's Patent,” *Patent Office Society* 28.2 (1946): 109-136; Pamela Long, “Invention, Authorship, 'Intellectual Property,' and the Origin of Patents: Notes toward a Conceptual History,” *Technology and Culture* 32.4 (1991): 846-84.

¹⁴² Eamon, *Science and the Secrets of Nature*, 344.

the garden, when a Necromancer 'dressed in a very strange robe, perhaps the product of art; with a mitre on his head full of pentacles and extravagant characters, seeming truly to be a new Zoroaster.' In front of the eyes of those invited, he formed with a knife a circle on the lawn; he enclosed the circle with thick ship's rope, and put on the right side two big cauldrons with lit coals inside of them; and on the left, a sceptre of *avellane* and a vase full of spices. 'With grave gestures and silence he then introduced the Grand Duke and his companions,' asking if anyone would be his assistant: they loaned him Sansonetto of the Bardi counts of Vernio who the Necromancer made disrobe, and so to put down the arms of all the courtiers.

Sansonetto was charged with holding elevated and in a threatening attitude the knife that Necromancer already used: 'he was large in stature, fat, and open in his face seeming like a new Bacchus. So much so that the Grand Duke, looking at him undressed and standing between the cauldrons holding the knife in the air, he couldn't contain his laughter; and then neither could his companions.' But immediately after the Necromancer 'accomodated the Grand Duke in the middle upon a cushion of black velvet,' making him sit with the others in the circle. Imposing silence, (the Necromancer) emitted four whistles towards the cardinal points, then called three times seven spirits (of 'ridiculous names'): 'Bardicul, Stulflogor, Solsibec, Graffaril, Tarmidar, Zampir, and Borgamur.' 'Nothing was visible, save for the reflected coals in the cauldrons, whose grim splendor complimented the scene at hand.' Sansonetto had the difficult task of pouring the spices on the coals, 'to fumigate the air all around, and which were composed of assafoetida, tar and sulfur and other putrid and intolerable ingredients; never thinking that he would put the amount that he did...' The excessive stench which was so provocative 'reached...all the way to the nostrils of the signora Bianca, who remained unseen, to see the mockeries, (she) was in front with some ladies in waiting at a high window of her palace.'

But after the grand duke couldn't tolerate the terrible odor anymore, he obligated the Necromancer to accelerate his time. 'Don't fear, friends of mine, but stay in your places. And saying this, (the Necromancer) clapped loudly three times': it was the signal for he devils. Suddenly, 'hearing infinite voices and cries, strange howls, gnashing of teeth, claps, iron chains shaking, crying, whispers, and infinite flames of fire, which arose all around coming out of many holes made with wonderful artefice out of the lawn's ground around the circle, which burned the grass around them: such a thing, indeed, to those who did not know the secret, was shocking to hear and gaze upon. At that point, the Necromancer put fire to a mine, and at his signal the ground- previously prepared with a concealed chasm- sank, pulling Grand Duke and courtiers: ' fallen and tangled together in the hole, (and) they were left with the devils around them with the same fireworks and bombs, which seemed to be even bigger as they were closer to their ears and seeing the ugly *ceffi* and the horrendous and

shocking gestures reflected by the continuously flickering flames. At this point the poor (courtiers) were out of their senses, not knowing whether they were alive or dead,' 'there were some, as they later confessed, who believed they would never see the face of the sky or the light of the sun ever again.'

But here the joke muted its tone. 'While everyone was suffering these agonies and torments, beautiful young girls appeared, who emanated gentle and precious odors and mitigated the great stench, and taking the Grand Duke by the hand along with the others who remained steadfast in the conflict, conducting them through the alleyways and honoring them with loving gestures and sweet manners, and approaching the garden's loggia, they began to smell the precious and gentle odor coming from the great golden lamp abundantly illuminating the scene... And marveling at the beautiful young girls who were nude with golden mantles superbly adorned, which in the lightest way covered their secret parts, full of of pearls, diamonds, rubies, sapphires, and emeralds, and perfumed to their heads with plants, which maximally increased the delightful odor of the lamp. And convened in the loggia, they began... to hear a wonderful concert of different instruments, through which quasi-angelic and divine voices and divine caroled various appropriated madrigals... When the Grand Duke and companions saw such a superb and regal apparatus; the magnificent and splendid order of such a variety of fruits... with an infinite number of golden and silver vases, they could not but believe themselves to have arrived at the Elysian Fields or the earthly Paradise... Then the Grand Duke finished the rally and awakening from such stupor of the mind, which until this time he possessed the novelty of such a great spectacle of confusion and suspense, saying to his companions, which were Santasofia, the two Strozzi and the Altoviti, having fainted with all the others in the pit and for all appearances corpses, to be brought on different beds prepared for the effect, with doctors and medicines and servants at hand to bring them back to health: both to his satisfaction...' Then followed the singing of songs, while the knights invited by the nymphs refreshed themselves; 'there remained the graceful young beauties, including one who was called Milla Capraia, gorgeous and wonderfully gentle, to caress those Knights; but new music and concerts of other gentle instruments interrupted, singing these verses:

Go, o great Heroes, it is no longer to be
That you stay with us, go happy,
Wherever you discern our handmaidens.

Hearing this from such affable and courteous young girls, they conducted the Grand and his companions with sweet manners to the foyer, and paying them every reverence, dismissed them. At

which, after receiving the thanks owed, they heard a great clamor, and were driven with great fury by devils from the garden.¹⁴³

¹⁴³«Un tal Cammillo, organizzatore di scherzi, aveva ideato lo svolgimento; ma la regia ancora una volta deve essere stata di Buontalenti. Al primo calare della notte, Francesco coi cortigiani era nel giardino passeggiando al fresco, quando comparve il Negromante, 'vestito con un abito molto strano, appropriato però all'arte; con una mitera in capo piena di pentacoli e di stravaganti... caratteri, parendo veramente un novello Zoroastro.' Tra l'attenzione degli invitati, egli formò con un coltello un circolo sul prato; cinse il circolo con una gomena da nave, pose sul lato destro due grandi pignatte (olle) con entro carboni accesi; e sul sinistro, una verga di avellane e un vaso pieno di spezie. 'Con gravi gesti e silenzio egli poi introdusse dentro il Granduca e i compagni,' chiedendo che qualcuno gli facesse da aiutante: si prestò Sansonetto dei conti Bardi di Vernio che il Negromante fece scalzare, così come fece deporre l'armi a tutti i cortigiani.

Sansonetto ebbe il compito di tener levato e minaccioso il coltello già usato dal Negromante: 'era egli grande di persona, grasso, et acceso sempre nel viso sembrando un novello Bacco. Il che il Granduca, miratelo così scalzo et in piedi fra l'olle col coltello alzato nell'aria, non si poté rattenere dalle risa; così feroero tutti gli altri compagni.' Ma subito dopo il Negromante 'accomodò il Granduca nel mezzo sopra un guanciaie di velluto nero,' facendo sedere anche gli altri nel circolo. Imposto il silenzio, egli emise quattro grandi fischi verso i punti cardinali, quindi chiamò tre volte sette spiriti (dai nomi 'ridicolosi'): 'Bardicul, Stulflogor, Solsibec, Graffaril, Tarmidar, Zampir, e Borgamur.' 'Non si vedeva nulla se non per il riflesso dei carboni accesi nell'olle, il cui splendore favoriva mirabilmente la faccenda.' Sansonetto ebbe tosto il comando di porre le spezie sui carboni, 'per suffumigare l'aria d'ogni intorno, le quali erano composte di assafetida, pece e solfore et altri putridi e insopportabili ingredienti; non si pensando mai che gli ne ponesse la quantità che egli fece...' Il fetore eccessivo così provocato 'giunse...sino alle narici della signora Bianca, che senza esser veduta da alcuno, per vedere le beffe era affacciata con alcune gentildonne sue familiarissime ad una finestra alta del suo palazzo.'

Ma poiché il granduca non reggeva più quel terribile odore, ciò costrinse il Negromante ad accelerare i tempi. 'Non temete amici miei, ma state fermi nei vostri luoghi. E detto ciò, egli tre volte percosse fortemente palma a palma': er il segnale per i diavoli. Subito 'udivansi infinite voci e lamenti, ululati strani, stridori di denti, battere palme a palme, scuotere catene di ferro, pianti, sospiri, et infinite fiamme di fuoco, le quali scaturivano da tutte le parti, uscendo fuori da molti buchi fatti con arte meravigliosa rasente il terreno del prato, d'intorno al circolo, le quali abbruciarono sino l'erbe che vi erano: cosa invero, a chi non avesse saputo il secreto, spaventosissima ad udire e rimirare.' A quel punto il Negromante dette fuoco a una mina, ed a un suo segnale infine il terreno – precedentemente preparato con una voragine celata – sprofondò trascinando Granduca e cortigiani: 'caduti e avviluppati l'uno con l'altro nella buca, non restarono allora i diavoli di non essergli intorno con gli stessi strepiti e rimbombi, i quali parevano più maggiori, essendo loro più presso all'orecchie, vedendo quei bruttissimi ceffi et orrendi e spaventosi gesti per il riflesso delle continove fiamme che si spargevano. Onde i poverelli erano cotanto fuori di sé, che non sapevano se erano vivi o morti,' 'non ve ne fu alcuno, siccome poi confessarono, che non si credesse mai più di non rivedere la faccia del cielo né la luce del sole.'

Ma qui lo scherzo mutò tono. 'Stando ognuno in cotante agonie e timori, comparvero belle giovanette, le quali coi soavi e preziosi odori che uscivano da esse, mitigarono alquanto il gran fetore, e presero per mano il Granduca insieme con gli altri che eran rimasti saldi nel conflitto, conducendoli per il calle et avvalorandogli con amorosi gesti e dolci maniere, et avvicinandosi alla loggetta del giardino, incominciarono a sentire il preziosissimo odore e soavissimo che usciva dalla gran lampada d'oro, abbondantissima illuminatrice del luogo... E rimirando le bellissime fanciulle tutte ignude con manti d'oro, ornate superbissamente, le quali con leggiadrissimo modo coprivano le loro secrete parti, piene di perle, diamanti, rubini, zaffiri, e smeraldi, e profumate tutte dal capo alle piante, che maggiormente accrescevano il gratissimo odore della lampada. E giunti nella loggetta, s'incominciò... ad udire un mirabile concerto di diversi strumenti, ne' quali carolavano alcune voci quasi angeliche e divine diversi madrigali appropriati... Quando il Granduca e i compagni videro così superbo e regale apparato; l'ordine magnifico e splendidissimo di cotante variate sorte di frutti... con infinito numero di vasa d'oro et argento, non potevano se non credere di essere pervenuti nei Campi Elisi o nel Paradiso terrestre... Allora il Granduca infinse di risorgere e risvegliarsi da cotanto stupore di mente, nel quale sin'ora l'aveva tenuto la novità di sì gran fatto confuso e sospeso, dicendo ai compagni, i quali erano il Santasofia, i due Strozzi e l'Altoviti, essendo rimasti tutti gli altri tramortiti nella buca, i quali a guisa di corpi morti, senza risentirsi punto, furono portati poi sopra diverse lette preparate per tale effetto, con medici, medicine e servitori condecanti al loro bisogno per risanarli: sia egli come si voglia, cotesta stanza mi pare da non sprezzar punto né tanpoco così bella e così gentil compagnia...'. Segui l'esecuzione di canti, mentre i cavalieri invitati dalle ninfe si rifocillavano; 'non rimasero tuttavia le leggiadrissime giovanette, fra le quali ve n'era una chiamata Milla Capraia, bellissima e gentilissima a meraviglia, di non accarezzare quei Cavalieri; ma le interruppe novella musica e concerto di altri soavissimi istrumenti, cantando questi versi:

Partiti, o grande Eroe, che più concesso
Non t'è lo star con noi, vanne felice,

This extraordinary account offers a spectacular glimpse into the intermingling of magic with entertainment, technology, theater, and medicine at the court of Francesco I and Bianca Cappello in late-sixteenth-century Florence. The show of the “Necromancer” may appear to us moderns a bit camp, with its reliance on a volunteer from the audience to fumigate the area with the noxious substances detailed above, but the Orti Oricellari spectacle lays to rest any shadow of a doubt about Francesco I and his court's comfort with magical themes and even explicitly demonic ritual. For the present study, this bridges a significant chasm in speculating whether or not theurgy and magical animation were similarly known and incorporated into the automata for Francesco I's Villa Pratolino; the primary obstacle to experimentation with theurgy through natural or celestial channels, for this period would have been essentially a religious one, an objection to trafficking with potentially demonic intelligences. If the Orti Oricellari feast of 1578 is any indication, this was a non-issue for Francesco I and his circle. To the contrary, all evidence points to the high entertainment value which demonic interaction (such as the invocation of the spirits “Bardicul, Stulflogor, Solsibec, Graffaril, Tarmidar, Zampir, and Borgamur” and the appearance of “devils”) had for this court.

Moreover, the “Necromancer” is presented as a new Zoroaster, dressed just about how we would imagine a stereotypical Renaissance magus: long robes paired with a pointed hat (the miter) covered in five-pointed stars and mysterious characters. Zoroaster seems to have been a figure of great fascination to Francesco I and his court as well as for the age: De' Vieri invokes Zoroaster in his treatise on Pratolino, recalling the Persian's exhortation to “seek paradise” and to return to the point of origin, which De' Vieri precises in the same breath, is God and the “great Judge” Jesus Christ.¹⁴⁴ Notwithstanding the eclectic style characteristic of both De' Vieri as well as the zeitgeist which sought to reconcile a *prisca theologica* with Christianity, this passage supports the revival and amplification of ancient Oriental culture and philosophy, hand-in-hand with Platonism and Neoplatonism, throughout the Renaissance traced by Karl Dannenfeldt.¹⁴⁵ Marsilio Ficino had afforded Zoroaster a special place as the oldest and original transmitter of the esoteric tradition which passed then to Hermes Trismegistus, Orpheus, Pythagoras, Plato, Plotinus, Porphyry, and

Ove ti scorgon queste nostre ancelle.

Udito ciò dalle affabili e cortesi fanciulle, condussero il Granduca e i compagni con dolcissime maniere nell'antro, e fattogli ogni debita riverenza si licenziarono. Alle quali, dopo ebbero reso le dovute grazie, udirono grandissime strepito e rimbombo, e con grandissimo impeto furono spinti dai diavoli nel giardino.” Passerini, *Degli Orti Oricellari*; quoted in idem, 218-220.

¹⁴⁴ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 50.

¹⁴⁵ Dannenfeldt, “The Renaissance and Pre-Classical Civilizations,” 436.

Iamblichus.¹⁴⁶ Ficino's later writings place Hermes Trismegistus second in importance to Zoroaster, and the *Oracula Chaldaica*, were ascribed to this more ancient Persian source by both Plethon and Ficino. Modern scholars' analysis of the fragments of the Chaldaean Oracles corroborate the strong case for a "Irano-Syrano-Babylonian theocracy."¹⁴⁷ By the time De' Vieri composed his panegyric to Pratolino in the final quarter of the sixteenth century, the oracles "of Zoroaster" had been published several times over and incorporated most notably in the *Heptaplus* (1489) of Pico della Mirandola. Shortly after they would appear even more prominently in the *De perenni conclusiones secundum opinionam propriam* and *De perenni philosophia libri X* of the Italian exegete Augustine Steuchi (1496-1549) and the *Nova de universis philosophia* and *Magia philosophia* by Francesco Patrizi (1529-1597), who was a professor of philosophy in Ferrara and Rome. The figure of Zoroaster in Francesco I's entertainment programme was no mere masque, but a very current figure in late-Renaissance philosophy.

Secondly, in the description of these festivities, we see a seamless overlap between magic and technology, which we can extrapolate would have been a parallel experience of the automata at Pratolino for their rarefied Renaissance audiences. Most of the "magic" at Francesco I's court was in fact skillful manipulation of natural substances in order to create spectacular effects. Within imposing cauldrons, burning pitch, sulfur, and other noxious substances created the hellish atmosphere, and Medici advances in pyrotechnics can be credited with the "mine" and other explosives which were set off and which trapped the courtiers in a pit surrounded by devils hurling fireworks and other incendiaries. This evening was not for the faint-hearted, clearly; we also see Medici medicinal and pharmacopoeic knowledge put on display at the close of the evening's entertainments when those that have collapsed are brought in to the loggia and revived. We may also even wonder whether the "pearls, diamonds, rubies, sapphires, and emeralds" worn by the young girls were authentic or still more examples of Medici ingenuity as well! In virtually every facet of the evening's "magical" programme, we see just under its surface the clever application of chemical and technological advances which were the fruits of this Grand Duke's preoccupation with the work of his laboratories, alchemy, and esoteric philosophy. Nevertheless, they were presented

¹⁴⁶ Idem, 437; Kristeller, *The Philosophy of Marsilio Ficino*, 15.

¹⁴⁷ Specifically links to the Iranian theological system have been perceived in the Chaldaean Oracles' appearance of Aion/Chronos (related to the Iranian Zervan, the Supreme God), Hades (related to the Iranian Ahriman, the evil "Lord of the terrestrial domain"), and Adad (to the Syrian Hadad); however, problems have been raised as well. Nevertheless, in the Chaldaean Oracles, Lewy and Dodds have perceived the fusion, albeit incomplete, of the gods and demons of a Greco-Oriental cult. See Eliza Marian Dodds, "New Light on the 'Chaldaean Oracles,'" *The Harvard Theological Review* 54.4 (1961): 266, 268-9, 272; Lewy, *Chaldaean Oracles and Theurgy*, 425.

and received with an understanding of their magical dimension that did not necessarily need any further clarification.

Whereas it is a simple feat for the modern mind to look at the descriptions of the entertainment for the 1578 feast in the Orti Oricellari and identify within the proto-Scientific mechanisms and chemical interactions at play, it is not such a simple proposition to take documented technology, in this case the Pratolino automata, and argue for the tangible presence of magical philosophy informing their production. Although De' Vieri's description of Pratolino and its automata associates these works of early-modern technology with magically-animated statues of antiquity, it can be argued that this was as much a literary convention as a nod to esoteric currents of thought at Francesco I's court. In the absence of a document which conclusively ties the automata to magical philosophy as it appeared at the Grand-Ducal Medici court of the late-sixteenth century, the most which the present study can aim for is a thoroughly informed speculation bolstered by what we do know about the tastes and culture of this court. In support of this speculation, the picture which the passage above paints is of one which was comfortable with using magical philosophy paired with technology as entertainment. However, virtually no material examples of any part of this legacy have survived through the present day (excluding examples of ceramics, porcelain, crystal and glass-ware, and similar testimonies to the high level of craftsmanship attained). In the following section, we examine the possibility that this present state of affairs is the result of a deliberate destruction of both objects and memory after the deaths of Francesco I and Bianca Cappello on October 20, 1587.

6.4. Erasing All Traces: The Case for *Damnatio Memoriae*

With little solid evidence at hand, the present study finds itself at best in the territory of “very likely probability” that magical philosophy, specifically astral or natural theurgy from antique, Hermetic, and Neoplatonic sources, informed the process by moving hydraulic and pneumatic automata were “brought to life” at Pratolino. Reading this magical dimension into these mechanical artworks more accurately reflects philosophical currents coursing through late-sixteenth-century Florence, and the Pratolino automata, though they no longer exist, deserve equal recognition as material examples of the realization of these esoteric philosophies which have been so eloquently identified in other late-Renaissance works of art and architecture. However, although an enthusiasm

for experimentation and a taste for magical rituals were hallmarks of Francesco I's court, without definitive proof beyond De' Vieri's comparison of Pratolino's automata to the living statues of Daedalus described in Aristotle's *De Anima*, absolute certainty will remain elusive. The absence of other documentary traces, visual or textual, is likely the result of several factors, beginning with what I will argue was a conscious effort to eliminate unorthodox elements from the memory of Francesco I perpetrated by his brother and successor Ferdinando de' Medici (1549-1609). This campaign curated aspects of Francesco I's image in his capacity as Grand Duke and also effected a purge upon any elements of a pagan, magical philosophy which were out of place in post-Tridentine, Counter-Reformationist Italy. This final section reads as a delayed coda to this study's first chapter which looked at the reasons why the Pratolino automata have remained relatively obscure within their broader fields of study; perhaps the most compelling reason for the lack of precise drawings or even extent examples of Pratolino's vast waterworks and automata is the hypothesis that they were intentionally destroyed after the lifetime of Francesco I.

Particularly in the case of "occult" machinery, a late-seventeenth century document testifies to the destruction of some of Buontalenti's automata created for the Grand Ducal theatre in the Uffizi by later generations with different values and sentiments:

Perspectives and machines, which as much as has been said by those some time ago, were removed on the advice of people so envious, so zealous but (the works) left their memory, which people speak about even up until today, as something without peer either before or since; and because these machines were so exemplary, from them engineers all over Europe took their styles and the latest and most singular devices...¹⁴⁸

However, the intentional erasure of memories of Francesco I may have begun immediately after his death by means of an historically-established procedure known as *damnatio memoriae*, practiced in antiquity and resurrected in the Renaissance. Tracey Robey explored this phenomenon as a particularly Florentine revival of an antique practice in which undesirable elements of rulers were eliminated by their successors.¹⁴⁹ Whereas in the late-medieval period, this involved extreme acts

¹⁴⁸ My translation of Balducci, quoted from Mastroioco, *Le Mutazioni di Proteo*, 118.

¹⁴⁹ See Tracey E. Robey, "Damnatio memoriae: The Rebirth of Condemnation of Memory in Renaissance Florence," *Renaissance & Reformation* 36.3 (2013): 5-32.

which included the razing of houses, corpse abuse, cannibalism,¹⁵⁰ and which resulted in large gaps in the archival record, by the late sixteenth-century, the Medici practiced a more discreet form of memory erasure among their own family members who were felt to be an embarrassment, and therefore a threat to the house's reputation.

Giulia de' Medici (1535-1588), the daughter of the assassinated Duke Alessandro, demanded equal standing at Cosimo's court as his daughters, even after he received the title of Grand Duke; for this, historians believe her portrait was painted over in black.¹⁵¹ For her adulterous affair with a cousin, images of Isabella d'Este (1542-1576), Francesco I's sister, disappeared from otherwise complete Medici collections;¹⁵² art historians Gabrielle Langdon¹⁵³ and Karla Landedijk¹⁵⁴ also commented upon the disappearance of images of this wayward Medici daughter and drew the same conclusion that she presented enough of a threat to the Medici's social status as to merit total elimination from the record. Of course, *damnatio memoriae* did not occur in the historical record alone. Instead it may be seen as a secondary (and more innocuous) symptom of the notoriously murderous inclinations of this dynasty. Isabella the sister of Francesco was asphyxiated by her husband Paolo Giordano Orsini, ostensibly with the approval and upon the recommendation of Francesco I personally. Only a few days prior, Francesco I's brother Don Pietro de' Medici had killed his wife and cousin Eleonora de' Medici (the niece of their mother, Eleonora of Toledo) in the Medici Villa Cafaggiolo.¹⁵⁵ Even through the present day, the deaths of Francesco I and Bianca Cappello together within a few days of each other in October 1587 at the Medici Villa Poggio a Caiano still elicit insinuations of poison by Francesco I's brother, who arrived shortly before. It has been argued by modern scholars that the pair's lingering illness was due to malaria¹⁵⁶ (the picturesque basins and pools of Italian villas assume a new dimension from our modern perspective as ripe breeding grounds for malarial mosquitoes, whose fatal consequences had not yet occurred to Renaissance architects), but old theories of arsenic poisoning resurfaced based on reports of doctors who conducted the original autopsies, an 1857 exhumation of the body of Francesco I, and the conclusion of modern forensic toxicological analysis of hair and bone

¹⁵⁰ As with the bodies of two supporters of Walter Brienne VI, Duke of Athens (1304-1356), see *idem*, 13-14.

¹⁵¹ *Idem*, 22.

¹⁵² E.g. the tin miniatures originally owned by Cosimo; *idem*, 21.

¹⁵³ Gabrielle Langdon, *Medici Women: Portraits of Power, Love, and Betrayal from the Court of Duke Cosimo I* (Toronto: University of Toronto Press, 2006), 166-68.

¹⁵⁴ Karla Landedijk, *Portraits of the Medici* (Florence: Studio per edizioni scelte, 1981-87), vol. I, 128.

¹⁵⁵ Mastroiocco, *Le Mutazioni di Proteo*, 91.

¹⁵⁶ Gino Fornacieri, Raffaella Bianucci, et al. "Malaria was 'the Killer' of Francesco I de' Medici (1531-1587)," *The American Journal of Medicine* 123.6 (2010): 568-9.

fragments.¹⁵⁷ These are still disputed, and so the mystery remains whether or not Ferdinando murdered the pair before he set about erasing their cultural legacy.

Even if someday he is fully exonerated in their mysterious deaths, Ferdinando's erasure of the memory of Bianca Cappello was methodical and comprehensive:¹⁵⁸ the Capello family arms were obliterated throughout Italy, a ban was placed upon any mention of her as Grand Duchess,¹⁵⁹ her grave was not marked, and she was denied burial next to Francesco I in the family vault. The hate which their intense and irregular love affair had fomented during the span of their twenty-odd years together eventually boiled over. Francesco's affair with the married Venetian before and throughout his marriage to Joanna of Austria outraged morality to the point of crisis with Austria.¹⁶⁰ Francesco recognized a son born to Bianca Capello as his own, though many historians perpetuate a claim that the child was stolen and that Bianca Capello faked her pregnancy. When a son was born to his Hapsburg wife Joanna of Austria, Bianca Capello was merely sent to the suburban villa of Poggio a Caiano for a short time. Barely two months after the death of Joanna, Francesco had married and elevated Bianca Capello to the status of Grand Duchess. This outraged conventional morality of the day on several fronts. Add to this climate reports of the court's dazzling consumption and mysterious proclivities, and the Florentine populace possessed a perfect recipe of suspicion, hatred, and envy that left their mark on Francesco I and Bianca Cappello's reputation through the coming centuries.

Even in Francesco's lifetime, a scurrilous rhyme about the Grand Duke circulated which infuriated his brother in Rome:

Il Granduca di Toscana
ha sposato una puttana
gentildonna veneziana. ¹⁶¹

¹⁵⁷ Francesco Mari, Aldo Poletti, *La morte di Francesco I de' Medici e della sua sposa Bianca Cappello* (Firenze: Le Lettere, 2007); see also Massimo Beccattini, "Francesco e Bianca: arsenico e vecchi merletti," *Archaeologia Viva* 123 (2007); Donatella Lipi and Marco Ferri, *I Medici. La dinastia dei misteri* Firenze: Giunti, 2007).

¹⁵⁸ See Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 27; Godwin, *The Pagan Dream of the Renaissance*, 174-80; Berti, *Il Principe dello Studiolo*, 29-30. See also Litta M. Medri, *The Grottoes in the Boboli Gardens*, trans. R. Fowler (Florence: Sillabe, 2002).

¹⁵⁹ Robey, "Damnatio memoriae: The Rebirth of Condemnation of Memory in Renaissance Florence," 21.

¹⁶⁰ *Idem*, 92.

¹⁶¹ Berti, *Il Principe dello Studiolo*, 29. Translated, its verses are merely that the Tuscan Grand Duke married a Venetian whore, but this obliterates the lyrical quality of the original.

After the deaths of Francesco I and Bianca Cappello's deaths, the rhymes and popular taunts grew even more elaborate, such as the one which eulogizes a “cadaver, full of evil and vice,” and his consort, “a whore, a witch, an evil hag who favored bandits and spies,”¹⁶² and Berti calls the popular impression of the ducal seat as “a theater of immorality, orgies, and criminals; in their fantasies, the Casino had to have been little less than a poison factory,¹⁶³ Pratolino an expensive and inaccessible labyrinth of forests and grottoes with diabolical mechanisms... The beauty and charm of (Bianca) Cappello they said was the fruit of a witch's horrible spells, the lowest of the harlot's arts.”¹⁶⁴

This mingling of magic and the illicit was the inspiration for the Jacobean dramas *White Devil* (1612) by John Webster and Thomas Middleton's *Women Beware Women* (ca. 1653). Francesco I's affair with Bianca Cappello also inspired a profusion of operas, beginning with Giovanni Sanseverino's 1776 Berlin production as well as books, and plays through the mid-nineteenth century.¹⁶⁵ Serious scholarship that was written through the mid-twentieth century preserved the condemnatory tone, and the hint of scandal of these earlier, increasingly fictionalized interpretations, such as the works of Arcangelo Piccioli (“Storia di Toscana,” 1856), Guglielmo Enrico Saltini (*Bianca Cappello e Francesco I*, 1898), George Young (*The Medici*, 1909), and Philippe Erlanger (1967).¹⁶⁶ In the case of Francesco I and Bianca Cappello, their reputation was such that it permeated four centuries of writers' fantasies, but much of the subsequent cultural perspective which analyzed their legacies was formented by the initiatives of Ferdinando I de' Medici when he ascended to power after their deaths. It is to this paradigm-shift which our focus now turns.

Ferdinando lived most of his life as a cardinal in Rome before he became the second Grand Duke of Tuscany, bringing the fervor of the Counter-Reformation and the Baroque style with him and extinguishing the pagan-infused, Mannerist culture of his predecessor's court. However,

¹⁶² My translation:

“Qui giace un Cavatel pien di malie
e pien di vizzi. La Bianca Cappella,
Puttana Strega, Maliarda, e fella
Che sempre favori furfanti e spie.” Idem, 288.

¹⁶³ As we have seen above with Francesco's activities making poisons antidotes, this characterization may not have been so far from the truth.

¹⁶⁴ Berti, *Il Principe dello Studiolo*, 224

¹⁶⁵ Brown, *Pratolino and the Transforming Influence of Natural Philosophy*, 12.

¹⁶⁶ Philippe Erlanger, *The Age of Courts and Kings, Manners and Morals 1558-1715* New York: Harper Collins, 1967), 67.

Ferdinando does appear to have share at least Francesco's fascination for alchemy, if not his experimental zeal. A nail which was supposedly transmuted to gold by Leonhard Thurneysser in 1586 for the cardinal was exhibited in Florence through the late seventeenth century,¹⁶⁷ and he continued patronage of the “*fonderia farmaceutica*” within the Medici household and established the Accademia del Cimento as well.¹⁶⁸ Nevertheless, Ferdinando looked upon Francesco I's pursuits as sinister and irreligious, and these sentiments may have been the motivation for Ferdinando's modifications to Francesco I's original decorative scheme of the Grotta Grande in the Boboli Gardens. Ferdinando also altered many aspects of the villa, grottoes, and automata at Pratolino; they have been included in Zangheri's history of the diverse features, but so far have not been analyzed with respect to any *damnatio memoriae* which may have been carried out. Furthermore, the defining event of the early years of Ferdinando's reign was his wedding to Christine de Lorraine in 1589, and the Medici suburban villas, Pratolino included, as well as the Pitti Palace in Florence were subject to extensive renovations and interventions in conjunction with the program of spectacles planned out not only to impress his bride, a grand-daughter of Catherine de' Medici, Queen Mother of France, and her powerful family, but also to consolidate their political hegemony on the European stage.¹⁶⁹

Ferdinando was absent from Francesco's funeral, but this owes perhaps more to the convention that “Cardinals never go to the Dead, if not the Pope's.”¹⁷⁰ However, he spent lavishly on the proceedings.¹⁷¹ The painted panels which immortalized Francesco's lifeworks (as evaluated by Ferdinand) were exclusively practical, omitting any allusion to the occupations which actually occupied the defunct Prince's activities and mind. They were: the birth of Francesco I, Francesco as a child in Genoa with Philip II of Spain, the visit of Philip II, the visit of Francesco I to his fiancée Joanna of Austria in Innsbruck, the assumption of the regency, the construction of Pratolino, the redirection of the Arno, the fortification of Livorno, the fortification of Pistoia, the meeting with Don Giovanni of Austria at Porto Baratto, a naval battle with the galleys of Santo Stefano against the Turks, and the reception of the Japanese legacy to Florence in 1584 (though this was last scene

¹⁶⁷ This nail's exhibition history and its criticism as a “bunglingly joined” counterfeit by those who saw it has been summarized in Multhauf, *Origins of Chemistry*, 261. It appears however to have been subsequently lost; its present location is unknown.

¹⁶⁸ See idem, 268f; Giovanni Targioni-Tozzetti, *Notizie sulla storia delle scienze fisiche in Toscana* (Firenze: I. R. R. Biblioteca Palatina, 1852), 208, 239.

¹⁶⁹ See Pastore, “Expanding Antiquity: Andrea Navagero, Renaissance Gardens, and the Islamic Landscape,” 11-12.

¹⁷⁰ My translation: “perché i Cardinali non vanno mai a Morti, se non a' Papi.” Berti, *Il Principe dello Studiolo*, 286.

¹⁷¹ 12,000 scudi. Ibid.

was remembered as the visit of the “Indian princes.”)¹⁷² Francesco I's interest in alchemy, experimentation, esoteric philosophy, machinery, or any of the “wonders” attributed to either himself or Buontalenti, or any aspect of his patronage at all, went entirely unremarked. The historian Luciano Berti speculated that under the charge of an artist like Vasari or Borghini, a discreet allusion to Bianca Cappello would have likely been included, but in this new climate, “intellectual liberty was extinguished parallel to its political counterpart.”¹⁷³

Although Ferdinando continued certain directives and initiatives and maintained his predecessor's ministers and most successful artists (as Francesco had done with Cosimo's), there was a marked change in climate. Giambologna was denounced to the Inquisition (1589),¹⁷⁴ among the evidence against him was that during his more than twenty years of service to the Grand Duke in Florence, he had not produced a single work with a Christian subject.¹⁷⁵ Following this pattern, I believe that it must be taken into account that any evidence which may have illuminated the more esoteric pursuits of Francesco I would have been vulnerable to what appears to have been a Medici hallmark: its discreet form of *damnatio memoriae* via erasure of elements deemed undesirable to the house's reputation.

The last consideration of any *damnatio memoriae* perpetrated against the esoteric works and philosophies of Francesco I's court is not so demonstrably intentional, but rather the transition of style which occurred in late-sixteenth-century Florence, from Mannerism to the Baroque, the Pratolino automata's unique embodiment of the former, and its obsolescence in the latter. Francesco I and Buontalenti's machinery, architecture, and other works which rendered their world a perpetual theater of Grand-Ducal magnificence participated, and in many ways were exemplary of, the end of the late-Mannerist style in Florence. Although several art historians can offer a more complete accounting of the defining characteristics of this virtuosic and capricious style, for the purpose of this study, I defer to Hauser's observation that this style of art intentionally sought to alienate the viewer both from his mundane surroundings and his comfortable concept of self. Spectacles were not meant to be reassuring or aesthetic. Rather, they could be frightening (like the devils in the Orti Oricellari), unsettling, and calculated to elicit a psychological response in the viewer that could range from wonder to terror. At Pratolino, the Grotto of Galatea was constructed in such a way as to

¹⁷² Idem, 287.

¹⁷³ Ibid.

¹⁷⁴ Idem, 226.

¹⁷⁵ Idem, 260.

appear to be on the verge of imminent collapse; we see in the drawing by Giovanni Guerra of this grotto its cracked pediment and other indications of its former appearance (fig. 70), and De' Vieri describes as “seeming to be at the point of ruin and about to collapse to the ground.”¹⁷⁶ The ambiguity of whether the visitor to Pratolino encountered “men, gods, or statues” was cultivated intentionally in De' Vieri's description.¹⁷⁷ We use these example as emblems of the disturbing aura which pervaded through works realized while this style dominated the late-sixteenth-century courtly circles. Francesco I's court in Florence was its epicenter, from whence it radiated outward throughout the continent and influenced later styles. The total identification of the (late-) Mannerist style with the court and personality of Francesco I has been described thusly:

...(it went) beyond exceeding a style, the moral condemnation of a moment; in this way, as in the Studiolo or at Pratolino, the shadow of the hated Francesco I must have projected itself, worrisome and aloof, on the figurative expressions almost as (if they were) emanations of himself.¹⁷⁸

Neither the style nor the figurehead possessed a wide appeal. Contemporaries noticed that the masses were ready for Ferdinando; his friends transformed into his servants, and his servants into his slaves.¹⁷⁹ After the death of Francesco I and the succession of his brother the former cardinal Ferdinando de' Medici, a decisive shift in style and taste occurred, favoring the Baroque, which for all of its virtuosity aimed for an entirely different spiritual effect upon the viewer. The new style was meant to shepherd the mind and the heart of the viewer through manipulations of entirely different emotions: pity, compassion, empathy, love. The Baroque did not seek to effect an alienation of self, but an ever-closer affiliation with the proper Christian conception of a tripartite divinity sanctioned by the Council of Trent.

Perhaps the yard stick with which we can measure the “conversion” of Florence from Mannerist styles and attitudes to those of the Baroques can be traced through the actions of the Counter-Reformation's vanguard, the Jesuits. Already during Francesco's reign, the Jesuits were making inroads in Florence. The first arrivals were in 1546, censures of library collections for heretical works began in 1549, and the first burning of books and vanities in 1551. Sumptuary laws were passed in 1562, some time after friars had begun calling for their institution. The Jesuits' arrival

¹⁷⁶ De' Vieri, *Delle Maravigliose Opere di Pratolino*, 35.

¹⁷⁷ Idem, 12.

¹⁷⁸ My translation from Berti, *Il Principe dello Studiolo*, 270.

¹⁷⁹ Soderini, quoted in idem, 288.

undermined the famed tolerance of Francesco's rule as well. Harassment of Jews started in 1553, obligatory distinguishing of Jews in 1567, and finally the creation of the ghetto in 1571.¹⁸⁰

Meanwhile, dabbling in magical philosophy or even a too-enthusiastic embrace of Humanism became for some an increasingly dangerous proposition, in step with the new hardline stance of the Jesuits and the Counter-Reformational Church. As far back as the fifteenth century, members of the first Roman Academy, which flourished under the humanist popes Nicholas V Parentucelli (reg. 1447-55) and Pius II Piccolomini (reg. 1458-64), were mostly the pupils of Giulio Pomponio Leto (1424-98), Professor of Rhetoric at the University of Rome. Despite scarce information on the activities of the Roman Academy, their activities disturbed Pope Paul II Barbo (reg. 1464-71), and rumors swirled of their heresy. Their arrest was ordered by the Pope in March 1468; heresy and conspiracy were the charges, and those members who did not escape were tortured and imprisoned for a year.¹⁸¹ It has been proposed that following the Roman Academy's persecution, an esoteric Christian society went underground, but this also presents problems to the modern scholar. The existence of such a secret, neopagan society “presupposes an astounding acting talent” on the part of the later patrons of “magical” villas which have been interpreted with an esoteric key: Cardinal Madruzzi, who helped shape the Council of Trent, Cardinal Gambaro, a chief of the Inquisition, or even Vicino Orsini who confessed and received communion before his death, all constructed fantastic, Classicizing villas for themselves.¹⁸² Nevertheless, in the private spaces of these individuals and other elites, including Francesco I, their unorthodox delights could endure protected from the increasingly hostile and dangerous climate to heretical ideas.

By the 1570s, although convictions of sorcery are documented, at this time they were still largely punished by fines; however, a growing mania embroiled the later decades of the century and the one that followed. Godwin mapped the later descent into a very real danger of being involved with anything with the scent of sorcery in this time period: orgies were believed (1590), the existence of children-witches was confirmed (between seven and ten years old, 1595), and magicians were legally defined “heretics” and thus vulnerable to the all of the the punishments and fury which lay in store (Synod of Trieste, 1593).¹⁸³

The Mannerist style, indeed many of the motions of Francesco's court as it become

¹⁸⁰ Idem, 227.

¹⁸¹ Godwin, *The Pagan Dream of the Renaissance*, 11-12

¹⁸² Idem, 173.

¹⁸³ Idem 121.

increasingly isolated in its liberality from outward trends of the Counter-Reformation, were the tangible avenues of escape which its artists' minds found from the immobilizing effect and the feat of an increasingly absolute order and orthodoxy:

...charges of instinctive and aggressive energy sought their outlets in transgression and running after 'caprices,' vital- though they were also sinful and criminal.... That (Mannerist) sense, rapacious to the point of ferocious, highly attuned to the threatening, perhaps tormented by remorse, constrained to furtive expressions and highly fascinating because of this, even if it appeared incomprehensible or deplorable... for either the old mentality or the new Counter-Reformational devotion, must have attracted all the more (Francesco I).¹⁸⁴

In this vein, we may well wonder whether the diagnosis which the Dodds has applied to the rise of theurgy and other “irrational” elements in Greek religion (and Hermeticism in particular; the abandonment of reason in favor of revelation has been noted in its literature¹⁸⁵) might be applicable to its revival in sixteenth-century Florence. He links other factors such as a reliance on revelation and a kind of spiritual resignation to the break-up of the *polis* and the loss of certain freedoms, religious syncretism and its attendant anxiety, warfare and eventual Roman domination, and “plain intellectual exhaustion.”¹⁸⁶ Might historical times of uncertainty, in ancient Greece or in post-Tridentine, Mannerist Italy, be ideal breeding grounds for new pursuits of magical practices? Might the appeal of procedures which promised a degree of control, even if that control were demonic in nature, be preferable to man's otherwise “helpless dependence upon capricious Power”?¹⁸⁷

In broad strokes, the culture and patronage fostered by Francesco I has been oriented towards transfigurations accomplished through veils of mystery, disturbing fantasies, hidden dangers, and liminal settings where things shed their chains of the ordinary,¹⁸⁸ yet the famed panoply of Pratolino's automata has so far resisted clear associations with antique and esoteric methods of bringing statues to life, in spite of De' Vieri's allusion to this and other esoteric

¹⁸⁴ My translation: “...le cariche istintive e aggressive cercavano insomma il loro sfogo di energie nella trasgressione, ricorrevano ad un loro 'capriccio,' vitale anche se peccaminoso e delinquenziale... Quel senso rapace fino al feroce, a sua volta attorniato dalla minaccia, tormentato magari dal rimorso, costretto spesso ad un agire furtivo, e pure affascinato da ciò, se appariva incomprendibile e riprovevolissimo- come vedremo al Capitolo seguente- per la mentalità di vecchia morale o di nuova devozionalità controriformistica, deve avere invece attratto il nostro personaggio.” Berti, *Il Principe dello Studiolo*, 221.

¹⁸⁵ Eamon, *Science and the Secrets of Nature*, 19.

¹⁸⁶ Idem, 18.

¹⁸⁷ Dodds, *The Greeks and the Irrational*, 45.

¹⁸⁸ Berti, *Il Principe dello Studiolo*, 221.

philosophies which the post-Tridentine establishment viewed with a jaundiced eye. Yet, in the scope of Francesco I's proto-Scientific interests, it was the wonderful and the “capricious” which most captivated his attention, and the automata have been recognized as “almost superhuman mechanisms”¹⁸⁹ among the other feats of his patronage including the perpetual motor, the seemingly miraculous antidote to poisons, the fabrication of materials to rival nature's most rare and precious materials, and new art forms which kept pace with advances in technology in virtuosity and innovation. Francesco I brought together two poles of Renaissance thought, one oriented towards the recovery of antique philology and the other of the naturalist dedicated to cataloging the physical world and experimenting directly with its materials; the allure of this combination, as has been observed, was a risky one for the soul as pagan books beckoned.¹⁹⁰ This was the singular and short-lived climate that produced the early machinery which this study argues were understood by their as much in magical framework rooted in antiquity as we understand them today as manipulations of natural physics.

¹⁸⁹ *Idem*, 169.

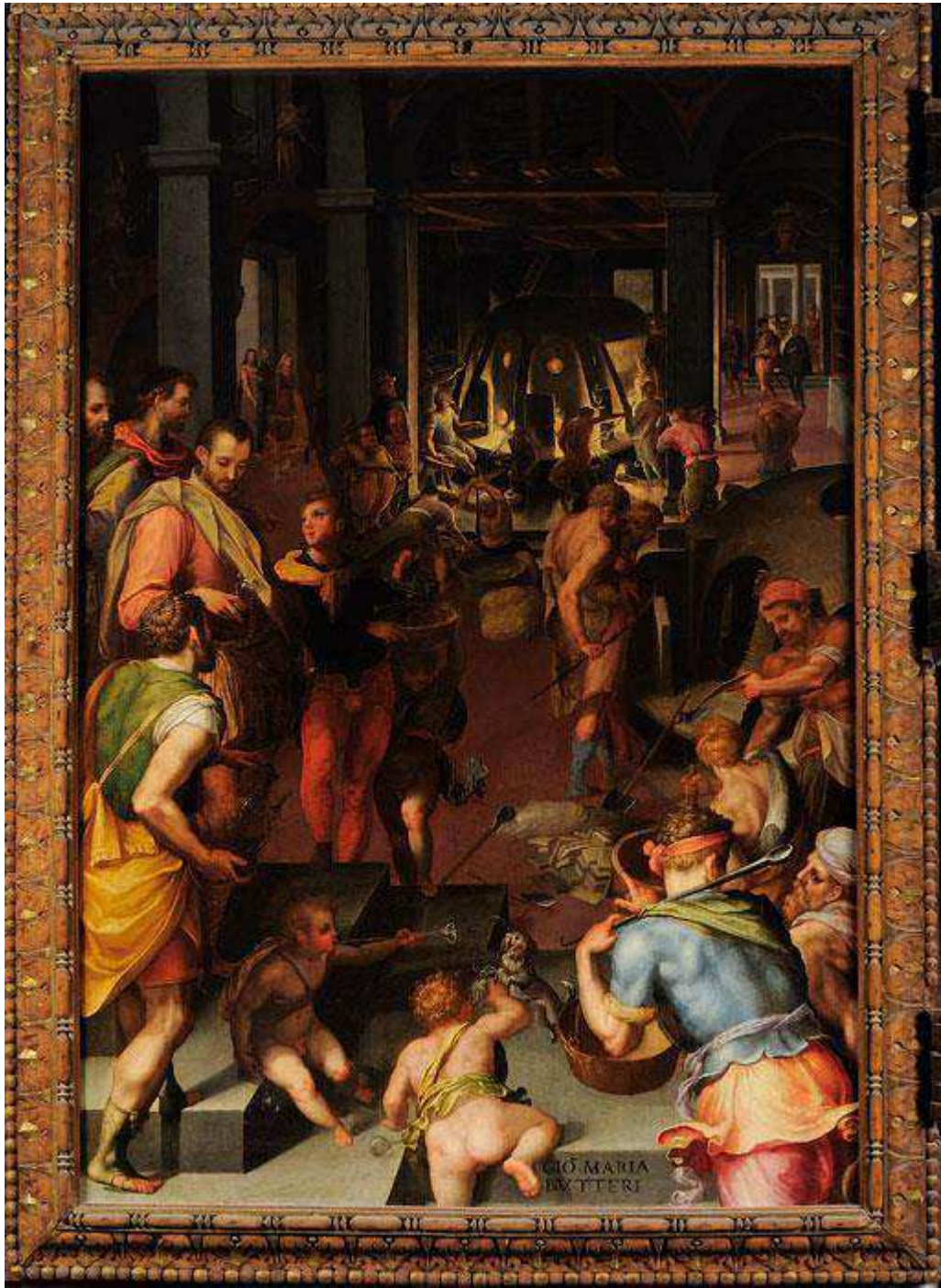
¹⁹⁰ *Idem*, 109.



57. Giorgio Vasari, *Castration of Ouranos by Saturn*, Palazzo Vecchio, Florence, 1563.



58. Johannes Stradanus, *The Alchemists*, Palazzo Vecchio, Florence, 1570.



59. Giovanni Maria Butteri, *The Glassworks*, Palazzo Vecchio, Florence, 1570.



60. Francesco detto Poppi, *The Bronze Foundry*, Palazzo Vecchio, Florence, 1570.



61. Andrea Palladio and Marc Antonio Barbaro, *Nymphaeum with Sculpture*, Villa Barbaro, Maser, ca. 1560.



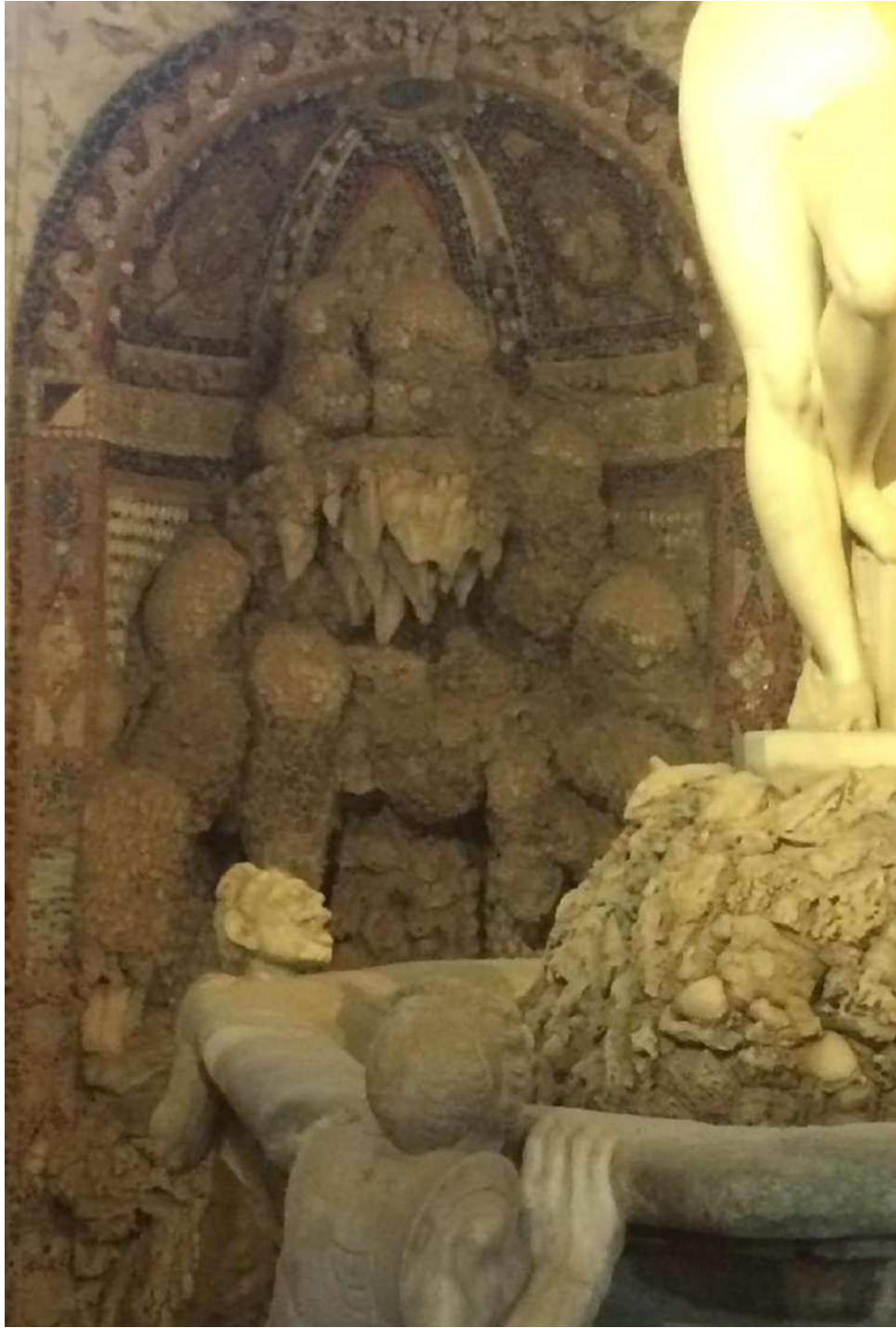
62. Medici workshops, *Porcelain Vase*, Florence, 1575-87.



63. Francesco and Romolo del Tadda, *Justice*, Piazza Santa Trinità, Florence, 1580.



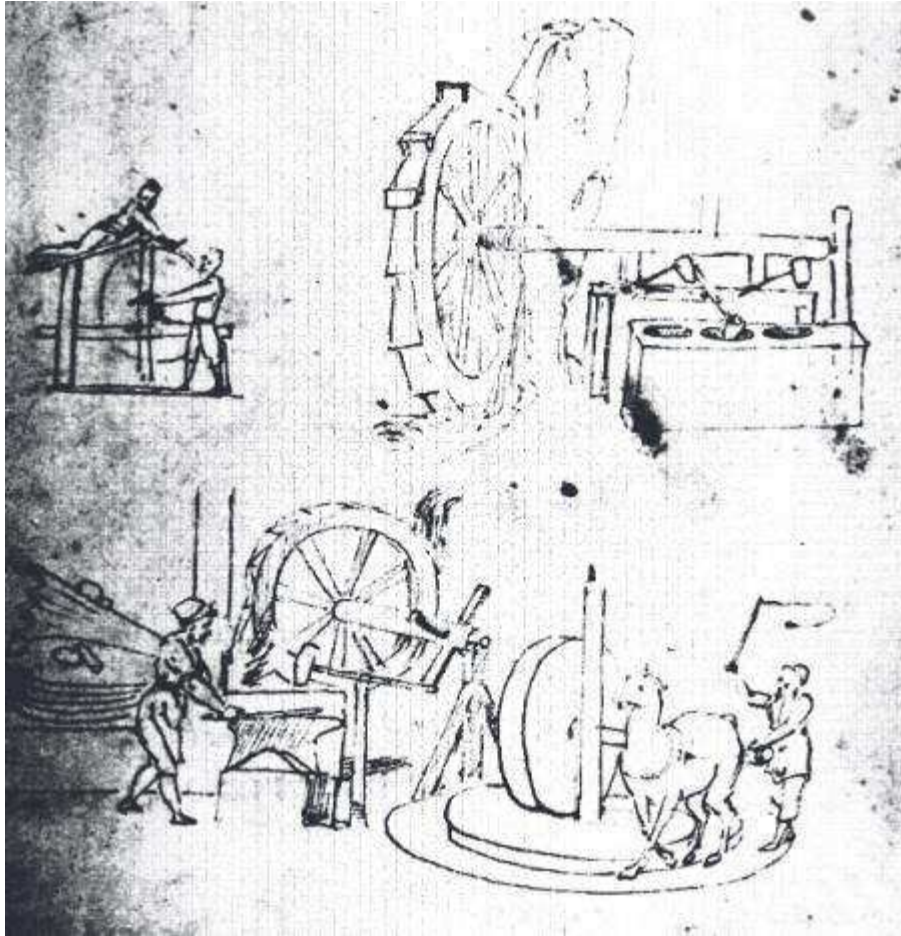
64. Matteo Nigetti and the Opificio delle Pietre Dure, *Chapel of the Princes*, San Lorenzo, Florence, 1604.



65. Giovanni Battista del Tadda, *Crystal Fountain Behind Venus*, Grotta Grande, Boboli Gardens, Florence, 1589.



66. Johannes Stradanus, *Fireworks over Piazza della Signoria*, Palazzo Vecchio, Florence, 1560.



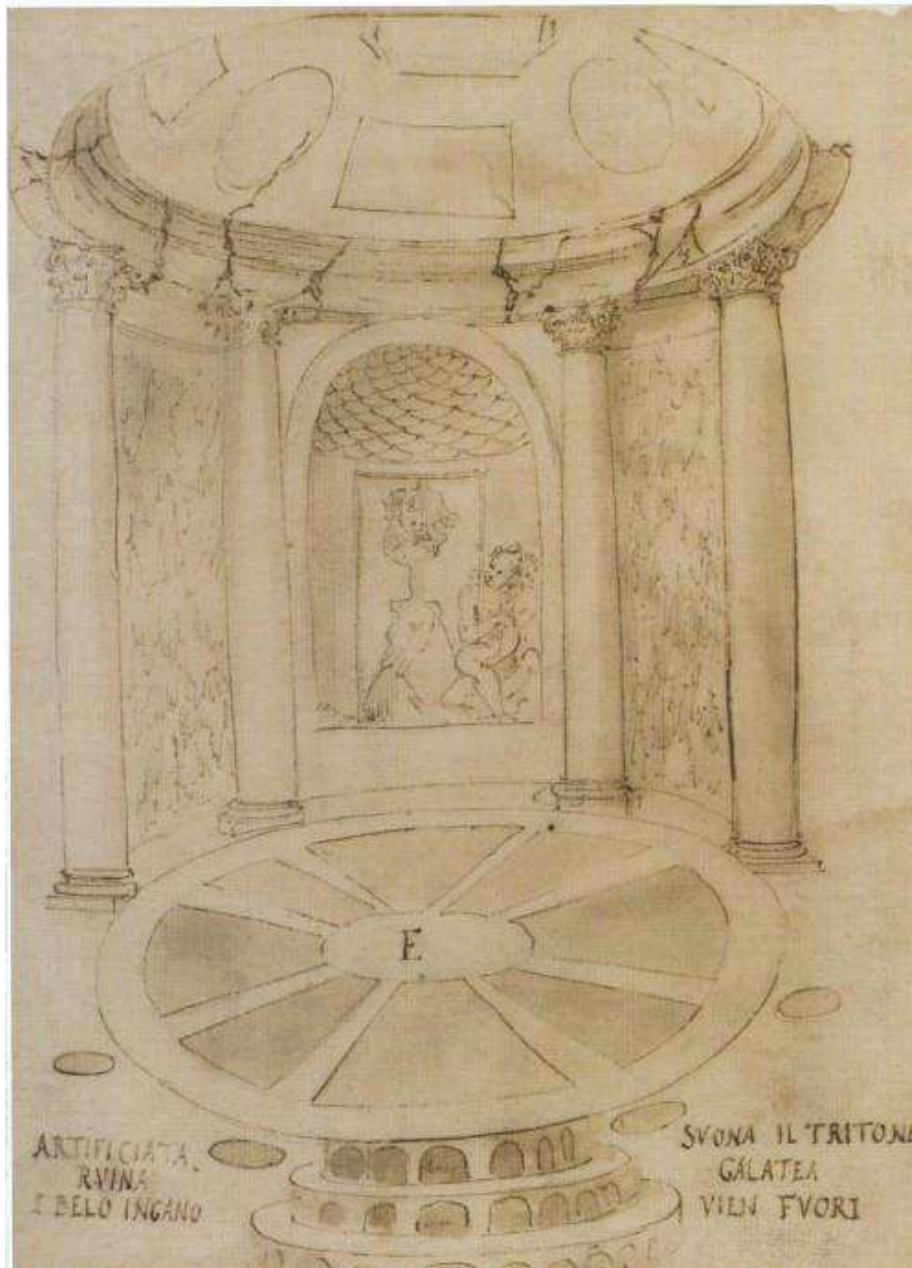
67. Giovanni Guerra, *Automata in the Grotto of the Deluge*, Albertina Museum, Vienna, 1601.



68. Girolamo Macchietti, *Medea Rejuvenates Jason*, Palazzo Vecchio, Florence, 1570.



69. Johannes Stradanus, *Ulysses and Circe*, Palazzo Vecchio, Florence, 1570.



70. Giovanni Guerra, *Artificiata Ruina e Belo Ingano Suona il Tritone Galatea Vien Fuori*, Albertina Museum, Vienna, 1601.

Conclusion

This study set out to explore what Francesco de' Vieri could have meant, for his contemporary audience, by the eclectic references and allusions to well-known “magical” or Hermetic statues in antiquity in relationship to those he was praising for his sixteenth-century patron Francesco I de' Medici. That line of inquiry wended through magical and religious philosophy from antiquity ancient and near; it snaked insistently through the earliest scientific minds of the Middle Ages who looked into the nature of light, air, and the cosmos. Although they were well-known across the major courts of Europe in the seventeenth century, the Pratolino automata are obscure objects in standard histories of Renaissance or Mannerist Art, and the text which some scholars have classified a paean to his powerful patron has, in itself, been of little interest to many except scholars of the demolished villa and its fabled wonders. Nevertheless, these automata and the class of objects to which they belonged in their time period are themselves a key to understanding much about how fifteenth- and sixteenth-century man saw the significance of his own manipulation of the natural world. Through their models in late antiquity and then, in permuted forms in medieval magical formulae and Renaissance Neoplatonic and Hermetic star magic, the automata as described by the philosopher Francesco de' Vieri called upon a rich knowledge tradition which, taken as a whole, ultimately undermined the official Aristotelian position within which the powers and conventions of his era dictated that he write and teach.

As this study has set out to delineate, from antiquity the minds of natural philosophers and early scientists were occupied very much with the physics, so to speak, of metaphysics: the soul and unseen spirits, how they behaved, what laws they obeyed, and at the peak of Humanist daring in the Renaissance, how man might master these forces in concert with the other natural forces which were his exciting new dominions. The highly refined, natural mechanics with which spiritual and astral influences were presumed to operate in the automata or the theurgic *telestiké* specifically and upon the terrestrial sphere at large could constitute even their own separate chapter in the history of how astro-particle physics evolved as an intellectual concept far before the instruments existed which confirmed the presence and qualities of cosmic radiation. The automata in this “magical” sense as potential vessels for directed quantities of how said “influences” (or radiation, in modern terms) was conceived constitute material expressions of a chapter of early modern scientific investigation about which much remains to be written. The surface of the late-Renaissance automata

as an early-modern pre- (or proto-) scientific device has been scratched, but much work remains to be done which will ultimately situate these hybrids of art, mechanics, and philosophy through the wide range of art, social, scientific, and technological histories to which they belong.

De' Vieri's eclectic philosophy in the late Renaissance permits a unique insight into how the late-Renaissance court of Francesco I, awash as it was with the magical currents of Neoplatonism and Hermeticism, conceived and ultimately modelled in their artwork their control over different natural forces. As this study set out to demonstrate, a close reading of De' Vieri's description of the automata of Pratolino and his panegyric to their maker invokes a wide variety of ancient philosophers whose writings invoked theurgy, or similar ritual procedures to draw down and invest some kind of unseen astral-spiritual essence into a man-made object; that this intense search for the quintessence so characterized the activities of the court of Francesco I de' Medici, Florence's well-known alchemist prince (although the truly scientific achievements of his life and works are continually being brought to light), is the critical context by which we must read De' Vieri not only as a testament to their appearances and significances, but also as a product of this same court which staged elaborate "magical" performances for their documented entertainments. This study intuited that the central question or criterion which drove the comparison of Pratolino's automata to the "magically" automata of antiquity, primarily the question of quicksilver animating an antique Venus found in Aristotle, occupied the sharp intellects of late-Renaissance Humanism as well. The ancient authorities and Medieval Latin Christian luminaries which De' Vieri cites by name in his *Maravigliose Opere* form a roadmap to his Renaissance readers for an exploration of Egyptian, Greek, Chaldaic, Hermetic, and other sources for "god-making," theurgic, or similar investment procedures. Therefore, De' Vieri's document from the last quarter of the sixteenth century furnishes the modern historian with a compelling piece in the puzzle of understanding the many ways by which the eclecticism of Renaissance Aristotelianism could be tailored to its patron's requirements. In the case of the Pratolino automata, this study put forward the supposition that the late sixteenth-century understanding of the natural physics of air and even water was intimately connected to the philosophy of high-magic familiar to learned circles primarily through the Neoplatonic writers and the Hermetic corpus; furthermore, as has been discussed, intricate mechanical objects in the early modern period were just as much feats of virtuosity as conceptual models by which intellectual processes were rendered tangible. In the case of the automata, there are ample indications that the mastery of far more than water and air was in play at the experimental, scientifically advanced court

of Francesco I. The erudition of De' Vieri, then, becomes a demonstrative point of the authorities on the ancient world's magic and ritual but also, equally, natural philosophy and metaphysics; in the Mannerist spirit of virtuosity and the magician's command of wonder, De' Vieri's description of Pratolino leaves even the most well-read Humanist reader to wonder whether Francesco I de' Medici really could have surpassed the ancients, indeed to wonder whether the secret of animating the inanimate was close to hand in the texts of Plotinus, Hermes, and Ficino and put on display in Florence at the end of the sixteenth century.

Appendix: De' Vieri's description *Delle Maravigliose Opere di Pratolino*,
transcribed from its original publication

Although De' Vieri's *Delle Maravigliose Opere di Pratolino, & d'Amore* is available in a scanned version of its original 1587 publication of Giorgio Marescotti online;¹ I was not aware of any publication which reproduced in its entirety this most comprehensive of works. As I set about transcribing the work from Marescotti's sixteenth-century typeface, in places where the text was illegible, I initially believed that I had no choice to mark those areas with an ellipsis and move on; however, well into my transcription, it was my happy discovery that the entire work has been uploaded to Google Books and that questionable areas in Marescotti's scanned original could be revealed by consulting this source. This was able to fill in many blanks which riddled my original transcription, but overall, the following text is not simply lifted from the same source and some imperfections or discrepancies may be found. Certain words which remain unclear in all available versions are marked with a parenthetical ellipsis (...). De' Vieri, or rather the publisher as the case may be, did not apply any reliable uniformity to accents, punctuation, or spelling throughout the work, and my transcription does not impose any not found in the original text.

The motivation for the inclusion of this transcription as an appendix to the study was for the reader to be able to consult the original passages which I cite of De' Vieri's in their original Italian, without placing an excessive burden of text in the notes. Because the original page numbers were of paramount importance when seeking a reference, I've adopted the convention of placing the original pagination in parentheses preceding the text, and in places where the text breaks to begin a new page, no matter where that break may have occurred in the paragraph. Therefore, the transcription is dotted with these page numbers in parentheses throughout, which are intended to be signposts for the reader seeking a specific reference; the text itself starts, as is noted below, on the third page of the Marescotti edition. Finally, although the work is known summarily as *Delle Meravigliose Opere di Pratolino, & d'Amore*, the second and separate treatise on love (*Il Secondo Ragionamento d'Amore*) I have omitted as it was never referenced, and was not relevant to the study at hand.

DISCORSI DI M. FRANCESCO DE' VIERI, DETTO

¹ Via a scanned copy possessed by Österreichische Nationalbibliothek /Austrian National Library published by Europeana Collections (europeana.eu), September 8 2014.

IL VERINO SECONDO.
Cittadino Fiorentino.
Delle Maravigliose Opere di Pratolino,
& d'Amore
Al Serenissimo D. FRANCESCO MEDICI
Secondo Grand Duca di Toscana.
IN FIRENZE
Apresso Giorgio Marescotti, 1587.
Con licenza de' Superiori.

(3) AL
SERENISSIMO
DON FRANCESCO
MEDICI,
SECONDO GRAN DUCA
DI TOSCANA

Ecco, Serenissimo GRAN DUCA, & mio Signore, le considerationi, le quali io hò fatte sopra il suo graziosissimo Pratolino, & sopra le maravigliose opere di quello, accioche quanto ad esso (opera così magnifica, & regia) e' resti, * duri in tutti i futuri secoli contro alla natura del tempo, che è corrompere, & distrurre tutte le cose di quaggiù. Quanto à V.A.S. (4) à fine che il suo gentile, & bello animo, & maraviglioso à ogni sorte di persone, & presenti, & lontane si faccia piu noto, & piu chiaro. Et finalmente perche gl'altri ne prendino nobili delectationi, & gioveuoli avvertimenti. V.A. Sereniss. si degni ricevere queste mie compositioni, le quali sono il ritratto del suo Pratolino, con gratissimo animo, & le prenda per testimonio certissimo dell'ardentissimo, & prontissimo animo mio, che è di servirla, & di farle sempre cosa grata, così per mia propria elettione, come per obbligo. Le bacio con ogni atto di reverenza, & di fedelissimo servitù la veste, con desiderargli da Dio perfetta sanità, & ogni felicissimo contento.

Di V.A.Sereniss.

L'humiliss. & fedeliss. Serve,

(5) RAGIONAMENTO

PRIMO SOPRA

L'OPERE DI

PRATOLINO

Il Prohemio.

Tra tutte le cretaure: l quali sotto al cerchio della Luna si contengono ni una ne è, che partecipi del divino se non l'humo: come di ciò ne fanno ampia testimonianza le divine scritture & come il medesima con fortissime ragioni dimostrano i migliori, & i piu eccellenti filosofi fra gl'huomini, poi quegli piu à Dio si assomigliano, & piu gli son grati, l quali in ogni loro asso di contemplatione, & di attione, & d'operatione artificiosa giovano, & fanno beneficia non solamente à loro stessa: ma ancora alla patria, a'parenti, agl'amici, & à ogni sorte (6) d'huomini. Da queste due sentenze non meno infiammato quanto all'affetto, che avvertito quanto all'intelletto io (se bene tra i Filosofanti di questi tempi sono il minimo, cosi per intelligenza, come per fortuna) mi son sempre ingegnato con ogni diligenza, & amore, di essere giovevole, & utile con quel poco di Filosofia, che da Dio trà gl'altri beni hò ricevuto à ogni sorte di persone; come di ciò ne posson far fede più, & piu miei componimenti: ne' quali più tosto severamente, che da scherzo, io hò havvuto l'occhio à dilettere, & giovare altrui nobilmente: hora perche la virtù, ò sia speculatrice, ò attiva, ò effetrice, quale è quella de' piu ingenosi, & piu lodati professori dell'arti è di tanta stima, & cotanto ci è necessaria al viver bene, & felicemente: che ad essa siamo sino nell'opere fatte per diletto, & quasi per gioco indivitti, & infiammati: quali sono sopra tutte l'atre quelle, le quali hanno piu del maraviglioso, & dello stupendo della Regal Villa di Pratolino: Di qui è che per non mancare ancora in questa maniera di fare atti di beneficenza, che io mi son proposto di farci intorno alcuni ragionamenti. Il primo de' quali apparterrà all'istesse (7) opere di Pratolino. Il secondo sarà d'Amore, à fine che il suo ritratto così gratioso, che è pur in Pratolino si conosca, & intenda meglio, & con più diletto. Col favore dunque primieramente della Divina Maestà. Secondariamente di esso Serenissima Gran Duca. Et terzo di ogni giuditioso, & gentile spirito, darò principio à quanto io mi son risoluto di dire. Et se nelle mie parole sarò piu presto rozzo che leggiadro, & che gratioso, scusumi il poco tempo, che hò

da pensare à i concetti, che siano veri, & con facilità, & ordine spiegati: non che alla gratia, & all'ornamento delle parole, oltre che io stimo, che l'arozzezza delle parole con la bellezza, & meraviglia de'concetti, habbino à fare, che questi miei discorsi siano più dilettevoli, come più conformi alle bell'opere di Prtolino: le quali molto più piacciono in luoghi così rozzi, ne' quali le si ritrovano; forse perche le gratia delle cose molto più si conosce quando gl'è vicino il suo contratio, che quando le è lontano, oltre che in questa maniera ci vien ricordato, che ogni perfetione di quaggiù, & ogni bellezza hà havuto principio, ò vero origine dal suo contrario. Prima gl'huomini furon rozzi, quanto all'arti, (8) & le professioni tutte: poi alcuni di esse vi dettero opera, & con essi giovevano à molti. Et così habbero del Divino, & sia gli Dij furono annoverati da' Gentili. Ma tempo è horamai di dare principio à quanto io mi son proposto.

Dovendo dunque io hora discorrero dell'opere di Prtolino così maravigliose, & così magnifiche, & dilettevoli, & utili al ricordarvi il bene, & virtuosamente adoperare, procedurrò con questo ordine. Primieramente io essporrò in quante maniere si prendino queste voci da'buoni scrittori, Prtolini, Giardino, & Paradiso, notando di quale io intenda qui di discorrere, accioche l'animo di chi legge non istea sospeso, & confuso. Et à fine, che di qui ancora apparisca, come Prtolino sia un ritatto prima di una Republica ben governata quaggiù in terra, & poi della Sopracelesta, & divina in quanta agli ci significa la bellezza dell'animo similitudine delle bellezza del Superno Paradiso, & di quelle delle Republiche sono regali, & buone: alla quale Superna Republica noi con i pensieri, con le parole, & con l'opere dobbiamo sempre aspirare: così per essere grati di quell'attivo, beneficentissimo (9) Prencipe sopra tutti i Prencipi: come per condurvici con la Divina gratia per essere poi per sempre felici, & beati. Secondariamente dirò le cagioni, dalle quali si potesse muovere il Serenissimo Gran FRANCESCO à questa magnifica, & maravigliosa impresa: accioche si sappino le cagioni principali: donde il bello, & gratioso Prtolino hà origine, onde se ne harà qualche notizia. Nel terzo luogo perche la cognitione historica è piu facile à riscontrarsi con le cose sensibili, per essere ella elle cose in particolare, & per havere per sua proprietà il vero: dove la Scientiale & de' Filosofi se bene ancora essa aspira alla verità, non dim neo la contempla nelle cose in universale, & più difficili ad apprendersi. La poetica imita l'attione de' particolari, ma co' fintioni, & menzogne. Et l'oratoria magnifica il bene, & il male piu che non sono veramente. Di qui è, che io racconterò per modo di historia, & co' piu ordine che per me si potrà le piu degne, et piu stupende opere, insieme esponendo co'sensi specolativi, & con marali ciascuna di esse. In oltre andrò poi

notado alcuni artifizij piu maravigliosi, coparandogli con queglii di Pratolino, (10) & dimostrando che questo ne sono a questi inferiori, ma si bene superiori, onde insieme si scopriranno piu le maravigle di questa gran Villa, de' professori dell'arte di questi tempi, & di esso Serenissimo Gran Duca, che di essi è protettore, & remuneratore conforme alla regale, & distributrice virtù. Nel quinto luogo, perche in questo Pratolino vi si contengono Giove, Pan, Cupido, & altri Dij, & cose favolose de' Gentili: di qui è, che io tratterò delle favole, esponendo in universale quella, che si sia la favola, & come la sia usata da Platone, come da Aristotile, & come da poeti, & come da gl'oratori insieme, dichiarandone molte, & cavandone utili, & maravigliose verità. Finalmente perche così magnifiche opere à ogni maniera di virtù invita ogni conditione di persone, perciò io per compimento, & epilogo di uesto primo discorso ci aggiugnerò un'esortatione à tutti gl'huomini alle buone arti, alle dottrine, & alle altre giovevoli, & graziose professione.

(11) DISCORSI DI M. FRANCESCO

DE' VERI.

Delle Maravigliose opere di Pratolino

LE SIGNIFICAZIONI DI

questi nomi Pratolino, Paradiso,

& Giardino: & come si pren-

da in questo luogo.

Capitolo. I.

Quanto alle significazioni di queste voci, Pratolino, Paradiso, & Giardino. Primieramente io esporrò in comune quello che significhino. Secondariamente racconterò tutti i significati. Nel terzo, & ultimo luogo da e si dubiterà quale (12) di detti significati sia il primo, & qual l'ultimo, & quali quelli di mezzo, mercè del primo punto, se ne harà la cognitione piu spetiale: ma però confusa, & mercè del terzo si intenderà à quale de pratolini, paradisi, & giardini prima convenghino questi nomi, & così quale si dee prima conoscere, & pregiare, & qual poi. Dico dunque quanto al primo punto, che questi tre nomi significano il medesimo, ma secondo tre diversi rispetti: percioche, ò la moltitudine delle cose, partecipano della bontà, & della bellezza, & gratia son animate di anima vegetatrice solamente come le piante, ò humana come gl'huommi, ò intellettuale come gl'angeli. Se i luoghi son pieni di piante fiorite, & massimamente di piante grandi, & con artificiose ordine

disposte giardini. Se di huomini, ò dij, ò statue di essi paradisi, propriamente parlando: ma in comune ogni luogo pieno, & adorno di cose buone, & belle, si puo indifferentemente dire paradiso, giardino, & prato, ò vero pratolino. Quanto al secondo punto à me pare, che i pratolini, ò veri giardini, ò paradisi si possino ridurre al numero di dodici. Il primo de quali è la Divina essenza con tutte le creature che vi sono intelligibilmente, & con intelligibile ordine: done dependono tutte quelle, le quali fuori di (13) Dio si ritrovano, & di loro ordine come confessano i Theologi Santi; nella Quisitione dell'Idee: Platone nel Timeo, & nel Parmenide, & nel Convito, & altrove: & Aristotele nel duodecimo libro della sua Metafisica, & come io ho chiaramente esposto, & sottilmente dimostro in questa si gran disputa. Il secondo Paradiso è il Ciclo Empireo con i nove cori angelici, & con l'anime beate. Di questo ragionò con verità, & altamente il gran Dionisio Areopagita, sommo Filosofo, & Theologo Christiano insieme. Il terzo è un componimento di tutti invisibili, & resplendentissimi Cieli, con tanto ordine disposti, & mossi, che é uno stupore à ogni più rilevate intelletto: questo è quello, del quale disse il gran Profeta, & (...), che narra la gloria di Dio, & Dante disse, che si ritrovò nel Cielo, che piu della Divina luce prende, di questo hanno ragionato i Theologi, Platone, Aristotele, & i piu eccellenti Astronomi. Il Quarto è questo Mondo elementare, composto di quattro elementi, Terra, Acqua, Aria, & Fuoco, di Misti metheorologici, & delle piante, & de gl'animali, & dell'huomo, come ci insegna con bellissimo ordine, & con fortissime dimostrazioni il principe, & maestro de'Peripatetici, & tutti coloro che fanno le cose per loro proprie cagioni. Il quinto è il paradiso terrestre: nl quale furono creati, & collocati Adamo, & Eva, & vi stettono per quale che (14) egli non furon disubidenti all'eterno, & sopraceleste Padre, come è scritto dal gran Profeta Moyses nel Genesis: del quale con sette maravigliose espositioni ha trattato, le mirandola Fenice. Il sesto è un giardino di piante d'ogni sore benissimo disposte, & tenute: come tra i piu celebrati è quello de' Pitti, opera di loro Serenissime Altezze, questi hà tanto del grande, & del gratioso: che egli fa à gara nella grandezza, & nella leggiadria al Palazzo che hebbe principio da quel nostro, gran Cittadino Messer Luca Pitti: & poi è stato condotto à perfezione così stupenda dal Serenissimo Gran Duca COSIMO MEDICI, & dal Serenissimo Gran Duca FRANCESCO suo degnissimo successore. Et detto giardino, & detto palazzo tutti e due insieme fanno à gara à fare testimonianza del magnifico, & regale animo di loro Altezze Serenissime. Il settimo è un luogo, nel quale sono boschi, piante domestiche con arte disposte, & statue di huomini rari per virtù, & di Dij de gentili con grandissima copia di acque, con diversi, & maravigliosi artitij à certo tempo manifestantisi à chi vi si ritrova, & co'ingannevoli scherzi

facendolo cavaliere bagnato: di questo intendo io qui di ragionare, accioche ognuno ne habbia piena, giovevole, & nobile intelligenza, cosi delle persone lontane, come delle presenti: & così di quelle che varrano in questo Mondo di tempo (15) in tempo: come di quelle, che ci sono in presente. L'ottavo è una persona gratiosissima per bellezza del corpo, & per nobili, & gentili creanze dell'animo: come è l'Amata donna allo amante suo, delle gratie maravigliose della quale, & della forza che l'hanno ne gl'animi nobili, & di valore largamente, & con ogni possibil leggiadra n'han detto Messer Francesco Petrarca, Messer Lodovico, & Messer Guglielmo Martelli, Messer Giovambattista Strozzi il vecchio, & molti, & molti altri rari ingegni de'nostri Fiorentini, brevemente: ma con profondo, & sottile intendimento Guido Cavalcanti similmente Fiorentino, come si può comprendere da gl'intelligenti da quella sua dotissima, & difficilissima Canzone, il cui principio è questo/

*Donna mi prega perche voglio dire
D'un Accidente ch'è sovente, & fera,
Et è si altero, ch'è chiamato Amore.*

Il nono è l'animo de' più ingegnosi, & celebrati professori dell'Arti, come de' Pittori, Scultuori, Architettori, & simili: questo nono giardino, & fiorito prato di suora ci si mostra, per gl'edifitij, per le pitture, sculture, & statue de' grandi, & de' famosi huomini, delle quali opere ne è un gran numero sopra gl'ufitij in Galleria, & in Roma nel giardino, ò palazzo del'Illustrissimo, & Reverendissimo (16) Cardinale ARNALDO de' Medici uno de' piu liberali, & de' piu magnifici Signori, & Cardinali, che vi siano. Il decimo son gl'huomini rari per prudenza, & valore nell'attioni humane, & al tempo di pace, & al tempo di guerra: tra i gran guerrieri, & insieme nobilissimi di sangue la Città nostra ha havuti, lo Illustrissimo Signor Giovanni De Medici, & il Signor Piero Strozzi, quegli il quale farebbe molto piu celebrato, se egli contro alla sua patria non fusse venuto, & contro à quel benignissimo, & prudentissimo Signore, che il Prencipe de' Principi ci havea dato, & ci confervò mentre che visse per nostro Duce. L'undecimo, & penultimo giardino, & luogo di huomini rari per intelligenza: son quegli, i quali tengono meritamente il primo luogo per gli studij, come sono i gran lettori di Filosofia specolativa, quegli della Legale, quegli di Medicina: quei di Logica, & i gran Theologi, & Metafisici: de' quali il famoso Studio di Pisa è stato in ogni tempo abbondante: come per loro dotissime lettioni, & dispute si è conosciuto, & per loro componimenti. Il duodecimo, &

ultimo significato di questi nomi, Pratinolo, Paradiso, & Giardino, sia il ragionamento de' sopradetti, se alcuno de' più rari intelletti si mettesse à discorrerne di tutti con altezza di concetti, con parole convenienti, & con bell'ordine la ragione perche à tali, & tante cose appunto convenghino questi nomi (17) di Pratinolo, Giardino, & Paradiso può essere questa à mio giuditio, perche, ò il paradiso è cosa invisibile, ò visibile. Se è invisibile, o è cosa increata, & questa è la divina essenza con tutte le creature, & con l'ordine intelligibilmente, & come esempio, & idee di tutte le cose, che son fuori di quella. Se è invisibile, ma creata, questi è il cielo empireo con tutti i nove cori angelici, & con l'anime beate. Se il paradiso è cosa visibile, ò del mondo grande, ò del piccolo, che è l'huomo. Se del mondo grande, ò di parte grande, ò di parte piccola. Se di parte grande, ò egli è il cielo visibile, ò questo mondo inferiore. Se di parte piccola, ò ella è fatta da Dio: come il Terrestre Paradiso. Si dall'huomo, ò egli è il cielo visibile, ò questo mondo inferiore. Se di parte piccola, ò ella è fatta da Dio: come il Terrestre Paradiso. Se dall'huomo, ò egli è un giardino di piante, & di fiori, ò di opere parte artificiose, & parte dalla natura, & questi è il Pratinolo gratioso, opera del Serenissimo Gran Duca FRANCESCO. Se del mondo piccolo, ò egli è bello di bellezza naturale: come è l'amata allo amante suo, ò di bellezza acquistata. Et se così, ò per arte, come è quella degli artefici più ingegnosi, ò per costume, come quella de' prudenti, & virtuosi di virtù morale, & civile, ò per speculationi, come quella de' Filosofi specolativi, ò finalmente il giardino è un raccolto di ragionamenti gratiosi di queglii, come di sopra da me si è detto. Quanto al terzo capo, che era à quale de'detti paradisi, questi nomi prima convenghino, se a quali (18) poi, questo è facile à risolversi con dire, che secondo l'ordine di eccellenza, & nobiltà prima si deono attribuire alla divina essenza con l'idee di tutte le creature dipoi al cielo empireo con l'angeliche creature, & con l'anime beate. Terzo a visibili cieli, & così per ordine. Ma rispetto al nostro modo, & ordine di comprendere, & di conoscere le cose per via de'sensi à quei giardini prima convengono queste voci, i quali son più sensibili, & più cognoscibili col senso della vita: come sono queglii, che propri mente si chiamano giardini, come è questo gratiosissimo Pratinolo, & altri simili.

Le cagioni, dalle quali può havere havuto
origine Pratinolo, & l'opere d'esse.

Cap. II.

Per ritrovare le cagioni: le quali poteron muovere il Serenissimo Gran Duca FRANCESCO, à far

fare questa grand opera, & stupenda di Pratolino (per quanto è lecito, & è possibile al servo comprendere de' pensieri del suo Signore) fa di' bisogno, che io supponga alcune notitie, & importantissime verità: nelle quali così virtualmente le cause di cotanta impresa si contengono, come (19) nella pietra fochaia, & nel fucile il fuoco, & il suo splendore.

Le prima dunque sia questa, che i buoni Principi si assomigliano à quello, che è unico, & principe sopra tutti gl'altri, & per sempre: & l'assomigliarsegli consiste nella prudenza, con la quale questi principi terreni drizzano ogni loro atto, & de' sudditi à un ottimo fine, che consiste nel retto, et giusto uso di tutti i beni humani, eō debiti mezzi, & in tempi convenienti. Et questo appartiene alla parte intellettiva di essi Signori, & governatori degli stati; quanto alla volontà similmente e' si assomigliano alla Divina Maestà ne gl'atti beneficēza verso i bisognosi, & i meritevoli, & con i gastighi de'rej, secondo, che conviene alla regale loro giustitia; che si dee conformare con la Divina nello essere retta, & severa con quegli che in tutto son rei, & nello essere congiunta con la clemenza con quegli, che errano, & son degni di qualche compassione. Quanto alla potestà questa sta questa si dee assomigliare con quella di Dio nella fermezza, & nel valore: & tutto questo pende dall'unione, & benevolenza di essi principi con i loro, & poi luno con l'altro per amicitia, & parentadi, & per atti di gran liberalità così cō i suoi, come con gl'altri principi, & soprattutto con l'essere per atti religiosi, & di carità unita con Dio: donde hanno havuto il domini: & dal quale è loro custodite, & confermato.

(20) La seconda verità si è, che ogn'huomo veramente prudente, & massimamente i principi deono havere l'occhio à Dio, che è loro superiore, à loro stessi: Et terzo a loro soggetti. Et quarto un prencipe all'altro. Quanto a Dio fa di mestiero essere verso quello religiosissimo, si per essergli grato, si ancora perche come dice Aristotele ne' libri di governi i sudditi piu volentieri l'ubbidiscono, sperando dal Signore religioso atti di giustitia, & di beneficenza, oltre che niuno ardisce, se non è stolto, di machinare contro à quegli, i quali per religiosa pietà son grati al Re dell'universo. Quanto à loro stese, e'deono porre ogni diligenza nell'acquisto di tutte le civili, & heroiche virtù, & poi nell'operare, secondo quelle: poi che ciascuno de' Principi dee col numero, & cō l'eccellenza delle virtu essere superiore à gl'altri: accioche e' sia con ragione reverito & ricevuto per loro Signore. Alle persone private ò assai di risplendere con alcuna delle virtù: come à Capitani valorosi per la fortezza alle nobili donne, & à giovani per la temperanza.

A molto ricchi per la magnificenza con la liberalità congiunta. A' queglii, che mediocrementemente hanno delle facultà, basta l'essere liberali, & cortesi: a' nobili conviene la magnanimità: a' poveri la pazienza, à gl'amici la affabilità. Quanto a' sudditi, il Prencipe dee tutti amargli, & mantenergli in pace, con fargli, osservare le sue giustissimo (21) leggi, & remunerandocialcuno più, ò meno secondo i meriti, & secondo le condizioni di essi, & procurando l'abbondanza delle cose necessarie. Quanto a' prencipi tra loro si possono unire, per atti di amicitia, & di parentale, come e' fanno.

Il terzo, & ultimo fondamento sia questo, che tra gli altri ufittij di amorevolissimo principe, uno è questo, provvedere à certi tempi à se stesso, & a' suoi soggetti qualche nobile recreatione: come sono felte giardini, musiche, & altre così fatte: atteso che gl'huomini per l'infinita molestie & risolvano quanto alle forze del corpo, & per i molesti pensieri dell'animo, si soprendono, & si abbandonano, & perciò fa di bisogno ricorrere alle recreationi, purchè habbino del nobile del virtuoso, conforme al fine ottimo delle Republiche bene, & ottimamente governate, oltre che in similità spassi, & feste unitamente fanno à garra à dimostrare la loro eccellenza i più ingegnosi professori dell'arti, come à questi avvenne nella Comedia del gentilissimo Signore Giovanni da Vernio, recitata per ordine del Serenissimo Gran Duca, & in quegli stupendi intermedij: dove oltre al ricrearli in più volte grandissimo numero di poppli, con grandissimo stupore e si veddono opere miracolose condotte in un subito con machine, & ingegni quasi soprahumani, si udirono musiche suavissime, & voci contrafatte di uccelli (22) tanto simile, che di uccelli stassi li credeva, che fussero.

Da tutte queste verità, è facil cosa il cavare le cagioni delle bell'opere, agnifiche, & stupende di
Pratolino.

L'historica cognizione dell'opere di Pra-
tolino con le loro significationi.

Cap. III.

L'historica cognitine primieramente ricerca il vero senza altra prova, ò ornamento di parole: onde non meno per quello conto elle dee proporsi ad ogni altro modo di scrittura, che per essere più facile: Da questa prendono gl'oratori, i poeti, & gl'altri authori il soggetto, le parti, & le condizioni.

Dipoi, & à quello, & a queste historicamente intese danno forma, ò di ragionamento con persuasione, & dissuasione, ò di imitatione, & favola, ò prendendo à dirne in universale, & cō ragioni tanto forti, quanto comporra il soggetto se gli da forma di scienza, secōdo che questi scrittori fanno professione, ò di oratori, ò di poeti, ò di scienziati. Di qui è, che io innanzi à tutti gli altri modi di scrivere terrò primieramente l'historica, narrando à parte à parte tutte le piu maravigliose (23) opere di Prtolino, così appunto, & con ordine: Come per me sarà possibile, & secondo, che io in un sol giorno, che l'ho vedute, ne hò potuto tenere à memoria; & secondo, che in brevissimo tempo di un'hora l'Eccellente Architetto, & Ingegniere Messer Bernardo Buontalenti, & Messer Francesco suo figliuolo m'hanno aiutato mettere in carta; oltre che come molti sanno l'animo mio è molto distrahato da ogni gentile speculatione, per tante, & tante mie sventure. Dove dunque in raccontare cotante opere, & così stupende per artifizij, & così ricche per regale magnificenza io harò mancato, supplisca in ciò il desiderio, & l'ardentissimo afetto, che io hò havuto di dirne à bastanza. Et quel poco, che io ne dirò così confusamente, doverrà al Serenissimo mio Signore, & ad ogni altro divino spirito essere gratissimo per la nobiltà del soggetto, & per gl'utili, & nobili avvertimenti, che io ne harò scoperti, oltre che facil cosa sarà a' belli spiriti dal mio ragionamento, se bene non è in tutto compito, aiutati il poterne dire a sufficienza, si come ad Aristotele, & Platone fu facile, esaminando la dottrina de gl'antichi, & rozzi filosofanti scrivere di Filosofia molto meglio, & più scientatamēte: Et per questo e' confessorono di essere loro ubligati. Ma tempo è di venire all'historia.

Dirò dunque così, facendomi da questo principio. Nel mezzo di Prtolino (luogo per natura (24) salvatico, attorniato di monti, & pieno di boschi), risiede un magnifico Palazzo con regali scale. Al primo palco vi sono una gran scala, & un salotto, & da ogni banda vi sono sette camere, le quali sale son riccamente fornite di teste di rilievo antiche, di quadri, & paesi bellissimi. Le comere son tutte di richi, & varij drappi parate, sopra questo primo palco son' altrettante stanze, & così sopra'lterzo. Quanto à me io mi fò dal detto Palazzo, si perche lo prendo per centro, & l'opere fuori di esso per linee, che da esso nascono, & senza far memoria di esso quelle non si intendono con ordine. Il detto edifitio è riccamente, & magnificamente adornato, & à ragione dovendo essere degno ricatto di loro Serenissime Altezze, & d'itanti grand'huomini, che vi vengono per negotij importantissimi del Serenissimo Grand Duca, ò di loro stessi, ò comuni. Quanto all'opere, che vi sono, così come ell'hanno del grande, del nuovo, & del maraviglioso, così à proportione conveniva, che fusse il

Palazzo di quel luogo. Et essendo tale il Palazzo, che così fussero quell'opere.

Secondariamente, dirimpetto alla porta dinanzi verso Tramontana è un profondissimo pozzo, con freddissima, & chiarissima acqua, nel più alto, & più lontano luogo à rincontro al detto pozzo v'è posta una statua di marmo di Giove, il quale da un canto hà un'Aquila di marmo nero, & dall'altro (25) lato ha in mano un fulgure d'oro, che getta acqua dinanzi, & di dietro, & dinanzi fulgura verso il grā Monte Appennino, dico di quello, che di sotto per arte vi si vede. Qui sono (per più intelligenza, & per cavarne qualche dilettevole, & utile avvertimento) da considerare tre punti: Il primo de' quali è lo essere collocata la statua di Giove nel più rilevato luogo. Il secondo l'Aquila postagli à lato. Il terzo à folgore, donde esce gran copia d'acque. La ragione del primo si è, perche Giove è nome di Dio, come governatore, & rettore dell'universo, & di ciascuna sua creatura, questi per mezzo de' cieli', dà la vita à tutte le co'e di quaggiù, & i cieli sono nel più alto, & più rilevato luogo: de sopra essi sono Dio, & gli'altri Divini intelletti: come condessa fino ad Aristotele nel primo libro del Cielo. La cagione del secondo punto si è, perche si come l'aquila ha un fortissimo vedere, & è a di tanto forte vista, che può affisare gl'occhi fino nel sole: così Dio vede il tutto, fino i nostri pensieri, & affisa la virtù sua in se stesso, che è sopraceleste, & l'invisibile sole. Del terzo punto si può dire, che per questo si finga, che Giove fulmini acqua, perché egli è quello, che fa piovere, & con la piovra fa generare più e diverse spezie di creature à conservatione di esse, per quanto dee durare il mondo con ogni sua parte, le quali partecipano di qualche grado di bontà, ò più chiaramente, (26) ò meno, oltre che per l'acque di Giove si potrebbero intendere le virtù sue, ma come communicate alle creature, nel qual modo l'hanno un'essere flussile: et dependent: et non tutto insieme, et independēte come in Dio fonte vivissimo d'ogni bene, et d'ogni gratia. Egli dūque per la smme eccellenza dee sommamente essere reverito, et honorato, er la somma beneficenza sommamente dee da ogni creature essere amato, et laudato, et per l'infinita potestà ibidito, et remut, atti, et ufiti della vera, et religiosa pieta.

Terzo, dopo à questa grande statua di Giove, allontanandosi quanto è un tiro di mano, et venendo verso il Palazzo à dirittura, è un labirinto pieno di allati, et nel mezzo è un circuito grāde à otto faccie con otto colonne: sopra le quali ha à essere una gran pergola à cupola di ferro, di altezza di braccia diciotto, et di diametro di braccia dugento in circa, nel mezzo di detta pergola vi è una spugna cavata di Corsica, la quale nella cima getta acqua. Questa spugna, et questa pergola

significano gl'huomini rozzi, et dediti al bere acqua ogni volta, che e'vogliono discorrere del governo di Dio, et de'suoi segreti si avvilupono, et sinarriscono: come le fussero in un'laberinto; del quale che sà uscire merita di essere condusse per la sua gran virtù di corona di allora, che sta sempre verde.

Quarto, accostandosi ancor più al palazzo, si trova (27) un gran Monte, che si prende per il Monte Appennino, al quale si appoggia un gran gigante di tanta grandezza, che se e' fusse ritto in piedi, come gli è à sedere, sarebbe braccia settanta, è di pietra serena tutto voto dentro, nel voto di detto Monte, vi sono delle stanze, nelle quali son dipinte tutte le miniere, et huomini, che ne cavano metalli et pietre. Nella stanza maggiore vi è una rarissima fonte fata tutta di opere maravigliose della Natura, come di ricchi nicchi marini, dentrovi varie sorti di animali, in questo modo. Et prima, cominciandosi dalla più alta parte di detta fonte vi è posta una statua di Thetide tutta di nicchi, che riguarda con maraviglia in giù, et stupisce, che l'arte superi in un certo modo la natura, poiche l'ha fatto si mirabil vaso in forma di pila di otto facie, et su ogni canto vi è un pipistrello di madreperla, et nel mezzo una lumaca similmente di madreperla. E' retto il detto vaso da quatro delfini, con un ricetto intorna di nicchie, le facciate di detta stanza son figurate et le figure son Livorno, l'Elba, et altri ricetti con varie figure, come sirene, et altre. Il pavimento di detta stanza è tutto di Terra di Levante di fogliami, cosa ricchissima, et getta acqua per ogni verso, quando occorre. Sopra la detta Fonte è un Terrazzo con murriciuoli intorno, et con diversi mosaici. Al detto Terazzo si slae per iscale di pietra, et di quivi fi entra in corpo al detto Gigante, (28) dove é una fonte di nicchie, frombole, di varij colori, & spugne. Nel mezzo della qual fonte vi è un vaso di diaspro intagliato à ruote, et nel mezzo un fiore di corallina venuto del mar rosso, che getta un gorgoglio d'acqua, et di più altre boccie d'acqua di gran valore. Di detto poggio ne escon'acque in gran copia, le quali cascano più à basso in un pelago, che il suo diametro è di braccia cento, ornato di ricchi balaustri: così di pietre, et di spugne à uso di Theatro. Qui sono da cosiderare più cose, et prima, che all'Appennino monte altissimo in Italia sia appoggiato à sedere un gran gigante, che ci ricorda la gran superbia de gl'antichi giganti, che tentarono mettendo monte sopra monte di prendere il Cielo; i quali furono fulminati da Giove. Et questo altro non vuol significare, se non che Dio sbassa quegli, i quali à guisa di altissimi monti, et di superbissimi giganti, si esalcano fuori del convenevole, ò per la prudenza, ò per la forza del corpo, ò per le ricchezze, ò per qualche altro bene terreno, lasciandogli andare in rovina. Et non ne havendo più cura: come ci dimostra l'esperienza tutto il

giorno, et come tra i primi filosofi confessa il Divino Platone nel quarto libro delle leggi: fa dūque di mestiero à chi vuole arrivare al porto dell'eterna beatitudine, et di qua vivere bene, et religiosamente essere humili con Dio, et con I Principi: si come questo mondo elementare al celeste et (29) come dee essere soggetto in noi l'appetito sentivo alla ragione. La seconda cosa, che si dee qui avvertire è lo esser' in detto mōte delle fonte delle nicchie, de' metalli, et delle piāte, che si fa à sapere, che dētro alle cavità della terra si generano dell'acque, et de'metalli, et pietra et di fuori sopra terra sono le piāte, et di qui ci è redutta à memoria la somma beneficenza di Dio, che ha data alla terr, per mezo del lime del cielo tāte cose, à nostro servitio, et perche gli rendiamo gratie, et lodi del cōtinuo; et di qui similmente è detto a' prencipi, et a' grādi, et potenti, che siano cō gl'altri liberali, et benefici.

Quinto, calando, et venendo pure verso il palazzo, si trova un gran Prato fiorito, di braccia 350, in circa, con 26 nicchie di ferro, che vanno coperte di ellera; et in ciascuna nicchia è una statua di marmo antica: di maniera, che le sono 13 da un lato, e 13 dall'altro lato, et son tramezzate da Aguglie, ò vero Piramidi, le quali medesimamēte vanno coperte di ellera con festoni in aria, che vanno dalla stecca alla Piramide. Qui io considero ancora tre cose mirabili, la prima si è, che dopo a'maravigliosi effetti, i quali sono nella terra, et sopra la terra, ci si parano innanzi gl'huomini rari, et famosi per qualche virtù, così perche ce gli prepōghiamo per essempli, et regole al bene, et virtuosamente adoperare, come per honore, et perpetua memoria di detti duomini virtuosi, et singolari. La seconda è lo essere le statue di essi di marmo bianco, (30) in nicchie coperte di Ellera, che tutto si significa la candidezza, stabilità, et virtù loro. La terza sono le piramidi significatrici dell'ardentissime fiamme d'amore verso qualche virtù, et degna professione, mercè del qual'amore alcuni son venuti singularissimi, et vengono, come dice Platone nel Convito, come ci dimostra l'esperienza, et di più la ragione: perche chi è innamorato di qualche virtù, ò virtuosa professione, v'ha dentro grande inclinatione, et per apprenderla vi mette ogni estrema diligenza, et così è forza, che vi divenga dentro eccellentissimo, con gran giuditio dunque tra le statue di tanti huomini heroici sono state collocate le piramidi: et cō gran ragione per dinotare la verdezza del virtuoso amore, vi sono aggiunti festoni di Ellera verde.

Sesto, dal lato destro di detto Prato, venendo similmente verso il palazo si trova una Cappella nel mezzo di un bosco di Abeti: questa è à cupola con sei faccie, che gira da ottanta braccia, con un

ricetto, ò portico intorno largo quattro braccia, il palco di detto ricetto è coperto dal tetto soppananato di legname di cipresso, et è sustentato da dodici colonne di marmo, dentro nela Cappella vi sono intorno bellissimi inginocchiatoi intagliati, i quali ancora sono di cipresso, con un'Altare usopportionato, la Tavola di detto Altare è di marmo del Botticello, et vi son dentro dipinte bellissime figure. Et qui primieramente è da (31) sapere, che con gran ragione la Chiesa di Dio è dal lato destro, percioche gl'huomini heroici, et divini deono havere l'occhio destro alla Divina Maestà: et al sinistro alle cose del mondoL si come più nobile, et senza proportione son le cose divine, et l'eterna beatitudine, che l'humane, et che qual si voglia humane felicità a tutto questo è conforme à quella divina sentenza. Cercate prima il regno di Dio, et l'altre cose vi saranno date, et aggiunte, similmente prima il gran fattore di tutte le creature intende di farci partecipi quanto all'anima della parte divina, et poiche in essa siano l'inferiori potenze, et in ultimo, che la si infonda nel corpo caduto, et mortale per istarvi per certo spatio di tempo. Secondariamente con ottimo consiglio il Tempio Divino è tra gli Abeti, piante altissime, et dirittissime, per significarci, che il Tempio di Dio son gl'huomini retti di mente, et d'opere, et che con l'affetto, et con il pensiero sono in alto, et in Cielo, se bene ogliano (mentre che quaggiù vivono) sono col corpo in terra, come affermano Paolo Apostolo nelle sue divine lettere, et Platone nel Theeteto, ò vero della Scienza. Ancora ha molto del ragiovole, che il tetto, et gli inginocchiatoi siano di cipresso, legno molto odorifero, et pianta significatrice di morte: per ammeastrarci, che gl'huomini giusti, et divini, sono à guisa di piante odorifere, et grate, et son morti quanto all'affetto à questi (32) beni terreni, et transitorij. Se il granello del gran gettato in terra prima non si corompesse, non nascerebbe per far si uto; come disse il Maestro della Vita l'ddio, et huomo insieme Christo Gesù. A questo riguardando il sapientissimo Socrate disse nel Fedone che la Filosofia era una meditaione della morte. Finalmente nello Altare con ragione son dipinte bellissime figure perche à sua Divina Maestà nel suo tempio si deono porre le più belle cose, et le più perfette per testimonianza, che da quella procede ogni cosa, che partecipa di bellezza, et di bontà.

Settimo, più à basso vi è un Perseo di marmo, che siede sun un serpente di marmo misto, che getta acqua per bocca, et è posato su un monte di spugne. Sonvi muricciuoli à torno, et sotto à detta loggetta vi è una volta dipinta à vasi pieni di varie herbe, et fiori, et vi sono ancora dipinto delle canne. In testa vi è una fonte sopra la quale vi è un Esculapio, che tiene in mano una serpe, che getta acqua et vi sono assai spugne. Questo, Perseo è la parte in noi divina dell'anima come soprastanto al

vario Serpe delle passioni: mercè, dello quali gluomini sono in continui tormenti, et dagl'occhi (...) abbondantissime lacrime. Sotto a Perseo è Esculapio, che è la medesima parte divina in noi, ma come curatrice delle malattie del corpo inferiore all'appetito sensitivo, l'appetito, dico, ad infinite passioni soggetto. Di qui (33) si cava, che quell'huomo è in tutto santo, & beato, il quale ha l'vita, & altra sanita, & dell'anima, & del corpo. Et perche, ce si questa come ogni altro bene s'ottiene principalmente così favore divino. Però rivolti à Dio con grand affetto, insieme con gl'antichi Savi diciamo, *Beatoram antiquissima sanitas in reliquam vitam te(...) fino.*

Ottavo, di là dal detto Esculapio più à basso, si ritrova una grotta di spugne, dentrovi un'orsa, con i suoi orsacchini, che getta acqua per bocca, & vi sono molti altri ricchi ornamenti d'intorno. Questo potrebbe significare, che all'ora procureremo la sanità dell'animo, & quella del corpo quando ci ameremo da vero, unendo l'appetito con amorosa unione, con la parte rationale. Et mettendo pace, & unione tra gli humori del corpo, come dee fare il perfetto medico: Et come ci insegna Erisimacho nel Convito di Platone: à questa amorosa providenza di noi stessi, ci invita fino l'orsa: animale rozzo, & goffo, col naturale amore, & cura, che ha de' suoi orsacchini.

Nono, uscendo del palazzo di verso Mezzo giorno vi è un magnifico ballatoio con balaustri, & cori due scale à ovate, per le quali si sale, & scende: & sotto alle dette scale v'è una grandissima, & stupenda grotta, com' di sotto si dirà. Delle dette scale escono, a beneplacito di essi ne ha cura, zampilli d'acqua in gran copia, che per ischerzo (34) ammollano che ne sale, & scende. Qui si possono considerare tre importantissimi punti. Il primo le dette scale col ballatoio verso Mezzo giorno. Il secondo è la figura ovata delle scale. Il terzo, che di dette scale eschino zampilli d'acqua à certo tempo occultamente. Tutti questi si possono intendere per il celeste palazzo del Sole, per il quale e'sale, et scende, hora accostandosi à poi discostandoli, onde nascono diverse stagioni dell'anno. Et nel medesimo giorno si alza fino al circolo meridiano, poi va calando verso Ponente, et per virtù del Sole si producono quaggiù le acque, le quali si alzano su all'aria, ma in vapori, et poi ripiovano in giù, come di sotto si dirà. Puossi ancora dire, che l'anima nostra esce per creazione da Dio, che è l'invisibile Sole, et discende in questo corpo; Et quando con esso esce del ventre della madre, piange, non solamente perche sente l'aria manco temperata; ma più oltre perche è presaga, & indovina delle future miserie; così al tempo della corruzione del suo corpo quando di qua dee far partita si addolara temendo il futuro giudizio. Per tanto vedere giuditiosi, et gentili Spiriti: come le

maravigliose opere di Pratolino si possono esporre con altissimi, & importantsimi sensi di speculationi, & di moralità, oltre allo essere come artificiose opere stupendissime, et come dipendenti da animo regale, et magnificentissimo.

(35) Sotto alle dette scale, v'è (come s'è detto) una grandissima grotta, & che fa stupire ogni persona, che v'entra dentro. A' rincontro dell'uscio v'è una particolare grotta, che si chiama la grotta della Galatea, di maniera figurata, che e'pare che detta grotta stia di punto in punto per rovinare, & per venirsene in terra: è tutta di madreperle, con un mare di acqua con varij scogli, coperta di coralli, & di chiocciole marine. Fra detti scogli apparisce un Tritone, sonando una chiocciola marina, & in detto tempo si apre uno scoglio, del quale n'escie fuori la stessa Galatea sopra una nicchia d'oro tirata da duoi delfini, i quali gettano acqua per bocca, è accompagnata all riva del mare da due altre ninfe, che escono da duoi altri luoghi, le quali gettano fuori acqua da certe branche di corallo, che la tengono in mano. Nella detta grotta grande da uno de' lati vi sono due Tavolini in nicchie di marmi mistij cō pittura, & quelle nicchie son'ornate di varij nicchi, & spugne marine. I detti Tavolini gettano acque in gran possa, facendo rinfrescatoio. In detta grotta sono più oltre un Corbezzolo, & un'Agrifoglio con varij animali di bronzo, in due nicchie, simili à quelli di sopra. A'rincontro alla detta grotta vi sono due nicchie grandi fate di mosaico d'oro, & vi son nicchie, & spugne con duoi grandissimi monti similmente di spugne, che gettano grandissima copia d'acque. In testa à dette nicchie vi sono (36) due Arpie di Mosaico, che gettono di molta acqua, bagnando chi sta à vedere.

Dall'altro lato di detta grotta grande verso l'entrata vi sono due pile, sopra le quali vi sono due arpie, le quali gettano dell'acqua in dette pile. Accanto ale quali vi è un fanciullo, che ha una palla grossa, che pare un'appamondo girato dall'acqua, & ne getta assai à piè vi sono due anitre in un pelago d'acqua, che beano.

In testa di detta grotta grande, vi é il Bagno della Stufa, che è una stanza di stucchi dipinta, & con molte pietre fini commesseni. Di piu vi è un pilo di marino goffo con un mote di sopra, che fa una pioggia cadente in dette pile di acqua calda. Sonvi ancora di molti coralli, chiocciole, & madreperle, con molti animali dentrovi la'qual fonte ha due cannelle, che una getta acqua calda, & l'atra fredda.

Dall'altra testa à dirimpetto vi sono tre stanze, che nella prima v'è tutto il Cielo di pittura, à pergola, & d'oro, & le faccie son fornite di spugne bianche de'bottin di Siena. Nel mezzo di detta stanza vi è una spugna di marmo bianco fatta da due gocciole di acqua, da altezza di due braccia, venuta da Lucca, coperta di varij Animali, con un riceto soto di nicchi di chiocciolo, & di brâche di coralli che gettano acqa in grande abbondanza. Il pavimento è tutto di Terra di Urbino dipinta, & così nella sopradetta Stufa.

Accanto (37) à detta stanza, v'è una credenza di vasi tutta di Porcellana, & à canto à detta stanza v'è un pilo antico, fatto in una nicchia di spugne, & sopr'esse v'è un Pastore, che suona la cornamusa, il quale è in compagnia di più sorti d'animali. Più oltre v'è un Tavolino a otto faccie, che in ogni faccia v'è un'ovato incavato à uso di rinfrescatoio, & nel mezzo un tondo similmente incavato, & per certi buchi, che ha intorno intorno manda l'acqua à quegli ovati. Accanto v'è un'huomo di pietra, che dà l'acqua alle mani à uso di Scalco. Nel muro della stanza v'è una ruota da Monache, per la quale vengon le vivande, quando il Prencipe vuol mangiare, & non vuole esservito, se non da un solo.

Sopra quello non capo farebbe da filosofare, & da cavarne molte, & molte utili, & gentili verità delle quali io ne toccherò alcune, lasciando l'altre à più ingegnosi, & a quelli, i quali hanno più tempo, & l'animo più quieto, & contento di die' da considerare intorno a queste regali gentilezze. La prima dunque sin questa; che per la Grotta della Galatea, io intendo il corpo gratioso di alcuna bella donna come si legge, che fu quello di Madonna Laura del Petrarca, di Elene, & di alcune altre. Et perchè il suo corpo è caduto, & mortale, però la sua Grotta si dipinge, & ci si mostra in modo, che stia per cadere. Escia d'uno scoglio per mare, accompagnata da due (38) ninfe: denotando, che la bella donna cosà dell'animo, come di corpo, escie di questo mare pieno di pericolosi intoppo, accompagnata con la prudenza, & con la honestà. O vero si può dire, che le belle donne mentre sono in questa bassa grotta soggett al celeste palazzo, sono come in una grotta, che stia per rovinare, in quanto mercè della bellezza del corpo da molti ardentemente desiderata, et cerca, le portano gran pericolo di non rovinare nel vitio della intemperanza, et della dishonestà: perciò fa di mestiero, come faceva Madonna Laura col suo Messer Francesco, hor ritirarsi da esso, & tal'hora soccorrerlo con grata accoglienza. La seconda avvertenza è intrno alle due piante, su le quali son varij animali. Et è di questa maniera, che le due piante significhino due corone, che meritano le gratiosissime donne, se valorosamente si oppongono à gran desiderij della carne, et al gran diletto che ne

promette loro, l'amore per mezzo delli amanti loro; i vaij uccelli, che cantano sono i poeti, et scrittori gratiosi, che le celebrano, ò siano Greci, ò Latini, ò Toscani: ma quale sia il fine dell'amore, et quale sia l'arte d'amare con honestà, da me si dirà nel secondo discorso che io farò di questo vittorioso, & sommo duce, il cui habito è altero, inusitato, & nuovo. Più oltre le due Arpie, che gettano acqua in certe pile possono significare i duoi vizij tra loro opposti, che sono l'avaritia, & la prodigalità, (39) quella nuoce altrui, ritenendo quello, con quali si dovrebbero aiutare i bisognosi: et questa è primieramente Arpia al prodigo, che scia l'acqua il suo pazzamentre, et poi mancandoli diventa arpia, togliendo, & usurpando l'altrui. Il fanciullo, che ha una palla grossa, e getta acqua in gran copia, significa l'amore, che regge il mondo, mercè di esso ognuno si bagna d'acqua di lacrime. Et chi non crede possa il ver sentire.

Queste lacrime ne gl'amanti avventurati procedono da smisurata allegrezza, et ne gli sventurati da grandissimi dolori, & timore di non perdere la gratia delle loro amate. Di qui è, che il loro bagno di lacrime di questedue sorti di innamorati ha due cannelle, una, che getta acqua calda, l'altra fredda. Potrebbe ancora dire, che l'acqua calda, che escie da amore fuse quella degli amanti che, ardono d'Amore divino, et che sospirano, & aspirano all'eternelle bellezze, et son freddi quanto a queste bellezze di quaggiù. La stanza, nella quale è dipinto il Cielo à pergola, et d'oro significa, che intorno à gl'amanti è il cielo, cosa di mirabile come è il vino pretioso al gusto, et massimamente di coloro, i quali hanno grandissima sete. Le faccie sono di spugne bianche, & queste posson significare la candidezza, et mondezza de gli spiriti angelici, et dell'anime beate, & in noi la mondezza del cuore, se però bramiamo salire al cielo, & di vedere, & godere Dio felicemente.

(40) In ultima la pila tonda, che riccuo di fuori l'acqua per se, & la comunica alle pile ovate, significa l'ottimo Principe, il quale riceve le virtù che lavano l'animo da ogni macchia di fuori dall'eterno fonte, che è Dio; & col suo buon'esempio, & con le buone leggi dà l'acqua a'suoi soggetti, cioè la virtù, & è cagione, che eglino vivino bene, & virtuosamente, conforme all'angeliche nature, le quali da Dio sono illuminate, & informate di virtù, & gratia.

Decimo, Sotto alla detta Grotta grande, & sotto le scale del Palazzo, vi sono due cave, nelle quali sono due statue: Et sotto ad una delle dette statue, v'è una Donnola, che è sopra un Serpente, con lettere doro, & son queste, AMAT VICTORIA CURAM. impresa del Serenissimo Gran Duca

FRANCESCO. Sotto all'altra statua v'è un Cignio, che si china, & beve, & getta acqua. Di queste due statue una significa l'huomo, non solo come invitio rispetto à gl'altri, con i quali ha da praticare, ma ancora come vittorioso de' suoi affetti, con la propria virtù, & con la diligenza, che egli vi mette. L'altra statua, che è quella del Cigno, ci denota la candidezza dell'animo fino alla fine, di maniera, che l'opere fino ultime cantino le sue lodi. Ancora tutto questo si può accomodare à un valoroso Capitano, il quale con ogni estrema diligenza procura di ottenere honorata vittoria de' suoi (41) nimici, alla quale gli succedono trionfi con musiche, & canti, & fama, per fino alla fine del mondo.

Undecimo, Nell'uscio di detta grotta grande sopra la porta vi sono delle spere, nelle quali riguardando da diversi luoghi vi si veggono varie spetie di animali, & di historie. Questo pare, che sia conforme al deto di Democrito, & di alcuno altro de gli antichi Filosofanti: i quali stimarono, che la verità consistesse in apparenza; Et niente da noi di vero, & di stabile si comprendesse come avviene à chi riguarda nel collo della colōba, che è al Sole, per un verso egli vi vede certi colori, et guardado da un'altro, vene vede de gl'altri, & non quegli: Et di qui si verrà à rendere ragion, perche e' non si sappia dominare à gl'affetti, ne i Capitani a'nimici, la quale sarà, perche e' non si comprende il vero delle cose, come sono il vero fine, & i veri mezzi, che à quello ne guidano. Contro à questa opinion argomentò Platone in questo modo, & conro à coloro dicendo; O' e'si comprende il vero di molte cose, ò no: Se I comprende, adunque la vostra opinione è falsa: Se non si comprende, a dunque ne voi sapere come cosa vera, che non si comprende il vero. Puossi ancora contro à costoro, & in favore dela verità così discorrere, se l'huomo è animale partecipe di intelligenza, & di cognitione ancora sensitiva; adunque e' dee comprendere le cose come le (42) stanno, accioche, e' l'usi bene, altamente e' sarebbe sempre mal disposto: come è quelli, il quale ha la febbre, & non comprende il sapore del vino come gl'è, & come lo comprendono, & gustono tutti gl'altri. Ma per ridurre à buon sentimento l'opinione di Democrito, & de' suoi seguaci, si può dire, che g'huomini si psson considerare in due maniere; in una come ben disposti, & come padroni di loro stessi, come sono i prudenti, & i buoni; in un'altra come appassionati, & come quegli, ne'quali l'appetito sensitivo domina alla ragione, quei primi sono atti à comprendere il vero, l'amono, & se ne servono per mondare l'animo loro da ognia machia di vitio, & così conservarlo netto: come de'Santi, & Santo, & de'virtuosi è chiaro, dico, di virtù heroica, & divina, gl'altri come troppo appassionati hanno la ragione offuscata da gli affetti, & non veggono il vero, ne lo vogliono vedere, Et di qui nascono tanti, & tanti errori, & tante, & tante ingiustitue: onde avviene, che la vita nostra è

piena di miserie, & di dolori, & di pazzie. A' queste riguardando Democrito si ridea gl'huomini. Heraclito considerando i danni, & i dolori piangeva l'humana conditione.

Duodecimo, Usciti fuori di detta Grotta, v'è un gran prato, che cigne intorno il palazzo con murccioli intorno da sedere, & si scende nel Barco, che è pieno di diverse fontane. Sotto à dette (43) scale, che scendono nel Barco, v'è in testa un fiume, nominato il Mugnone, che dà l'acqua à tutte quelle fontane. Più oltre soto alle dette scale à uso di grotta vi sono la Fama cō una tromba d'oro con ali: un Drago, che bee, & un contadino, che porge una tazza, per virtù di acqua, ò di occulto artificio, la Fama suona, dimena l'ali, empiesi la tazza, il Contadino l'alza, & il Serpente con la testa si inchina, vi si tuffa, & la be. Di qui si cava, che l'operare virtosamente non solo procede dall'inganno de'sensi, & della ragione: ma ancora da due altre cagioni, l'una delle quali è la mala inclinatione, & massimamente al piacere de' sensi procedente dalla mala, & rozza complessione del corpo, quale è quella del contadino, & del vile, che non sa tener modo, ne regola nelle sue operationi. L'altra è il Serpe, ò vero Demonio con le sue tentationi, alle quali il rozzo, & vile cede. Di qui ne segue, che la Fama divulga il male, & tanto più lo fa maggiore, quanto per più bocche si va referendo: in guisa, che (come disse Virgilio) la Fama è una mala cosa, della quale niun'altra è più veloce, essa quāto più oltre si muove, tanto più vigore, et di forza acquista. Alla rozzezza della complessione si resiste col vivere di cibi buoni, & temperati per chi può, per mutarla di rozza in gentile, alla mala consuetudine, con la buona, & con il conversare con I buoni, alle tentazioni diaboliche, con (44) ricorrere ogni di à Dio, & chiedergli la vittoria di esse, & di operare conforme alla sua divina volontà, et così di venire ogni di più bello dell'animo, come usò di fare fino à Socrate, che era gentile: come di esso referisce Platone nella del Fedro, ò vero del Bello.

Decimoterzo, A rincontro della Fama v'è à uso di un altra Grotta il Dio Pan, che suona la zampogna, composta di sette canne. Questi si rizza, suona, si muove la testa, et poi resta, et si ripone giù, mentre che e' suona sopra è gente, che balla. Evvi ancora la Siringa, che si converte in canne. Per questo Dio Pan si può intender la parte ragionevole dell'anima nostra, atta à divenire ogni cosa per intelligēza, et di ogni cosa servirsi. Questa come ottimo Pastore si innamora di Siringa, che è la parte inferiore mobile, così al bene, come al male: come la canna ad ogni parte, secōdo che da diversi venti è mossa. Se di queste canne escono movimenti temperati col favore della divina gratia ne resulta la vera musica, tutte l'altre son musiche, ò consonanze apparenti, et non vere; com'è

quella di molti nati nobili, et che vestono il corpo nobilmente di drappi. Et niente si curano come adonino l'anima, così quella di coloro, i quali intendono bene l'una, et l'altra parte di Filosofia, et con eleganza di parole ne ragionano: ma sono poi vitiosi, ò per maledicenza; ò per impietà, ò per avaritia estrema, ò per intemperanza, (45) ò per più, ò per tutti questi vitij, insieme.

Decimoquarto, Con le scale di dette Grotte si attesta una via di quaranta braccia di lunghezza: dove di qua, & di la son di molte fontane, sotto alle quali escon zampilli, che fanno un pergolato, sotto al quale andando, l'huomo non si bagna. Questa via lunga, & large, che va all'ingiù ci denota (al mio parere) tutto il corso di questa nostra vita: il quale noi giudichiamo esere lunghissimo per le tante, & tante molestie, che l'accompagnano, & perche siamo ritardati di pervenire allo stato tranquilo di beatitudine, quei zampilli sono le predette miserie, le quali non toccano nocendo, quegli i quali nel passare di questa vita non ne fanno stima, & tra esse con la virtù tengono il mezzo; ò vero quei zampilli sono atti di virtù, da'quali sono lontani quegli, che vanno all'ingiù: & per la via non meno vitiosa, che facile a passarsi.

Decimoquinto, In testa alla detta via sopra un gran Trovolo é un Lavandaia, la quale attorcendo un telo bianco, ne sprema acqua: & à lato le è un fanciullino, che orina similmente acqua. Tutto questo si può così esporre, che la Lavandaia rappresenti la parte rationale nelle persone grandi; la quale stringe & sforza l'appetito ragionevole, con l'acqua della virtù, & ne sprema ogni bruttura. Il fanciullino è il medesimo huomo, quando (46) ancora non può discorrere, dal quale se nascono degli errori, ò del bene, la cagione ne è la naturale inclinazione, & non perche con la virtù acquistata faccia forza all'appetitrice potenza; ò veramente si dee dire, che l'huomo quando è in età di conoscere il bene dal male fa forza all'appetito sensitivo, moderando gli affeti, & le attoni sue: ma quando è troppo fanciullo, opera bene, non per propria elttione, ma se è congiunto per ubidienza alla madre ò al padre.

Decimosesto, Accanto alla detta Lavandaia ritornando verso il palazzo vi sono tre vai grādissimi à uso di pelagi: & sopra v'è un bagno tutto imbrecciato di pietre di varij colori, & ne son fatti scompartimenti mirabili. Questi tre vivai posson significare tre luoghi, a'quali pervengon gl'huomini, poiche di qua hanno atteso, ò a nettare l'anima dalle brutture, ò non vi hanno atteso, ò parte si, et parte no. Et questi luoghi significano l'Inferno, il Purgatorio, & il Paradiso: de quali i

nostri Theologi ragionano, cava dagli dalla Santa Scrittura, et dalla Divina Giustitia: Et in questo si conforma come in molte altre verità il Divino Platone nel libro dell'Anima, et altrove. Si possono ancora intendere per questi tre gran pelghi tre maniere di grandissimi virij, per i quali le persone perdono il Paradiso, & vanno all'infornali pene; et i vitij sono, l'avaritia, che si oppone alla carità, che è contraria alla fede & la (47) diffidenza della misericordia di Dio per instigazione del Demonio, & per la consideratione della moltitudine, & della gravezza de' peccati commessi.

Decimosettimo, Dalle sponde di detto bagno escon zampilli, i quali fanno una pioggia cadente à dosso à queglii, che si bagnano, & da lato in un bosco di Lauri tribisondi v'è il Monte Parnasso con le nove Muse, le quali suonano variate canzni di Musica, per virtù d'acqua. Queste parte si può così esporre, che le nove Muse siano gl'huomini virtuosi, quando son pervenuti al colmo della virtù, il cavallo alato è la loro volontà al bene, & virtuosamente adoperare. L'ali son l'intelligenza perfetta di essa virtù, & l'ardentissimo Amore ad esa, ò il meraviglioso diletto, che ne promette loro la virtuosa operatione. Questi in ogni loro impresa harmonicamente procedono temperando in guisa gl'affeti, et l'attioni esterne variamente, che ne resulta una concordanza suavissima.

Decimooottavo, Di sotto al detto Monte alquanto di lontano v'è una gran Quercia con due scale à torno, per le quali si sale, et si arriva su un piano di sedici braccia, dove è una magnifica fonte. Questa gran quercia, dinota l'antica rozzezza de' primi, che viveano di ghiande, cioè de' cibi senza arte disposti. Le due scale, per le quali si sale al piano di detta quercia son la fedeltà l'un con l'altro, (48) & il buono Amore; il fonte è l'animo buono, donde escono atti fedeli, & amorosi: mercè de'quali, quegli dell'antico secolo furon reputati felici, & fino à qui restano per fama immortali.

Decimonono, Sopra'l dettobegno (tornando verso il palazzo), v'è una fontana con otto statue di terra; Evvi Giunone su un'arco baleno, così v'è l'Iride in forma di donna, che getta acqua per le poppe. Di queste otto statue, quale è figurata per alcuna delle virtù, alcuna per Fiorenza. Per tutto questo io intendo gl'huomini Gioviali, & benefici, per mezzo delle virtù: de' quali la nostra Regale Città Fiorenza è una fontana abbondantissima, ò parlisi delle virtù fattrice, quali sono l'arti giovevoli, & commode al corpo humano, ò attive quāto a' governi, al guerreggiare, all'orare, & simili; ò per altezza di speculationi, come per l'histoire, et per l'opere, et scritti di più, et più famosi Fiorētini è manifesto: et come altrove io ne dirò, non meno con verità, che cō somme lodi' di questa Città, la

quale è hoggi una fiorita Roma, per la copia de magnifici edifitij, et per l'ingegno di piu professori dell'arti, et per huomini rari in lettere, et in armi.

Vigesimo, Sopra detta Fonte, tornando verso il palazzo, v'è una gandissima Gabbia lunga braccia cento, et larga cinquanta, tutta di cavaletti in aria di ferro, dentrovi allori, hellere, et altre piante, con una fonte da capo, et molte sorte di (49) uccelli. Qui si figura quali sarebbero gl'huomini, se si governassero in tutto, & per tutto bene con la propria virtù, & professione, mentre che sono in questa gran gabbia dell'Universo, da Dio fabbricata, & circundata, come da fortissima rete di ferro da'celesti corpi. In questa altri sarebbero simili à gli allora, & alle piante sempre verdi, come gli Eccellentissimi Poeti, Filosofi, Pittori, Scultori, Oratori, & altri huomini di altro intendimento; altri si assomiglierebbero con le loro attioni di beneficenza alle piante piu fruttifere; & tutti à guisa di varij uccelli con g'atti loro di virtù sarebbero come i suoni, & le voci musicali altrui gratisimi. Per il contrario le persone, le quali non sono di alcuno giovamento in questo mondo: come sono gl'otiosi, & queglii, i quali per niuno si vogliono affaticate son simili alle piante sterili, & salvatiche. Quelle, le quali piu oltre nuocon altrui, con torre quel d'altri, sono, come nibbi, come arpie, & altri animali rapaci. Et se e' fanno altrui danno con astutie, & ingani, si assomigliano alla golpe, se con la forza del corpo son simili al leone. Et quando Pittagora (uno de'sette savi della Grecia) disse, che l'anime nostre entravano di un corpo in un'altro e' non intese questo essere vero, come pare, che significhino le sue parole. Et quelle di Platone nel Timeo: ma vossero dire questi duoi gran Filosofanti, che l'anime nostre ne'costumi si mutano, (50) come se entrasse, ò ne'corpi di diversi animali bruti: perche in verità, si come ciascuna arte si serve de' suoi proprij strumenti; & non di quelli di un'altra nell'operare: così ciascuna anima, & ciascuna forma ha di bisogno, per operare, della propria materia con la propria, & accomodata dispositione: segno di ciò evidentissimo si è, che distemperata, che è detta materia, quella forma non vi resta ma ve ne nasce un'altra con altre operationi.

Vigesimoprimo, Sopra detta Gabbia, v'è un Giardino, disegnato con bellissimi scompartimenti, con una fontana in testa, con due colonne di Porfido, che reggono un tetto à cupola; cioè sopra questo mondo, nel quale le persone, & virtuose, & senza virtù, & gratia, come di ogni'altro bene. Le due colonne, le quali sono intorno à questo fonte, son la Divina Giustitia in punire i rei, & la divina carità in premiare i giusti. Questo è quel Paradiso, al quale nelle sue ammirabili sentenze ci chiamò

fino Zoroastro, dicendo, Cerca il Paradiso. Et in quell'altra, Ricordati di ritornare donde sei venuto. Cioè à Dio con la simiglianza dell'opere buone, & di beneficenza, senza le quali non s'entra all'eterna beatitudine, ma ne siamo esclusi: come al di del giardino universale (51) del gran Giudice Christo Giesu sarà detto à tutti quelli, i quali saranno quà vissuti, senza giovare altrui, & piu presto haranno ad altri nociuto. Studisi dunque ogn'uno con ardentissima scusa di giovare.

Vigesimosecondo, Dall'altra banda (pure da basso cominciando) dove è la Lavandaia, & venendo verso'l palazzo, v'è in terra una Salamandra di otto braccia, che getta acqua in una palude, nella quale è un Contadino, che sega de'giunchi, & in detta palude vi sono piu sorti di piante, & di herbe. Tutte queste oper con gran ragione ci significano i vitiosi, i quali rovinano al basso, andandosene finalmente all'inferno; di questi, altri sono à guisa di Salamandre fredissimi, & non sentono il fuoco della carità, se bene vivono fra buoni, i quali abbruciano del divino fuoco amoroso; altri sono come contadini, in quanto notengono modo nell'operare, & in quanto legano i loro affetti con vincolo debolissimo, & fralissimo, che è un tiepido fuoco di ben fare. Tutti questi son piante sciocche, & sterili, come quelle de luoghi pantanosi, & troppo bassi.

Vigesimoterzo, Evvi più oltre un borro à uso di Tonfani pieni d'acqua, dentro del quale vi son pesci di piu, & piu forti. Qui ancora (per filosofare qualche cosa, & cavarne qualche verità) si può dire, che questo borro non è altro, che questo mare, & questo gran fiume delle persone (52) le quali vivono poco, ogni di morendone: & la morte de'quali ci doverrebbe ricordare, che ancor noi siamo mortali: & che ci conviene presto render ragione dell'attioni nostre, & secondo che faranno state informate di carità, ò nò; così faremo, ò dell'eterna beatitudine premiato, ò all'eterne pene condotti. Beati, beati noi, se per considerenza ogni di almeno una volta pensassimo al velocissimo corso della vita nostra, & per contemplazione entrassimo nell'Inferno, nel Purgatorio, & nel Paradiso: in quelli, acchioche comprese l'acerbissime pene, l'oscurità de'luoghi, la fierezza, & crudeltà de'Demoni, ci astenessimo dal male, & dal nuocere altrui, & all'anime nostre, & dall'offendere la Divina Maestà; Et in questo affine, che conosciuto in parte il contento, la dignità del luogo, & la benignità delli Spiriti angelici, & del Re dell'universo, operassimo bene, & christianamente; à questo fine Dante Poeta, Filosofo, & Theologo eccellentissimo ci rappresentò nella sua gran Commedia l'Inferno, il Purgatorio, & il Paradiso, tanto conform al vero, quanto, per le divine, scritture, & quanto conforme alla Divina Giustitia quel rilevatissimo intelletto potette comprendere: & con la pena esorimerci.

Vigesimoquarto, Accanto à detti Tonfani, & luoghi profondi, e pieni d'acqua, v'è una grotta: nella quale è un Cupido di bronzo, che per (53) ingegnoso artificio tal'hora si volta intorno, & per la sua facella getta di molta acqua à questo, & à quello. Questa grotta è tutta inganni, perche quegli i quali v'entrano dentro, non se n'accorgendo si trovano bagnati, così ancora nello starvi, & nel sedervi.

Per tutto questo si può intēdere, che tutte quelle persone, le quali entrano nella corte d'amore, intendēdo questo humano, & carnale, entrano in luogo pieno d'inganni: percioche dove e' si pensa con questo Signore di vivere in gioia, e' si vive con una infinità di molestie, & di tormenti; dove' e'si crede, che'l supremo bene consista nel godere le terrene bellezze, & egli consiste nell'eterne dove altri crede acquistarne fama, & l'huomo ne diviene favola del mondo: ma beati, beati noi, se' il nostro amore si alzi all'increata bontà, & bellezza, & non si fermi in queste di quaggiù. Questa è quell'arte, la quale fa tanto cara, & pregiata dal sapientissimo Socrate, che fu'gentile: & consiste in servirsi delle create bellezze per iscala ad alzarci all'increata, & invisibile. L'altre sono la Venere de'vulgati, & degli stolti; & quella è la celeste de' savi, & de' buoni. L'amore di questa ci fa mentire, che ci viviamo havemo un suavissimo bacio, & sentimento per speranza & poi di là il premio sia maggiore, perche quella si goderà con dilette ineffabili, & stupendi sempre.

Finalmente, oltre alle tante, & tante maravigliose (54) opere già narrate, & espote, si ritrovano ancora nel bello, & regale Pratolino, un Contadino, il quale vota un barile pieno d'acqua, etun satiro, che mugne una pecora, ò una capra, & ne trahe acqua. Il cōtadino, che vota il barile dell'acqua ci può significare la nostra rozza natura, & vota sul principio d'ogni virtù, & massimamente della religiosa pietà, dee primieramente lavare l'anima sua, & purgarla dalli affetti, si come il contadino lava prima, & lieva il cattivo odore, & sapre al vaso, nel quale e'vuol mettere il buon liquoredel vino; così l'huomo in quanto è in lui la parte ragionevole è huomo, inquanto è ancora animale ha del brutale. Et volendo cavare il reo, & fare bene, deve spremere la parte brutale, & constringerla à fare buon frutti. La virtù (per più intelligenza di quello, che io ho detto) ha tre, ò vero quattro gradi di essere. Il primo è ne' continent, i quali operano virtuosamente: ma con gran resistenza dell'appetito sentivo, & si chiama continenza. Il secondo piu perfetto, quando per costume di operare bene l'è perfettamente acquistata, all'hora s'opera con poca resistenza dell'appetito, ò niuna, anzi opera con diletto, come fanno i temperati, i forti, i liberali, & così discorrendo de gl'altri informati à pieno

delle virtù morali, & civili. Il terzo è di eccellenza, & si nomina virtù heroica, mercè della quale alcuni con ardentissimo amore delle potenze tutte desideratrici, operano bene, & virtuosamente. Il quarto, & supremo è quando più oltre, ogni buon pensiero, ogni buona parola, & ogni buon'atto termina à Dio, per piacergli, & per assomigliarsogli. Di qui si può cavare la ragione, perche di alcuni si possa dire con verità, che sono tre, & quattro volte beati.

Comparatione di alcune artificiosissime opere di Pratolino: con alcune degli antichi. Cap. III.

Sino à qui io ho ragionato dell'opere maravigliose di Pratolino, raccontando, come le son fatte, & scoprendone molt, & molte nobili, & utili verità, & avvertenze per la vita attiva, hora perche per via di comparatione dopo alla notitia assoluta molto piu si comprendono le cose, & il pregio loro. Di qui è che io andrò pragonando alcune opere stupende dell'arti più ingegnosi de gl'antichi artefici, con quelle de' presenti, che in esso Pratolino si contengono con gran maraviglia, & stupore: ma questo paragone nō si può fare, se prima non si fa memoria alcune delle piu lodate, & piu celebrate degli antichi. Et perche (56) queste, come quelle di Pratolino convengono in essere stupende, & maravigliose: perciò io primieramente esporrò quello, che significhino queste voci maraviglia, & stupore. Secondariamente, ridurrò altrui à memoria, alcune dell'opere artificiose di maraviglia, & stupore antiche. Et terzo le paragonerò con le moderne di questa regale villa, ò vero regale Pratolino, inalzando queste sopra quelle, come in verità le sono. Per ispeditione del primo punto, dico, che mirabili, & stupende son tutte queste cose, delle quali non si sanno le ragioni, & questo può essere, ò perche sul principio ci sono incognite, ò vero perche le cagioni ci sono sempre occulte per mentre che viviamo in questo mondo. A' primi Filosofanti gli effetti naturali, se non tutti, almeno di molti arrecarono maraviglia, & stupore; come furono gli Eclissi del Sole, & della Luna; i tremoti, le saette, il flusso, & reflusso del mare, & altri simili; poi per mezzo delle regole della Logica, & esaminando la rozza dottrina delli antiqui, & distinguendola con cavarne il falso, & prendere il vero, & aggiugnere il resto. Si ridusse la naturale Filosofia à perfettione da Aristotele Principe della Peripetica dottrina, et così à lui, et alli altri, che da esso hanno imparate le cagioni dell'Opere di Dio, et di natura le non son piu maravigliose, ne stupende, per conto dell'ignoranza dalle cagioni, se bene quanto all'eccellenza di esse le son sempre (57) maravigliosissime. Quelle

poi, le quali son state, sono al presente, et saranno fino al fine di maraviglia, et di stupore, et non se ne sà la vera, et propria cagione sono essempli gratia, perche la calamita tiri il ferro, l'ambra la paglia, perche la torpedine toccata da alcuni gli renda stupida la mano, et il braccio, et altri altre simiglianti cose, delle quali, quando si di nanda della cagione ad alcuno de' più eccellenti Filosofi, et letterati, et sia qual si voglia risponde, avviene da una causa occulta, che tanto è dire, che non si sà. L'opere artificiose sono di maraviglia, et di stupore nel primo modo, perche non subito se ne ritrova la causa, et perche sono fatte con tanta virtù, che supera il comune uso. Di qui si puo cavare, che la maraviglia, ò lo stupore non è altro, che un gran desiderio di sapere la causa di alcuni effetti, che di rado avvengono, mercè del quale desiderio ci occupiamo tutti nella consideratione, et investigatione di essa, et per mentre non la troviamo, inalziamo le ciglia, et stringiamo le labbra; Lo inarcare le ciglia si sa per dinotare, che la cagione è nota à Dio; che è sopra il cielo su alto; et lo stringere le labbra il facciamo per significare, che la ci è occulta, et non la possiamo ad altrui dare ad intendere: Quanto al secondo punto, mirabili et stupende furon reputate (per farmi di qui) le statue di Dedalo, le quali si muoveano da per loro senza fermarsi: come racconta Aristotele nel primo (58) dell'Anima al testo quarātaquattresimo, prendendo ciò da Filippo authore di Commedie, et se ne serve questo nostro Filosofo à esporci, come Democrito volesse, che l'anima movendo prima se stessa, movesse il corpo, et il modo era questo, che si come la Venere di Dedalo si muovea, perche v'era dentro dell'argente vivo, il quale movendosi, muoveva la statua, che era di legno, così l'anima de'viventi movendo se stessa, la quale è racchiusa in questo corpo, ancor muove questo stesso. Platone similmente verso la fine del Mennone fa memoria di queste mobili statue di Dedalo, et dice, che si come queste non istanno ferme, se non si legano con le funi: così le vere opinioni, fuggano dell'anima, se le non vi si legano con forti ragioni. Nel secondo luogo si può porre per cosa mirabile il Mercurio di Pasone, il quale era di rilievo: ma di maniera era congegnato, et posto dentro à certo marmo, ò pietra trasparente, che a'riguardanti era dubbio, se era fuori, ò dentro, come racconta Aristotele ne'libri della Metafisica. A' questo Mercurio si possono assomigliare quegli scolari, i quali non sanno, et per loro buona sorte, et per beneficenza de' dottori passano per dottori, questi in quanto son ricevuti per dottori, si crede da molti, che habbino dottrina, ma in quanto nel passare si portano male, non ne sanno et così la loro dottrina è dentro secondo l'apparenza, ma in verità è fuori nell'anima de'veri dottori, (59) et lettori. Terzo, maravigliosi furon reputati gli specchi di quel gran Mathematico, i quali erano tanto concavi, che opposti alla spera del Sole i raggi vi davano dentro, & si riflettevano, & cagionavano un'angholo tanto acuto, & tanto forte, che

abbruciava prestissimamente le nevi, & galere de'nimici. Il quarto effetto stupendo fu il vaso, chiamato Clessidra, col quale si annassiano gl'orti per molti buchi, per i quali entra l'acqua, & non ne può uscire, fino à tanto, che di sopra si tiene turato il buco di sopra; il quale artificio è per avventura imparat da quello, che accade delle botti piene di vino, & fortemente turate di sopra col chocchiere, le quali non lo gettano, se bene si stura la cannella: fino à tanto non s'apre di sopra, accioche v'entri l'aria in cambio del vino, & non si dia il voto. Il quinto strumento, così di grande importanza, come di gran maraviglia, è l'oriuolo: il quale per forza di ruote, & contrapesi ci fa conoscere le parti del tempo minute, come l'hore, & le mezze hore, & minuti; perche possiamo eleggere il tempo opportuno in qual si voglia negotio. Di questo si serve Aristotele ne'libri della generatione de gli animali, dicendo, che si come questo maraviglioso strumento ha il principio del moto di fuori da chi lo tempera, & poi per se stesso segue di muoversi ordinatamente; così il seme riceve la virtù del formare le membra del corpo dell'animale del generante, & poi separato (60) da esso, & gettato nella femmina, va formando con tanta arte ogni parte del corpo, come conviene all'operatione di essa. Et questa virtù formatrice è regolata dall'arte divina, che non erra; pure, che la materia sia disposta, & gl'agenti prossimi siano idonei à tale impresa. La sesta cosa maravigliosa, è il rimedio de'medeci, di medicare il veleno col veleno, come è il sanare i morsi dallo Scorpione con l'olio de gli stessi Scorpioni, così della Vipera, con la Vipera. Settimo, apportarono gran maraviglia quelle figure de' pittori, le quali sendo in piano, & immobili, ci si mostrano in fuori, & voltarsi per ogni verso; Come avviene tra le altre di quell'Anno, che è dipinto in Campo Santo di Pisa. Et chi così lo dipinse, pare, che egli ci volesse avvertire, che l'asino per ogni verso ci si mostra come asino, & così chi è scortese con tutti è tale, & in ogni tempo. Finalmente (per non essere in ciò piu lungo) dico, che tra gli strumenti maravigliosi si possono annoverare quegli degli ingegnieri, i quali per virtù di circuli, & ruote tirano sù grandissimi pesi, come colonne, piramidi, & altre simil cose, con poca fatica, & in poco tempo; così alcuni strumenti così fatti servono à Medici; altri alla professione della Militia. Di così fatte machine, ne cerca la cagione Aristotele nelle sue Quisitione Mechaniche. Ma venghiamo horamai à raccontare alcune dell'opere (61) stupende di Pratinolo, & paragoniamole con quelle degli antichi già dette.

Primieramente dunque dico, che se le statue di Dedalo furon tenute mirabili per muoversi da luogo à luogo, per occulta cagione. La statua del Dio Pan è mirabilissima, perche non solamente e si muove rizzandosi, & riponendosi à sedere, ma ancora perche e'suona il suo strumento Musico, & muove

gl'occhi, & tutto il capo.

Secondariamente, se il Mercurio di Pasone parendo dentro, & fuori, faceva maravigliare chi lo riguardava; quanto più fa questo la Galathea, la quale prima e dentro à certi scogli, poi escie fuori, & se ne va per mare accompagnata, & di nuovo ritorna al suo scoglio, & così si vede dentro, & fuori, quieta, & mobile.

Terzo, se con gli specchi concavi quei gran Mathematico opponendogli al Sole, & riverberandonisi i raggi si abbruciavano le navi così presto, & con tanto stupore: Come non è cosa stupenda, che l'acqua di tante, & tante statue in tanti luoghi, & in tante maniere con furia procedenti ci bagnino con piacevolissimi inganni imitando le maniere de'movimenti dell'acque dell'Universo: delle quali alcune prendono il principio materiale di quaggiù di Terra, in quanto da essa, sendo humida, per virtù del Sole se ne levano vapori, & sono condotti fino alla mezza regione dell'aria; & dalla (62) freddezza di essa, & abbandonati dallo halito secco, si condensano in nugole, & di nugole ne vengono giù in forma di goccioline d'acqua. Altre acque si generano dentro alla sommità, & cavità de'monti; Et quivi si fanno le fonti, & da fonti hanno il lor nascimento i fiumi, che sono acque, che all'ingù vengono con velocità scorrendo del continuo, & finalmente si conducono al mare, come à luogo bassissimo, & come al suo tutto, si come da me è stato dichiarato nella mia Metheora, con fondamento, facilità, & con ordine. Altre ancora ne sono dell'acque, che vengono giù sopra qualche parte della terra, non di quivi prima partitesi, ma d'altrōde, & per forza cōdotte sopra quella parte come avviene la state, che in un tratto tira vento, rannugola, & piove. Et altre finalmente vengono da alto occultamente calando al basso, che nō si veggono, & poi si alzano fuori alla scoperta: come avviene del bollore, che è alla doccia à San Filippo in quel di Siena.

Quarto, se arrecava, & arreca gran maraviglia quel vaso, detto Clessidra, per prendere l'acqua ritenerla à nostro piacere, & à nostro beneplacito lasciarla, che in giù ricaschi, è ancora di grande stupore, che nel medesimo tempo la Fama suoni la tromba, & muova l'ali, il serpente si inchini per bere, & il contadino alzi il braccio, & porga la tazza.

Quinto (63) se gl'antichi ebbero per cosa mirabile lo strumento, detto oriuolo, perche con esso si sà, che hora corre del giorno, & ella rotte, è ancora di gran maraviglia, che questo stesso si conosce

per via di alcune linee, & numeri opposti al sole, che sono su per le sponde delle scale del palazzo, senza havere tante, & tante volte à ritemperare l'oriuolo: Et poi che sendo queste linee da sapere lhore disegnate su per le scale del palazzo ci è significato, che al Tempo son soggette le cose tutte, el quali sono sotto al celeste alazo, le quali scendono in questo mondo, quando procedendo dall'arte divina son condotte dal non essere a lo essere, salgono poi di nuovo all'insù le creature rationali, se di quà si partono cō la divina gratia, il qual passaggio in tal caso è felice, & tale desiderava fino al sapientissimo Socrate, ceh fu gentile: come di esso, & della sua passata all'altro mōdo con religiosa pietà è scritto da Platone nel Fedone, ò vero dell'anima. Vedete, vedete gentili, & giuditiosi spiriti, come questi strumenti di Pratolino da conoscere l'hore siano da ogni ben da, che eglino si considerano maravigliosi, & stupendi.

Sesto, se fu opera di gran maraviglia quel rimedio de'Medici di riparare alle malatte procedenti da veleno, con cose velenose in tto contrarie alla natura nostra: attese, che i male si sogliono curare con rimedij contrarij, & non con simili. (64) Si può ancora tra l'opere miracolose di questa maniera, annoverare la grotta della Galatea, la quale è fatta per non rovinare, & nondimeno è tutta crepata, à modo di cosa, che stia à ogni momento per andarsene in rovina: si come ancora il Campanile del Duomo di Pisa, il quale è di maniera torto, che ognuno giudica miracolo, che è non sia in tanti secoli di già caduto.

Settimo, quanto son di stupore le pitture, che ci si mostrano di rilievo, se bene sono in piano, & più oltre, che si voltano, ò tutte, ò secondo alcuna parte, tanto, & molto piu fa stare con grande attentione il Cupido, che si volta per ogni verso, & che getta acqua per la faretta: non altramente, che l'amata li faccia voltare l'amante suo per ogni verso, & il faccia lacrimare à tutte l'hore.

Finalmente, se gl'antichi ritrovorono gli ingegnosi strumenti, de'quali si servivano, ò in su le guerre, ò nelle muraglie, ò nell'opere di Medicina, ò in altre professioni: & noi habbiamo i terribili strumenti da guerra, come sono archibusi, moschette, & altre simili; così à gli Architettori, & Medici di questo secolo non mancano machine, per condurre à fine ogni loro disegno; Et in Pratolino, perche quelle statue si voltino, suonino, gettino acqua, sono tanti, & tanti artifizij stupendi in luoghi occulti, che chi gli vedersi tutti insieme, se n'andrebbe in estasi. Son dunque l'opere (65) di Pratolino piacevolissime à riguardare per la loro bellezza, & diversità, sono per l'importanti verità,

al vivere bene di gran pregio, & per l'occulte cagioni, & ingegnose, stupende, come da tutto quello, che io ne ho discorso, puo ciascuno chiaramente conoscere.

*Favola, che cosa sia, à chi s'appartenga il
fingerla; & quello, che significhino
alcune favole in Platone, & in Aristotele. Cap. V.*

Ne à me, come Filosofo, è disdicevole il considerare le favole: poiche i più eccellenti Filosofanti l'usano ne' loro scritti di Filosofia: come sono Platone, Aristotele, ne disconvene ancora al soggetto, anzi quadra benissimo, poiche molte delle statue, & opere di Pradolino, sono di cose favolose: come sono, la statua di Givoe, della Galatea, di Cupido, d'Appollo, & delle none Muse; Ne terzo, si disdice à voi, gentilissimi spirit, l'udirne, ò leggere il ragionamento, poiche vi diletate della Filosofia, & de' Poemi, & dell'Orazioni, & in quella, & queste lettioni trovate dell'ingegnose favole, & desiderate, cavarne nobili, & gentili ammaestramenti, oltre che la Favola (66) ha del mirabile, & l'huomo, & massimamente chi è nobile, ha tra le altre proprietà questa di essere soggetto al maravigliarsi: da ogni banda dunque, & per ogni cagione mi conviene il discorrere alquanto delle favole; delle quali io procedendo con ordine, toccherò questi tre punti di grandissima importanza. Il primo sarà quello, che significhi questa voce, favola, appresso à gli scrittori, i quali l'hanno ritrovata, ò almeo usata. Il secondo sia il risolvere à chi si aspetti servirsi di esa, & in qual maniera. Il terzo, & ultimo mi piace, che sia lo esporre alcuni favolosi ritrovamenti, i quali si ritrovano in Platone, & in Aristotele; à fine, che queste autorità oscure si rendino facile, & intelligibili: mercè della determinatione del primo punto si sapranno le cagioni principali, dalle quali ha havuta l'origine sua la Favola, mercè della intelligenza del terzo, si scopriranno altissimi sensi in quei Filosofi, i quali tra tutti gl'altri tengono il principato: Et perche l'opere di Pradolino son quelle, che mi danno occasione di dire delle favole: insieme di qui si può cavare quato ancora per questo conto se gli habbia obbligo, & à chi ne è padrone, & inventore, che è il Serenissimo Gran Duca FRANCESCO, Gran Duca di Toscana.

(67) Quanto al primo punto (lasciando ogni altra definitione, ò descrizione de gl'altri) dico, che la favola è una fintione, ò trovato dell'attioni divine, ò humane, che ha del mirabile, & del dilettevole contenente oscuramente qualche utili verità; & così fatto trovato dipende dal verisimile, &

dall'humana ragione: quando io ho detto, che la favola è una fintione, ò trovato, io pongo il genere; nel quale la conviene con ogni maniera di favolosi ritrovamenti: come tra gl'altri sono quei di Esopo Frigio, che finse, che gli animali parlassino tra loro, perche se ne cavassero utili ammaestramenti per chi desidera vivere con prudenza, & secondo la retta ragione; così ogni trovato, & bugia in un certo modo è fintione, & pensiero, ò ragionamento favoloso; il soggetto, ò vero causa materiale della favola sono l'attioni, ò humane, ò divine, poiche si sono formate favole di huomini, & di Dij de' Gentili. La forma, che dà lo essere alla favola propriamente presa è l'havere del maraviglioso, & del dilettevole insieme, & contenere qualche utile verità; Et in tutto questo è differente dalle bugie, che si dicano giornalmēte da gl'huomini vitiosi per ingannare l'un l'altro, & per ingannare i buoni; queste non hanno del maraviglioso, non diletmano, ma dispiacciono, & sono di danno, & non di utile, il fine è per dilettere, & giovare l'uditore, le cagioni efficienti, la principale è l'humana ragione, (68) ò vero l'huomo come ragionevole, poiche con artificio si sono ritrovate, & poi usate; la strumentale è la simiglianza, ò vero similitudine, altramente non si presterrebbe loro alcuna fede, ne se ne potrebbe cavare alcuna verità. Per piu chiara intelligenza di questa definizione, che io ho dato alla favola, fa di bisogno, che io supponga qui alcune verità, la prima delle quali sia questa. Ogni cosa, che è in qualche modo, ò ella ha lo essere reale fuori dell'anima nostra, come sono tutte le cose divine, le naturali, & l'opere dell'Arti, & l'attioni humane, le quali tutte possono ancora per conoscenza ritrovarsi nell'anima nostra, ò in particolare ne'sensi, & massimamente nella fantasia, ò in universale nella parte intelettiva: come per essemplio, un palazzo ha lo essere suo fuori dell'anima, & è fondato in terra, & per similitudine è nell'animo di chi l'ha veduto, & lo vede; & quanto alle regola universali è nell'intelletto dell'artefice, & architetto: questo è il primo modo di essere delle cose prima realmente, & poi per conoscenza. Il secondo modo opposto è, quando una cosa è nell'anima solamente, & non si ritrova fuori dell'anima, come sono i centauri, i satiri, la chimera, & altre simili fintioni; & così la favola contiene della menzogna.

La seconda suppositione si a così fatta, che questa voce, favola, può pigliarsi, ò molto impregnamente(?), come l'usa qualche volta Platone, il quale (69) chiama alcuna historia favola, se bene è di cose vere; pure, che se gli possa dare qualche ingegnoso, & allegorico senso: come nota il nostro gran Platonico M. Marsilio Ficino nel suo argomento sopra il decimo libro della Republica; & questo egli conferma di sentenza, & di osservatione di Olimpiodor, un'essemplio ne dà quivi il Ficino dell'Historia di Ero Armeno, chiamata Favola. Questi fu morto in una giornata: con infiniti

altri, & il dodicesimo giorno risuscitò, narrando à quegli di quel tempo le atrocissime pene, con le quali per Divina Giustitia son di là gastigati i malvag, questa fu vera: come piace à Giustino martire, & filosofo Platonico, con tutto ciò questa historia è chiamata favola, da Platone, perche se le può dare un maraviglioso, & allegorico senso, che è questi, che chi combatte per la patria valorosamente resurge per vivere sempre immortale: così ancora pare, che il Bocaccio prendesse questo nome favola, quando così gli piacque di chiamare i suoi ragionamenti con tanto artificio intessuti, & con tanta leggiadria di paroe adornati: pure, che gli da alcuni si fusse astenuto, i quali hanno dell'empio, & del poco religioso, & da quegli, i quali son troppo lascivi. Per lo che la Santa Madre Chiesa gelosa de'suoi, che non diventino inreligiosi, & mal costumati, ha fatto levare quegli, i quali, ò nell'uno, ò nell'altro vitio erano pericolosi, ò almeno (70) gl'ha fatti murare, quanto a'nomi, & levare, quanto à certe parole. Nel secondo modo, & propriamente, & questi si puo suddividere in favola propria, & in favola propriissima. Proprie favole si possono chiamare tutte quelle di Esopo, delle quali, per darn un'esempio, una è questa, che il liono perseguitando un cervio, tanto superiore di corso al liono, quanto è il liono al cervio di forze; quegli suggerendosi uscì di vista al liono, il quale arrivato in un bosco dimandò à un pastore, dove si fusse nasoso il cervio, il quale pastore negò à parole di haverlo veduto: ma con mano accennò, dove gli era. La golpe (la quale da Esopo per animale astuto è introdotto nelle sua favole) al pastore così disse, si come tu sei pauroso, così sei reo; pauroso del liono, & reo verso il cervio. Questa favola, ò enigma Frigio, lo Epicuro (se fusse vivo) così l'esporebbe, dicendo, che in questa maniera è fatto colui, il quale biasima il piacere con parole, & poi lo segue cō i fatti, & col pensiero. Questo medesimo nome favola, quanto al suo propriissimo significato conviene à huomini, & à Dij finti, quanto all'attioni. Et così lo prendo nella mia predetta definitione, ò descriptione; & così la prende il Poeta principalmente ne'suoi poemi, ò siano Comici, ò Tragici, ò Epici, cioè Romanzi, ò di attioni divine.

Il terzo principio, che io suppongo per piu facile cognitione della favola si è, che fa bene io ho detto, (71) che l'è una fintione delli atti de gl'huomini, ò di Dij, che non hanno lo essere loro tale, & con tali atti fuori dell'anima, questo si dee intendere, quanto allo essere con la vita; perche quanto allo essere senza vita, possono ritrovarsi ne gli scritti de gli autori; informa di statue, come in Pratinolo; & ne'Poemi, come in Commedie, & Tragedie recitate; con lo essere con la vita di altri, & non di quegli stessi, che sono imitati.

Il quarto presupposto sia quest, che gl'ati nostri, se bene sono imperfettissimi, à comparatione di queglii di Dio: nondimeno quanto al numero generale: i filosofi gl'hanno conosciuti essere come queglii di tre maniere, ò speculationi di quelle cose, le quali non dependono da noi, ma da Dio, & da gl'agenti naturali, ò attioni nostre libere,, ò operationi artificiose, & opere dell'arti, & la causa si è, perche, ò la ragione humana vuole ornare se stessa di cognitione speculative, ò moderare gli affetti, & l'attioni, ò disporre le cose serventi al corpo à suo buono, & delicato uso: & perche le favole sono trovate, per giovare all'animo, nelle speculationi, & nell'attioni, cō imitare, ò quelle de gl'huomini, ò de gli stessi Dij de'Gentili. E' ben vero, che la Chiesa Cattolica non ammette le favole di Dio, ò de gli Angeli, ò Santi, & Sante: ma vuole la nuda, & la chiara, & salutifera verità; & massimamente in questi (72) tempi di luce apportataci da quello, che è la luce del mondo, & poi predicata, & esposta da gli Apostoli suoi, & da' Santi Dottori, & Predicatori; è ben lecito usare figure, & parabole, esponendole però conforme al vero, & pio sentimento.

Il quinto, & ultimo sia questo, che la similitudine, donde gl'huomini cavano le favole, puo essere di piu maniere; & per tocchare le principali, queste mi pare, che siano tre: percioche ò ell'è di operationi, ma non di natura, come è la similitudine della Chimera con l'huomo, quella è un'animale, la parte anteriore, del quale è di liono, quella di mezzo di capra, quella di dreto di drago: & l'huomo è l'animale ragionevole. Eccì la similitudine, quanto all'operationi: perche gl'huomini per lo piu si governano vinti dall'appetito irascibile, o dal cōcupiscibile, o da poca prudenza, o veramente, & questo è il secōdo modo. Le favole son prese dalla similitudine di natura, & d'operationi insieme; come sono le fintioni di huomini, & di Dij, sotto forma di huomini, & di Dij; come sono le favole de' Poeti, come è quella di Venere, & Marte; & come quelle di huomini travagliati d'amore, & per parentadi.

Il terzo modo si è simiglianza hor di nature, & d'operationi; & hora d'operationi, & non di natura, come sono la Favola di Proteo Dio marino, (73) che si muti in varie nature, & forme: & così d'operationi: la quale significa la materia prima, che si muta di una forma in un'altra, & così in operationi conformi à quella forma, che di nuovo la prende per opera di Dio primo motore del tutto; così è esposta questa favola comunemente dalla maggior parte de' Filosofi, se bene moralmente si potrebbe intendere de gl'huomini, che partecipano del divino, & sono in questo mare di travagli. Et questa natura humana si mura di huomo in pietra, per insensataggine: in porco, per golosità: in

bertuccia, per imitatione; così discorrendo. Tal'hora la favola finge gl'huomini simili d'operationi, mutarsi in altra natura, ma non mutarsi l'operationi, come è quel trovato di Esopo, di quei Contadini, i quali per troppo rubare furono convertiti in formiche: Questi mantennero l'atto del rubare, se bene erano simili alla formica.

Quanto al secondo punto à quale de gli scrittori appartenga la favola; qui si puo cercare due cose, una à quale appartenga l'uso di essa; l'altra l'inventione. Circa la prima, è facile la resolutione di così fatto dubbio, dicendo così; ò la vita nostra ha per fine ultimo le speculationi, & cognitioni delle cose, le quali non pendono da noi; ò più oltre le attioni rete, e commendabili: quella si chiama vita specolativa, & questa (74) attiva; alle speculationi si servono i Filosofi delle favole, o per occultare alcune delle più alte verità al vulgo, & con fintione, che ha del meraviglioso farle ammirabili piu di quello, che non farebbero ammirate da'gentili spiriti, & desiderosi, & degni di intenderle, à questi fini l'ha usato Platone ne'suoi dialogi, o veramente i Filosofi contemplativi si servono delle favole, esponendole à maggiore confermatione, & chiarezza del vero, che è occulto: accioche e' si vegga, che la verità in ogni secolo è stata compresa da più intelligenti, & che come fermissima si dee così ritenere, & difendere, à questo fine ha usate le favole nella sua Filosofia Aristotele, come di sotto da me si dimostrerà, esponendo con esso alcune di esse, per l'attioni poi attive, & honeste, & per ritrarci dalle vitiose. Le favole si possono usare, o dottrinalmente esponendole conforme al senso morale, & lodevole; o piu presto per ischerzo, & per dilettere. Nel primo modo usando insieme ragioni probabili lo fa il morale, & civile, commovēdo gl'affetti, lo fa tal'hora l'oratore, come in pratica si puo vedere appresso à Massimo Tyrio Platonico ne'suoi sermoni, o vero orationi. Nel secondo modo, & per imitatione si usa dal Poeta, piu per dilettere, & muovere all'ammirazione altrui, che per utile, & honesto, se bene à cio termina ogni sua fatica, conobbero molto bene gl'inventori de'Poemi, che faceva di mestiero condur'gli huomini (75) al bene, & virtuosamente vivere con modi facili, & ingegnosi insieme; atteso, che l'huomo per tante, e tante gran passioni con gran fatica diventa buono, et opera bene; i modi facili son quegli, i quali son molto conformi alle proprietà humano: è proprio dell'huomo il rifuggire à piaceri del senso il meravigliarsi, l'imitare l'un l'altro et la Divina Maestà; il ridere, il piangere, l'essere capace, et desideroso del sapere; perciò tutti quegli artifizij, et modi ingegnosi, con i quali i Poeti hanno potuto satisfare alle proprietà de gl'huomini l'hanno usate; come sono il dilettere, l'imitare, il fingere meravigliose cose. Et così discorrendo, è ben vero, che gl'hanno errato nel fingere di Dio, et de gl'huomini heroici, favole, le

quali secondo il senso letterale hanno dell'empio, et del dishonesto: onde come contrarij alla pietà, et alla bontà de' costumi, quanto à questa parto con ragione e'furono fino ad Omeri pricipie de'Poeti Tragici, esclusi dal Divino Platone delle buone Republiche, se bene per gli ingegnosi artifizij, et divini altrove e sono dal medesimo sommamente celebrati. Circa l'inventione delle favole, dico, che è piu presto del Poeta, che del Filosofo, o di alcuno altro professore; atteso, che il Filosofo aspira principalmente al vero, & al vivere honesto, così ogni altro professore; ma il Poeta al diletto, & alla maraviglia, o almeno al vero; ma per modi dilettevoli, & maravigliosi si (76) compresi nelle favole.

Quanto al terzo, & ultimo capo appartenente all'intelligenza di alcune maniere di favole, fa di bisogno primieramente ridurre le stesse favole à certi capi principali con questa argomentatione procedente pur via di divisione, così dicendo, ò le favole son fintioni d'huomini, & delle loro attioni, o delle Dij, & delle loro opere, o parte di queglii, & quelle, & parte di questi, & di queste. Se di attioni humane solamente, o di persone di bassa cōditione: come sono quelle de'poemi, chiamate Commedie, ne'quali si fingono alcuni casa sotto nomi di persone di basso stato, & son finte, per non si concitare ad ira alcuno: come si puo vedere in Terentio, e negl'altri poeti Comici, o le favole son' trovati dell'attioni humane di huomini grandi, & illustri, come son quelle delle Tragedie, & come quelle de'poemi Epici detti Romanzi: come son queglii di Omero, quel di Virgilio, quel di Messer Lodovico Ariosto, detto il Furioso, di Messer Luigi Alamanni, & d'altri gentili Poeti. Se le favole sono fintioni de gli Dij, o le appartengono à Dio, quanto all'opere sue na noi specolabili, o di quelle di piu, che da noi sono imitabili, come è il governo del mondo grande, conforme al quale si dee reggere il piccolo.

Quelle favole in ultimo, che sono di speculatione, & di attione insieme son quelle, le quali si (77) possono esporre secondo il senso allegorico speculativo, & secondo l'attivo. Delle favole, che sono dell'opere di Dio da specularsi da noi solamente (per cominciarmi da queste, & darne qualche essemplio, & insieme esporre.) Una è questa; Celio, secondo gli antichi Theologi, & Poeti de' Gentili: Dio sopra tutti gli altri generò Saturno. Et Saturno produsse Giove, governatore del Cielo: Nettuno Signore delle cose di quaggiù, & del mare: Et Plutone rettore delle parti sotto terra. Questa favola da alcuni de' piu eccellenti Platonici è così interpretata, che Celio significhi Dio, & queglii che è eccellentissimo sopra ogni eccellenza, & nel quale son celate, & contenute tutte le creature in un modo ineffabile: come si termina nella gran disputa del modo di intendere di Dio; per Saturno si

intende la prima mense angelica, la quale ancora si chiama mondo esemplare da Platone nel Timeo, & da Mercurio Trismegisto, & dall'istesso Platone Tazza. Da questa mente contemplatrice furon generati tre governatori in nome: ma in verità è un solo, che è 'anima del mondo: questa in quanto vivifica, muove, & governa la parte celeste, giovevole col suo moto, & lume alle cose di quaggiù, & à noi si chiama Giove, inquanto uinifica, muove, & regge le creature di questo basso mondo, soggette al continuo flusso; come l'acque è addomandata Nettuno, inquanto uinifica, muove, & regge le parti (78) sotto terra, & conferisce alla generatione de metalli, & delle pietre pretiose: Et in quelle, & in queste consistono le ricchezze: perciò ella è nominata Plutone, o vero Dio delle ricchezze. Secondo Aristotele il medesimo Dio, che è la prima cagione, considerato, come eccellētissimo si chiama Celio, ma contemplato poi, come intelligente di se, & di tutte le creature, si puo dire Saturno, come governatore del cielo, delle cose inferiori, & di quelle sotto terra, gli convengono questi nomi, Giove, Nettuno, & Plutone. Questa stessa favola si puo ancora adattare al piccol mondo, che è l'huomo, intendendo per Celio la parte divina come eccellentissima, & come contemplante, si puo chiamare Saturno, & in quanto la si inchina al governo di questo corpo, & de' suoi beni si puo dire Giove, & in quanto attende alle ricchezze Plutone. L'altra favola simile è ancora essa usata da Platone nel settimo libro dell Republica dal principio, & è questa, che l'huomo è collocato su l'uscio di una spelonca, di maniera, che gli non si puo voltare verso il lume, & verso le cose proprie, le quali poi sciolto egli conosce distintamente, & non come prima per l'immagini, & per l'ombre di esse; questo bel trovato significa l'huomo come intelligente, prima per le spetie, & similitudini delle cose, & poi come conoscente le medesime chiaramente nel divino Sole. La terza favola di simil maniera ò quella del (79) nascimento di Venere, & massimamente parlando della celeste, & à modo de'Platonici, & de gl'antichissimi Theologi de'Gentili: questi dicono che Saturno, sendo Celio suo padre al fuoco, gli tagliò i genitali, & gettogli in mare, & di quella stiuma, o seme nacque Venere: volendo per tutto questo significare, che l'idee delle cose furono dalla prima mente prese da Dio, & gettate nella sua angelica essenza amplissima, & l'ordine, che ne resultò fu la celeste bellezza, & venustà.

Secondariamente, delle favole, le quali piu presto secondo il senso morale sono atte ad esporsi, una puo essere questa, che Narciso giovane bellissime rimirandosi in una chiarissima acqua di una fontana, si innamorò di se stesso, e tanto vi stette, che morì, & si transformò in una pianta, che se il fiore bianco, & giallo, & di grave odore, questa significa gl'huomini, i quali son troppo innamorati

di loro stessi, & sprezzano gl'altri, questi son piante inutili, & moleste; essendo ciascuno di noi quaggiù da Dio mandati, perche ci amiamo l'un l'altro, & ci gioviamo. L'altra similmente utile all'attioni rette sia questa, che essendo venuto in Lydia un gran tremuoto, la terra quivi si sparse, & Gigi pastore mercēnario vedde in quell'apertura un gran Cavallo di bronzo, o vero di rame, & nel corpo per certa finestra vi era un morto, che havea un'anello in dito con una bellissima gioia. Questo Gigi si prese questo anello, & metteselo in dito, (80) & nello andaresene gli venne rivolta la gioia in dentro, & così gl'altri pastori non lo vedevano; poi tirata la gioia in fuori, fu veduto. Egli accortosi della virtù di detto anello, procurò di andare à parlare con il Re di Lydia, & la Reina se ne innamorò; & fece uccidere questo Re suo marito, prendendo per suo Signore questo Gigi. Di questa favola si serve Platone: per mostrare, che l'huomo nell'attioni sue sarebbe ingiusto, & reo, ogni volta, che egli pensasse, che non li avesse à ritrovare le sue tristitie; & percioche gl'ha di bisogno di governo, & di leggi; & tutto questo si dee intendere per gl'huomini plebei, & troppo soggetti alle passioni, perchi i nobili, & generosi ancora che se havessero l'anello di Gigi, o la Elitropia di Chalandrino, hanno pensieri, parole, & atti nobili, & lodevoli. La terza sia così fatta; gl'huomini erano già doppi: e perche erano troppo superbi, Dio gli divise per il mezzo, & di qui è, che uno ama, più uno, che un'altro, perche gliè il suo mezzo: come è scritto nell'oratione di Aristofane nell'amoroso Convito da Platone; il significato morale puo essere questo, che niuno huomo puo giovarsi con l'arte di un'altro, ma ha di bisogno dell'altro; o veramente, che ne gl'amori, & nell'amicitie niuno puo fare da se, che piu gl'è conforme per costumi, & per volontà, altramente ogn'uno sarebbe superbo, se a'bastasse à se stesso. (81) Delle favole in ultimo, che si possono insieme esporne col senso di speculatione, & col morale, una è questa. Che Venere moglie di Vulcano fu trovata da esso con Marte, & con rete fortissima furon legati insieme, & dimostri così legati à gl'altri Dij: come racconta Omero; questo favoloso ritrovamento è esposte da'Platonica così, che e'voglia dire, che Venere è una unione forte di piu cose discordanti, come quella celeste di diverse idee con la natura, & essenza di quel primo angelo, & come la vulgare, & sensibile del mondo, che è una forte unione, & ordinatione di moltissime, & diverse creature repugnanti; Et questo sentimento è di speculatione, da Aristotele principe de' Peripatetici è dichiarato moralmente, dicendo, che per così fatta fintione gli antichi ci volsero dare ad intendere quegli piu essere soggetti à gl'atti di Venere, & alle amorse passioni, i quali sono collerici, & Martiali; così quella favola, che l'amore sia nato di Poro, & di Penia, cioè di povertà, & di ricchezza, si puo esporre speculationamente, con dire, che gl'amanti parte son poveri, inquanto mancano di quella bellezza,

che ardentemente desiderano, & son ricchi di essa, inquanto e' la possono godere, disponendovisi, ma moralmente si puo dire, che chi ama qualche virtù, o arte virtuosa, parte ne è ricco in potenza, parte povero, inquanto ci non l'ha in atto. Similmente la favola, che Giove di cielo in terra (82) in forma di aquila mutato se ne volò per respirare il gratioso Ganimede. Similmente, dico, si puo intendere specolativamente, & moralmente, nel primo modo dicendo, che Dio à guisa di aquila inalza i begli ingegni alla speculatione di se stesso; & con l'animo, & con l'amore conversa con la Divina Maestà, & à quella ministra porgendo le dolcissime verità à gl'animi de gl'uditori similmente divini, & che aspirano alle celesti, & alla sopracelesti bellezze. Nel secondo dicendo, che quegli sono da Dio tirati per attione giusta alla celeste patria, à quali egli per copia di gratia discende. Questo è tutto quello, che mi è parso per pienissima intelligenza utilissima, & giocondissima dell'opere di Pratinolo, di discorrerne. Resta hora, che io qui aggiunga una breve esortatione a'giovani al vivere virtuosamente, & al darsi à qualche ingegnosa, e lodata professione, per compimento, e fine, così di questo primo ragionamento, come delle persone, che desiderano bene, e felicemente vivere, e poi morire, per salire all'eterna beatitudine.

(83) *Esortatione a' giovani al vivere bene, & virtuosamente, & al darsi à qualche professione. Cap.*

VI.

& ultimo.

O'Dio immortale, quanti sono de gl'huomini, i quali si danno all'otio, pensandosi così vivendo essere reputati piu nobili, & piu grandi: si come per il contrario eglino stimano quegli essere persone abiette, & vili, i quali si danno alle facende, & si impiegano in qualche esercizio giovevole à loro stessi, & ad altri. Quanti ancora son quegli, i quali si vanno à spasso, non si curando d'altro, che di vestir bene, per quanto e'possono, darsi al giuoco, & cavarsi ogni lor voglia della gola, & della carne, poco, & niente curandosi se verrà tempo, che non potranno così vivere, & non si avvedendo di consumare il tempo inutilmente. Quanto piu oltre amano la vita otiosa per ignoranza del fine, al quale e'sono in questa vita dal Re dell'universo quaggiù mandati; e parte perche sono pigri, & infingardi al ben fare. Et finalmente molti ne sono, i quali stanno à bottega, piu perche guadagnando del guadagno si vagliono à gittarlo via in loro passatempo del corpo che (84) per supplire alle necessità, come fanno gli artigiano, & plebei, e non sarà dunque fuori di proposito, se io mi ingegnerò di persuadere a'giovani, che con ogni prontezza d'animo, & con ogni diligēza si mettono à

imparare qualche arte, o dottrina, o scienza, & in quella poi si esercitino à beneficio loro, & d'altri; & se bene infiniti sono i luoghi, da'quali si possono prendere l'argomentationi à disporgli, & à persuadergli à tutto questo: nondimeno i principali, & quelli, che hora mi soccorrono alla memoria sono otto, o al piu nove. Il primo è l'imitatione della Divina Maestà; al che fare ogni creatura è tenuta, & massimamente l'huomo, il quale partecipa del divino, & ha in se stesso l'immagine, & la similitudine di Dio. Hora se Dio, che ha cō tal doni crea l'anima nostra, & in questo corpo infusa, & tutte le creature sue ci fanno beneficio, & in ciò lo vanno imitando; questo medesimo dobbiamo fare ancor noi con l'apprendere, & esercitarci in virtù, & in qualche giovevole professione. De gl'angioli alcuni muovono i cieli con tanti lor lumi per queste cose di quaggiù, delle quali ci serviamo, altri son nostri custodi al bene operare, & perche ci guardiamo dal male; & finalmente niuna creatura è, che non ci apporti qualche utile: dunque noi vorremo soli essere otiosi, & inutili assomigliamoci, assomigliamoci accortissimi giovani, chi all'opere naturali di Dio con l'arti, chi al retto governo (85) di se, & d'altri, come Dio rettamente governa questa gran Republica dell'universo, chi con le altissime speculationi, come fanno i Filosofi, & i Theologi. La seconda ragione si puo pigliare dal numero quasi infinito de'bisogni, a'quali è soggetta questa nostra vita corporale, così dicendo; Se questo nostro corpo, & questa nostra anima hanno di bisogno di un numero quasi infinito di beni, a'quali si aspira d'ogni arte dottrina, & scienza. Percioche quella qualche bene del corpo ci procura, come l'agricoltura, & altre simili il nutrimento; l'arte della lana, et della seta, et simili il vestire; la medicina la sanità, quella conservando, et se è persa ricuperando, con la regola della vita, con i medicamenti, e con la chirurgia, et il Mercante provvede di grani, lane, sete, et altre cose, conducendo il tutto da luoghi, ne' quali ne è abbondanza, a'luoghi, ne'quali ne è carestia. Et quanto all'aima per le attive si moderano gli affetti, et le attioni; et per le speculative si adorna, et nobilita la parte intelletiva; E perche noi non possiamo intendere l'un l'altro, come le intelligenze, o vero Angeli, et Dio: ma ci bisogna il mezzo delle voci: di qui è, che furono ritrovate le lettere, et la faculta gramaticale, che ci dà le regole à parlare, et à scrivere bene, et acconciamente ogni nostro concetto in qual si voglia maniera di linguaggio, o Toscano, o Latino, o Greco, o Hebreo, o altro. Et in oltre per non (86) errare nel discorrere nelle speculationi, e nell'attioni ci bisognarono le facultà logicali, come la Logica dimostrativa per le Scienze, la Dialettica, per disputare, la Rhetorica per persuadere, et dissuadere, parte con ragioni probabili, parte commuovendo gl'affetti, et parte con le belle parole, et gesti dell'oratore. La Poetica, per incitarci al bene con diletto, con imitationi, et fintioni; et per liberare gl'amatori del vero dall'importunità delle

argomentazioni sofistiche: di qui è, che il nostro Filosofo Aristotele ci lascio scritte le regole da sapere formare i sofismi, et à sapergli risolvere. Vedete, vedete dunque quante, et quali sono le professioni giovevoli al corpo, et all'anima, parlandone in generale; ognuno dunque ad alcuna si applichi per essere utile à se, et ad altri, et non essere inutile contro ad ogni legge. Il terzo modo di argomentare dipende dalle lodi, et da gl'honori, che conseguiscono queglii, i quali si mettono, et attendono à qualche esercizio: percioche le professioni, che apportano molto utile, come sono la Legge, la Medicina, et la Mercatura, fa le casate ricche, e ben'agiate, et potenti à sovvenire assai il publico: et ciascuno particolare: onde essi acquistano tanta benevolenza, che facilmente moti son ricevuti per parenti da nobili, et di qui poi hanno ricevute delle maggiore dignità, oltre che di molti acquistae le cose ne cessarie, alcuni si diedero alla facultà militare, et vi hanno (87) acquistato dentro fama immortale, altri p via di lettere hāno il medesimo cōseguito, e parlando de'nostri Fiorentini, uno de'grandi humanisti in lettere Grece, e Latine a'tempi nostri è stato M. Piero Vettori, nella facultà degli oratori M. Baccio Cavalcanti, nella poesia M. Givoambatista Strozzi il vecchio, et hora il giovane, nella lingua Toscana è di gran pregio M. Lionardo Salviati, Cavaliere di Santo Stefano, in questa, et ne'versi pur Toscani son molto stimati, Frate Antonio de'Pazzi, Cavaliere di Malta, et M. Giovambatista Strozzi il giovane; nella Filosofia M. Francesco de' Vieri, detto il Verino primo, et mio auolo: nella medesima professione magnanima sono di molta stima M. Francesco Buonamici, uno de' miei concorrenti all'ordinaria, et all'extraordinaria M. Giulio de'Libri; de'Filosofi similmente Fiorentini, ma che nō leggono in studio, ci sono M. Giovanni Acciaiuoli Filosofo, e Theologo eccellentissimo, così M. Piero, et M. Carlo Rucellai, M. Piero Covoni, M. Giovanni Rondinelli, M. Bastiano Antinori, et M. Domenico Mellini, et M. Lorenzo Giacomini; nella prudenza legale lo Eccellentissimo M. Baccio Valori, il fortissimo M. Francesco Lenzoni, M. Alessandro Malegonnelle, il Niccolini, M. Giulio del Caccia, hoggi Governatore degnissimo di Siena; e tra Dottori leggenti giovani, ma di grande aspettatione ci è Messer Filippo Buonaventuri, huomo (88) insieme molto cortese, e di buone costumi. Lascio di fare memoria di molti altri, riferandomi à fare questo de'Fiorentini, et di quelli che non son Fiorentini altrove. Nell'armi sono stati molto valorosi gli Strozzi, Giovambatista Venturi, & infiniti altri del nostro tempo. Nella pittura, scultura, & architettura, è stato rarissimo Michelangelo Buonarruoti, in medicina M. Francesco del Garbo, il Guidi il vecchio, & M. Francesco Violi, & delli altri. In santità di vita sono stati un'esempio raro Papa Pio Quinto tra i Pontefici, tra Cardinali il Buonromeo, tra gl'Arcivescovi, lo Altovito, tra i Vescovi detti, e di gran bontà di vita, é molto reputato M. Ugolino

Martelli, tra Religiosi di minore grado habbiano il Priore de'Linari, M. Francesco di Bartolomeo Benvenuti, & à Prato la molto veneranda Suor' Caterina de' Ricci.

La quarta cagione, che vi dee muovere à segnare la via delle virtù, & ad attendere à qualche ingegnosa, & utile professione, è perche così si fugge l'otio, che è causa di molti, & molti errori, ne' quali incorrono gli otiosi, & li sfaccendati. Uno de'quali è d'innamorarsi di lascivo amore, nutrito d'otio, & di lascivia humana, merce della quale amorosa passione l'huomo è soggetto il giorno, & la notte ad infiniti tormenti: di maniera, che di sua potenza spesso se ne consegue morte, o stato vicino à morte. Il secondo inconveniente dall'otiosa (89) vita è il dare in pratiche di persone similmente scioperate, che vi inducano alla rovina della roba, spendendo nell'osterie, nelle quistioni, & ne'giuochi; oltre che le ree pratiche ad altra ree, & sozze opere ci guidono con la perdita di ogni sorte di bene, o sia dell'anima, o del corpo, o della roba, o dell'honore. Il terzo, & molto notabile errore, che nasce dall'otio si è il venire in disgratia, & in odio a'buoni, & a'prudenti insieme, da quali solo dopo à Dio, & dopo al Prencipe datoci per sua ordinatione si puo, & si deve sperare di ottenere in questa vita, ogni bene de' beni humani di quaggiù, & non da gl'otiosi, & inutili al mondo. Il quarto disord ne è, che gl'otiosi il piu delle volte spendendo, & non guadagnando vengono in estrema necessità, & pariscono con infiniti dispiaceri di ogni cosa, et tal volta si mettono fino a fare cose vituperose, et degne di asprisimo gastigo. Se dunque, ò giovani, & amici cari, voi volete sfuggire tutti questi grandi, & pericolosi inconvenienti; seguite qualche esercizio, & guardatevi dall'otio. La quinta prova à persuadervi à questo, ò spiriti accorti, si prndeda me da contenti, & piaceri, che sentono dento di loro quegli, che si occupano in qualche honesta facultà, mentre ci vivono, & quando eglino si conducono al punto della morte: perhe chi non fa per prova, che quegli, i quali vituosamente si esercitano, & bene, che e'gustono diletto, (90) & non piccolo atteso, che con ogni perfetta operatione è congiunta qualche piacere, come nel vedere, nel gustare, nell'odorare, nell'intendere, e così discorrendo in ogni altro atto perfetto; & di questo piacere honesto è ancora (come bene si afferma da Aristotele nel libro dell'Ethica) inditio certissimo dell'habito virtuoso, e perfetto di già acquistato. La sesta, & efficacissima ragione sia questa; ognuno, che è veramente savio dee prendere quei mezzi, mercè de'quali egli arrivi all'eterna beatitudine, et fugga l'eterna miseria: ma tra gl'altri mezzi il principale è l'arte della carità verso i poveri, & i bisognosi, & queste non si puo esercitare senza havere che dare; Et questo si ottiene per mezzo dello esercitarsi in qualche utile, & giovevole facultà; adunque per questo conto ancora è sommamente bene, &

necessario lo attenderci. Il settimo argomento viene dall'autorità de' piu santi, & de' piu intelligenti della nostra Patria, & dell'altre. Questi tutti si deono, come esempi rarissimi del ben vivere imitare; & questi tutti (se andrete considerando i passati, & i presenti) si sono impiegati in qualche impresa, & in qualche esercizio, & così hanno seguito fino al fine. Voi dunque similmente, o giovani, ne'quali è posta ogni speranza de' vecchi, & de' passati, non mancate di giovare à voi stessi, & alla vostra (...). Considerate, considerate (vi prego) quello che sarebbero le (91) Città, & le comunanze de' popoli, se ognuno vivesse oziosament, tutti dico, saremo come bestie, vivendo di cibi senz'arte preparati; così faremo scalzi, & ignudi, & senza legge di maniera, che la vita farebbe con infinite miserie, & dispiaceri accompagnata; & niuno giovando all'altro amerebbe l'altro, ne sarebbe amato, & così si leverebbe la civile amistà, & concordia; al che riguardando i buoni Precipi, & Governatori delli stati procurano con ogni diligenza, che per essi stati si esercitino tutte le buone arti, et professioni, et con giustitia. Et quanto à quelle, che ricercano grande intelligenza, come sono la Theologia, la Filosofia, la Legge, la Medicina, et la Logica, et l'Humanità, non perdonano à spesa veruna per havere Dottori, et Lettori suffzienti, di maniera, che la loro dottrina sia ben fondata facile ad apprendersi, et ben'ordinata, et che questi stessi siano persone di buon costumi.

Finalmente (per non essere piu lungo) io vi prego, che vi diate à qualche degna, et utile professione, poi che fino le feste, et i giuochi à questo stesso vi chiamano, et vi esortano; et massimamente le maravigliose opere di Pratulino: come di sopra disorrendone io vi ho dimostrato.

Per tutte queste cagioni dunque se siate savi, et havete (93) l'animo buono, et benefico spenderete i giorni della vostra vita, come hanno fatto, e fanno tutti i prudenti, et di buone mente sino à qui.

IL FINE.

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Estratto per riassunto della tesi di dottorato

L'estratto (max. 1000 battute) deve essere redatto sia in lingua italiana che in lingua inglese e nella lingua straniera eventualmente indicata dal Collegio dei docenti.

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Ciclo: 30 _____

Titolo della tesi¹: Engineering Gods: Theurgy and the Late Sixteenth-Century Automata of Francesco I de' Medici _____

Abstract:

¹ Il titolo deve essere quello definitivo, uguale a quello che risulta stampato sulla copertina dell'elaborato consegnato.

The writings of the sixteenth-century court philosopher and university lecturer Francesco de' Vieri, also known as Verino Secondo, have to date been recognized by intellectual historians primarily for their contributions to the history of Aristotelianism in the vernacular and by art historians as a primary source for the architectural and artistic features of the Medici Villa Pratolino, a site realized for Francesco I de' Medici which was largely demolished in the early nineteenth century. However, while De' Vieri's 1587 text which describes the features of Pratolino, *Delle Maravigliose Opere di Pratolino*, d'Amore, has been mined for the material and iconographic details it provides on no-longer extant works of art and architecture, its commentary on Pratolino's automata has not been adequately recognized, neither for its unique commentary early modern technology in a transitional period which blended occult philosophy with emerging mechanical proficiency, nor for this commentary's and the automata themselves' affirmation of the identity of their Medici patron as terrestrial sovereign and divine demiurge, or in the words of one Pratolino scholar, "the mirror of the passions and virtues of a narcissistic prince." While the conceptual unity of art history with mechanics, or properly technology, did not emerge until the late eighteenth century, the commentary of Francesco de' Vieri provides rare and valuable insights into the reception and function of such technology in the courtly milieu of the late sixteenth century. I argue that the creation of moving statues at the court of Francesco I de' Medici was a process with occult associations with ancient Greek and Egyptian traditions of binding spirit to cult statues; in Francesco I and his court's success at manipulating natural forces to bring autonomous movement- Classical philosophy's criterion for life- to inanimate statues spoke to a total mastery of the elements parallel to his terrestrial sovereignty.

Firma dello studente

