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Ovid's Metamorphoses and the Scientific Revolution

Galson, Samuel J.

Princeton, NJ : Princeton University

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Ovid's *Metamorphoses* and the Scientific Revolution

Samuel J. Galson

A Dissertation
Presented to the Faculty
of Princeton University
in Candidacy for the Degree
of Doctor of Philosophy

Recommended for Acceptance
by the Department of
Classics

Adviser: Andrew Feldherr

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Abstract

This dissertation examines Ovid's engagement with philosophy in the *Metamorphoses* in light of the continuous reception of the poem by natural philosophers, from Seneca the Younger to thinkers credited with the foundation of modern scientific principles, such as Francis Bacon and René Descartes. In Chapter 1, it provides a new interpretation of the "realism" of Ovid's fantastical fictions, demonstrating that by setting realism in conflict with fantasy Ovid highlights the fact that different ancient philosophical schools both attacked and defended the usefulness of fictions to philosophy in contrasting ways. Contemporary scholars usually regard Ovid as straightforwardly anti-philosophical, but the reception history unveiled in the following five chapters sets this view against the historical fact that Ovid's credibility as a natural philosophical authority grew with the development of natural philosophy in the Middle Ages and actually reached its height during the Scientific Revolution. Focussing on astrology, natural magic and alchemy, and their modern counterparts, astronomy, experimental science and chemistry, the dissertation shows that the reception of Ovid in these domains exhibits a complex interplay of rejection and appropriation, both within and between different philosophers, which replays the dynamics of the reception of fiction exposed within the original poem. Ovid's poem thus functioned historically as a crucial site for debate about the role of fiction in scientific method, and affords valuable insights into disputes between realist and anti-realist philosophers of science that continue to generate controversy.

Acknowledgements

This dissertation would not have been possible without a conspiracy of many causes, beginning with the sympathetic direction of Sylvie Franchet-D'Espèrey during my Masters at Paris IV. Andrew Feldherr convinced me to apply to the Department of Classics at Princeton, where my interest in Ovid germinated in his graduate seminar on the *Metamorphoses*: he has been a source of encouragement, support and inspiration ever since. Without the visionary guidance of Brooke Holmes in the early stages of the project and the environment fostered by Jeff Dolven in the Interdisciplinary Doctoral Program in the Humanities, I would not have dared to range so far beyond the bounds of Classics. Brooke, too, is a continuing source of support and inspiration. I am grateful to Eileen Reeves for joining us on the "other side" of East Pyne; she has been equally kind and helpful in guiding me through the early modern material (not to mention the provision of cookies). Finally, I wish to thank to Guido Giglioni, who welcomed, supported and advised me during a long stay at the Warburg Institute, where I made many new discoveries and friends. Of course, nothing at all would have been possible without family, friends and the notorious M. K. J.

Contents

Abstract iii

Acknowledgements iv

List of Figures vi

List of Abbreviations vii

Introduction **1**

0.1 Allegory of a shell 1

0.2 Poetry and science in antiquity 9

0.3 Finding "heuristic fiction" 19

0.4 Waypoints 29

1 Metamorphoses of Philosophy **37**

1.1 Body and *simulacrum* 37

1.2 Power and poetry 50

1.3 Metamorphosis and metempsychosis 59

1.4 Seneca's *Natural Questions* 69

2 Astrology **84**

2.1 Two paths for astrology 84

2.2 Ovid between idolatry and astrology 90

2.3 "Fables or tables" in Albert the Great 94

2.4 Roger Bacon and the naturalisation of religious history 106

2.5 Pico, Ficino, and animistic astrology 112

3 Demonology and Magic **127**

3.1 The rise of demons 127

3.2 Demonologists on the limits of nature 132

3.3 Pietro Pomponazzi against demonology 139

3.4 Natural magic and similitudes in Giambattista Della Porta 151

4 Alchemy, or the Chaos of the Sages **173**

4.1 Alchemy and corpuscular mechanism 173

4.2 Timeline of alchemical allegory 186

4.3 Terrestrial astrology 193

4.4 Origins of the alchemical Ovid 200

4.5 The cosmogonical analogy 207

4.6 Ovid's chaos 214

5 Critics of Alchemical Allegory **222**

5.1 The metamorphosis of the alchemist 222

5.2 Paracelsus the Democritean 227

5.3 Libavius' corpuscularianism 235

5.4 Libavius' Ovidianism 246

5.5 Francis Bacon and the alphabet of nature 253

5.6 Ovid and the doctrine of spirits 262

5.7 The face of chaos 269

6 The Mechanical Philosophy **274**

6.1 *Mundus est fabula* 274

6.2 Metamorphosis without Ovid? 280

6.3 Galilean metamorphosis 291

6.4 Galileo's *Assayer*: the suicide of suspicion 299
6.5 Back to Ovid: three variations 319

Bibliography **334**

List of Figures

1 Letter from Thomas Gold 10
2 Ovid displays the cosmic egg 95
3 Image from the *De Humana Physiognomia* 154
4 A page from Salomon Trismosin's *Splendor Solis* 187
5 Schematisation of Libavius' outline of types of transmutation 231
6 Portrait of René Descartes 275
7 Scheiner's "monsters" 295
8 Galileo's (dis-)analogies between light and sight 313

List of Abbreviations

AT *Oeuvres de Descartes* (1983). (C. Adam and P. Tannery Eds.). 11 vols. Paris: J. Vrin.

AMB *B. Alberti Magni Opera Omnia* (1890-1899). (A. and E. Borgnet Eds.). 38 vols. Paris: Vivès.

DHC Bayle, P. (1730). *Dictionnaire Historique et Critique*. 4 vols. Amsterdam: P. Brunel, *et al*.

EC *Alberti Magni Opera Omnia* (1951-), Editio Coloniensis. (Albertus-Magnus-Institut Eds.), 41 vols. Münster: Aschendorff Verlag.

FPT Ficino, M. (2001-2006). *Platonic Theology*. (M. J. B. Allen and J. Hankins Eds. and Trs.). 6 vols. Cambridge: Harvard University Press.

KGW *Johannes Kepler Gesammelte Werke* (1937-2009). Herausgegeben im Auftrag der Deutschen Forschungsgemeinschaft und der Bayerischen Akademie der Wissenschaften. (W. von Dyck and M. Caspar Eds.). 21 vols. München: C. H. Beck'sche.

MBC *Bibliotheca Chemica Curiosa* (1702). (J.-J. Manget Ed.). 2 vols. Geneva: Chouet.

MOG *Raimundi Lulli Opera omnia* (1721–42), Editio Moguntina. (I. Salzinger Ed.). 8 vols. Mainz; reprinted Frankfurt: 1965.

OCV *Oeuvres complètes de Voltaire* (1968–). (T. Besterman Ed.). 135 vols. (projected). Geneva, Banbury, and Oxford: Voltaire Foundation.

OFB *The Oxford Francis Bacon* (1996–). (G. Rees, L. Jardine and B. Vickers Eds.). 15 vols. (projected). Oxford: Oxford University Press.

OG *Le Opere di Galileo Galilei* (1890-1909), Edizione Nazionale. (A. Favaro Ed.). 20 vols. Firenze: G. Barbera.

PSW *Theophrast von Hohenheim gen. Paracelsus Sämtliche Werke* (1929–1933). (K. Sudhoff Ed.). 14 vols. München: Oldenbourg.

SEH *The Works of Francis Bacon* (1857–74). (J. Spedding, R. L. Ellis, and D. D. Heath Eds.). 14 vols. London: Longman.

SVF *Stoicorum Veterum Fragmenta* (1903–24). (F. A. von Arnim and M. Adler Eds.). 4 vols. Leipzig: Teubner.

TC *Theatrum Chemicum* (1659–1661). (J. J. Heilmann Ed.). 6 vols. Strasbourg: Zetzner.

Any other abbreviations of classical authors or Greek and Latin works are given according to the system used in the *Oxford Classical Dictionary*.

> There is some mythology in science and some science in mythology. What remains is to recount this immense history or legend, without fragmentation.
>
> Serres in Serres and Latour (1995, p. 158)

Introduction

0.1 Allegory of a shell

At the beginning of his seminal *Principles of Geology*, Charles Lyell (1797–1875) adduced some historical precedents for the vision of directionless terrestrial transformation he was about to unveil: "far more philosophical" than any other ancient account, he suggested, was that delivered by Pythagoras in Book XV of the *Metamorphoses*, "a comprehensive and masterly summary of almost all the great causes of change now in activity on the globe" (Lyell 1830–33, vol. 1, p. 12-14; cf. p. 323). Or, as the disciple of Darwin, T. H. Huxley, later put it: "Ovid foreshadowed the discoveries of the geologist" (Huxley 1863, p. 1).[1] This dissertation aims to reveal the history and function of such strange intrusions of ancient poetry upon modern science. It will be a history presented, as far as possible, "without fragmentation", tracing the reception of Ovid not just across countries and through time from ancient Rome to the renaissance of natural philosophy in the twelfth and thirteenth centuries, and into the scientific revolution in the seventeenth, but also between disciplines, for Ovid's popularity among natural philosophers depended on his poetic technique. In

[1] The notion of Ovid as a geologist reappeared in a number of geological text books after Lyell: Richardson (1842, p. 29), Phillips (Phillips 1834, pp. 33-4 and frontispiece), Knox (1855, p. 36), sv. *Geology* in Knight (1838, p. 128), Mather (1833, p. 116). Although citation of Ovid in a geological context was very common, Lyell claimed to have been the first to see in Ovid the principles of a properly modern geology: see his response to an accusation of having plagiarised the classical learning of others (Lyell 1831).

highlighting this continuity, it will recount the legend of the Scientific Revolution, but in the broadest sense, as a historical event whose morphology spreads across centuries, and whose identity lies in an ancient pattern eternally repeated, a pattern which nonetheless unfolds into something startlingly new in the sixteenth and seventeenth centuries, like the flower from the leaf. At the same time, the pattern that is continuously repeated is one characterised by ruptures, radical splits and disagreements: the history without fragmentation is perhaps what "remains to be recounted", because such a history must concern itself with what are, in the end, remains.

I begin with a shell. That is to say, on the one hand, I begin with modern geology, perhaps the field in which one is most likely still to find natural philosophical interpretations of the *Metamorphoses*;[2] and, on the other hand, in taking a relatively late example, I begin with what is little more than a shell of the long tradition of reading Ovid scientifically, one whose flesh has been swept away by centuries of insistence on the divisions between ancient and modern, poetry and prose, myth and science. If, as Lyell proclaims of himself, "the philosopher...rejects the fabulous tales of former ages" (Lyell 1830–33, vol. 1, p. 76; cf. p. 332), what parts exactly of the Roman poet are preserved? It is tempting to suppose that little remains beyond the concept of flux or metamorphosis, a concept so vague and metamorphic itself that it can have little claim to scientific status. Such, broadly speaking, was the opinion of one of Lyell's reviewers who acknowledged the "striking" resemblances between the *Metamorphoses* and Lyell's vision, but warned against confusing Ovid's poetry with Lyell's science: "he only discovers who proves...a guess, however happy, is nothing more than a happy guess" (Scott et al. 1842, p. 163). To mention at the start of a scientific work that a discovery has been "foreshadowed" by an ancient poet seems in this light little more than a *captatio benevolentiae*: an entertaining aside, a display of erudition, or perhaps

[2]This is especially so in the field known as "geomythology" – the attempt to read myths for evidence of past geological events – for which, see Piccardi and Masse (2007), Clendenon (2009) and Figure 1. A recent attempt to pin the myth of Phaethon to a particular meteorite impact in Bavaria (Barbara et al. 2010), however, smacks of a crackpot.

an attempt to project the cultural authority of the classics. This we might call the "mere rhetoric" interpretation of Ovid's scientific reception.

Against the relatively modern example of Lyell, where the "mere rhetoric" interpretation appears at first quite persuasive, we could set the several *Lectures and Discourses upon Earthquakes* that Robert Hooke (1635–1703), the famous physicist and polymath, delivered to the Royal Society between 1668 and 1693. In these lectures, Hooke declared his intention to step back from the vast quantities of geological evidence being assembled by the Royal Society and, out of "so great a Pile", to construct a hypothesis, a "Superstructure", as he put it, that would organise the "heap of confusion" (1996, p. 160). Hooke's hypothesis was that seismic activity had caused massive changes in the earth's structure over long periods, an idea that, while not new, was not widely accepted and had never received such detailed support; in addition, Hooke deduced some important consequences of terrestrial fluidity, hypothesising for the first time, for example, that the earth's rotation would cause it to bulge at the equator.[3] His key witnesses in this endeavour were two: on the one hand, shells, whose discovery in strange places proved the gradual interchange of sea and land, so that, as he put it, he had "turned the World upside down for the sake of a Shell" (1996, p. 304); and, on the other hand, Ovid, who had not only enunciated the general principle of constant metamorphosis expressed by the image of "the devouring Teeth of time" (1996, p. 201), but had deliberately concealed in the *Metamorphoses*' sequence of myths "a sufficient number of such Catastrophies that have happened in former Ages to make the Hypothesis, I have indeavoured to explain, to seem at least probable, if not necessary" (1996, p. 284). Hooke supported the latter claim with detailed geological interpretations of the tales of the cosmogony, the four ages, the giants, Lycaon, Deucalion and Pyrrha, Apollo and Python, Perseus and Andromeda, Atlas, Medusa, and Pluto and Proserpina. If "he only discovers who proves", the discovery of Hooke's hypothesis could, according to Hooke, justly be attributed to Ovid.

[3]For fuller accounts of Hooke's geological theories and their context, see Oldroyd (1972; 1989), Ito (1988) and Drake (1996). Rappaport (1986) focusses on the chronology of the lectures.

Lyell, in his historical introduction, judges Hooke to have made "an important step in the progress of modern science", even while retaining an explanatory mechanism (seismic convulsions) "as extravagant and visionary as that of his most fanciful predecessors" (1830–33, vol. 1, pp. 34-5). He does not mention Hooke's readings of Ovid, but they are readily linked to this addiction to the "fanciful". Few today would regard the view that Lycaon represents "Sulphurous, Subterraneous Vapours" (1996, pp. 291-2) as the mark of sober judgement. Yet Hooke's approach to Ovid is more sophisticated than it first appears. First, Hooke's enterprise is conditioned by the refusal of his contemporaries to go below the surface in their interpretations of geological remains; if Hooke displays a surfeit of interpretation, it is because he is counteracting a real deficit. Whereas most of Hooke's contemporaries regarded fossils as spontaneous productions of the earth (*lusus naturae*), which had no connection to animate life beyond their mere resemblance, Hooke dared to infer that fossils were either "the very Substances themselves converted into Stone", or "such other Mineral or Earthy Substances, as Clays, Sands, Earths, Flinty Juices, etc. which have filled up, and been moulded in divers other Bodies...especially Shells" (1996, p. 161) The fossils, in other words, were literally metamorphoses of what they resembled. Just as under this hypothesis of metamorphosis, fossils could be regarded as "Monuments and Hieroglyphick Characters of preceding Transactions" on the earth's surface (1996, p. 304), so the *Metamorphoses* itself was no longer just a shell, but a shell whose outer form described the living flesh of ancient geological wisdom. Just as petrifying juices had "by long continuance and digestion" transformed organic bodies (1996, p. 204), Ovid had "digested" this geological wisdom "into fabulous stories" (1996, p. 277). Whereas others devoted their inquiries to the visible remains, Hooke emphasised that "the sensible part of the World is almost infinitely the least part of the Body thereof, and but, as it were, the Cuticula, or outward Filme of things" (1996, p. 220). Ovid's fables thus aligned themselves with fossils, with the "Spherical Shells" of the earth itself (1996, p. 215), and even with the entire world, as objects with a story to tell.

To some extent, then, Hooke's decision to tackle the *Metamorphoses* is motivated by his desire to exemplify a particular method – one which interprets and speculates rather than merely collects – rather than any burning conviction that the poem really contains scientific wisdom. This is a method whose difficulties and pitfalls Hooke emphasises over many pages, but whose benefits are clear, especially in the dismissal of the *lusus naturae* (non-)explanation of fossils. Hooke is presumably well aware of the judgement of Thomas Sprat, who wrote in his history of the Royal Society (a book to which Hooke contributed an essay himself) that "The Wit of the Fables and Religions of the Ancient World is well nigh consum'd...and it is now high time to dismiss them; especially seeing that they have this particular Imperfection, that they were only fictions at first." (1667, p. 414). But at the same time, he sees that in one area in particular, the fictions of fable still hold a certain power. That area is the one which lies beyond the catalogues of empirical evidence, the piles of rocks, the shells of the world: it is the area of hypothesis. Hooke included at the beginning of one lecture a particularly lucid explanation of the nature of scientific hypotheses. Science proceeds by combining two methods, the "synthetic", which induces hypotheses on the basis of experiments, and the "deductive", which deduces further hypotheses on the basis of those derived from experiment. Although the "deductive" method, which goes beyond what is strictly provable by experience, is frequently false, it is necessary to go beyond the evidence to give purpose and direction to future experiments: thus, it "proves of excellent use, even tho' it proceed by a false position" (1996, p. 227). Hooke fully expects that his own hypothesis may prove both useful and "false" in this manner: "I propound it only as a Hypothesis" (1996, p. 248), an awareness which won him the praise of Lyell: "none of these conjectures...are proposed dogmatically, but rather in the hope of promoting fresh inquiries and experiments" (1830–33, vol. 1, p. 33).

When notice is given to Hooke's efforts to maintain the distance between hypothesis and evidenced truth, the commitment to the geological interpretation of the *Metamorphoses* loses some of its appearance of naiveté. Just as Hooke stresses the tendentiousness of erecting

the "superstructure" of a hypothesis upon "Sap-rotten" timber (1996, p. 160), or "a rotten shell" (1996, p. 304), he underlines that his readings of Ovid are mere "Conjectures at the meaning of the Fables" (1996, p. 275). In fact, not only is Hooke's interpretation of Ovid hypothetical, but the interpretation is made possible only because Ovid himself has organised his own confused pile of material in accordance with his own conjectures. Just as fossils are shaped "according as the Matter chanced to be jumbled together, and to fill up the Mould of the Shell." (1996, p. 175), Ovid's poem is an edifice "made up and pieced of the Rubbish, Ruins and Fragments of those Antiquities which they in those times could rake together" (1996, p. 276-77). Hooke even takes the speech of Pythagoras to include a precise description of the method of analytic deduction, which Ovid employed in building a hypothesis from these fragments: "what nature denied to human eyes, he drunk in with the eyes of his heart" (1996, p. 228; *Met.* 1.63-4). In other words, if Hooke succeeds in drawing a geological system from the fossilised hieroglyphs of Ovid's fables, that system must not be thought of as the equivalent of the living creature hypothesised from the remnant of a shell. It is, in fact, itself just another shell: "the Hypothesis in Ovid" which Hooke extracts through allegorical interpretation is itself "only an Hypothesis in him" (1996, p. 285).[4] In recognising Ovid's poem for the "preposterous *Moles*" (ill-proportioned monument) it actually is, Hooke demonstrates that he has imbibed the contemporary critique of myth, as of hypothesis not based on experience, before setting it temporarily aside. Thus, although Hooke does delve into the scientific substance of Ovid's fables in a manner avoided by Lyell, the status of Ovid's scientific wisdom for each nonetheless has this in common: it is the shell of a tradition that has been lost. If one takes this interpretation of Hooke to its limit, and explains Hooke's readings of Ovid entirely as a demonstration of principle, an entirely hypothetical example of a certain method of hypothesising, then one arrives at something resembling the "mere rhetoric" interpretation for Hooke as well. At one point Hooke even

[4]Oldroyd (1972) recognises that Hooke's aim in the *Lectures and Discourses* is the promotion of hypothesising in general, as much as the promotion of a specific hypothesis, but he does not connect this to Hooke's reading of Ovid; indeed, he appears to regard the readings of Ovid as manifesting the opposite tendency, the collection of "true" facts (cf. 1991, p. 151).

suggests that his main aim in turning to Ovid is to "to take off the odium of Novelty" (1996, p. 275).

Since criticism of fiction in the name of science is, no matter how old exactly one takes science to be, as old as science itself,[5] there is probably no example of a scientific reading of Ovid for which the "mere rhetoric" interpretation does not suggest itself in some form. At the same time, the differences between Lyell and Hooke are notable. Lyell set out to criticise precisely the kind of speculation which Hooke deliberately establishes as his aim. Establishing the "principles" for a properly modern geology meant, according to Lyell, resisting any hypothesis which goes beyond what data has been collected. Lyell excluded from consideration all geological processes not currently in visible operation on the globe. In Hooke's case, while the equation of Ovid with mere rhetoric is suggested by his theorisation of hypothesis as "false position", it is nonetheless clear that Hooke is in some sense invested heavily in the "reality" of the hypothesis proposed, as well as the interpretations of Ovid which carry it forward, at least insofar as he desires Ovid's hypothesis to have a real impact in guiding experimental practice. The metamorphosis of Ovid's scientific wisdom from living tradition into, as it were, a rhetorical shell, is only partly accomplished. This intermediary state marks Hooke's difference from Lyell. And yet, Hooke also serves, for that very reason, as an instance in the morphology of that metamorphosis, one from which its continuity into the past and future can be inferred. What in Lyell has truly become "a rotten shell" can itself be traced back, through Hooke, to the same tradition, so that this shell not only allows us to make conjectures about an age in which myth and science were not so distinguished, but hints at processes, to use Lyell's phrase, "now in activity".

Not only does Lyell derive some concrete geological "facts" from Ovid,[6] but recent studies have indeed shown that Lyell's scientific work is as "literary" as any of the literary masterpieces of his age. Geology of any kind depended heavily on imaginative visualisation and

[5]See Lloyd (1979, pp. 10-58) for a discussion of this trope in the fifth century BC.

[6]Besides his discussion of the speech of Pythagoras, in which Lyell bullet-points sixteen distinct processes of change highlighted by Pythagoras, Lyell cites *Met.* 15.293 for evidence of the swallowing of Helice and Bura by sea (1830–33, vol. 1, p. 323).

storytelling in the construction of its hypotheses (O'Connor 2008). More than that, the nature of geology as a science was determined in part by the specific choice of the literary form in which these hypotheses were couched. In particular, as Buckland (2013) shows, Lyell opposed his conception of geological history as the result of eternal, unchanging geological laws to narratives of geological history with a linear "epic" progression, particularly those which indulged in what Lyell saw as ungrounded speculation about periods of catastrophic change occurring before or after the present period of observable regularity. Lyell's method of induction resisted the allure of "epic" hypotheses, refusing to postulate any causes of changes not presently in operation, and was instead fundamentally shaped by the form of "mock-epic" (cf. Secord 2015, pp. 138-172). It is not hard to see how Lyell's praise of Ovid might have fitted into this programme. Indeed, the literary form of the *Metamorphoses*, which occupies a third pole triangulated from epic and mock-epic, is perhaps an even better model for Lyell's somewhat ambivalent quasi-epic, anti-epic geological narrative than is the model of *The Battle of Frogs and Mice*.[7] There are, then, grounds for seeing Lyell's praise of Ovid as a way of directly addressing properly scientific concerns. Crucially, adopting an Ovidian model served a double purpose, simultaneously establishing a role for imagination in science, and, by implicitly co-opting Ovid's scepticism with regards to grand narratives, placing boundaries on where imagination could go. This is the same double effect visible in Hooke, though differently weighted. Hooke's self-consciousness regarding the problematic nature of hypotheses resembled Lyell's own, but, his overarching aims were opposite to those of Lyell: Hooke is building a superstructure to satisfy those fed up with mere collecting; Lyell is, for the most part, advocating more collecting and less interpretation. Ovid is able to model both objectives.

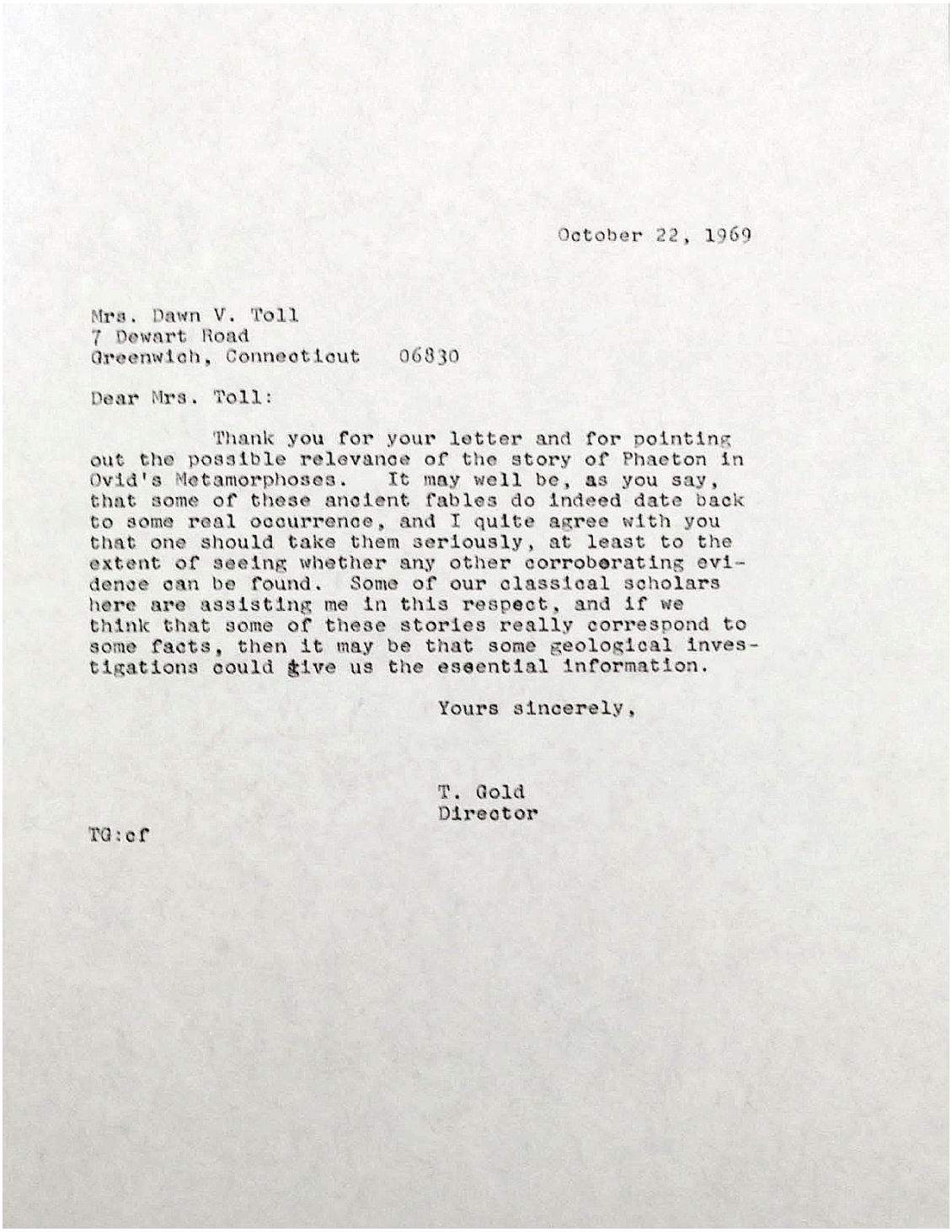
The different positions of Hooke and Lyell are adopted not because of any fundamentalist opinion on the value of hypothesising, but as opportunistic counter-reactions to a perceived

[7] "Ovid's poem is the representation of an alternative view [to both epic and mock-epic], which by the fact of its difference calls the other two into question" (Solodow 1988, p. 154). Some of the specific examples of mock-epic alluded to by Lyell are themselves significantly shaped by Ovid as a poetic model, for example, Pope's *Rape of the Lock*.

excess in the contrary direction among contemporary scientists. The progress of science depends on the continual interaction of data and hypothesis, empirical (synthetic) and deductive (analytic) methods. Thus, Hooke's speculations proved fruitful, even if extravagant, while Lyell's refusal to speculate at some point had to be abandoned, since for periods of its history the earth has in fact experienced conditions radically different from those of the present. Differing in their emphases, Hooke and Lyell articulate the eternal tension produced by the interaction data and hypothesis, and, we might add, tradition and innovation. This tension is the golden thread that unites the history of Ovid's scientific reception set out in the pages that follow. Just as the relative values of speculation and observation cannot remain fixed, but continually fluctuate around each other, so the habit of aligning scientific hypotheses with Ovid's poem – a habit I shall be referring to as the "Ovidianism" of science – acquires alternately positive and negative valences. The alternating reaction to Ovid does not simply mirror the alternation of observation and speculation, but both influences and responds to it. If Hooke's positive evaluation of Ovid emerges from his indulgence in speculation, this speculation is only validated by its retroactive confirmation by observation, which, having converted hypothesis into fact, tends to re-evaluate the dependence on Ovid in negative terms. Conversely, if Lyell's positive evaluation of Ovid emerges from his attachment to empirically established facts and his mockery of extravagant hypotheses as fictions, this attachment to Ovid comes to be re-evaluated in negative terms when conflicting facts come to light, or the value of speculation is reasserted.

0.2 Poetry and science in antiquity

The first area to which this dissertation stands to make a contribution is to our understanding of Ovid's poetic technique and, more generally, the debate surrounding the relationship of poetry to science in the Hellenistic age. It is widely acknowledged that the *Metamorphoses* is permeated with philosophical, and particularly Lucretian influence. The most obvious ex-



October 22, 1969

Mrs. Dawn V. Toll
7 Dewart Road
Greenwich, Connecticut 06830

Dear Mrs. Toll:

Thank you for your letter and for pointing out the possible relevance of the story of Phaeton in Ovid's Metamorphoses. It may well be, as you say, that some of these ancient fables do indeed date back to some real occurrence, and I quite agree with you that one should take them seriously, at least to the extent of seeing whether any other corroborating evidence can be found. Some of our classical scholars here are assisting me in this respect, and if we think that some of these stories really correspond to some facts, then it may be that some geological investigations could give us the essential information.

Yours sincerely,

T. Gold
Director

TG:cf

Figure 1: Letter from Thomas Gold, former Director of the Center for Radiophysics and Space Research at Cornell (Wellcome Trust Archive, London).

amples of this influence are the cosmogony and the closing speech by Pythagoras on "the nature of things" (*rerum natura*, *Met.* 15.6).[8] There is a division, therefore, between the poem's philosophical frame and mythical interior. But it is not a strict one. The tales of Deucalion and Pyrrha, Phaethon, the crow, Narcissus, Arethusa, Boreas, Aeacus, Lichas and Memnon, for example, all conspicuously adapt Lucretian elements.[9] Conversely, the philosophical frame is itself shaped by the sequence of mythological narratives of which it forms a continuous part. Ovid suggests a structure – a division between mythological narrative and philosophical explanation – which does not quite stand up. At the same time, the philosophical frame is not consistently Lucretian, or consistently any particular philosophy. The cosmogony, for example, draws variously upon Lucretius, the Stoic Posidonius, Plato, Anaxagoras and Empedocles. The closing speech is Lucretian in many ways, but also Empedoclean and Pythagorean, and, insofar as its main theme is the immortality of the soul, anti-Lucretian as well. When examined through the lens of the playful mythological narratives which dominate the poem, this lack of a consistently articulated philosophical position is usually interpreted as a lack of serious philosophical engagement *tout court*. The reception history that I unveil in this dissertation will, I hope, provoke the decline of this broad scholarly consensus. Although strange, it is nonetheless true that Ovid's credibility as a natural philosophical authority grew with the increasing importance of natural philosophy in the Middle Ages and actually reached its height during the Scientific Revolution. The popularity of Ovid among natural philosophers in this period cannot be regarded as a function of the reception context alone, but is a consequence of the poem's own philosophical work.

Before we examine the present state of the debate about the relation of science to poetry in antiquity, I must provide a quick note on my use of the terms "science", "natural philosophy" and "philosophy". Of the several different classifications of science produced in antiquity,

[8]For the generic affiliation of Pythagoras' speech with didactic, see Volk (2002, p. 66).

[9]See Myers (1994), Hardie (1988, 1994), Segal (2001) and Beasley (2012) for discussions of the Lucretianism of these episodes. Zingerle (1871, pp. 12-57) offers a fuller list of Lucretian imitations in the *Metamorphoses*.

Aristotle's was one of the most influential: he divided the sciences into the productive (such as medicine and bricklaying), the practical (ethics and politics) and the theoretical (science which aims at knowledge for its own sake, including "physics" or "natural philosophy" and branches of mathematics, such as harmonics and mechanics). I will be using "science" loosely to mean either the "art" (τέχνη) or "knowledge" (ἐπιστήμη) of any of these disciplines. For the most part, I will therefore be ignoring distinctions between productive sciences and theoretical philosophy, as well as between the different branches of theoretical philosophy. I do so because in the case of "natural philosophy", these boundaries are particularly fluid (e.g. Galen emphasises the importance of philosophy to medicine, just as Plato makes use of medicine in the *Timaeus*); and because when the question at issue is that of the relation of poetry to "science" in general, the different branches of science tend to be lumped together, both by poets who exploit this general opposition, and by modern critics. In the case of Ovid, the effect of juxtaposing a myth with Epicurean physics is similar, if not exactly identical, to the effect of juxtaposing a myth with a medical description, or an aetiology drawn from astrology or geography. The similarity derives, in part, from the use that the latter disciplines make of physics: one can hardly separate Aratus' astrological doctrines from his Stoic physics, for example.

The debate about the relation of science and poetry in antiquity involves two related but distinct questions: why did some natural philosophers write poetry? And why did some poets draw on, and sometimes systematically versify, contemporary natural science? These questions overlap to the extent that the identification of a thinker as primarily a poet or a philosopher is in some cases the very point at issue; for the moment, I will consider the Ovidian position, which is that of a poet who draws on natural science. In either case, the principal features of poetry whose relation to science is in question are its use of metre, its generic conventions, such as traditional forms and motifs, including the use of conventional myths and fictions, and its liberal use of metaphor and tropes. There are, very broadly, three ways in which ancient scientific or quasi-scientific poetry has been approached: (1) as a more

or less transparent vehicle for communicating scientific or philosophical knowledge (what I earlier called the "mere rhetoric" interpretation); (2) from the perspective that science and poetry in such cases are fundamentally intertwined; or (3) on the assumption that scientific poetry exploits science for purposes completely unrelated to science, but proper to poetry. These views need not, of course, be global judgements, since some may apply better to some poems than to others, but it is not uncommon to find general lessons about the relation of science and poetry drawn from analyses of specific poems.

A famous case of the first view, which takes poetry to be a transparent shell for the communication of scientific knowledge is Aristotle's judgement of Empedocles, whom Aristotle denied the title of poet (ποιητής), defining him instead as a natural philosopher (φυσιόλογος) who just happened to write in metre (*Poet.* 1447b). Aristotle's view of Empedocles is reflected by the occasional modern distinction between poetry proper and "versification", the latter term being reserved for philosophical poetry deemed dry and unpoetical, such as, according to Housman's notorious verdict, Manilius' "sums in verse" (Manilius 1903–30, vol. 2, p. xiii). Several recent volumes have gathered papers addressing the role of written communication in ancient science from a variety of perspectives.[10] In this context, in a manner redolent of Aristotle, scientific poetry tends to be treated as a "genre" of scientific writing selected for its perlocutionary advantages (that is, rhetorical or social) rather than strictly scientific advantages. Taub, for example, explains the decision of some Hellenistic mathematicians and the *Aetna* poet to write poetry in terms of a desire to identify with a certain cultural tradition (2009, p. 134; 2013, p. 357), or the desire to gain a wider audience (Taub 2008, p. 52). Pingoud similarly speaks of the *Aetna* poet's use of myth as a "concession that the poet makes to his reader" (2008, p. 218). Von Staden (2001) and Totelin (2012) have shown that Galen preferred poetry to prose as a medium for the transmission of pharmacological recipes because the metre made the prescriptions easier to remember and harder

[10]See *Writing Science* (Asper and Kanthak 2013), *Authorial Voices* (Taub and Doody 2009), and the special edition of *Studies in History and Philosophy of Science* entitled *Structures and Strategies in Ancient Greek and Roman Technical Writing* (Doody et al. 2012).

to corrupt (see e.g. *On the Composition of Drugs by Types* 5.10 (xiii, 820K), 2.2 (xiv, 115 K), *On Antidotes* 1.15 (xiv, 89 K) and 2.15 (xiv, 191 K)). Galen was, however, insistent on the obligation not to confuse poetry with such a well-defined scientific purpose with poetry that merely appeared to convey scientific knowledge (such as Homer and Hesiod; see Rosen 2013).

The second and no less popular viewpoint regards natural philosophy and poetry as – at least in certain cases – inextricably intertwined and mutually self-constituting. The geographer Strabo (Ovid's contemporary) evokes such a viewpoint when he quotes the Stoic dictum that "the wise man alone is a poet" (*Geog.* 1.2.3). The most widely accepted philosophical role for poetry is as a bridge between (prosaic) scientific or philosophical representation and the objects it represents. This bridging can take many forms, but perhaps the best known is Lucretius' exploitation of the letter-atom analogy, by which his verse comes to exemplify the very objects it describes. In general, poetry is thought better able than prose to 'animate' its representations, in a manner, as we shall see, closely associated with Ovidian metamorphosis. Lucretius' poetry enacts the way in which sense and beauty are raised upon and fall back into the meaningless atomic flow (see e.g. Holmes 2005 and my further discussion in Chapter 1). Manilius deploys tropes in such a way as to enact specific astrological relationships, and animates the reciprocity of microcosm and macrocosm through this very correspondence of verse and universe (Hübner 2011).[11] In the special case of mathematics, the animating or bridging function often fulfilled by poetry is inherent to the discipline – the representation, in a sense, already is the content. Thus, Netz (2009) has shown that the kinds of mathematical (or physico-mathematical) questions pursued in both poems and prose treatises, and the manner in which they were pursued, were fundamentally conditioned by contemporary poetic style. Perhaps most importantly, poetry offered rich resources, if problematic ones, for bridging between abstract philosophical representations of divinity and the manifestation of divinity in nature. Empedocles, for example, uses mythic plots to suggest the mutual im-

[11]Cf. Gauthier (2011, pp. 22-86) on the relationship between mathematics and metre in Manilius and Wilson (2015, pp. 56-114) on the relationship between poetic sign and star-sign in Aratus.

plication of elemental transformation and transformation in the psychic sphere (Primavesi 2005; Primavesi 2008, esp. p. 268).[12] Lehoux (2011) sees Manilius' use of myths as motived by the need to give concrete expression to the doctrine of the providential design of the universe.

The third view, that even scientific poetry has fundamentally different aims to science itself, is associated with, among others, the name of Eratosthenes, the Librarian of Alexandria, who wrote that poets who deal with scientific topics (Aratus's *Phaenomena* being the central example in Greek) "aim at entertainment [ψυχαγωγία], not instruction [διδασκαλία]" (cited by Strabo *Geog.* 1.2.3).[13] Such a judgement has the opposite effect to Aristotle's, encouraging us to deny the title of natural philosopher to scientific poets or at least to distinguish strongly between an individual's output in each field (Eratosthenes was active in both). Eratosthenes' view is also one often echoed today, for example by Schuler (1983, p. 11), Fakas (2001), Cusset (2006, p. 10), Overduin (2009, p. 138) and Volk (2009, p. 181), who compares didactic poems to "our coffee table books"; Payne (2014) goes one step farther and argues that Hellenistic didactic springs from a sense of the impossibility, for a layman, of accessing the understanding of an expert in a particular subject: instead, didactic merely simulates what it would be like to know if such knowledge were possible. Analyses of the role of allusions to contemporary science in Callimachus and Apollonius have likewise suggested that they subordinate science to strictly poetic ends. Zanker (1987) regards the appeal to science as part of a broader strategy of representing mythic subjects in a "realist" mode, devised to connect modern Alexandria to its ancient Greek roots: science is exploited to "confer immediacy and credibility on poetic subject-matter, in particular upon myth, or to define the distance between myth and the present" (1987, p. 113). Asper (2009) has recently elaborated Zanker's thesis, providing some examples from Callimachus in which sci-

[12]Note that this view contrasts with Althoff (2012), who argues that Empedocles switches from a prose-like style for physical passages to a Homeric style for mythical passages, which suggests a deliberate attempt to keep the divine and physical aspects separate; on the other hand, one must make sense of the fact that they are nonetheless part of the same poem.

[13]Eratosthenes' position was in fact probably more nuanced than Strabo makes out (Netz 2009, pp. 172-3).

entific rationalisation is deliberately inverted by the substitution of a mythological account. Sometimes the intervention of myth is taken to mark the moment at which a poet loses faith in the ability of science to meaningfully represent the world (so Glauthier 2011, pp. 87-132 on the *Aetna*).

As I will show in Chapter 1, the breaking of the boundaries between these different positions – the dramatising of the movement of one into the other – is the core feature of Ovid's contribution to these debates. Indeed, the categorisation I have just provided, while it has a heuristic validity, should not be taken absolutely, since there is a considerable overlap and a dynamic interplay between all these perspectives. So, for example, if the rhetorical wrapping of science appears to effect the way science is carried out a fundamental level, the first perspective may come to resemble the second. Conversely, if the poeticisation of science implied by the second perspective is deemed more advantageous for science than poetry, then the second will come to resemble the first. Coxhead (2012) explains the quotation of poetry in a treatise on mechanics by appeal to both the first and the second: it bestows authority and thus aims at "persuasion", but it also provides a model for scientific representation: like poetry, as Aristotle defined it, mechanics is "mimetic" of universal truths. Often, however, the second perspective is predicated on a tacit distinction between primitive science, superstition or magic (inherently poetical or mythological) and science proper. For example, Hübner's reading of Manilius sets out from the assumption that "poetry and astrology are both essentially metaphorical" (2011, p. 142). Where the adoption of the second perspective is predicated on such a distinction, then it comes to resemble the third.

Ovid is usually read by contemporary scholars from the third perspective, as drawing on science and philosophy either simply to make fun of it, or to make a literary, or political, rather than a natural philosophical point.[14] Such readings often draw analogies between

[14]The following remarks refer to the *Metamorphoses*: Ovid "does not have a philosophical mind" (Lafaye 1904, p. 222); his is "Philosophy for effect – not based on convictions" (DeLacy 1947, p. 153); "Ovid did not have a philosophical temperament" (Stephens 1957, p. 46); he was "content with random snatches of philosophy as they took his fancy" (Currie 1964, p. 152); the poem "contains no positive philosophical doctrine which could provide some moral or spiritual justification" (Segal 1969, p. 292); "his purpose is to expose philosophy as inferior to myth" (McKim 1984, p. 97); "no poet can be imagined to whom philosophy

Ovid's treatment of Lucretius and Vergil's. Following Hardie, it has been usual to read Vergil as subordinating Lucretian physics to "a dominating mythical construction of vast forces controlled (or not controlled) by a superior providence" (Hardie 1986, p. 95). Hardie's description of this process as "remythologisation" is usually taken to imply an antagonistic stance towards philosophy *per se*. This view is, however, difficult to reconcile with the long history of reading Ovid scientifically, which invites the adoption of the first or the third perspectives. Barkan explains the scientific interpretation of Ovid as a way of stripping away the frivolous aspects of his poetry, so as to give it purpose within the context of medieval Christianity (1986, esp. pp. 117-125, 171-206): thus, Ovid's serious engagement with philosophy allowed his mythical aspects to be dismissed as mere rhetoric, as in the first point of view. Usually, however, in studies of reception, the third perspective is transformed into the second by equating natural philosophy which takes Ovid seriously with a domain of myth and imagination distinguished from modern science, itself defined in opposition to such "pre-modern" forms of natural philosophy (e.g. Doran 1964; Findlen 1990). This explanation for Ovid's scientific reception is typically based on the Foucauldian narrative of a transition from an Age of Resemblances, in which the confusion of identity and resemblance produces a "play of metamorphoses" (Foucault 2005, p. 5), to a Classical Age (roughly post-1600), when the determination of identity becomes subject to the systematic exclusion of differences, and representation takes the place of resemblance.[15] Note that the explanations

was more uncongenial than to Ovid" (Solodow 1988, p. 215); "the cosmogony is not serious philosophy" (Feeney 1991, p. 189); "commentators agree in their observation that Ovid had no «philosophical mind»" (Hoefmans 1994, p. 148, n. 44); the "eclectic natural-philosophical framework of the poem does not encode a philosophical justification for or explanation of the metamorphosis theme" (Myers 1994, p. 6); "philosophical coloring" is "subordinated" to poetic ends (Galinsky 1998, p. 327); "Ovid is no philosopher" (Hardie 2002, p. 9); he has "a deliberately unphilosophical approach to philosophy" (Beagon 2009); "Ovid is anything but a philosophical poet" (Volk 2011, p. 65); "Ovid's pseudo-scientific stance mocks the delusion that attentive observation of metamorphosis will serve to explain it" (von Glinski 2012, p. 39). In the case of the *Fasti*, although the old view that the poem is littered with astronomical errors is now convincingly refuted (Lewis 2014), Ovid's engagement with philosophy is regarded in a similar light. So, for example, Gee sees Ovid's marshalling of the "fragmentation and mutation" of myth against Aratus' Stoic "uniformity" as a rejection of Augustan imperialism (2013, p. 173), and Ham's (2013) and Garani's (2013, esp. p. 258) readings of the Empedoclean intertextuality of the *Fasti* emphasise the political meaning of the alternation of Love and Strife.

[15]Cf. Perrot (1979, p. 16): "Once metamorphosis triumphed over man, but now man triumphs over metamorphosis, putting it to his service."

of Barkan and Findlen involve diametrically opposed understandings of the relation of premodern natural philosophy to myth: in the first, natural philosophy furnishes a limit that excludes what remains mythical in Ovidian metamorphosis, while in the second, natural philosophy is expanded so as to include mythical transformations itself.

Ovid's unwillingness to defend a particular philosophical position is paradoxically essential to his popularity in the context of natural science. If it is true that Ovid "remythologises" natural philosophy, his technique is quite different to Vergil's. In Vergil, as Hardie indicates with the parenthesis "(or not controlled)", the process of remythologisation founders on certain material facts; but in Ovid, it is systematically undone, juxtaposed relentlessly with various forms of "demythologisation", whose keynote is the ironic distance from which the poems' fictions are narrated.[16] In other words, while there does not seem to be any particular philosophical representation that one could say the *Metamorphoses* is attempting to animate, there is also no particular mythical representation that replaces it. There is nothing to replace philosophy except philosophy itself, which although it ceaselessly alternates with myth, ceaselessly returns. The central argument of Chapter 1 is that this alternation is powered by the manipulation of different philosophical viewpoints, especially Platonism and Epicureanism; these different viewpoints shift the perspective from which the relation of poetry to science is viewed in certain situations. For example, if a particular myth is given a philosophical purpose in both Epicureanism and Platonism, but those purposes are opposed, then the myth becomes simultaneously essential to the articulation of each philosophy, and the prime symptom of one philosophy's mythical status from the perspective of the other. In mobilising conflicting philosophical perspectives, Ovid thus accomplishes two things: he anticipates the judgement that poetry is unsuitable for scientific expression, or can be defended as scientific only by distinguishing a "poetic" science from science proper; but he simultaneously inverts the polarity of the distinction by remythologising any "proper

[16]The Aetna poet is particularly vociferous in its criticisms of mythical explanations of vulcanism, debunking several myths in the first hundred lines, but going on to recount his own *miranda fabula* (line 603). Manilius, too, criticises myths (*Astr.* 2.37) before going on to make extensive use of them in later books. The case of Lucretius will be discussed in more detail in Chapter 1.

science" that attempts to distinguish itself in this way, while presenting science and poetry as fundamentally intertwined.

0.3 Finding "heuristic fiction"

The second, related, contribution of my dissertation will be to demonstrate the centrality of the *Metamorphoses* to the formation of historical debates about the role of fiction in science. In turn, this history will shed new light on the resurgence of these debates in current philosophy of science, and the associated historiographical question of how to characterise the epistemological transformation that took place during the Scientific Revolution. The overlap of remythologisation and demythologisation in the *Metamorphoses* means that poetry's ability to bridge between scientific representation and reality – to concretise what it represents – takes on a double aspect responding to the familiar duality of Pygmalion and Narcissus. On the one hand, explaining the formation of the object in the reader's hands, the scientific representation "becomes useful with use" (*fit utilis usu*, *Met.* 10.286): it comes to life beneath the hand of the artist. On the other hand, since that object has been artificially created and is fictional, mythical, or metaphorical, it may deceive the reader with its realism more than it guides him or her in the understanding of reality. The interplay of these two responses is the leitmotif of Ovid's scientific reception. There is no moment, whether in the thirteenth or nineteenth centuries, in which readers do not mark the tension between the poetic and the philosophical aspects of the poem, reading it for facts, while rejecting its fictions, or reading it for fictions, while rejecting its facts, or both. Consequently, as the revolutions in knowledge from the thirteenth to the seventeenth centuries both challenged traditional boundaries between fiction and fact, and made some account of their distinction all the more pressing, the *Metamorphoses* became a site – perhaps *the* site – for thinking about the role of fictions in scientific investigation, both before and after a role had been articulated explicitly in these terms.

The most obvious role for the *Metamorphoses* in a scientific context is entirely negative – it plays a foil to reality, helping to define modern science by the exclusion both of fiction and of knowledge derived from books rather than nature. From this perspective, we can challenge the Foucauldian notion that pre-modern science was characterised by the blending of fact and fiction (Foucault 2005, pp. 43-44), whereas modern science depended on distinguishing strongly between them, by demonstrating the antiquity of this negative role. As it happens, one of Foucault's main examples for the supposed confusion of fable and philosophy – the Bolognese naturalist Ulisse Aldrovandi (1522–1605) – gives a particularly clear example of how attention to the reception of Ovid challenges the Foucauldian narrative. Aldrovandi's history of monsters contains a section entitled "Metamorphoses" articulated into three parts covering metamorphoses fabulous, natural and "above the order of nature", with the fabulous metamorphoses taken entirely from Ovid. Whereas the inclusion of fabulous metamorphoses in a work of natural history initially appears as a category confusion, on closer examination, Ovid is adopted to highlight the opposition between fable and nature: Aldrovandi explains that he will treat the fabulous metamorphoses first "so that, once we have understood these, the serious and true metamorphoses might shine out the more" (1642, p. 184). Thus, Ovid's fictionality, emphasised within the poem by the constant demythologisation of Narcissan delusions, has rendered him the ideal foil against which a realm of identities can be seen to emerge. Critics of Foucault have pointed out that, indeed, the desire to limit the play of resemblances is often voiced in the Age of Resemblances and of course derives from ancient principles (Maclean 1998, citing Vickers 1992).[17]

As in many cases, however, the reception of the *Metamorphoses* in Aldrovandi turns out to be double-edged, replaying the tensions between demythologisation and remythologisation

[17]Foucault himself notes tensions within the order of resemblances that anticipate the emerging order of identities. The famous systems of correspondences between stones, plants, animals and stars is, if anything, primarily hierarchical – a form of representation, rather than resemblance, designed to explain the manner in which divine ideas relate, from a certain distance, to matter (cf. 2005, pp. 22, 34). Thus, when Foucault revisited the concept of resemblance in *Ceci n'est pas une pipe* (1983 p. 44), he characterised it, in a Platonic vein, as resemblance of a model *in opposition* to the free reign of similarity that the concept seems to express in the *Les mots et les choses*.

in the poem itself. Aldrovandi's very insistence on a domain of natural transformations constructed in opposition to those of fable turns out from another perspective to reinforce the category confusion highlighted by Foucault. The only kinds of natural metamorphosis Aldrovandi mentions are changes of sex and transformations effected by demons, conceived of as part of nature.[18] Demonic transformations, of course, are transformations which from our perspective are just as mythical as those derived directly from Ovid. Moreover, Aldrovandi had in fact earlier cited Ovid's description of *semidei* – fauns, nymphs and satyrs – as evidence that the devil could be found among the pagans "transforming himself into many shapes" (Aldrovandi 1642, p. 26). In this respect, therefore, the scientific reception of Ovid is associated with precisely the failure to distinguish fact and fiction described by Foucault. Still, that this category confusion is present in Aldrovandi does not by itself confirm Foucault's narrative, since we can still point to the continued mining of Ovid for erroneous natural philosophical data into the nineteenth century. Moreover, the paradox of Ovid's reception in Aldrovandi is not just that the exclusion of Ovid's fables can coincide with the mistaking of his fables for reality, but that it can be precisely the strict division between these domains which leads to error, as phenomena whose nature is poorly understood are too hastily placed on one side or the other. The exclusion of the fictional in this case reinforces the inclusion of a false fact.

[18]Some other examples of naturalists who weave fables from the *Metamorphoses* into their natural histories are Edward Topsell (c. 1572–1625) (1967, pp. 14, 493, 578, 674, 790-791) and, much more systematically, Pierre Belon (1517–1564; Belon [1555] 2011 *passim*, over 30 citations: see index; and 1555, pp. 78, 152, 156, 201, 220, 286, 330, 338, 378). The pattern of employing Ovid as a foil while simultaneously adopting a rather credulous attitude to certain aspects of his poem is paralleled by Pliny's treatment of myths. We encounter many dismissive references to fictions that are instanced in the *Metamorphoses* in the *Natural History*: the marriages, physical features, and especially the crimes of the gods (ii, 5.17), the palace of Antaeus and the grove of the Hesperides (v, 1.4), metempsychosis (vii, 52.174-5), werewolves (viii, 34.81-2), the Pegasus bird and sirens (x, 70.136), Actaeon and Cippus (xi, 44.123), a tree underneath which Jupiter lay with Europa (xii, 5.12), the origin of the Narcissus (xxi, 75.128), the stories of Prometheus and Midas' ring (xxxiii, 4.8), and, above all, the mythical origin of amber (xxxvii, 11.30-12.51). Meanwhile, Pliny is of course famous for a willingness to accept fantastical stories and we do indeed find a number of legends referred to by Ovid that are mentioned by Pliny without being discredited or specifically affirmed: the hyacinth (xxi, 38.66), the birds of Diomedes (x, 61.127), the tree to which Argus tethered Io (xvi, 89.239), the powers of Medea and Circe (xxv, 5.10), the origin of aconite in the spittle of Cerberus (xxvii, 1.4), Apollo's love for the laurel (xv, 40.134-5). Pliny seems to assume the actual existence of Fauns, Satyrs, Tritons and Nereids. He mentions the exhibition of the monster that attacked Andromeda made by Marcus Scaurus (ix 5.11) and asserts the existence of tribes that have degenerated into animals (v, 8.45-46).

In recognition of the problem that a hostility towards fiction can be just as detrimental to science as its confusion with reality, there exists a narrative of the scientific revolution which, contrasting with that of Foucault, places fiction at the heart of the modern scientific method. In the historiography of astronomy in particular, the notion took hold that early modern science was born when fictions began to be taken more seriously than they had been taken previously. The gap between the Copernican hypothesis and everyday experience was so vast that the difficulty of verifying the hypothesis on strictly empirical grounds (given the range of different models that accurately predicted the planets' apparent motions) was felt particularly acutely; Copernicans thus displayed a particular interest in fictions (such as Kepler's *Somnium*), in which perspectives other than those available on earth could be mobilised to explore the implications of their hypotheses. At the same time, however, they interpreted these fictions with a "realist" attitude, devising new instruments, like the telescope, to test them.[19] When the importance of fictions for scientific progress are emphasised in this manner, then the *Metamorphoses* can begin to play a more positive role in narratives of the Scientific Revolution. In Chapter 3, we shall encounter many cases of Ovid being read, as Aldrovandi reads him, as a source on demonology. But I will argue that one reason Ovid is adopted in such cases was in fact to convey the "fictional" status of many phenomena attributed to demons, insofar these were interpreted as mere deceptions, whose underlying (natural) mechanism had yet to be exposed, but had been earmarked for further investigation. The apparent contradiction between Aldrovandi's understanding that the *Metamorphoses* are fabulous, and his citation of them for this fact, can be, to some extent, resolved, if we believe that he too wishes to emphasise the fictional status of demonic illusion, and the possibility of penetrating it to reveal a naturalistic explanation for the phenomena.

[19]The notion that Copernicans differed from previous astronomers in interpreting fictional models as real derives from Duhem (1908) and Koyré (1953), though others have located a similar realism in Ptolemy (Lloyd 1978; Musgrave 1999). For a broad investigation of the poetics of early modern astronomy, see Hallyn (1990; cf. 2004); Lambert (2002) and Aït-Touati (2011) focus on fictionality in particular; Reeves (1999) explores the gender-politics of the astronomers' dependence on fictions.

The dependence of science on fictions does not in itself explain the positive reception of the *Metamorphoses*, however. Even the most hardboiled of scientific realists will agree that science makes use of "heuristic fictions" in some form, but exactly what this dependence entails for the relation of scientific to literary fictions remains the subject of considerable dispute. The term "heuristic fiction" originally derives from Kant, who had suggested that the truths of the noumenal sphere (God, soul, morality, freedom, etc.) do not really exist in nature, but nonetheless operate there as "heuristic fictions". The term did not achieve wide recognition, however, until Hans Vaihinger drew attention to it in his *Philosophy of 'As If'* (1911) and emphasised the role that ideational constructs, such as point-particles, played in science.[20] Though Vaihinger regarded the "heuristic fiction" and the scientific hypothesis as interdependent, he distinguished strongly between them: a "hypothesis" was a supposition about reality made in accordance with a heuristic fiction acting as a regulative ideal; the hypothesis "discovers", the fiction "invents" (Vaihinger 1935, esp. pp., 39-42, 271-287). Hypotheses were therefore verifiable, and could be converted into facts, whereas heuristic fictions were not. Poetic fictions, as having no bearing upon reality, were even farther removed from truths of nature.[21] The notion that science depends on heuristic fictions is therefore not necessarily inconsistent with a Foucauldian narrative emphasising the development of a distinction between fiction and fact. In the particular case of Aldrovandi, the notion that he adopts demonic metamorphoses as deliberate fictions does not persuade. Rather, we seem to be dealing with a genuine confusion of fact and fiction, which a proper understanding of the distinctions between hypothesis, heuristic fiction, and literary fiction might have avoided.

On the other hand, in his positivist belief in the verifiability of hypotheses, Vaihinger differs from many philosophers who tend towards a more severe erosion of the distinction be-

[20]For a balanced assessment of Vaihinger, see Fine (1993).

[21]Miller (1997) tries to strengthen distinctions between literary fictions and Vaihinger's heuristic fictions; his argument relies on literary fictions not being "pragmatically" oriented towards hypotheses, i.e. specific goals. The problem with a text like the *Metamorphoses*, however is that it alternates between pragmatic attitude and poetic revelry.

tween realistic hypothesis and literary fiction. These philosophers are grouped broadly under the label of "anti-realist", including "conventionalists", "constructivists" and "instrumentalists". One of the most important figures for (but not necessarily "in") this tradition is Karl Popper, who made the troubling claim that hypotheses are never verifiable, but falsifiable at best, and then only relative to certain untested presuppositions. The distinction between fiction and science was thus a function of how that fiction is received and discussed: "what we call science is differentiated from the older myths not by being something distinct from myth but by being accompanied by a second-order tradition – that of critically discussing the myth" (Popper 2002 [1949], pp. 170-172). This sort of view cuts across many divides in the philosophy of science. Compare, for example, the claim of Popper's critic, Willard Quine that "physical objects and the gods differ only in degree, not in kind. Both sorts of entities enter our conception only as cultural posits" (Quine 1951, p. 41). Other influential philosophers who have been associated with anti-realism include Feyerabend, who frequently describes scientific theories as "myths" (e.g. 1993, pp. 21, 33, n. 1, p. 164, p. 256), French post-structuralists such as Barthes, Derrida and Lacan, and, more recently, the representatives of "science studies", such as Shapin and Latour, who have greatly influenced the latest wave of scholarship at the intersection of literary criticism and the history of science.[22]

If emphasising the role of "heuristic fiction" in scientific method serves to explain how science puts itself in a position to make discoveries that fundamentally change pre-existing knowledge, then the position of anti-realism serves to explain the seeming endlessness of such progress, since it assumes that there is no ultimate fact whose appropriation could put an end to such changes.[23] By radicalising the fictionality of science anti-realism counters the natural tendency to assume that hypotheses which have passed from the domain of fiction to fact have reached their final destination. This emphasis on the continued revision of existing knowledge is one reason that anti-realists often claim that they are the true

[22]For further examples of the equation of anti-realism with the view that scientific theories are myths or fictions, see, for example, Zhengkun (2013) and Amrine (2012, p. x)

[23]The demise of scientifically established facts is itself a process that can be studied and quantified: facts in different fields have been shown to have different "half-lives" (Arbesman 2013).

realists – "realistic realists" as Latour puts it (1999, p. 15).[24] Like "realists", they position themselves against "myth", arguing that obscuring the contingency of scientific facts makes science itself "mythical" (Latour 1988, pp. 116, 121; e.g. MacCormac 1976; Serres 1995, p. 128, 163). On the other hand, Latour also speaks of "abolish[ing] the distinction between science and fiction" (Latour 1988, p. 166). *We Have Never Been Modern* is the title of his most famous book. Even as he objects to "myth", he sees the growth of modern science as the proliferation of hybrids, quasi-objects, or "morphisms", fusions of fact and fiction (cf. Clarke 2008, pp. 47-54; 1993 p. 137), or what he elsewhere describes – using the very term Foucault used to describe the Age of Resemblances – as "metamorphoses" (1993 p. 81). From a strong anti-realist perspective, therefore, positive receptions of the *Metamorphoses* in science are more easily explicable, because they can be at once entirely fictional and entirely factual. Spiller writes in her recent "Latourian" reading of early modern science that:

> Science maintains strong affiliations with poetic fictions because, in ways that are rarely acknowledged, its practice emerges out of a central understanding of art as a basis for producing knowledge. A belief in the made rather than the found character of early modern knowledge unites poets and natural scientists.
>
> (Spiller 2006, p. 2)

Marchitello (2011) goes even farther in arguing that early modern literature and poetry actually *does* science in a sense indistinguishable from scientific works. Literary fictions are just another kind of "literary technology", in the sense Shapin applied to the writing of Boyle (Shapin 1984).[25] Thus we might claim that Aldrovandi does indeed mistake some facts for fictions, but that this mistake reflects, or even constructs, the nature of the "reality" of his particular era.

[24]Sismondo (1996) attempts to show the common ground of realism and anti-realism. Norris (1997, pp. 117-155; 2000, pp. 75-102) presents Derrida's philosophy of science as anti- "anti-realist".

[25]See also Fletcher (2009). The nineteenth century has been the focus of similar reassessments, perhaps because it is the other contender (along with the seventeenth) for being the period in which a properly "modern" scientific method is developed. See Serres (1975), Thiher (2001), Jenkins (2007), Buckland (2013), Marsden (2015), Beer (1999; 2000) and Levine (1988; 2008; 2010; 2011). Binoche (2013), Neubauer (2012) and Moser (2012) give analyses of scientific fictionality in in the eighteenth century.

While Latour's attack on the distinction between fiction and hypothesis does important work, there is no doubting that it is somewhat exaggerated, and that we will often want some way of distinguishing fictions of the Pygmalion type, which build facts, from fictions of the Narcissan type, which lead nowhere. As the ridicule of anti-realists during the "Science Wars" of the 1990s made painfully clear, if fiction is to be given a place in science in any way that does not appear "facile" (Segal 1996, p. 82), careful attention must be paid to tensions between the literary fiction and the realistic hypothesis. Theories of the Scientific Revolution that give literary fictions a role to play must take account of common-sense distinctions upon which the validity of scientific knowledge is often thought to depend.[26] Otherwise, they risk obscuring the important differences between the "literary technologies" of science, and poems like the *Metamorphoses*; and they risk obscuring the historiographical narrative they were initially developed to defend; for example, they necessitate a new explanation of the observable transformation, whereby the incorporation of the *Metamorphoses* into scientific discourse becomes less and less common. In other words, due weight must be given to the fallacious aspect of Aldrovandi's incorporation of the *Metamorphoses* into natural science. Here, locating Latour's use of the term "metamorphoses" in the long history of using Ovid to think about these problems helps to make sense both of his own use of the term, and of the objections which have been levelled against him.

All too often, Ovid's metamorphoses reveal the gap between humanity and nature, more than any Latourian hybridity. By playing the Pygmalion effect against the Narcissan delusion, remythologisation against demythologisation, the *Metamorphoses* simultaneously emphasises the "constructed" character of scientific knowledge while practicing a "realist" critique of the fictional. Therefore, if we connect Latour's use of the term metamorphosis to these Ovidian roots we see that – like most of the receptions of the *Metamorphoses* we shall encounter – it can be viewed from both perspectives. That is to say, there is indeed a sense in which modern science inherits the *Metamorphoses*' confusion of fact and fiction, achieving

[26]For a more recent defence of the "whig" history of science, see Weinberg (2015).

its results through a Pygmalion effect. On the other hand, Ovid, and the history of Ovid's interpretation, show us that the domain of the "real", whether or not it is identified with fiction, is created by the exclusion of other fictions. If anti-realists demythologise one form of mysticism in science – the forgetting that the origin of hypotheses in fictions gives them an ineliminable contingency – then Ovid demythologises another dynamically related to the first: that is, the forgetting that not all fictions are facts. Likewise, in the history of Ovidian interpretation, the shifting boundary between fact and fiction which is the effect of scientific progress means that any synthesis of the fictionality and factuality of the *Metamorphoses* will itself be counteracted by a tendency to assign Ovid to one half of the dichotomy, which enables competing scientific theories to mark their difference from those of the past. So while Hooke, for example, mobilises the *Metamorphoses* in a way that treats it as both fact and fiction (it contains a probably "false" hypothesis, but one that is nonetheless worthy to be acted on), distinguishing his own interpretation from, say, certain mystical interpretations of the fables, he also manifests a much greater commitment to Ovid's factuality than proved tolerable in a later age.

In other words, although anti-realism can be seen as "realistic", and vice-versa, the ceaseless adoption and rejection of scientific hypotheses necessitates an alternation between these perspectives which renders any particular synthesis unstable. The reception of Ovid in science both responds to and influences this alternating perspective, and so provides at one moment a valuable "realist" counterpoint to the Latourian tendency to homogenise fact and fiction; at another moment, a valuable "anti-realist" modification of the division between fiction and hypothesis insisted on by Vaihinger and implicit in the Foucauldian narrative.

Significantly, Vaihinger's key example of a heuristic fiction was Goethe's concept of "metamorphosis" (the idea that organic development occurs through the modification of previously existing organs), which Goethe himself at once connected to and separated from Ovid.[27]

[27]Engelstein (2009, pp. 23-60) has shown that although Goethe was understandably disappointed when others connected his scientific idea of metamorphosis to Ovid's *Metamorphoses*, he nonetheless used Ovidian myths to represent aspects of the scientific idea in his novel *Elective Affinities*.

Vaihinger argued that "Goethe's fiction prepared the way heuristically for the Darwinian hypothesis. Whereas Darwinism asserts the actual existence of such animal archetypes, Goethe definitely denied it" (Vaihinger 1935, p. 86). It is no coincidence that metamorphosis furnishes the example of a concept which has travelled the course from myth to heuristic fiction, to hypothesis, and then to fact, since the tension between fictionality and objectivity is one of the key aspect's of its original formulation in Ovid and, as we shall see, had been repeatedly exploited in situations where the fictionality of a hypothesis was in question. In taking this example, Vaihinger is probably responding to Darwin's own claims that where previous naturalists "used such language only in a metaphorical sense", it can now "be used literally" (Darwin 1996, pp. 322-3). Yet in Darwin too, where "metamorphosis" is presented as fact, the continued use of the term underlines the debt of his scientific work to literary form (Beer 2000, pp. 1-8), and suggests a possible anti-realist interpretation of his discovery. While no scientist will dispute the reality of evolution itself, the factuality of specific connotations of Darwin's invocation of "metamorphosis" (for example, the notion that inherited variation is entirely random) is indeed subject to revision.

The history of Ovid's scientific reception thus clarifies an important point that is only implicit in Vaihinger's account of the fiction-hypothesis distinction: that distinction is an idealisation – a heuristic fiction itself. That does not mean it can be abandoned, as anti-realists tend to do; but nor can it be reified. On the one hand, the task of science is to either transform heuristic fictions into facts, or else to discard them if this turns out not to be possible: this is its Pygmalion effect; on the other hand, as Vaihinger himself underlines, fiction and hypothesis are easily confused, so that fiction often slips into hypothesis, then dogma, without any basis in reality (1935, p. 127). Frequently, therefore, what first appears as a Pygmalion effect emerges later as a Narcissus delusion. We shall observe this phenomenon time and again in the reception of Ovid's *Metamorphoses*; the adoption of the poem as a fiction that guides in the hypothesising of some fact turns out, from a different perspective, to entail the adoption of a fact that is simply a fiction. Gradually, as this pattern repeats

over the centuries, it becomes more and more self-conscious. We saw in the allegory of the shell, for example, that Hooke already adopts Ovid not just to extract literal information, but also to theorise the necessity of progressing by "false position". The decision to incorporate, or reject, some aspect of the *Metamorphoses* from natural philosophy thus comes to reflect not just disputes about particular facts, but a general debate about the extent to which fictions lead or mislead scientific investigation. Indeed, it is possible that the explicit form of this debate as a debate about the relation of "myth" (Popper) or "the gods" (Quine) to science emerges in part precisely because of the frequent habit of adopting Ovid's fictions, or his philosophical rejection of fictions, in a scientific context. Thus, by the time of the nineteenth century, when poetic allegory has been (apart from a few shells) banished from natural science, the *Metamorphoses* remains relevant to discussions of scientific fiction in the abstract.

0.4 Waypoints

After unpacking the relationship between philosophy and myth in the *Metamorphoses*, we begin the story of Ovid's scientific reception in the final section of Chapter 1, *Metamorphoses of Philosophy*, by examining the reception of the *Metamorphoses* in the near contemporary work devoted to meteorology, Seneca's *Natural Questions*. Seneca displays a particularly ambivalent attitude towards poetic allegory, drawing on the *Metamorphoses* for its representation of the divine, for its representation of the chaotic aspect of nature, and for the way the poem sets the one against the other. I analyse this ambivalence in terms of tensions within Stoicism between divine transcendence and immanence (naturalism), or metaphysical monism and theological pluralism. From here, we pass in Chapter 2 to the beginnings of modern natural philosophy, instanced by the rise of astrology in the twelfth and thirteenth centuries. Chapters 3, 4 and 5 examine the use of Ovid in natural magic, demonology and alchemy, genres of natural philosophy which, like astrology, represent at once a major

break with earlier medieval theology and, from a modern perspective, classic examples of disciplines which appear "pre-modern" in their failure to separate imagination from reality. Finally, Chapter 6 turns to the mechanical philosophy so closely associated with the "Scientific Revolution" narrowly defined.

In passing from astrology, to natural magic, to alchemy, ending with the materialistic reductionism of the mechanical philosophy, I trace the gradual downwards movement of the epistemological membrane dividing the domain of transcendent, selfsame truth from the unpredictable flux of nature: this membrane shrinks from the floor of heaven, to the terrestrial atmosphere, abode of demons and sprites, to the material constituents of the visible bodies decomposed within the alembic, and, finally, to the knowing subject itself, the transcendent *cogito* of Descartes, whose withdrawal from the world marks the point at which the entire world (with the exception of the psyche itself) opens itself to scientific investigation. As this boundary shifts, we observe the rise and fall of different theories of change, forms of which, although they conflict, can all be found in the *Metamorphoses*: Platonic animism and metempsychosis, Aristotelian hylomorphism, Stoic hylozoism, supernatural intervention, Anaxagorean panspermia, and Democritean mechanical atomism. The boundary between truth and fiction is set in motion at the same time: the domain of the unreal (the sublunary world) begins increasingly to overlap and conflict with that of the real (the divine), intensifying the torsion within hypothesis and conjecture between fictionalism and realism and so bringing the *Metamorphoses*' incorporation of these theories of change to the attention of philosophers. This is a movement that is roughly diachronic, inasmuch as a movement away from a focus on the heavens to a focus on earth and, finally, matter, characterises the scientific revolution, but it is also synchronic, since at every stage the position of the boundary dividing the knowable from the unknowable is alternately articulated, challenged and dislodged, against the whole range of its possible motion. Thus, although we begin with astrology and move on to consider different disciplines, astrology remains an important point of reference in discussions of natural magic, and indeed, throughout, as the first moment,

both logically and historically, of the naturalisation of the divine. Likewise, alchemy appears as a species of natural magic, just as natural magic persists in alchemy, and the mechanical philosophy can be seen as developing from the vitalist corpuscularian philosophy of the alchemists, which, vice-versa, persists in the mechanical philosophy.

Chapter 2, *Astrology*, begins by contrasting the way in which Kepler separated his astrology from Ovid with the interconnection of the growing popularity of Ovid and astrology in the twelfth century, before turning to consider in detail a specific example of an astrological interpretation of Ovid in the scholastic Aristotelian Albert the Great (1206–1280). I analyse the tensions in Albert between the reading of specific astrological doctrines into Ovid and the adoption of his fables as heuristic fictions as reflecting the tensions in astrology itself between a continuing insistence on an absolute distinction between divine transcendence and nature, and the transference of agency from God to the stars. From there, I move to consider two contrasting receptions of the astrological Ovid in which the simultaneous drawing together and separation of God and nature is interpreted in different ways, taking on the one hand the Aristotelian Roger Bacon (1214–1292), and contrasting him with the Florentine Neoplatonists Marsilio Ficino (1433–1499). For astrologers aligned with Aristotle, the tendency was to criticise as "Ovidian" the celestial animism or polytheism implied by some presentations of astrology whilst explaining celestial influence through a kind of mechanical determinism which, from a different perspective, produced a more thorough confusion between the divine and the natural, and so inspired receptions of Ovid of a different kind. By contrast, Platonists tended to highlight the "Ovidianism" of Aristotelian astrology, but in doing so directly promoted an animistic conception of the heavenly bodies that also appeared Ovidian from the contrasting perspective.

Chapter 3, *Natural Magic and Demonology*, begins where the previous chapter left off, in taking up Platonic astrology, which in Ficino became closely associated with the possibility not just of explaining and therefore predicting terrestrial events, but of actively manipulating them by drawing powers from the heavens down into terrestrial bodies. This

astrological magic was one particularly influential form of natural magic, which contrasted with a range of other explanations for miraculous events recorded in various texts, among which the *Metamorphoses* was one of the most prominent. I first consider explanations of magical effects in terms of demonic activity, showing that while demonology is typically associated with superstition – an association apparently confirmed by the tendency to read Ovid for evidence of demonic activity – demonologists in fact adopted a highly sceptical attitude towards the *Metamorphoses* and often cited it specifically because Ovid had provided a way of interpreting his metamorphoses as mere illusions or deceptions with an underlying purely natural explanation. I then contrast conventional demonology with the doctrine of natural magic in the Paduan Aristotelian Pietro Pomponazzi (1462–1525), who denied the existence of demons, associating demonology negatively with Ovid, but in promoting a radically deterministic version of astrology as an alternative explanation for demonic phenomena, also produced a positive reading of Ovid for his own purposes. Finally, I examine the *Magia Naturalis* of the Neapolitan naturalist Giambattista Della Porta (1535–1615), which, although it is often taken to represent the moment at which the tradition of natural magic is finally transformed into something resembling modern empiricism, is also interpreted as displaying a confusion of Ovid with natural philosophy of the sort diagnosed by Foucault. I analyse Della Porta's tendency to both interpret Ovid as exemplifying the ontological significance of external appearances, and exploit his text for the various reductive explanations of external appearances it provides, in terms of his alternation between the explanation of natural powers using inductive reasoning based on external similitudes, and their explanation in terms of *a priori* causal systems, which in Della Porta are multiple, both astrological and materialistic or medical.

In Chapter 4, *Alchemy, or the Chaos of the Sages*, I turn to the discipline in which natural philosophical readings of the *Metamorphoses* were most widespread: alchemy. Although the reading of the *Metamorphoses* by alchemists was part of a much wider interest in symbolism and allegory, I show that the *Metamorphoses* had a special status as providing not just

many examples of myths that could be interpreted alchemically, but also, at a literal level, the alchemical theory of matter justifying these interpretations. That theory was the notion of matter as a "chaos" containing all of its future transformations enfolded within it, a containment often likened to the Anaxagorean concept of "panspermia" (every body contains the seeds of every other body). In promoting the notion of an all-containing chaos, the alchemists shifted the ontological and epistemological boundary between the heavenly and the terrestrial, which still retained its importance in astrology and natural magic, down towards the lowest elements of matter. They thus anticipated and in some cases directly inspired the attempt to explain all of nature in terms of the alterations of a single unchanging substratum (chaos) made by mechanical philosophers. At the same time, they are major proponents of the vitalist (hylozoic) or Aristotelian (hylomorphic) theories of matter against which the mechanical philosophy positioned itself, and furnish the prime example of a mode of science apparently engaged in a wholesale confusion of fable and natural fact. Their use of Ovid, I argue, can shed light on this double aspect of their position within the history of the Scientific Revolution, since his poem demonstrated the interconnection between the reduction of all transmutations to an identical chaos and the identification of natural change with, precisely, transmutation (that is, vitalistic growth or a flow of immaterial forms), as opposed to the mere rearrangement of unchanging constituents imagined by mechanical philosophers.

The chapter begins with a discussion of recent scholarship on the interconnection between alchemy and the mechanical philosophy and a summary of the history of the alchemical interpretation of Ovid, before turning to an example of allegorical reading of Ovid by the Welsh alchemist Bhasset Jones (1613/14–?), which demonstrates the way alchemists drew upon the astrological interpretation of Ovid, but altered its significance by transferring the powers of the stars to matter. I then explore the justification of the alchemical allegory of Ovid at the origin of the tradition in the Ferrarese scholastic Petrus Bonus (fl. 1340) and the Neoplatonically inspired alchemist and doctor Giovanni Bracesco (c. 1481–c. 1555?), before

returning to consider the history of the reception of Ovid's cosmogony from the twelfth century into the Renaissance, which endowed Ovid's chaos with the different valences that made Ovid the prime exponent of this justification.

Chapter 5, *Critics of Alchemical Allegory* continues the discussion of alchemy, but now from the perspective of two reformists who were critical of the tradition of alchemical allegory, of the confusion of astrological and medical with chemical doctrine, and of the doctrine of similitudes in general, but who nonetheless invested in the philosophical value of certain readings of the *Metamorphoses*: these two reformists are Andreas Libavius (1555–1615) and Francis Bacon (1561–1626). I adopt these two examples not only because they show that critique of alchemy allegory was answered by the reappropriation of Ovid in a different form, but to show that apparently similar critical movements could depart from and finish in opposing positions. Whereas Libavius identified the license with which alchemists multiplied their symbols as a consequence of the severing of the link between appearance and substance in the Democritean theory of matter, proposing scholastic Aristotelianism as an antidote, Bacon attacked scholasticism in terms similar to his attack on alchemy and promoted a Democritean attitude, that would pierce beneath external appearances, as an antidote. Both of these attacks on alchemy were associated with a criticism of the incorporation of Ovidian fiction into science, but both the antidotes proposed also depended on a positive re-evaluation of such incorporation. Libavius attacked specifically Paracelsians for their ("Democritean") theory of chaos, but was himself a practicing alchemist and promoted his own readings of alchemical texts, among which he numbered the *Metamorphoses*, in Aristotelian terms. Bacon drew on Ovid in order to underline the role of appearances in sustaining empirical research, especially the similitude between matter and living beings: in tension with his promotion of Democritus and his criticisms of alchemy, Bacon argued for a hylozoic theory of matter derived from the alchemists (the doctrine of "material spirits") and associated this theory with Ovid.

Chapter 6, *The Mechanical Philosophy* begins with a discussion of René Descartes' (1596–1650) equation of his own philosophy with the "fable of the world". This equation, I argue, derives from a difficulty entailed by the fundamental claim of the mechanical philosophy that only so-called "primary qualities" (size, shape, motion) truly exist in nature: that is, the difficulty of connecting our sensed experience of the world to the mechanical model urged upon us by pure reason. While the mechanical philosophy provided an extremely powerful critique of fictional aspects of philosophy derived from the confusion of appearances with essences, it did not eradicate the importance of Ovid to philosophy, insofar as hypothesis derived from induction from secondary qualities remained important, even though the objective relation of these qualities to primary qualities was obscure. The symptom of this continuing relevance of Ovid was the tendency to appeal to "metamorphosis", often deprived of any explicit Ovidian connection, at moments where the mechanical interpretation of nature reached its limits. To make the point that the mere separation of "metamorphosis" from Ovid did not necessarily imply the end of "Ovidianism", I show that an appeal to "metamorphosis" with no reference to Ovid was particularly associated with forms of philosophy (astrology, alchemy, etc.) where explicit allegory of Ovid was common, so that the use of the term by mechanical philosophers can be construed as an Ovidianism by proxy. I then consider in detail the case of Galileo Galilei (1564–1642), the first to argue for the ontological primacy of primary qualities, showing the way in which "metamorphosis" intervened in his philosophy at moments where the rejection of secondary qualities itself merited rejection. In such cases, explicit references to philosophical readings of Ovid as a negative example, associated with the naive belief in secondary qualities, encourages us to connect the more abstract, positive, use of "metamorphosis" to Ovid as well: certainly, the term continues to evoke the ambiguity implicit in the incorporation of Ovid himself into science, inasmuch as it appears alternately as a useful heuristic fiction, and as concealing a literal, misplaced, belief in fact.

I conclude with a brief look at three slightly later philosophers, who, by producing readings of Descartes that explicitly associate his philosophy with Ovid, confirm the ongoing

possibility of reading the purified form of metamorphosis as "Ovidian", and reflect three archetypal ways in which the various forms of reception discussed in the preceding chapters can be considered. Voltaire (1694–1778) illustrates the tendency of the incorporation of Ovid into science to undergo alternating re-evaluations, first as a heuristic fiction, then as a fact, then as a fiction confused with fact, then as a heuristic fiction again. The Cambridge Platonist Ralph Cudworth (1617–1688) demonstrates the possibility of reading this alternation as describing a fruitful synthesis of the different perspectives that the poem mobilises. The sceptic encyclopaedist Pierre Bayle (1647–1706), however, adopts the opposite perspective, and presents this alternation as a demonstration of the tendency of reason to perpetually undermine its own foundations.

Chapter 1

Metamorphoses of Philosophy

1.1 Body and *simulacrum*

The tendency to regard Ovidian poetry as incompatible with real philosophy certainly chimes well with ancient expectations about the existence of a division between these two types of discourse. Epicurus, for example, reportedly condemned poetry precisely because of "the deadly lure of myths" (Heraclit. *Quaest. Hom.* 4.2). Hellenistic grammarians divided narrative into three categories: the true, exemplified by history, the verisimilar, exemplified by new comedy, and that which is neither true nor verisimilar, exemplified by "fables" (*fabulae*). Fables are associated with tales of metamorphosis in particular, so that Ovid's explicit theme would seem to attach his poem to the genre of the incredible.[1] In addition, it seems that at least in theory, the Romans distinguished strongly between the immoral and undignified gods of poetry and the gods as interpreted by natural philosophical allegory (Feeney 1998, pp. 14-21). These two types of divinity formed the first two branches of Varro's so-called "tripartite theology", with the third taken up by the gods of civic religion (Aug. *De civ. D.* vi, 5 = Fr. 7 Cardauns). Varro described each branch as accommodated to a separate sphere, "the theatre", "the world" and "the city", respectively (Fr. 10 Cardauns).

[1]See Sext. Gramm. 1.263, *Rhet. ad Herr.* 1.13, Cic. *Invol. 1.*27, Quint. *Inst.* 2.4.2 and Servius *ad Aen.* 1.235. Cf. Ovid's characterisation of his metamorphoses as "unbelievable" (*non credendos*) at *Trist.* 2.64.

Thus, Ovid's combination of myth and philosophy is certainly jarring, and yet I will argue that it is not as trivialising as his refusal to subscribe to any particular philosophical school may suggest. In fact, I will argue that the philosophical aspects of the poem retain their philosophical significance in part precisely because of the way in which Ovid plays on generic expectations, repeatedly drawing attention to the fabulous nature of the other aspects of his poem in order to reinforce the opposition between the philosophical interpretation of myth and myth as deployed by the poets.

That is not to say, however, that Ovid is not also centrally concerned with the way in which allegory serves to entangle the poetic and philosophical theologies. Even as he encourages us to keep philosophy and poetry apart by accentuating the absurdity of his mythical world, he exploits the fact that, as Aristotle had famously remarked at the beginning of his *Metaphysics*, "the lover of myths is somehow a philosopher" (*Metaph.* 982b). Ovid is conscious that Latin epic had engaged deeply with philosophy since Ennius, and that, vice-versa, Empedocles and Lucretius had chosen to express their philosophy in hexameters (Hardie 1994). His own contribution to this tradition is obviously not philosophical poetry in the sense of philosophy in metre, but nor does it simply subordinate philosophy to poetry, as if to proclaim the 'failure' of philosophy's separation from myth. Rather, by suggesting a range of different positions from which the relationship between philosophy and myth can be evaluated, Ovid legitimates different perspectives even as he exposes their contingency. In particular, he exploits the fact that three influential philosophical schools which had propounded philosophical theologies – Platonism, Epicureanism and Stoicism – had distinguished philosophical from poetic myth in completely different ways. Just as one philosophy's appropriation of myth may be interpreted as poetical from the perspective of another philosophy, if Ovid's alignment of his poem with philosophical allegory appears absurd from one philosophical perspective, it may legitimate another. As one myth takes on a fabulous aspect, another emerges as philosophical, and as one becomes philosophical, an-

other becomes fabulous. Because philosophical and poetic myth do not comfortably overlap, their combination powers a ceaseless alternation of philosophical perspective.

In the following three sections I will be focussing exclusively on Ovid's relation to Lucretius and Plato, reserving the Stoics for a separate analysis. I proceed in this fashion partly because we have a near contemporary Stoic reading of the *Metamorphoses* in the form of Seneca's *Naturales Quaestiones*, which deserves to be examined in its own right, and partly because Seneca makes the combination of Lucretian and Platonic inter-texts essential to the expression of Stoic philosophy itself, insofar as Stoicism combines seemingly incompatible visions of the universe as entirely material and entirely perfect. I shall discuss three closely connected forms of representation whose relation to philosophy is interrogated by the poem: the first is the mimetic image, which appears alternately as a gateway to the invisible world and a deception; the second is the sign of divine power or presence, which allows contradictory tales to be told about the relation of gods to nature; and the third is metamorphosis itself, by which the inner and outer forms of nature are alternately reconciled and set at odds. In each case I shall highlight a particular motif that has been adopted in both Platonism and Epicureanism for a philosophical purpose – the mirror image, the battle of the gods and giants, and metamorphosis itself – showing how Ovid's evocation of the contrasting philosophical perspectives encourages us to see the motif as alternately remythologising and demythologising each philosophy.

We will begin with the case of the mirror image as it appears in the tale of Narcissus. This tale offers a paradigmatic example of how Ovid's habit of drawing attention to the artificiality of his own narrative produces alternative ways of reading the Lucretian and Platonic strains of the poem's philosophical frame. The basic ambiguity of the tale of Narcissus is generated by Narcissus' misidentification of the reality of an image, his reflection, which nonetheless has a real correlate in the universe of the poem, his real self. Narcissus' "error" (*Met.* 3.447) is on the one hand mistaking an illusion for reality, but on the other hand failing to connect that illusion to the reality in which the illusion exists as such. These different perspectives on his

error position the episode differently with respect to the episode's two primary philosophical subtexts, Lucretian and Platonic, alternately affirming the one as illusion, the other as the reality indicated by the illusion. In turn, this alternation reveals the way in which one philosophy's use of myth for its philosophical ends is what marks it as mythical from the perspective of the other, not simply because it fails to distinguish myth from philosophy, but precisely because of its projection, through myth, of a philosophical reality set up in opposition to myth, which can then itself appear mythical from a different perspective. The alternation corresponds to the pattern that we shall encounter in later chapters, whereby a hypothesis or heuristic fiction distinguishes itself from myth by addressing itself to reality, but finds itself realigned with myth from the perspective of other (usually future) hypotheses in the measure that it had at first reinforced this distinction.

Let us first consider the way in which Ovid models Narcissus on Lucretius' depiction of the intemperate lover (*Lucr.* 4.1037-1191). Lucretius' depiction arrives as the climax of the discussion of *simulacra*, the ultra-thin "copies" – effigies, figures, films or bark (*effigies, figuras, membranae, cortex*) – continuously thrown off the surface of bodies, which physically transport to our senses an image (*imago*) of the bodies' form or appearance (*formam, speciem*, *Lucr.* 4.48-52). These *simulacra* and their auditory equivalent (sound conceived as an emitted body) are responsible for both physical and mental illusions, echoes and mirror images, but also a range of mythological beliefs: centaurs, scyllas (*Lucr.* 4.732), giants (*Lucr.* 4.138-139), the sounds of satyrs or the piping of Pan (*Lucr.* 4.580-581). Finally, they are also the "fodder" (*pabula*) of lovers' desire, which is just as fantastical as the imagination of the mythologists, for no matter how hard lovers try to merge body with body, "nothing is given into the body beyond the *simulacra*" (*Lucr.* 4.1095). Hardie (1988) was the first to suggest that Narcissus' fascination with his reflection (labelled *fugacia simulacra* by Ovid) replays the mistake of the "Lucretian fool", who mistakes "insubstantial" *simulacra* for the body whose image they bear. He observes, for example, that Ovid evokes Lucretius' association of

the lover with Tantalus: Narcissus, too, is said to "feed" on something which cannot provide him physical sustenance.

Hardie suggests that the point of such allusions is to invert Lucretius' appropriation of traditional myth. The episode would thus fit into the general pattern of Ovid's playful "re-mythologisation" of philosophy. Consider as a parallel example that where Lucretius tells the myth of Phaethon, declaring it "far removed from true reason" (*Lucr.* 5.406) and explains the universal conflagration as the triumph of fire amidst the ongoing battle of the elements, Ovid retells the myth in the form Lucretius had rejected. Similarly, in the case of Narcissus, "the mythological fantasies that Lucretius dismisses are reality" (1988, p. 77): that is, the reality against which the insubstantiality of the *simulacrum* is exposed is one where mythological beings which themselves ought to be reducible to insubstantial *simulacra* instead have a fully embodied existence. Or, rather, they appear to. As Hardie himself suggests in a later essay (2002, p. 163), Narcissus's error is at the same time a fairly transparent allegory for our own encounter with the *Metamorphoses*' mythological fantasies. From the perspective of a reader positioned beyond the reach of the poem's illusions, the self-consciously fabulous nature of Ovid's own narratives allows us to see through the apparently substantial beings that are projected within them. Ovid lets us know, for example, that Narcissus' reflection is "the shadow", not of a body, but "of an image" (*Met.* 3.434). Whereas for Hardie the tension thus constructed makes the ultimate referent of the poem illusionistic art, I would emphasise that by allowing us to see through his mythological illusions, Ovid provides another perspective from which the poem can be read as philosophical poetry referring to reality itself. Now, instead of the philosophical subtext operating within the economy of the tale to highlight the internal reality of the mythological world, the mythological interior of the poem as a whole falls away in order to highlight the reality of the philosophical frame.

In other words, if we read Narcissus' mirror image as an allegory for Narcissus' own insubstantiality outside of the poem, we must also deal with the question of how the real correlate of Narcissus' reflection in the world of the poem, Narcissus, applies to the world

beyond it. Insofar as this world is described by the philosophical frame, and insofar as the philosophical frame refers us to the *De Rerum Natura*, the real correlate of the illusory Narcissus can only be the *simulacrum* itself: the *simulacrum* is what really exists, being composed of atoms, which is to say, "many minute bodies" (*Lucr.* 4.67-8).[2] From this perspective, however, the insubstantiality of the reflected image turns out not to confirm the Lucretian doctrine of the *simulacrum* but to indict it. Lucretius opens his account of *simulacra* by dismissing the notion that they are "shades" (*umbras*), in the sense of "ghosts". They are not shades, but bodies. Narcissus believes the same, but is mistaken – "what is a shade (*umbra*), he thinks to be a body" (*Met.* 3.417). Trying to grasp his image with his hands, he is from this perspective the prototype of the materialist unable to see that form lies beyond matter. Some philosophers who come after Ovid in fact re-evaluate Narcissus' 'mistake' in a positive light for just this reason.[3] Thus, where Hardie sees the tale as posing the question of whether the artwork is or is not as insubstantial as the *simulacrum*, attending to the philosophical frame convokes the question of the substantiality or insubstantiality of the *simulacrum* itself. A perspective emerges from which Narcissus' mistake is not confusing the reflection with the body from which it originates, but rather confusing it precisely with the corporeal *simulacrum*.[4]

Allowing the different points of view from which reality is projected by the poem to reflect differently on the reality of the *simulacrum* does not merely confirm or undermine a single philosophical subtext: it generates a shift from one to another. The reader will recall

[2]Wheeler (1995) emphasises the Lucretianism of Ovid's cosmogony, also noting that this Lucretianism is not, as it were, pure, but arrived at by demythologising Vergil's remythologisation of certain aspects of Lucretius' cosmogony.

[3]The notion that Narcissus' devotion to the surface is in fact the way to correctly represent reality appears, for example, in Leon Battista Alberti, in relation to perspective painting (1972, p. 62), in Giordano Bruno, in relation to the relativity of motion (BOI i, p. 128, l. 9-17), and in Galileo, in relation to the interpretation of telescopic images (Reeves 2009).

[4]In a reading of the Lucretianism of the episode that seems structurally similar to Hardie's, Holmes (2006) construes Narcissus' attachment to his double as a dramatisation of Lucretius' account of the way the fear of death arises from our mistaken projection of subjectivity onto a lifeless corpse. Yet if this dramatisation is interpreted through the frame to express the truth of Lucretian physics, Narcissus' mistake will also be interpretable as Lucretius' own equal and opposite mistake, from a Platonic perspective: projecting the lifelessness of the atomic world onto the living self by, for example, reducing thought to a succession of *simulacra* in the brain.

that the philosophical frame is not consistently Lucretian. Indeed, rival, anti-Epicurean, philosophical perspectives are on offer, in which the insubstantiality of the reflected image has rather different implications. The account of the demiurge shaping chaos is, for example, clearly indebted to Plato's *Timaeus*. Ovid's language may directly evoke the translation of the *Timaeus* by Cicero (*fabricator huius tanti operis*, Cicero, *Tim.* 6.3 ~ *mundi fabricator, Met.* 1.57).[5] As Bartsch (2006, p. 85) pointed out, there is also a Platonic subtext to the Narcissus episode, namely the notion which appears in the *Phaedrus* that the lover's eye is a mirror in which the beloved perceives his own beauty (Plato also compares the reflection to an echo). At first the beloved does not recognise himself, but his reflected beauty spurs him on to acquiring self-knowledge, and thus knowledge of the soul (255b-e; cf. *Alcibiades I* 113a).[6] Ovid evokes this tradition by framing the tale of Narcissus as a journey towards self-knowledge, but gives it a tragic twist: Narcissus is told that he will live long "if he does not come to know himself" (*Met.* 3.348). The perspective from which Narcissus appears to mistake his reflection for a corporeal *simulacrum* aligns with the famous Platonic interpretations of his error found in Plotinus and Ficino: "He does not look upon his face: that is, he never notices his own substance and virtue. But he follows his shade in the water and tries to embrace it: that is, he admires his beauty in fragile body, flowing like water, which is the shade of the soul itself" (*De amore* vi, 17; Ficino 2002, p. 195). From the Platonic perspective, the reality that produces the image is precisely what the Lucretian perspective treats as the image produced by reality: that is to say, what is real is not the body behind the image, but its form when abstracted from all body.

What Hardie frames as the Lucretian reading of the tale of Narcissus is thus converted, from the Platonic perspective, into an allegory of the error of Lucretian materialism. This is perhaps the perspective from which it makes the most sense to regard Ovid as "remythologising" Lucretius, since it is the perspective from which Lucretius himself believes too much

[5]Robinson (1967) identifies the *Timaeus* as Ovid's primary model in the cosmogony. See also Lämmli (1962, vol. 1).

[6]Egan (2004) has argued that Plato actually based this account on some unknown version of the Narcissus myth.

in the reality of traditional myths. For if the *simulacrum* is interpreted as a body referring to another body, that is, if its position with regards to the poetic world serves to underline the corporeality of what Lucretius had dismissed as myth, then it also serves to underline the fact that Lucretius did not so much dismiss the reality of such myths, as give them a new reality in the atomic bodies which poetic imaginings literally are. This remythologisation of Lucretius is not a rejection of philosophy *per se*, precisely because it coincides with a shift to the Platonic perspective, which permits the myth to be rationalised in a different way. The insubstantiality of Ovid's poetic world, when it is interpreted in terms of Lucretian *simulacra*, comes to reveal the unreality of a world composed of nothing but atoms. Following the path outlined in the *Phaedrus*, reinforced by the Platonic aspects of the philosophical frame, and the insubstantiality of Narcissus' own body, we will look beyond the body to the realities of the intelligible realm. And yet Narcissus conspicuously fails to achieve the enlightenment offered to the lover in the *Phaedrus*: when he does recognise himself, he vanishes, leaving behind only a flower and a set of new questions about where his reality lies.[7] Just as the Lucretian revelation of the corporeal reality of the image, when aligned with the reality constructed within the poem, is what produced this alternate perspective, so the failure of the reality implied by the Platonic subtext to manifest itself internally throws the substantiality of what lies beyond the body into doubt.

The shifts between the Platonic and Lucretian perspectives thus invert the way in which the relation of poetic myth to philosophical myth (or simply philosophy) is construed in each philosopher. One reading of Lucretius might point to the way in which he makes poetry in the fullest sense (not just its letters) a model of reality to show that he is not, in fact, a reductionist of the sort who would absurdly displace all of reality onto the level of atoms and void. He makes use of analogies and myths because they afford the only means of access to the invisible atomic world, taking care to strip away from them all that

[7] Ovid's highly complex portrayal of Narcissus' afterlife (he becomes, among other things, a flower, a ghost and another reflection) provokes a further series of interpretative dilemmas which I will pass over. See Von Glinski (2012, pp. 127-9).

is misleading, and yet he dwells on the danger of this process, the opacity of even purified myths, because part of what he must represent is the way in which atoms construct forms that no longer resemble atoms.[8] As it happens, the point at which Ovid seems to depict Narcissus' error as the belief in the corporeality of the *simulacrum* is also the point at which the "Lucretian" reading of the tale, equating the image and the *simulacrum*, departs from Lucretius' own handling of the relation between mirror images and *simulacra*. Lucretius himself only brings up mirror images because of the problem that the *simulacra*, being so slim, are not individually perceptible. Mirror images are placed alongside smoke, snake-skins and amniotic sacs as visible evidence that invisible films are thrown off the surface of things, but they are themselves second-order phenomena constructed by a repeated succession of such films (*Lucr.* 1.100-109). Lucretius thus preserves an important difference between the mirror image and the *simulacrum*.[9] Narcissus' mistake comes to represent that of Lucretius precisely when Lucretius' imagery is construed as a perfectly transparent representation of atomic reality, the mirror image mistaken for the *simulacrum* itself, and the mythological aspect of his poem denied.

The *Phaedrus* sets up an opposition between Platonic allegory and the kind of physical allegories of mythology that we find in Lucretius. Questioned as to whether he believes in the story of Boreas' rape of Orithyia, Socrates provides a naturalistic rationalisation of it, but protests that he does not have time for such niceties because he has not yet managed

[8] In his longest discussion of myth, an explanation of why the earth has received the name *magna mater* (*Lucr.* 2.600-60), Lucretius rejects a range of traditional allegories, but preserves the name for its ability to designate that the earth "contains the first beginnings of many things" (*Lucr.* 2.659; cf. 2.998). Even as he warns against "tinging" (*contingere*) this usage with religion, the preservation of the name seems motivated precisely by the problem of representing natural creativity. The danger of the myth is the corollary of the communicative aspect of the poetry with which, in the honeyed cup simile, the philosophical medicine is "tinged" deliberately (*contingunt, Lucr.* 1.938).

[9] Holmes (2005) draws attention to precisely this difference between the perceptible or mental image and the *simulacrum* to illuminate an analysis of Lucretius' preservation of a distinction between language and letters. She suggests that although Lucretius attempts to show how images arise from, and so can be reduced to, the invisible atomic *simulacra* they represent, he also identifies an unplaceable excess of the image over the *simulacrum*. Whereas Gale (1994) leans towards the interpretation of myth as "merely" illustrative, others have emphasised the way in which Lucretius' use of imagery does not merely illustrate, but in some sense constructs the nature it reflects: see Schiesaro (1990), Garani (2007), Schrijvers (2007) and Kennedy (2007).

to get knowledge of himself. Citing the Delphic motto, Socrates then immediately frames himself as a myth in need of interpretation, wishing to know whether his nature is more like the rebellious giant Typhon or a simple, divine creature (*Phdr.* 229b-230a). In general, Plato rejects myth precisely insofar as it purports to describe the physical world. The physical world is itself an image of the intelligible world, or, in the myth of the cave, a shadow of it. The Timaean demiurge creates the cosmos as the "resemblance" (εἰκόνα) of the perfect animal (*Ti.* 29b2, 91c6). The entities that come to be within it are the "imitations" (μιμήματα) of the forms (*Ti.* 50c5). Thus, poetry and myths that take as their model the physical world are to be ejected from the *Republic* as mere copies of copies, which are compared to mirror images in a negative sense (*Resp.* 596d-e). At the same time, just as the mirror of the self serves a positive function when the image pictures the soul, Plato mythologises freely when discussing the transcendent forms or the soul. The ideal city is itself something we "mythologise" (*Resp.* 501e4). The fate of the soul after death forms the subject of philosophical myths in the *Timaeus, Republic*, *Gorgias, Meno* and *Phaedo*. Even traditional myths can be turned to this purpose. In the *Republic*, for example, Plato compares the soul to the composite beasts, the Chimaera, Cerberus and Scylla (*Resp.* 588c2-10), as well as to Glaucus, whose divinity is obscured by barnacles and seaweed in the same way that the soul covers itself in the evils of the body (*Resp.* 611b10-612b7).

It is precisely because of its connection to evil and obscurity that myth is useful in such circumstances, when philosophy is attempting to describe something whose existence is suspected, but whose precise nature is obscure. By consciously imitating myths, Plato prevents us granting too much substance to our contingent reflection upon such matters: "the journey towards precise knowledge proceeds best when everyone has an exact understanding of the status of their own beliefs" (Morgan 2000, p. 155). In fact, the very notion that the physical world is a shadow or copy of the divine world emerges from such contingent reflection – the allegory of the cave (*Resp.* 514a), the "resembling myth" of Timaeus (εἰκότα

μῦθον, *Ti.* 29d2, 68d2).[10] The analogies Plato uses to describe the resemblance of sensible to intelligible forms are cases where a form is transferred from one material to another (imprinting, projecting, imitating, reflecting), but the ideal forms are completely outside matter. Thus, the Platonic use of myth finds itself "remythologised" when the metaphorical status of the very notion of the resemblance of the physical to the divine is denied, and the metaphor of resemblance conceived as a literal truth. The distinction between the resemblance of myth to the intelligible truths and the resemblance of the physical world to those same forms is then lost, so that philosophical myths seem to stand in directly for the physical world: tales of demiurges, winged souls, Glaucons, etc., become absurdly physical themselves. In the allegory of the divided line (*Resp.* 509d-511e), Plato distinguishes two twofold levels of reality: the forms and geometrical objects (making up the intelligible realm), and the physical world and shadows or "reflections in water" (making up the physical realm). While Plato also uses reflection as a metaphor to describe the relation of the intelligible realm to the physical, anyone who would mistake this reflection for a literal reflection would be placing himself back in the lower two levels of reality.

To recap, reading Narcissus with Lucretian eyes involves perceiving simultaneously that the Narcissan *simulacrum* is an illusion, insofar as Narcissus mistakes it for a fully fleshed out human, and, insofar as Ovid frames his myths in opposition to philosophy, a figure for the real atomic *simulacra* that lie beneath such illusions. This double perspective is like the double perspective offered on myth by Lucretius himself, for whom myth is at once a deception, and a model for philosophical imagery, which affords an insight onto atomic reality because, by preserving a deceptive aspect, it does not quite coincide with it. A similar, but inverted, duality appears from the Platonic perspective. Narcissus thinks the *simulacrum* to be real because he is devoted too much to the material image as such, whereas for the Platonic reader, the reality of the image lies in its origin outside of the matter in which it appears.

[10]While εἰκότα is usually translated "probable" or "likely", Burnyeat (2009) has argued for "appropriate" or "reasonable", implying that only a rational myth could be appropriate to the work of the demiurge. To my mind, "resembling" captures both rationality and distance from the truth.

Again, the image is capable of revealing this incorporeal dimension precisely because its lack of materiality has been highlighted. Here we have two alternative philosophical readings of the tale in which Ovid's myth is bent into the service of different aspects of the philosophical frame. Each reading in a sense contaminates philosophy with poetry, but in each case the deceptiveness of the image is nonetheless mobilised for the ends of the particular philosophy in question. When the two readings are no longer conceived separately, but made to reflect upon each other, however, the tensions in the philosophical use of myth are converted into a contradiction. Whereas from Hardie's Lucretian perspective, Narcissus' mistake is the belief in something real beyond the *simulacrum*, from the Platonic perspective the problem is that Narcissus accords too much reality to the *simulacrum* itself (a body), and fails to see the incorporeal form behind it.

It is worth noting at this point, that Ovid is not the first to perceive in the physical reality of the Epicurean *simulacrum* a point of inversion in the trajectory of Epicurean "de-mythologisation". Cicero's mouthpiece in the *De Natura Deorum*, Cotta, criticises Velleius precisely because he gives too concrete a reality to what other philosophers regard as mere imaginings: "for other philosophers call every such mental figure an empty motion [*vanum motum*], but you say that images come upon us and enter into our mind. So then, when I seem to see Tiberius Gracchus declaiming on the Capitol, producing the urn for the vote on Marcus Octavius, I say this is an empty motion of my mind, but you say that images of Gracchus and Octavius have been left behind, which are borne to my mind when I come to the Capitol" (*Nat. D.* 1.105-6). There is a startling ontological extravagance, or as Cotta puts it, *licentia* (*Nat. D.* 1.107, 109), implicated in the Epicurean vision of a profusion of *simulacra* physically surrounding and permeating us. Cotta connects this form of 'belief in images' with an overindulgence in ordinary religious idolatry, mentioning Epicureans of his acquaintance who "worship every little image" (*omnia sigilla*, *Nat. D.* 1.85).[11] In the case of

[11]The context makes it clear that Cicero is referring to images of the gods, but the remark may also be motivated by the well-documented popularity of personal portraiture among Epicureans (Frischer 1982, p. 91).

the *simulacra* of the gods that we all carry about in our heads, the difference between image and object is indeed all but lost, for such *simulacra* prove that the gods exist: Lucretius denies only that they concern themselves with our lives and that they experience any kind of pain or disturbance. In a certain way, the Epicurean conception of the gods therefore conforms better than that of any other philosophy with their depiction in myth. Whereas for Plato god is an ineffable, transcendent principle, Lucretius posits anthropomorphic gods made of the same stuff as you and me.[12]

Similarly, Ovid is hardly the first to perceive in the insistence on the reality of the intelligible realm outside the physical world the moment at which the Platonic rationalisation of myth experiences its own point of inversion. The images and myths that Plato invested as philosophical ("resembling"), always invited criticism as incorrectly hypostatised fictions. Zeno of Citium (c. 334–262 BC), the founder of Stoicism, regarded the forms as "figments" (φαντάσματα), the same word used for apparitions, dreams or hallucinations (Stobaeus i, 136.21-137.6 = SVF 1.65).[13] Cicero describes the forms as *ficta* (*Orat.* 7-10). Velleius dismisses both Platonic and Stoic notions of the gods as "made up" (*commenticias)*, "portents" (*portenta*), and "miracles" (*miracula*, *Nat. D.* 1.18). He complains that the Platonist Heraclides Pontus "stuffed his books with puerile fables" (*Nat. D.* 1.34). Such accusations are predicated on ignoring the "mythical" aspect of Plato's treatment of the intelligible world, ignoring that its mode of reality is entirely unlike the reality of the physical world. Velleius

[12]It is is disputed whether Epicurus himself similarly believed in the physical existence of the gods. See the papers of Sedley and Konstan articulating rival views in Fish and Sanders (2011). In terms of Lucretius' explicit doctrine, he certainly posits physically existent gods (as Sedley admits), although of course one may still choose to interpret this physicality as in some way imagistic or allegorical, especially as his descriptions of the gods are based partly on Homer (*Lucr.* 3.18-22 ~ *Od.* 6.42-45). While attacking the Epicureans for their overly literalistic anthropomorphism, Cicero simultaneously criticises their inability to explain just how the gods can be immortal. Because of that lack of explanation, he complains, the divine body they imagine is more like that of a statue than a human: "we shall say the same thing as in the Coan Venus: that is not a body, but the likeness of a body...in the Epicurean god there are no things [*res*] but similitudes of things". So these gods are either absurdly physical or, in the end, little more than "the outlines and forms of gods depicted in shadow [*adumbratorum*]" (*Nat. D.* 1.75).

[13]Gildenhard (2013) discusses Cicero's response to the Platonic Republic as an example of a fiction which is also invested with the ideality of a model; in the 50s BC, Cicero tends to regard such forms negatively as *ficta*; in the 40s, owing to the failure of the Roman Republic, he embraces them as a necessary counterpoint to reality.

ridicules the creation story of the *Timaeus* by trying to interpret it literally, as one might interpret the report of an aedile: "What method of construction was used for such a grand work? What tools, what levers, what cranes, what agents?" (*Nat. D.* 1.19). Again, philosophy finds itself contaminated with myth not just when philosophy is shown to be mythical, but also when this status is denied it. The natural philosophical interpretations of the poem we shall survey in the succeeding chapters must therefore be analysed not just in terms of how they interpret Ovid – as myth or philosophy – but equally in terms of how myth or philosophy, in either case, is construed, whether as mythical or philosophical. Whereas in some cases we shall find myth treated as myth, in others it will be adopted as heuristic fiction; conversely, whereas we shall sometimes find philosophy appearing philosophical, in many cases it will appear mythical, for example, when a notion that should have remained a mere heuristic fiction has been mistaken for reality.

1.2 Power and poetry

The interpretation of Ovid's philosophy which I am proposing here has its model in Feldherr's analysis of the political implications of Ovid's manipulation of fiction. Feldherr shows that the insistence with which Ovid draws attention to the fictionality of his narrative destabilises any attempt either to dismiss the fiction as "mere" poetic tomfoolery or to forge a connection between the fiction and a given political reality. One of the main poetic techniques Feldherr discusses is Ovid's narration of different responses within the poem to the credibility or otherwise of tales of divine power. Not only does Ovid construct internal narratives which dramatise the different consequences of responding to such tales in different ways, but these narratives tend to evoke other frames of reference in which the political consequences of their own fictionality are different or reversed, so that "the planes of reception generated by internal narratives veer away from conventional expectations of fictionality" (2010, p. 53). For example, the divine punishments that so often follow disbelief sometimes ask to be

interpreted "politically" as a warning about the real and terrible consequences of withholding belief from the fictions of the Roman imperial ideology, especially that of the divinity of the emperor. Yet the kind of divine power portrayed in these tales – lustful, petty, jealous, etc. – is hardly consistent with Augustan ideology, so that their status as *fabulae* continues to set them apart from a political "reality" constructed in opposition to such fictions. A belief in such frivolous deities might then bespeak an immersion in a realm of poetic freedom set up in opposition to the political world, or it might suggest a different view of that world – one in which Ovid's fictions are again "political", but this time because they accurately represent the more chaotic reality obscured by the imperial fantasy of divine control. Ovid establishes these alternative viewpoints not simply to show that ideology is a fiction, but to highlight different and often opposing ways in which that fiction reconnects with reality, which can itself be aligned alternately with the fact of an emperor telling fictions or the fact those fictions tell. Similarly, I am arguing that the philosophical intertext of the *Metamorphoses* is not simply designed to show that philosophy depends on myth – either such that it "demythologises" myth or "remythologises" philosophy – but to dramatise how this dependence opens up philosophy to rival interpretations that generate shifts of philosophical perspective.

The question of divine power in the poem, which Feldherr analyses in terms of its political significance, is of course also one of the central nodes around which philosophical differences are articulated. Characters who doubt divine power often seem to bring to bear a Lucretian or Stoic perspective on the poem's fictions. Lycaon's trial of the divinity of Jupiter, for example – which results in the first human metamorphosis in the poem – is described as a "test of the truth" and an "open trial" (*experientia veri* and *discrimen apertum*; *Met.* 1.222; Balsley 2011, p. 60). Jupiter compares Lycaon to the rebellious giants, whom Lucretius had identified with Epicurus in his assault on traditional *religio*. Lycaon's punishment would thus seem to imply that "the Epicurean redefinition of the gods is tested and rejected. Lucretius' attempt to demythologise the gods is reversed" (Beasley 2012, p. 92). That the victory of the gods is not in itself devoid of philosophical significance might furnish an initial objection

to such an interpretation. When Hardie first applied the concept of "remythologisation" to such episodes, he noted that the "mythical construction of vast forces controlled (or not controlled) by a superior providence" had its roots in Stoicism and Platonism. Wheeler (2000) similarly sees the *Metamorphoses* as structured by a tension between a Lucretian vision of the world as irredeemable chaos and a Vergilian one which insists on the action of a providential law. From this perspective, the behaviour of matter in the *De Rerum Natura* is what is anti-philosophical; the behaviour of gods, by contrast, guarantees the intelligibility of the natural world.[14] As Beasley herself notes, Ovid almost certainly knew that Lucretius had adopted his interpretation of the gigantomachy from Plato's *Sophist*, where Plato had described it as a battle "about being" between those who say that only bodies, and what can be grasped with the senses, exist, and "the friends of the forms" who say that there exist only ideas, conceived in the mind (*Soph.* 246a-c). Moreover, Lycaon's transformation into a wolf may pick up the Platonic myth of metempsychosis, in which the souls of tyrants are said to be destined for wolves in their next lives (Beasley 2012, p. 95).

But if we think that the victory of Jupiter should be interpreted as an expression of support for a Platonic concept of divine providence, Ovid's insistence on the fictionality of his own gods distinguishes his poem from Vergil's and opens up alternative viewpoints. Not only does Ovid systematically undermine Jupiter's moral authority (Anderson 1989), but the very fact that Jupiter comes to Lycaon "in the image of a human" (*Met.* 1.213) marks his departure from divine transcendence and his entry into a realm of poetic fiction that stands in opposition to the seriousness both of Augustan mythmaking (Feldherr 2010, p. 143) and of the Platonic myths of divine providence. In the *Republic*, Plato had specifically outlawed myths in which god is portrayed as "altering his form [εἶδος] into many shapes [μορφάς]" (380d). Even worse, Plato says, are myths in which gods adopt disguises: these constitute "a true lie" (ἀληθῶς ψεῦδος, *Resp.* 382a), since they do not merely substitute one surface

[14]Wallace-Hadrill (2005, p. 65) suggests that the political certainties established by Augustus inspired a wider belief in cosmic predictability, contributing to the growth of "astrology and other predictive sciences (including physiognomy and the interpretation of dreams)".

appearance for another, but pervert the inmost nature of the divine, which is incapable of deception. Thus, on the one hand, if Lycaon's Lucretian rejection of another reality behind Jupiter's disguise appears as a mistake from the Platonic perspective, the mythical form through which the Platonic perspective itself is expressed preserves the possibility that Lycaon was in fact correct in refusing to believe in the disguised Jupiter, precisely because he was disguised: the divine myth is exposed as a *simulacrum* in the sense of an image without substantial reality. The "fabulous" subjection of Jupiter to passions and impulses that are absurdly human (or lupine, insofar as they are tyrannical) may even suggest the substantial reality of the chaotic world of the atomists, especially as the flood that Jupiter summons in response to Lycaon's crime reproduces the state of the world before its providential organisation. Through various verbal echoes, Ovid underlines the similarity (or difference, depending on perspective) between his own flood and the flood described by Lucretius as an inevitable consequence of the atomic structure of reality, which Lucretius had himself presented as extracted from myth.[15]

Because the philosophical reading of these different interpretations of the nature of divine power in the Lycaon episode depends on the analogy of Lycaon with the giants, which is what primarily activates the philosophical intertexts of the *Sophist* and the *De Rerum Natura*, it is important to note that Ovid had told his own gigantomachy just a few lines before. The gigantomachy thus becomes a paradigm for the countless conflicts between divine and human power that follow. Its generic ambiguity is also a particularly good metaphor for that of Ovid's poetry in general. It is, on the one hand, the most hackneyed and self-consciously "mythical" of poetic subjects: the pre-Socratic Xenophanes (famous for his satire of anthropomorphic gods) was already complaining about the popularity of such tales, which, apparently inventing the metaphor, he dismissed as "fabrications [πλάσματα] of the ancients" (Fr. 1.22 DK = Athenaeus xi, 462c). On the other hand, the theme is recognised

[15]For Lucretius' demythologisation of the flood, see *Lucr.* 5.395, 412. Wheeler (2000, p. 27) notes that Ovid describes Jupiter's thoughts in words evoke Lucretius' description of the eventual destruction of the universe (cf. *Met.* 1.255-8 and *Lucr.* 5.92-96).

by rhetorical theorists and Augustan poets as the most sublime and, specifically, the closest that poetry can come to the sublimity of natural philosophy (Innes 1979). Ovid himself had earlier 'recused' the theme because of his self-proclaimed incapacity for seriousness (*Am.* 2.1.11; cf. *Met.* 10.150-153). Ovid's narration of Jupiter's victory (where Lucretius had trumpeted the victory of Epicurus) can be taken as a statement of support for the friends of the forms, except that he also includes a brief Lucretian rationalisation of the battle as an entirely materialistic conflict of elements: "nor was the lofty ether safe from the earth" (*Met.* 1.151). The choice of generic frame then complicates the interpretation of these Platonic and Lucretian aspects. If the "fabricated" aspect of Jupiter's victory implies that the Epicurean is correct, the very shift from fabrication to philosophy also implies that the episode – and thus the victory itself – can be read philosophically as a contradiction of the Epicureans. Conversely, emphasising the Lucretian rationalisation must highlight Ovid's divergence from the Lucretian account of the battle, which aligns his account with the ancient fabrication. Ovid defers any resolution of this dilemma by placing a twist in the coda of his myth – the metamorphosis of the blood of the defeated giants into a new race of men – which exploits the repetition of heavenly conflicts in the mythological tradition to confuse the initial distinction between Jupiter and the giants:

> Bathed with the plentiful blood of its children, the Earth
> Was watered, they say, and animated the warm gore
> And so that there would not be no monuments of its stock remaining
> It turned it into the face of men. But that shoot, too,
> Was contemptuous of the gods and most greedy for savage slaughter
> And violent: you would know that they were born from blood.
>
> (*Met.* 1.157-160)

Hesiod narrates three successive heavenly conflicts: first Cronos' castration of his father Ouranos (heaven), motivated by Ouranos' repression of the hundred-handers, then the assault of the Olympian gods and the hundred-handers upon Cronos and the Titans, then the

insurgency of Earth's youngest child, Typhoeus, put down by Zeus (*Theog.* 116-868). Ovid's story of the metamorphosis of the giants' blood is an adaptation from Hesiod's account of the castration of Ouranos,[16] whose blood fell to earth and generated the *gigantes* – creatures that have no further role in Hesiod, but were rapidly assimilated to the various generations of earth-born rebels (*Theog.* 182-186).[17] The myth from which Ovid borrows therefore casts his giants in the role of Hesiod's Ouranos, his gods in the role of Hesiod's earth-born Titans, and his men in the role of Hesiod's *gigantes*. Ovid reinforces this confusion in two further ways: first, immediately after relating the gigantomachy, he invokes Zeus as "Saturnian father" (*pater...Saturnius*). Second, although on the basis of Homer (*Od.* 11.315-6), Olympus is often understood to have been part of the giants' ladder to heaven (e.g. at Vergil *Georg.* 1.281, *Aetna* 49, *Prop.* 2.1.19), the expression applied to Zeus – "he shattered Olympus" (*perfregit Olympum, Met.* 1.154) – is, as Bomer noted, unusually violent. Furthermore, in Homer, Olympus, not heaven, is usually the abode of the gods, giving rise to the suspicion that the relevant lines are interpolated: no such explanation will serve for Ovid, however, where the violence of *perfregit* seems rather to deliberately evoke the confusion over Zeus' dual role as defender and attacker. This play with roles caused Boccaccio to identify Ovid's new race as literally those *gigantes* that would later take on the Olympian gods (*Gen. Div.* iv, 68.1, Boccaccio 2011). There is, indeed, no explicit assertion that this race, identified with men only through their form, really are men. Add, finally, that Ovid's whole episode occurs in the context of an age defined by Oedipal murder, and it becomes impossible to

[16]According to Schol. *Lycophr.* 1356 the Ligurians grew from the blood of the giants: otherwise, Ovid's version is unique (Wheeler 2000, p. 25, n. 65; Bomer 1969, p. 70). It is possible that Ovid also has in mind the Orphic story in which humans are generated from the ashes of the Titans, blasted by Zeus for dismembering Zagreus. There are possible traces of the anthropogonical element of this myth in Pindar (Fr. 133 *apud* Plato *Meno* 81b-c) and Plato (*Leg.* 701b-c), although there is no explicit version of it until the sixth century, when it may have been invented (by Olympiadorus, *In Phaed.* 1.1.3; see Edmonds (1999)). Velvet Yates (2004) has argued that some Neoplatonists conflated the Hesiodic and Orphic stories, reading them both as about the generation of plurality from the one.

[17]This confusion dates from the fifth century. For example the scene on the *peplos* of the Parthenon frieze is referred to as both a Gigantomachy and a Titanomachy (Plato *Resp.* 378c and Euripides *Hec.* 468-73, respectively). At *Euthyphro* 6b, Plato interprets gigantomachy as an intergenerational struggle.

disentangle the sequence of generations that produces, on the one hand, a line of giants, and, on the other, a line of gods.

The strange expression "turned it into the face of men" (*in faciem vertisse hominum*), reminds us of the crucial role played by the human face in a completely different account of the genesis of humans which Ovid has provided just a few lines earlier. In this earlier account Ovid speaks of the creation of men by the Titan Prometheus, who is said to fashion humans as the image (*effigiem*) of the gods by giving them a "lofty face" (*os...sublime, Met.* 1.83-5). Now, not only does Ovid therefore present us with two opposing interpretations of the human countenance, one which aligns us with giants, another which aligns us with gods,[18] but in each case the connection between form and content is established in a different way: to simplify slightly, in the case of the giants, there is a corporeal continuity – a bloodline (Ziogas 2013, p. 62) – between the face and what it represents, namely, the giants; while, in the case of Prometheus' effigy of the gods, the relationship is primarily one of purely formal resemblance (though a resemblance also animated by a "divine seed"). The question about whether identity is to be located in body or in form is thus posed as a preliminary to reaching the final determination as to whether we are more akin to the materialistic giants or the "friends of the forms", which would supposedly answer that very question. Moreover, looking beyond this simplified dichotomy, we find that the choice of either mode of interpretation leads in a direction that is opposed to the implications of the initial decision. So, for example, what makes the giants difficult to distinguish from the gods is precisely their physical descent from them, which connects them to the gods in spite of their external opposition; while the way in which the human gaze mirrors that of the gods, but from below, suggests not just the human emulation of the divine in a positive sense, but also the subordination and rivalry proper to the giants. In fact, Ovid may have borrowed the phrase

[18] Feldherr (2010, pp. 126-7) and Wheeler (2000, p. 26) provide analyses of the significance of this duplicity.

sublime os from Lucretius, who had used it to describe the physically "lofty" images of giants formed in the sky by the random motion of clouds.[19]

All this is to say that Ovid does not just give us a gigantomachy, but something more like a gigantomachy of gigantomachies. The victory of any particular philosophy triggers another struggle as to the meaning of that victory which revives the initial dilemma. In many situations of human-divine conflict, Ovid does not simply imply the alternative interpretations of the significance of the outcome, but explicitly recounts different internal responses and their consequences. In a sense, the story of Lycaon already exemplifies this technique, insofar as its status is rendered suspect by the fact that Jupiter is the sole authority for the tale. Ovid goes further in the competition between the mortal Pierides and the Muses narrated in Book V by allowing the different accounts of gigantomachy by mortals and immortals to be compared (although here too the Muses are remembering both accounts). While the Pierides tell of the gods' ruse of hiding from Typhon inside the forms of animals,[20] Calliope tells of the eventual burial of Typhon beneath Aetna (*Met.* 5.315-358). The very repetition of the original gigantomachy though such conflicts is at once a symptom and cause of the persistence of the rival interpretations it facilitates. Minerva, who has heard the tale of the Pierides, goes on to confront Arachne (*Met.* 6.1-145). Niobe, we are told, does not heed Arachne's example, and is herself punished by Latona (*Met.* 6.146-312). And so the sequence of conflicts continues until, before we know it, we have a continuous narrative of such conflicts linking the very first gigantomachy to the man who supposedly first coined the word "philosophy", Pythagoras, who "approached the gods in his mind" (*Met.* 15.63; the phrasing here recalls Epicurus' assault on *religio* at *Lucr.* 1.62-79).

[19]In explaining how the invisible *simulacra* combine to form mythological monsters, Lucretius gives the perceptible analogy of clouds "which shaped in many ways are born aloft [*sublime*] and melting away do not cease to change their appearance...for often the faces [*ora*] of Giants seem to fly around" (*Lucr.* 4.133-138). The use of *facies* for the earthborn man and *os* for the heavenly effigy may be designed to invert the distinction noted by Pliny: "only man has a face [*facies*], the rest" – like Lycaon after his transformation at *Met.* 1.234 – "have a snout [*os*]" (*HN.* xi, 51. 138).

[20]Chaudhuri (2014, pp. 99-100) sees the Pierides' song as "Lucretian" and Calliope's as "anti-Epicurean", but also "remythologising" and "anti-rationalising". One might instead observe that the absurdity of placing a "Lucretian" poem in the mouth of a Muse narrating the tale of a woman she has turned into magpie destabilises that very distinction, permitting Calliope's speech to "rationalise" from a different perspective.

One response to the play of opposing interpretations unleashed by Ovid's attention to the status of his own fiction is to interpret the lack of closure itself as tantamount to the profession of a kind of all-encompassing scepticism. Schiesaro, for example, has analysed the opposition Ovid constructs between "Lucretius' atomic foundationalism" and its negation, "Vergil's theodicy" in terms similar to those adopted here. Yet he argues that by setting these models against each other, Ovid aims to reject both and promote instead a way of knowing that is "rhetorical": "The place of authority is thus conceptually occupied by rhetoric, by the discursive arrangements which articulate reality according to variable points of view rather than ultimate truth" (2011, p. 65).[21] I would argue that Ovid's ceaseless concern to show how philosophical knowledge is itself articulated precisely through such rival and incompatible viewpoints makes subsuming the unfolding of rival points of view under the title of "rhetoric" far too neat a solution. Schiesaro claims that Ovid's world lacks both the impersonal model of natural law found in the *De Rerum Natura* and the anthropomorphic model of natural law found in the *Aeneid*: the gods are "mired in...contradictions" and "the laws of physics do not play a significant role" (2011, p. 74). Clearly, however, notions of divine majesty and power are no less in play for all the contradictions to which Ovid submits them. On the other hand, Pythagoras' claim to teach "by what law [*lege*] the stars move" (*Met.* 15.71), appeared to one historian of science as crucial evidence for the existence of a concept of impersonal natural law in antiquity.[22] If the irreverence of Ovid's myths disrupts the articulation of these different philosophical perspectives, it also ensures their survival by stimulating movement from one perspective to another.

Another way of stating this objection to the separation of "rhetorical" and philosophical ways of knowing is that philosophy, especially natural philosophy, dealing with the uncertain

[21]Schiesaro's thesis resembles that of Lanham (1976), who uses Ovid and Plato to represent the poles of a paradigmatic opposition between "fundamental strategies" for the construction of reality (rhetorical and philosophical), even as he aims to demonstrate the intertwinement of these two strategies in other texts.

[22]"Curiously, it is in Ovid (–45 B.C. to +A.D. 17) that we find the clearest statements of the existence of laws in the non-human world" (Needham 1956, pp. 534-5). We might also note that the case for the chronological orderliness of the poem, which Schiesaro denies, and which is an indicator of Ovid's attitude to Augustan astronomy, has recently been reasserted by Cole (2008).

sublunary world, is nothing but the articulation of reality according to variable points of view; that is to say, philosophy, just as much as rhetoric, depends on taking certain things for granted as a foundation for the elaboration of knowledge, and that these things are therefore subject to variation. Philosophy's division into rival schools is the result of this need to adopt a perspective before defending it. Conversely, rhetoric, especially in its Sophistic guise, exaggerates the relativity of truth, but from this exaggerated position of relativity derives not only an enhanced claim to mastery over truth (sophism rather than philo-sophism), but a confidence in its ability to have a 'serious' impact upon the world (as Cassin (1991) has suggested, Gorgias' attitude to truth has a fundamental kinship with that of Parmenides). It is for this reason that in Roman culture rhetoric often had a greater association with serious discourse – discourse which responds to and shapes reality – than philosophy, which sometimes seemed like a merely theoretical irrelevance. As Cicero put it, "knowledge and contemplation of nature is in a certain way lame and inchoate if no concrete action follows" (*De Officiis* i, 153; cf. Varro satires 155C = 122A, Quint. *Inst.* 12.2.7, 12.2.29-30, Tac. *Agric.* 4.30 and the discussion of Hine 2015). Ovid radicalises the Ciceronian subordination of theory to praxis: while he participates in the Roman mockery of abstract theorising, his view is not that theory must be supplemented by action, but that theory itself already is a kind of action. A shift of philosophical perspective is all one needs to produce a metamorphosis in the real.[23] Thus, the relativisation of knowledge in the *Metamorphoses* in fact helped to ensure that Ovid's poem remained for centuries not just a source of philosophical myth, but of philosophical doctrines literally upheld.

1.3 Metamorphosis and metempsychosis

The engine of philosophical conflict in the *Metamorphoses* is fuelled by nothing so much as by metamorphosis itself. While, as we noted, the poem's focus on metamorphosis aligns it with

[23]cf. Hardie's discovery in Ovid of "the close connection between the epistemological and the ontological...the interdependence of the two moments, believing and seeing" (2002, pp. 6-7).

the least credible of narrative genres, Ovid also repeatedly encourages comparison between his unbelievable metamorphoses and the wonders (*mirabilia*) recorded in natural histories. These comparisons accentuate the interpretative dilemma inherent to a very large class of metamorphoses in the poem – those that trace the transformation of a mythical figure from the distant past into a physical object, which is either perceived as part of nature by other characters in the poem, or is identified directly with an object known to the poem's external audience, who might have read about it in works of geography, natural history or natural philosophical allegory. Emphasis on the reality of the final form of such metamorphoses can make the poem's fabulous dimension appear as a transparent fabrication about some merely physical phenomenon. So, for example, Ovid interrupts Mercury's account of the metamorphosis of Syrinx to explain that after her transformation into a reed the wind moving over the reed made a sound "similar to" (and therefore not the same as) "someone lamenting", as if to explain in a Lucretian fashion why poets have invented the story that Mercury was just telling. On the other hand, in this case Ovid also allows us to interpret the wind itself not as a natural phenomenon, but as the breath of Pan: "while he sighs [*suspirat*] there, the wind [*ventos*] moved on the reed made a thin sound similar to someone lamenting" (*Met.* 1.707-8). Thus not only does the metamorphosis create an interpretative dilemma in which the story that is told conflicts with the new reality established by the change, but that new reality can itself be aligned either with the correlate of the new reality of the metamorphosis in the real world of natural history, in which reeds do whistle in the wind, or with the non-existent world of *fabulae*, in which even the wind is really the breath of Pan. In turn, the metamorphosis can be read at multiple levels as parading the insubstantiality of attempts to project human meaning onto the natural world, or of validating these attempts by constructing a natural world within the poem which is so teeming with human subjectivity.[24]

[24]In this particular case, as Feldherr (2010, p. 24) observes, Pan's belief that he can really converse with the inanimate reed is framed as the opposite equivalent of Argus' failure to engage with the human dimension of Syrinx's metamorphosis, for which, once his lack of attention translates into drowsiness, he will be punished in a way that makes the tale seem to be about his own fate. Konstan (1991, p. 21) regards Argus' detachment as a parody of a "philosophical" engagement with such a tale.

Just as Ovid envelops the material result of metamorphosis in the same mythical world from which the human figures who are transformed into natural objects seem initially to have departed, so he takes pains to highlight phenomena within the natural world which make it resemble the mythical world that is constructed in opposition to it. The clearest example of this concern is Ovid's narration of the metamorphosis of coral, in which the transformative power of the Gorgon's head is communicated via the "seeds" of the metamorphosed seaweed to the coral that we encounter "even now" (*Met.* 4.749-50). As Myers has shown, highlighting such correspondences between mythical and natural metamorphoses is one of the main functions of the speech of Pythagoras. Most of the transformations Pythagoras describes from an explicitly philosophical perspective have correlates earlier in the poem: petrifaction, spontaneous generation, flooding, formation of islands, the metamorphic powers of certain waters, sex changes, etc. Those that do not, such as that of the renewal of the phoenix, are included partly because they exemplify metamorphoses that are just as wondrous as those of the mythical world. Some aspects of Pythagoras' speech seem devised to challenge the credibility of natural history itself: for example, the Hyperboreans who "as the story goes" (*fama est*, *Met.* 15.356) sprout feathers upon immersion in a certain pool. In accounting for the properties of the river Anigrus Pythagoras himself calls on the "the faith of the bards" for an aetiology involving centaurs (*Met.* 15.282-3; cf. the denial of centaurs at *Lucr.* 5.878-81). As has been often observed, Pythagoras is in many ways a satire of a philosopher: long winded, overbearingly didactic, "learned...but not believed" (*Met.* 15.73-4).[25] But the satirical nature of the speech does not in itself tell us how to interpret the correspondences between the natural and the mythological it exposes: we must still decide, for example, whether the object of the satire is the view that would make metamorphosis an empty tale about natural objects, or the view that attributes reality to such transformations.

[25]See, for example, Segal (1969), Galinksy (1998), Beagon (2009), Miller (1994) and Myers (1994). The recent emphasis on the satirical aspects of Pythagoras contrasts with the older view that the speech provides a serious counterpoint to the *fabulae*, exemplified by Crahay and Hubaux (1958), Alfonsi (1958), Viarre (1964, pp. 211-88), Segl (1970) or Colavito (1989).

Perhaps the central question posed by the speech of Pythagoras is that of the relation between physical transformation and metempsychosis, or, as Barkan puts it "mutability and metempsychosis", regarding metamorphosis as the territory defined between these "extreme points" (1986, p. 86). At first glance, mutability and metempsychosis represent the radicalisation, respectively, of the view which approaches the results of metamorphosis from the outside as purely corporeal images, and the view which focusses on the continuity of the transformed being at the expense of its final form. Yet to the extent soul does unite with a body in any given transformation, the implications of these viewpoints can be spelled out in different ways. For example, the belief in metempsychosis seems to motivate the diatribe against sacrifice and meat-eating, on the basis that the transmigrating soul remains completely human, although it has entered the body of a cow: "feel that you are chewing your fellow labourers [*colonos*]!" (*Met.* 15.142, where, however, *colonos* could also be taken to refer metaphorically to cows). And yet, the same belief is, from another perspective, supposed to remove all concern for bodies: "Do not think your bodies can suffer any ills, whether the pyre's flame or the rot of old age take them away! Souls lack death" (*Met.* 15.156-8). We may object that if the soul truly is independent of the body into which it enters, that body might as well be destroyed by the teeth of humans as by "the teeth of age" (*Met.* 15.235). To put this interpretative dilemma another way, the emphasis on corporeal mutability means from one perspective that the soul is like the still point of the turning world, as forms accrete around it and pass away; and yet, from another perspective, bodily form is precisely what endures through its changes, while the soul is forced to move constantly from one body to another. Ovid's explanation of the famous *omnia mutantur*, *nihil interit* ("all things change, nothing dies"), begins as if what changed were the soul, which "wanders and goes from there to here, from here to there, and occupies whatever limbs it wishes, and passes from beastly into human bodies, and ours passes into beasts" (*Met.* 15.165-8). From this perspective, we are encouraged to refrain from sacrifice not because of the possibility of a parental soul lurking within the body, but because of the existence of bodies materially the same as bodies

that might have once possessed such a soul: "*bodies which may have harboured the souls of our parents*...let us allow them to be safe and respected!" (*Met.* 15.456-9, my emphasis).

It would seem, then, that it is not just bodies that change, while the soul remains the same, but that, from another perspective, as souls change, the same bodies harbour different souls. Yet, returning to the explanation of *omnia mutantur*, the simile which follows immediately constructs the soul as what does not change, while bodies come and go: "nor does it perish at any time, and just as pliant wax is marked by new figures and it does not remain as it was nor keep the same form, yet it is the same, so the soul is always the same" (*Met.* 15.168-171). This metaphor of the wax is itself susceptible to different interpretations. It takes up a common comparison of the soul to wax used by Plato, Aristotle, and others, in explaining perception (Pl. *Tht.* 190e5-196c5, Arist. *De an.* 424a17-24). But in those cases, the point of the analogy is that the soul is imprinted with an incorporeal form, not reshaped into a different body. Insofar as the wax is completely reshaped, the analogy is more reminiscent of the analogies of fluid gold or bronze typically used by the same philosophers to explain the relation of matter to form (*Ti.* 50a4-b5, *Metaph.* 1029a3-5, *Phys.* 191a9-12). In other words, even as Ovid is making the point that the soul remains while bodies come and go, he describes the soul in a way that makes it sound like matter, which actually is changed when it gains a new form.[26] Ovid may also intend to evoke the contrasting valences of the comparisons of bodies to wax in the episodes of Narcissus and Pygmalion. Whereas, for Narcissus, the melting of wax stands for the lack of substance in a mere form (*Met.* 3.487-90), for Pygmalion it stands for the ability of a form to become a substance (*Met.* 10.286).

Another way to understand how Ovid goes about facilitating such shifts of perspective is to emphasise the circularity that Pythagoras seems to impute to all corporeal transformations, day following night, the sun breeding maggots in a corpse, etc. Mutability then

[26]In quoting Ovid as part of a discussion of the inseparability of matter and form, the Parisian scholastic Nicole Oresme (c. 1320 – 1382) did in fact use the Ovidian example of wax as if it illustrated what the Aristotelian example of bronze is supposed to (2013, p. 107).

becomes thinkable in terms of the Lucretian (or Stoic) concept of palingenesis, namely, the notion that, given infinite time, the atoms that make us up must have existed before in exactly the same configuration, and at some point after death, will reform as they are now (*Lucr.* 3.854-8). Thus, Ovid does not simply oppose corporeal mutability to the continuity of the soul, but rather outlines two separate paradoxes of change and identity which nonetheless reflect upon each other: the persistence of body through its changes (palingenesis), and the persistence of soul through its changes (metempsychosis). Sometimes, what remains the same in bodily transformation will appear to be the soul. Sometimes, what remains the same in psychic transformation will appear to be the body (or rather, the form of the body, as it is reproduced over generations). This double branching of alternatives corresponds to the way in which the initial decision to view metamorphoses in terms of their material results or their animate histories is complicated by a second decision as to which way of viewing is aligned with philosophy, which with fable. The different aspects of both mutability and metempsychosis also shed different lights on the philosophical subtexts implied by these alternatives.

Viewing Ovid's changes through the lens of metempsychosis potentially frames the poem in terms of the Platonic myths of metempsychosis that we mentioned *à propos* of Lycaon. Plato narrates several such myths, which, while their primary motivation varies from dialogue to dialogue, all in some degree share the function of explaining the existence of bodily suffering as a consequence of individual moral choice. As Socrates explains in the *Phaedo*, for example: "the souls of the base...will flit about until through the desire of the corporeal, which clings to them, they are bound to some body. And (as is likely) they will be bound to the sorts of natures that they cultivated in their life": gluttons will pass into asses, tyrants into wolves and hawks, and those who lived civilly, yet without practicing philosophy, into ants, wasps or bees (*Phd.* 81e-82b). In the *Timaeus* and the *Laws*, this doctrine is expanded into a full blown theodicy, as metempsychosis explains not just a soul's submission to the created world, but the very creation of a world in which imperfect forms exist. "So that [the

demiurge] would not be responsible for the evil of any of them" (*Ti.* 42d4-5), he decrees that the various species will be created by the degeneration of human souls:

> Whoever has lived his time of life well will be conveyed into the abode of his kindred star and gain a happy and congenial life. But who fails at this will change into the nature of a woman at his second birth; and if in these conditions he does not cease from evil, depending how he sinned, according to the likeness of the way in which that sin comes to be, he will ever be changed into such a beastly nature; and as he changes he shall not cease from woes until he is drawn along by the revolution of the same and similar within him, and having mastered with reason the great mass [ὄχλον] of fire and water and earth and air afterwards clinging to him, a mass tumultuous and irrational, he comes into the image of his first and best condition.
>
> (*Ti.* 42b3-42d3; cf. 91d7-92c2)

This process resembles the way in which Ovid's metamorphoses often seem to realise or "clarify" some essential aspect of a character's being, resulting in the production of a natural world in which different species express different human traits, a *Menschenwelt*, as Schmidt (1991) terms it. Ovid has often been read "Platonically" in this broad sense.[27] But while Platonic metempsychosis suggests the autonomy of the soul's decision to enter "whatever limbs it wishes" (*quoslibet artus*, *Met.* 15.166), the perspective afforded by Ovidian metamorphosis is often very different. Io, for example, hardly selected the body of a cow and while Jove and Juno deem that "also the cow was beautiful" (*Met.* 1.612), as if to confirm beauty as an essential trait of her character, Io is understandably "horrified", literally beside herself, at how poorly her new body represents her (*exsternata*, *Met.* 1.641).[28] The

[27]Dorrie (1959) argued that the essence preserved by metamorphosis reflects the Stoic notion of an "individually qualified substance" which preserves its identity despite corporeal change, connecting this preserved essence with Pythagoras' soul. Anderson (1963, p. 27) similarly interprets Pythagoras as explaining the way in which "behind the variable forms exist unaltered the spirit,the soul, the substantial being". Solodow (1988, p. 174) argues more generally that metamorphosis involves a "clarification", which may be "essential" or "incidental".

[28]The notion of external beauty (*forma*) becoming an essential characteristic is of course itself a typical Ovidian paradox.

incongruity of Io's transformation does not necessarily undermine the Platonic interpretation, however. Its fabulousness, which makes a mockery of physics – Jupiter "lies that [Io] has sprung from the earth" (*Met.* 1.615) – potentially reinforces the unreality of her embodiment, confirming the Platonic myths from a different perspective. The Platonic interpretation only functions to the extent that the suffering caused by metamorphosis is freely chosen: "the prisoner is an accomplice in her own imprisonment" (*Phd.* 83a). Thus, in order to remain philosophical, the myth of the soul's imprisonment cannot be taken too literally. The Platonic myths aim to project the reality of the moment at which the soul is separated from the body, autonomous and free, rather than its embodiment: indeed, imputing too much significance to bodily pain and pleasure is the very mistake that drives the soul down the chain of being. Hackforth writes *à propos* of the *Timaeus*, that "the grotesqueness lies not in the application of the transmigration principle *per se* but in the attempt to describe a *physical* metamorphosis" (1952, p. 90). Ovid may support this interpretation insofar as his physical world is in reality a myth.

If, however, the Platonic myths are interpreted more literally, as granting some reality to the metamorphoses of the embodied soul, Ovid's metamorphoses may indeed be read as deliberately undermining them. On this reading, there is one perspective from which Io's horror would indicate that a soul might be trapped in "any" (*quoslibet*) body it does *not* wish. This is the absurdity for which Aristotle had derided the "Pythagorean fables" as fables (*De an.* 407b13). On the other hand, there is also another perspective from which the incongruity of the metamorphosis suggests the unreality of the entrapped soul – in other words, an interpretation in terms of corporeal mutability rather than metempsychosis. Thus, the remythologisation of Plato is not without its philosophical counter-rationalisation. Now, instead of the fabulousness of Ovid's myths reinforcing the philosophical myth of Platonism, it reinforces the external perspective which connects the physical forms that are produced to the world of natural history, in which the projection of souls upon such forms is, precisely, a mere projection. Io's presence in the cow, for example, may become an allegory of the merely

corporeal circle of consumption, in which our flesh rots in the grass that cows consume, so that humans do indeed become cows.[29] The soul itself becomes a matter of material breath, as in the metamorphosis of Syrinx.[30]

This counter-rationalisation can even be read back into Plato himself, who does in fact seem to challenge his account of the soul as an "origin of motion" (*Phdr.* 245c9, *Leg.* 896b3) by suggesting that its inclination to evil derives from the pre-existing motions of the primal "mass" of the elements (cf. *Plt.* 273b).[31] In the *Laws*, the soul's free choice of lower forms is an example of the way in which all kinds of physical transformations proceed without the need for divine supervision:

> For if, always looking to the whole, someone should fashion all things by changing their shapes – as fashioning ensouled water from fire – and if it were not the case that the many came from the one or the one from the many, then as all things participated in the first or second or even third generation, they would be infinite in the number of their altered arrangements. But, as it is, it is wonderfully easy for the being who looks after the all.[32]
>
> (*Leg.* 903e4-904a4)

[29]This is the manner in which Thomas Browne (1605–1682), for example, interprets Pythagoras' doctrine of metempsychosis: "*all flesh is grasse*, is not onely metaphorically, but literally true, for all those creatures we behold, are but the hearbs of the field, digested into flesh in them, or more remotely carnified in ourselves. Nay further, we are what we all abhorre, *Antropophagi* and Cannibals, devourers not onely of men, but of our selves; and that not in an allegory, but a positive truth; for all this masse of fleshe which we behold, came in at our mouths: this frame we looke upon, hath beene upon our trenchers; in briefe, we have devoured ourselves. I cannot beleeve the wisedome of *Pythagoras* did ever positively, and in a literall sense, affirme his *Metempsychosis,* or impossible transmigration of the soules of men into beasts" (Browne 1964, p. 36).

[30]This materialist interpretation of soul is suggested by the poem's *sphragis*, in which the transmigrating soul is refigured as the immortal breath of the poet (Hardie 2002, p. 95).

[31]See Mohr (1980), who emphasises that the overall perspective of the *Timaeus* differs on this account from that of the *Laws*; Carone (1994), however, sees a similar problem at play internally in the *Laws*. A further consequence of this paradox is the tension between the idea of unending cyclical rebirth prominent in the myth of Er, and the more teleological punishment myths of the Gorgias and Phaedo (Ehnmark 1957, Annas 1982).

[32]I follow Saunders (1973) in my interpretation of this vexed passage (the first, second and third generations referring to the generation of the elements) with a small *distinguo*: Plato's criticism of Heraclitus is not precisely that his cosmos is unstable, as per Saunders (1973, p. 243), but that its stability depends on the ongoing activity of the divine, whereas Plato builds stability into the cosmos at creation.

The reference to ensouled water coming from fire seems to be a reference to Heraclitus' proto-Stoic pantheism: Plato suggests that the immanence of divine activity in this system results in an overly busy god, who, presumably, would therefore also have to take personal responsibility for the degeneration of souls. Opposed to this pantheism is a hierarchical derivation of the cosmic arrangement from the one, in which the descent into the many is somehow predetermined by god, but not actively implemented by him: "Therefore he contrived for the all that something coming to be in a certain way should always and *by necessity* [my emphasis] acquire a certain seat to dwell in, and certain regions: but he left to the wills of each of us the causes of coming to be such" (*Leg.* 904c). At this point, the slightest nudge will invert the relation between the autonomy of the soul and the automatism of nature. Instead of the automatism of nature figuring the autonomy of the soul, the automatism of the soul will figure the autonomy of nature. This is the point at which Ovid intervenes to present us with a version of metamorphosis in which the soul has absolutely no control over its fate, but fades almost into non-existence as metempsychosis is replaced by a Stoic or Lucretian vision in which identity emerges from the ceaseless recycling of purely corporeal changes.

Of course the Lucretian perspective is no more stable than the Platonic, since the very denial of the reality of souls lurking with the products of Ovidian metamorphosis grants a substantiality to corporeal forms which themselves belong to the realm of fable. If the Platonic interpretation of the poem initially seems to depend on looking through the natural forms to the souls that are enclosed within them, Ovid's emphasis on the mismatch between body and soul reminds us that in another way the Platonic interpretation actually depends on viewing such transformations from the outside as merely physical alterations. While it still involves projecting the existence of a soul which has chosen to inhabit these external forms, the nature of that soul must be, precisely, projected from the external form, so that it has no independent existence which might conflict with that form. In this sense, the Platonic interpretation is actually facilitated by the way in which Ovid's emphasis on the

fabulousness of the mythical narrative reinforces the connection between the physical forms that are produced and the world of natural history. Schmidt observes that the construction of the *Menschenwelt* relies on the results of metamorphoses becoming final, enduring features of the cosmos. They must become, in other words, truly natural objects, not grotesque prisons. But if metamorphosis results in the production of a natural order in which souls correspond perfectly with bodies (because they have disappeared into them), it will indeed serve the ends of Platonic theodicy. As Schmidt (1991) emphasises, Pythagoras' vision of metempsychosis conflicts with the permanence of the individual metamorphoses that Ovid recounts, and the distinct species that result from them. But by reinterpreting the movement of the soul in terms of stable bodily recurrence the natural world can take on the appearance of divine design.[33]

1.4 Seneca's *Natural Questions*

Amidst the shifts of philosophical points of view encouraged by Ovid's interrogation of the status of images, divine power, and metamorphoses, there is one point of view whose possibility I have so far ignored: the Stoic one, which adopts elements of both the Platonic and Lucretian (providence and materialism) to produce something different from either. Anything in Ovid's poem that suggests the reality of divine power and of a cosmos constructed by design may be construed as Stoic; but so might anything that suggests the corporeality of that power, or even its imperfection, since only the sage comprehends the universe as perfect, and no one is a sage. If we consider the gigantomachy, for example, in light of Lucretius' identification with the giants, the victory of Jupiter may speak for a Stoic position against an Epicurean one. For the Stoic allegorist Cornutus, the giants represent a stage of human

[33]Campbell (2002, p. 20) has argued that Plato's explanation of evolution deliberately "remythologises" the materialist explanations of the origin of species offered by the presocratics, even citing Vergil's treatment of Lucretius as a parallel. But again, this "mythologisation" should not be interpreted as anti-philosophical. Sedley, for example, invokes Aristotle's positive reception of this part of the *Timaeus* (*Part an.* 686a24-b2) to argue that the schema is "more science than myth" (2007, p. 132): the notion that the natural species have evolved in conformity with their moral state grounds a teleological theory of the organism.

evolution before the gods have introduced the cultivation of reason (20.39.12-40.4, Lang 1881). But the corporealism of the giants was often itself associated with Stoics. The Stoic definition of body as what can act and be acted upon may even have been lifted directly from the definition attributed to the giants in the *Sophist* (Vogt 2009). Thus, the victory of Jupiter may equally appear to represent the supremacy of Platonism over Stoicism. The status of metamorphosis is just as problematic, since in Stoicism God himself endures the metamorphoses that Plato assigns to the soul: "This Zeus of yours", as Plutarch puts it, "is he not one as to his own nature, a great and continuous fire, but now slackened and subdued and transformed, having become and becoming every thing in his mutations?" (Plut. *Fac. In Orb. Lun.* 926d = SVF iii, 1045).[34] Palingenesis and metempsychosis become two perspectives on a single process, corresponding, perhaps, to the analysis of a cosmos otherwise conceived as rigorously "one" into the two so-called "active and passive principles".[35]

Rather than risk repetition by analysing Ovid for the ways in which he alternately supports and undermines a Stoic interpretation of his poem, I want to examine how a Stoic philosopher, Seneca the Younger (c. 4 BC–65 AD), exploits the different perspectives unfolded within Ovid's poem to articulate the tensions within Stoicism itself. This early Stoic reception exemplifies the central mechanism of the medieval and early modern transformation of Ovid into science: namely, how the repeated criticism or attempted elimination of Ovid as a source of natural philosophical authority, rather than exiling him from philosophic discourse, preserved his influence in different forms; and how it was Ovid's ventriloquism of similar criticisms within his own poem (producing what are typically interpreted as non-philosophical or anti-philosophical inconsistencies) that ensured this continuing relevance. But it also shows that tracing Ovid's reception is not simply a matter of tracing the separa-

[34]Sedley (2002) argues that the Stoic cosmology developed from debates over the *Timaeus* in the early Academy, citing Theophrastus (*apud* Simplicius *In Phys.* 26.7-15) and Cicero (*Academica* 1.27-29).

[35]"They think that there are two principles of the universe, an active and a passive. Thus, the passive principle is substance without quality, that is, matter, and the active is the reason in this, that is, god: for god is eternal and fashions [δημιουργεῖν] each thing through the whole of matter" (D.L. vii, 134 = SVF ii, 300). The evidence is unclear as to whether the principles should be understood as incorporeals, as mental abstractions, or as perfectly interpenetrating bodies (Sellars 2006, pp. 86-90). For a typical statement of Stoic monism, which contrasts with the notion of two principles, see Marc. Aur. *Med.* 7.9.

tion of myth from science, because the status of myth within the philosophers who read him remains bivalent, from one perspective, philosophical ("heuristic"), from another, fabulous. Tracing Ovid's reception is, therefore, more like retracing the series of interpretative dilemmas triggered within the poem itself, as they alter our perception first of the philosophical frame, and then of the different philosophers who draw on this frame in different ways. The Stoics are critical of the improprieties of the poets, and, in general, of any knowledge of nature which is merely heuristic or "likely" as opposed to absolutely perfect.[36] At the same time, they make greater use of poetic allegory than any other philosophical school. This tension, I will argue, itself derives from the double perspective in which Zeus is at once the animating soul of the world, and the sum of its material modifications.

Varro's tripartite theology actually originated among the Stoics (Aetius *Plac.* i, 6 = SVF ii, 1009), and it is no surprise that Stoicism often opposes its vision of God to the gods of poetry and civic religion. The Stoic God is indestructible, ingenerable, one, absolutely rational, perfect and provident, immanent in every part of the cosmos, but transcending any partial view of it, which is to say, any view that is not that of the sage. Thus, the Stoic Pliny the Elder, for example, inveighs against the "childish madness" of poetic anthropomorphism, which seems to identify God too closely with the world as humans understand it (*HN.* ii, 5.17). Cicero had put similar complaints into the mouth of his Stoic exponent, Balbus, in the *De Natura Deorum*:

> Do you see therefore how from physical facts well and usefully discovered the system has been dragged towards imaginary and made-up [*fictos*] gods? This bore false opinions and turbulent errors and superstitions like old wives' tales. For the forms of the gods, their ages, and clothes and ornaments are known to

[36]One must distinguish carefully here between conjecture about purely empirical interrelations of events (i.e. incorporeals) and conjecture about their underlying causes. The Stoics promoted purely empirical conjecture, but their motivation for doing so was nothing other than their rejection of conjecture about causes, which is to say, about bodies or nature. See, for example, Cic. *Div.* 1.127 or Strabo 2.3.8, and the discussion of Allen (2001, pp. 161-170). The simultaneous promotion and rejection of conjecture in these different guises reflects their simultaneous promotion and rejection of traditional myth, especially insofar as the latter was sometimes itself exploited for empirical evidence.

> us, their breeding, marriages and relationships, and everything is translated into the likeness of human weakness.[37]
>
> (*Nat. D.* 2.70)

On the other hand, as Plutarch implies, the identification of the Stoic God with the cosmos itself presents a problem for the comprehension of his transcendence and perfection. The distinction between God "as to his own nature" and God "subdued and transformed" refers to the distinction between two moments in the life-cycle of the cosmos, the moment at which the cosmos is entirely consumed by the active principle, so that there remains only a uniform divine fire (*ecyprosis*), and the period during which that fire, acting upon the passive principle, fashions the universe's particular forms (*diacosmesis*). The Stoics posited an endless repetition of *ecpyrosis* and *diacosmesis*. While the sense in which God is one is clear during *ecpyrosis*, the opposition between *ecpyrosis* and *diacosmesis* makes his unity in the latter period harder to understand. Similarly, it is hard to explain why *ecpyrosis* should be regarded as a "purification" of imperfections accumulated by *diacosmesis* (SVF ii, 598, 606, 1174), if God himself remains perfect and identical throughout the whole process. Thus, to non-Stoics the identification of God and cosmos seemed to deny even the partial transcendence of God, and present him rather as a victim of his every physical mutation. Cicero's Velleius complains that Pythagoras (here regarded as a proto-Stoic, as at *De Sen.* 77), "who believed that soul is stretched and moving through the whole nature of things, from which our souls are plucked, does not see that by this tearing away of human souls god is dismembered and mutilated" (*Nat. D.* 2.27). Such a betrayal is explicitly likened to the theology of the poets: "No more absurd are the things poured forth from the voices of the poets, which have harmed with their sweetness; these lead on gods inflamed with anger and raging with lust" (*Nat. D.* 2.42).

In turn, it is perhaps because of poetry's debased image of the gods that the Stoics themselves adopted poetry as an important tool for comprehending the identity of a single

[37] Philodemus criticised the Stoics for being more hostile to traditional religion than the Epicureans (Obbink 2002).

Zeus with the multiple parts of the universe. Allegory shows that beneath the variety of human attempts to find meaning in the cosmos, especially through the postulation of a multiplicity of gods, lies one single Stoic truth: the divine body and its single unified motion.[38] At the same time, there would be little point in bringing philosophy to bear upon poetry unless the poetic theology itself had some value, and indeed it does, precisely because that divine being divides itself up into the various parts of the cosmos, which in their multiplicity truly deserve a multiplicity of divine names.[39] As Balbus goes on to explain, immediately after complaining about the "made-up gods":

> But although these fables are spurned and repudiated, there is a god stretching through the nature of each thing, Ceres through the earth, Neptune through the waters, others through others; and who and what these are could be understood, and we should venerate and worship them with the name that custom has given to them.
>
> (*Nat. D.* 2.71)

For Cotta this, in theory, purely philosophical preservation of myth remains contaminated with poetry because it is a symptom of the incoherence of the identification of God with his material modifications. In other words, the attachment to philosophical myth is perceived as an attachment to poetic myth: "Whether the poets depraved the Stoics or the Stoics give their authority to the poets I could not easily say" (*Nat. D.* 3.91). Seneca seems to have been sympathetic to this perspective. He happens to furnish the only surviving examples of a Stoic criticising the practice of poetic allegory (*Ep.* 88.5, *De Ben.* 1.3; cf. *Phaedra* 195-203), perhaps because his sense of the distinction between the proper understanding of the universe as an interconnected totality, and the merely partial understanding

[38]See Struck (2009, pp. 112-141) and Ramelli (2004) for an interpretation of Stoic allegory as grounded by the unity of the cosmic body. Gourinat (2005) emphasises, against Long (1996, pp. 58-84), that Stoic allegory was not restricted to etymology but comprehended complete narratives. For discussions of the *Theologiae Graecae Compendium*, the only surviving complete work of Stoic allegory, by the Neronian Cornutus, see Most (1989) and Boys-Stones (2003).

[39]For the reality of cosmic parts, see e.g. the testimony of Zeno at Stob. *Ecl.* i, 66.4-22 = SVF i, 199 and Chrysippus at Plut. *Comm. Not.* 1079b-c. = SVF ii, 483, with Scade's commentary (2013).

available to human beings, and reflected in vulgar polytheism, is particularly strong. All Stoics tended to devalue knowledge that is not knowledge of the whole universe. Even "true belief" (*katalepsis*) is said to be worthless if it is not accompanied by "certain knowledge" (*episteme*), the impregnable systematic coherence obtained only by relating any particular object to the entire cosmic plan. But the Roman Stoics in particular never cease to denounce mankind for its congenital attachment to ignorance, madness, and vice. Seneca seems to associate his own attachment to the *Metamorphoses* with this inherent moral failing, a failing which is recognised as such, but which because of the practical impossibility of obtaining *episteme* cannot be avoided, like the vices that "we condemn but do not put aside" (*QNat.* iii, *praef.* 18).[40]

Let us turn to the *Naturales Quaestiones*, Seneca's only extant dedicated investigation of natural philosophy, written around 65 AD and concerned mainly with meteorological phenomena. In what has come to us as Book II of the *Naturales Quaestiones* (the last book in the original order), Seneca discusses lightning, particularly in its connection to fate. The book has two poetic citations, both Ovidian, which deliberately evoke Ovid's alternate ways of viewing the gods, as natural and poetic. For the first, we must look to the beginning of the book, where, listing the subjects of meteorology, Seneca mentions "thunder that moves the minds of men" (*Met.* 1.55; *QNat.* ii, 1.2) – a quotation from the cosmogony which thus posits as the origin of thunder not the mythical Jove, but the quasi-Stoic *mundi fabricator*

[40]On Senecan hypocrisy, see Jones (2014b). The predicament of man in the Stoic cosmos is put particularly neatly by Alexander of Aphrodisias: "the majority of men are bad, or rather, if there have been just one or two good men, as [the Stoics'] fables maintain, like some absurd and unnatural creature rarer than the Ethiopians' phoenix; and if all bad men are as bad as each other, without any differentiation, and all who are not wise are all alike mad, how could man not be the most miserable of all creatures in having vice and madness ingrown in him and allotted? (*De Fato* 199.14-22 = *SVF* 3.658). For the rarity of the sage, see also SVF 1.152 ("their sage has not been found"), Stob. *Ecl.* 2. 100. 2, 112. 1–5 and Brouwer (2014, pp. 92-135). Algra's (2009) analysis of Stoic theology concludes that the recognition of personified deities is both an epistemic necessity for the Stoics, and at odds with their metaphysical truth. According to Augustine, Varro himself equivocates as to the value of images of the gods: they can express divinity through their form (*De civ. D.* vii, 5 = Fr. 225 Cardauns), but are perhaps more likely to lead to error (*De civ. D.* iv, 9 = Fr. 18 Cardauns). The claim that Stoics mythologize may also reflect the fact that Stoics esteemed poetry so highly as occasionally to practice it (e.g. Cleanthes' *Hymn to Zeus*, Seneca's tragedies). This use of poetry seems to have been based on the delicately contradictory idea that the indulgence of emotion might dispose the soul to its eradication (see DeLacy 1947, Batinski 1993).

(*Met.* 1.57). This concept of Jupiter contrasts with the ways in which Jupiter was personified by the Etruscans as a passionate and vengeful dispenser of lightning bolts. For example, the Etruscans claimed that Jupiter had three kinds of lightning bolt, each of varying severity, a belief which is "appropriate to poetic license" (*poeticam licentiam decent*), and which Seneca illustrates with a quotation from Ovid's Semele episode, in which Jupiter is said to take up his "lighter bolt" (*Met.* 3.305). Seneca then contrasts this personified Jupiter to the philosophical view of God as "custodian and ruler", "soul and spirit", "lord and creator", "fate", "all the causes of things", "providence" and "nature". He explains that "the reason the Etruscans said that lightning is sent by Jove" is not because he directs it personally, but "because nothing is done without him" (*QNat.* ii, 45).

Ovid is useful in this case because he provides two perspectives, each of which turns out to be valid or invalid in a different way. The problem with the philosophical perspective is that it raises the question: "Why does Jupiter pass over those worthy to be struck and strike the innocent?" (*QNat.* ii, 46). A perfect justice – a justice manifest only in the whole – is perceived from the partial human perspective precisely as the sort of irrational behaviour exemplified by Ovid's personified Jupiter. Conversely, the value of the poetic representation is that it helps the "ignorant" (which, we must remember, is everyone) to understand the perfection of the Stoic God. According to Seneca, the Etruscans did not believe in their myths, but invented them to help the ignorant conceive of "something against which no one is powerful enough" (*QNat.* ii, 42). The particular episode evoked by Seneca – Jupiter's destruction of Semele – may even serve to allegorise specifically the cause of Jupiter's apparent injustice. It revolves around Jupiter submitting himself to a fate that he does not desire: he gives his word to Semele to grant her any wish, and must then fulfil a demand he knows will destroy her. Cicero has Cotta cite similar examples from the poets (Sol's destruction of Phaethon; Neptune's of Hippolytus) as examples of how the Stoics explain the existence of evil. While Cotta dismisses these examples as "fables" inappropriate for "philosophers" (*Nat. D.* 3.76), Seneca can be read not as dismissing Ovid's

"lighter bolt" outright, but noting on the contrary that such imaginations "are appropriate" (*decent*) material for allegory, for the same reason that Jupiter cannot appear to Semele *in propria persona* without disastrous consequences.[41] Thus, besides the Stoic and poetic visions of God both being found in Ovid, each appears to require the other. If the Stoic view of God – by making God the cause of evil – appears to make him as unjust as the Ovidian Jupiter, the poetic view of God provides a way of understanding such an unjust Jupiter as a manifestation of the Stoic God.

The majority of Seneca's references to Ovid occur in the book which would have begun the work (now known as Book III), whose explicit subject is water. After the preface, this book, and therefore the work proper, begins with a quotation describing the pool of Narcissus (*Met.* 3.407), who casts an obscure but suggestive shadow over what follows. Seneca subsequently alludes to the speech of Pythagoras at many points: in the account of the mutability of the elements; in the description of the earth as a living being; in a catalogue of different powers of waters, which quotes several Pythagorean passages in their original order.[42] Finally, we move to a discussion of the flood, in which we have another series of quotations from the episodes of Deucalion and Pyrrha, and Phaethon. Implicitly, Book III is concerned more than any other with *mutatio*: the vagaries of fortune, the mutability of the elements and, finally, the mortality of cosmos itself, whose *ecpyrosis* Seneca conflates with the great flood. The purpose of this focus on natural mutation, according to the preface, is to teach us about our own cosmic insignificance – our own mortality – so that we may escape "the servitude of the self" (*servitatem sui*). Living virtuously depends on "seeing the all in your mind" (*animo omnia vidisse*), which means seeing the insubstantiality of anything that is not the all itself. And yet from another perspective it depends on "seeing all things", that is, seeing

[41]Ovid adds a characteristic twist to the equation of theophany with destruction: as Blumenberg (1988 p. 236) observes, what destroys Semele is not in fact Jupiter's divine essence, as it were, but the *insignia* (the lightning bolt) he puts on; in another sense, it is specifically his anger, which he displays in fulfilment of Semele's desire that he appear *as he appears to Juno*.

[42]The elements (*Met.* 15. 239-251): throughout, but especially *QNat.* iii, 9-10; ensouled earth (*Met.* 15.342-355): *QNat.* iii, 15.1; powers of waters (*Met.* 15.313-314, 319-321, 329-331 and 273-276): *QNat.* iii, 20.3, 5, 6 and 26.4, respectively.

them individually as identical with that which transcends them. *Mutatio* is double-edged, since it both produces the cosmic differentiation that limits our perception of unity, and destroys that differentiation, revealing its unity while obscuring its multiplicity. Thus, we shall see again that Seneca draws on Ovid in order to contrast the different implications of change from different perspectives.[43]

In both the quotations from the speech of Pythagoras and from the deluge, the Ovidian intertext provides a different perspective than the one on behalf of which the quotations first seem to be deployed; a different perspective which, it turns out, because of an insufficiency in the first, Seneca also endorses. The purpose of Seneca's long enumeration of different types of water, which takes four of its examples from the speech of Pythagoras, is to underline the order and differentiation (*divisio*) that is essential nature (*QNat.* iii, 23.1). The Ovidian intertext speaks against this *divisio*, insofar as the perpetual flux that Pythagoras describes undermines the stability and particular identity of each natural form. But Seneca himself also appears to encourage us to interpret *divisio* in just this way. He explains the different qualities of water themselves through the *mutatio* of the elements: the water exhibits characteristics derived from the element it used to be. Just as the taste of milk depends on the cow's fodder, the quality of vinegar on the quality of the wine, "there is no thing which does not return marks of that from which it is born [*nascitur*] (*QNat.* iii, 22). By reading the *natura* (literally, the birth) of each particular water into its properties we connect it to the elements from which it is derived and thus potentially arrive at an understanding of their underlying unity. The *mutatio* of "birth" which Seneca draws out from the speech of Pythagoras is, nonetheless, primarily productive of differentiation. At first glance, therefore, this perspective on *mutatio* contrasts sharply with that represented by the flood, in which all the elements – including the earth itself – are transformed into water together, and *mutatio* means destruction. Yet in the case of the flood as well, the Ovidian intertext provides a contrasting perspective, which is simultaneously confirmed by Seneca. While it initially appears that Seneca cites

[43]My reading contrasts with the view that Seneca alludes to Ovid purely for the purpose of literary *aemulatio* (Degl'Innocenti Pierini 1990, Berno 2012).

Ovid's description of the flood because of its value for comprehending the insubstantiality of human lives compared to that of the cosmos, his own criticisms of Ovid reveals another aspect of the poem that suggests our moral task is to see that our individual human lives can be directly identified with the life of the cosmos itself.

The obvious perspective from which to view the philosophical meaning of the flood is in its depiction of God, to quote Plutarch again, "as to his own nature", entirely one. As Seneca emphasises elsewhere (e.g. *Ep.* 58.24), the contemplation of the transience of mortal bodies – the human body as well as the earth itself – frees the soul for the contemplation of God. Referring to the overwhelming of Scylla and Charybdis by the flood, Seneca says that the deluge will literally "wipe away all fables" (*omnes...fabulas obruet*); "so many names will perish" (*QNat.* iii, 29). Hence, we might say that Seneca appeals to Ovid's vision of the flood in order to underline the mythical nature of the particular forms we perceive to exist in nature, and by implication, the unworthiness of our specifically human concerns. Ovid happens to have been the first to make chaos a synonym for the underworld: Orpheus invokes "this huge *chaos* and the silences of the vast kingdom [*ingens vastique*]" (*Met.* 10.30; Tarrant 2002).[44] Seneca alludes directly to this line in his description of the earth's interior: "there are also vast caves and huge recesses [*vasti ingentesque*] and wide spaces hung here and there without mountains; there are abrupt gaps [*hiatus*] into infinity" (*QNat.* iii, 16.4).[45] The Ovidian intertext thus explains something of Seneca's particular fascination in this book with underground waters, and, in general, the 'subterranean' decay that brings about mortality. It is from these underground waters that the waters of the flood emerge, until the earth itself is united to their nature.

Yet, just as in *Letter 58* the contemplation of transience and mortality leads Seneca in the most un-Stoic of directions (there, towards Platonism),[46] so here there is something

[44] Ovid draws on *Aen.* 6.265: *Et Chaos et Phlegethon.*

[45] *Hiatus* is a Latin translation of *chaos.* I find no other parallels for the immediate pairing of *vastus* and *ingens* with *-que.*

[46] "Even the world, a thing eternal and unconquered, changes, nor does it remain the same...let us send our minds to what is eternal; let us admire the forms of all things flitting [*volitantes*] on high and god turning among them" (*Ep.* 58.24-27). This letter thus demonstrates particularly well how the pursuit of

inherently absurd, un-Stoic, not just in the Ovidian account, but in the very concept of a cosmic catastrophe. First, the deluge is not simply the death of the universe, but also its rebirth. As we are reminded in a timely digression after the description of the deluge (*QNat.* iii, 29), the universe repeats its *ratio* eternally and it contains its entire past and future in every moment (time itself does not have being, according to the Stoics, but is an incorporeal effect of the way things always are). From this perspective, the apparent collapse of differentiation into unity is itself illusory. What appears to us as the death of the cosmos is only an aspect of its life badly understood, and the same goes for our own mortality. Seneca draws on Ovidian poetry to make his philosophical point because while change does evoke the loss of the self before God, from another perspective, this loss is itself an illusion: that which was truly alive in us was the cosmos, which goes on living: "death is pure life" (Jones 2014a, p. 91). Thus we find that the accusation of *licentia* regarding Ovid's personification of Jupiter is paralleled by Seneca's famous criticism of Ovid's *lascivia* in his treatment of the flood:

> Therefore in the manner of islands rise up *mountains, and they increase the number of the scattered Cyclades* [*Met.* 2.264],[47] as the most outstandingly ingenious of poets says. Just as he spoke according to the magnitude of the theme, saying *everything was sea; the sea lacked shores as well* [*Met.* 1.292], had he not reduced the onrush of such great genius and matter to childish incompetencies: *the wolf swims among the sheep; the wave carries tawny lions* [*Met.* 1.304]. It is not a

Stoicism itself leads towards the most un-Stoic of positions. Seneca's embrace of Platonism here is certainly tinged with irony (*volitantes* recalls the motion of Epicurean atoms), but it reflects his distortion of Stoic ontology elsewhere, namely the positing of *quod est* as the highest genus, which therefore grants being to incorporeals as well as to bodies. Strictly speaking, the Stoics admitted the existence only of bodies, regarding incorporeals as possessing thinghood, but not being: "Seneca is perfectly familiar with the status granted to incorporeals by Stoic dialectics, as shown by the technicality of his analyses; but, of this status, he retains only those aspects that suit his ethical purposes...Seneca sacrifices dialectical consistency...because his scope and horizon are those of moral pedagogy" (Armisen-Marchetti 2013, p. 229). Seneca was perhaps responding to a contradiction within the Stoic theory that may be one reason why no sages exist: the impossibility for humans of approaching the nature of wisdom except through states, such as being-wise, which on the Stoic analysis are incorporeals and thus incapable of having any effect on that which is.

[47]The quotation of these lines, which refer to the conflagration rather than the deluge, may be intended to draw attention to the way in which Seneca is treating the deluge as if it meant the same as *ecpyrosis*.

> sober enough thing to make sport [*lascivire*] with the whole world devoured. He spoke great things and caught the image of such great confusion when he said: *the wandering rivers rush through the open fields and towers under pressure slip under the flood* [*Met.* 1.285, 290]. This is magnificently said, if he had not bothered about what the sheep and wolves were doing. Also, is it possible to swim in the flood and in that rapine? Or was not every flock drowned by the same onrush that snatched it. You have conceived the image as great as you ought to when all the lands are swept away and the sky itself is rushing to earth. You will know what is appropriate if you think that the whole globe is swimming.
>
> (*QNat.* iii, 27.13)

Noting that Book IV begins with a comparison of the present to the parlous state of humanity before the flood (*QNat.* iv.a, *Praef.* 14; *Met.* 1.241), Williams suggests that Seneca uses the Ovidian intertext of the deluge to imply the moral motivation of Jupiter's decision to flood the world "without compromising his rationalizing focus in the *Natural Questions* on nature's purely physical workings" (2012, p. 130; similarly, Degl'Innocenti Pierini 1990, p. 194). According to Williams, Ovid's poetic license is then criticised as corresponding itself to the moral vices that will be washed away by the flood. The latter is a particularly valuable suggestion for our purposes and indicates something a little strange about the first idea. Namely, if Seneca had wished to not "compromise" his naturalism, there was available a perfectly good Stoic discourse about the moral purpose of the flood, based upon the equation of nature itself with the Good and *ecpyrosis* as a "purification" (which as Williams mentions, Seneca invokes at iii, 29.5). Using Ovid to underline the Stoic message about the naturalism of providence does precisely what it is not supposed to: it compromises it, since, as Seneca explains, Ovid contaminates the moral seriousness of the depiction with frivolous poetic imagery. But now we can see the real philosophical importance of the parallelism between the critique of Ovid and the purification of the world. Seneca adopts Ovid here not just because, from one perspective within Stoicism, our death provides an

insight into the way the cosmos transcends our particular frame of reference, but because from another equally Stoic perspective, the notion that the world's perfection depends on the destruction of humanity is itself a myth, since the cosmic order is also immanent in us. From the perspective of God, the world, including human vice, is perfect. Only from a human perspective does the world appear vicious.

If from the first perspective Ovid's fable of the flood is the very philosophy that will "wipe away all fables", from the second it is more philosophical to regard Ovid's flood as perpetuating a fable than ventriloquising a philosophy. Conversely, the philosophical aspect of the reading of metamorphoses in terms of the productivity and *divisio* of nature is reinforced. In fact, returning to the section on the various kinds of water, we find that Seneca's crowning example of mutability is described as a fable, but this time one in which we should believe. The example in question is the production of fish in underground caves, a fact reported by Theophrastus, but something that "you would urbanely call a fable" (*QNat.* iii, 17).[48] This remark triggers a digression on luxury: "the works of luxury are more incredible" (iii, 17), in particular the way in which the death of a mullet is studiously arranged for the table to behold. Ostensibly, this digression aims to elicit our belief in the natural fact reported by Theophrastus. Regarding human vice itself as a fact of nature converts what we may otherwise have regarded as fable into philosophy. Why should we be surprised by the production of a terrestrial fish when nature has produced a thing as unnatural as a human being, a creature that feeds on fables – a creature that produces something like the *Metamorphoses*? There is at the same time, an obvious parallelism between the diners intent on the dying mullet and the readers about to consume the feast of destruction that Seneca will shortly present in the description of the flood, a display that likewise "we condemn but do not put aside".

The underlying sympathy with the *Metamorphoses* that persists through Seneca's criticisms of Ovid's *lascivia*, and that is even from another perspective expressed through those

[48]The text here is uncertain and a minority of scholars would delete the word *fabula*; the sense is in that case preserved by *in re incredibile* (Hine 1996, pp. 51-2).

very criticisms, becomes clear when we note further that the criticisms are modelled directly on a feature of the Ovidian text. Ovid himself signals the image of wolves swimming with lambs as a violation of decorum, and attributes the violation to nature herself. In speaking of the "the immense license of the sea" (*immensa licentia, Met.* 1.309), he recalls his own description (invention, in fact) of poetic license in the *Amores*: "the fertile license of poets ranges into the immense, and does not bind their words to the truth of history" (*exit in immensum...licentia*, *Am.* iii, 12.41-2; Barchiesi 2005, p. 194). Seneca, too, refers to the *licentia undis* (*QNat.* iii, 30),[49] in making the point that the chaos will not last – order will be restored. But even as the purificatory appears from this perspective as the *licentia* of nature, so the restored order will instantly descend, once more, into vice, as the book's closing words remind us that vice is a naturally occurring phenomenon: "the vices are learned without a teacher" (*QNat.* iii, 30). The philosophical aspect of the poem is thus separated from the mythical in contrasting ways. On the one hand, the differentiation revealed within the speech of Pythagoras identifies it with a philosophical perspective, in which the universe is unfolded into its parts, opposed to the poetic license unleashed in the blind chaos of the flood. But on the other hand, the cosmic unity represented by the chaos of the flood identifies it with a philosophical perspective opposed to the distinct forms which are generated by the mostly mythical metamorphoses throughout the poem.

In the following four chapters we shall survey the use of Ovid in three areas of natural philosophy typically regarded as pre-modern – astrology, magic and alchemy – before turning to the mechanical philosophy so closely associated with the scientific revolution. In each case, I hope to show that assessing the role that Ovid is playing in natural philosophy depends on making judgements about the way in which the philosophy itself is supposed to relate to reality, judgements whose contingency is precisely what Ovid's treatment of philosophy, as discussed in this chapter, exposes. In turn, the effects of this contingency are witnessed in

[49] I find *licentia* applied to water only here and in Ovid. Seneca's *antiquus ordo revocabitur* may also be an ironic inversion of Ovid's *chaos antiquum confundimur* (*Met.* 2.299; *antiquus ordo* is unparalleled). Note also that Seneca presents Ovid's Phaethon as an example of a true Stoic in the *De Providentia* (*Dial.* i, 5.10; cf. *QNat.* vi, 2.9 where the allusion is to the Phaethon of Vagellius; see De Vivo 2009).

the way in which successive competing attempts to eliminate myth from science reassert as philosophical what other philosophers had dismissed as mythical and so expose themselves to the same types of criticism. I do not mean to deny a perceptible chronological development: as the Scientific Revolution unfolds, metamorphosis becomes understood more and more in binary terms, either as a purely natural process, perhaps connected with the natural metamorphoses described by Pythagoras, or as fiction. Eventually, references to even the natural philosophical strains of the *Metamorphoses* begin to fall into discredit. But the cultural shift by which the poem comes to be associated with a domain of fiction that must remain unmixed with the domain of fact does not dispense with the problem of the relation of the two, since the role of fiction in sustaining scientific theory itself remains a point of philosophical importance, even as the fictionality of modern science becomes increasingly abstracted from any direct dependence on the specific text of the *Metamorphoses*. Ovid remains at the very least a feature of scientific debate as a polemical tool, the bogeyman to whom any scientist who has erred from the narrow path of truth will be compared. The significance of such a role is again dependent on the perspective from which one regards such errors: as unfortunate by-products of the march towards truth, or, if scientific truths are regarded from an anti-realist perspective, the very substance and essence of that progression.

Chapter 2

Astrology

2.1 Two paths for astrology

The year 1604 witnessed an extraordinary event in the heavens: a new star flared up in the foot of the constellation of the Serpent-bearer (*Serpentarius*) and burned brightly enough to be seen by the naked eye, even in daylight. After a couple of weeks it faded, but the agitation it had caused among astrologers did not. Not only was the star itself astonishing, it had occurred in the vicinity of a rare and eagerly expected planetary conjunction – the meeting of Jupiter and Saturn in a new 'trigon', a triplet of star-signs through which the conjunctions of the planets cycle, which changes every 240 years. The crowning wonder, however, was the subsequent approach of Mars, which formed a triangle with Jupiter and Saturn. The new trigon was associated with the element of fire, as was Mars: so the fiery trigon would play host to a fiery triangle. Famines, plagues, fires, revolutions, even the coming of the Antichrist, were proclaimed from every corner of Europe. Meanwhile Johannes Kepler (1571–1630), who at the time was working for the Emperor Rudolf II at Prague, observed the commotion with wry detachment. For him, the new star was primarily a confirmation of the theory of Copernicus, which suggested, against the claims of Aristotle, that heavenly substance was mutable. In a treatise on the star (now known as Kepler's Supernova) published in 1606, he

set out to separate the "nonsense" of the prognosticators from "the nature of things" (KGW i, p. 165), attacking the association of the images of the zodiac with elemental qualities. To believe that the images of the star-signs corresponded to some property in the stars themselves was tantamount to "idolatry" and belief in "fictitious planetary spirits" (KGW i, p. 172-3).[1] The images were clearly arbitrary conventions – invented by sailors and farmers as an aid to memory and for ease of communication (KGW i, p. 168; cf. p. 182). There could be no such thing as a "fiery" trigon (KGW i, p. 177-180).

Kepler framed his criticisms of astrology as a separation of mythology from mathematics. To underline the artificiality of the celestial images, he listed the several conflicting aetiologies and representations of the Serpent-bearer offered by the poets: "So great is the license of the poets that every day they transmute this Idol from a man into a woman...Everything is in vain; no fable squares [*quadrat*]" (KGW i, p. 220).[2] While here he speaks of myth in general, this kind of poetic license is something that Kepler elsewhere associated specifically with Ovid, drawing on a long tradition of associating Ovid with astrology. The next conjunction of Jupiter and Saturn in 1623 occasioned another flurry of pamphlets (it had occurred in Leo, an emblem on many European coats of arms) and another critique of astrology from Kepler, the*Discurs von der grossen Conjunction* (1623). Kepler compared those who drew a connection between the star-sign Leo and the fortunes of noble families to those who might read some logic into the progression of Ovid's *Metamorphoses*: "this house forges itself a new Astrology, through such consequences driven by necessity as by which dreams hang

[1]Cf. the criticism in the *Harmonices Mundi* (1619) of the kind of astrology which reasons "as if the *apotelesmata* [celestial events] were sorts of Gods" (KGW vi, p. 265, l. 36).

[2]*Quadrat* is a pun on geometry. Kepler's critique of the poets here is consonant with his approach to Lucan in the debate with Hewart discussed by Grafton (1994, pp. 187-191). Kepler argues against Hewart (24th December 1597) that Lucan displays no accurate astrological knowledge, but only a simplistic association of the star-signs and planets with their – in Kepler's view – fictitious properties (KGW xiii, p. 158). Kepler grew increasingly frustrated with Herwart's requests to clarify the astrological comments of various ancient poets (KGW xiv, p. 46). We may also note that Kepler excused his failure to decipher Galileo's anagram communicating his discovery of the rings of Saturn (decoded as *altissimum planetam tergeminum observavi*), on the basis that he lacked the exposure to Latin poetry that would have allowed him to recognise the not-so obscure poetic word *tergeminum* (Horace, *Odes* 1.1.8; Verg., *Aen.* 4.511 and 8.202; Ovid, *Tr.* 4.7.16; *Lucr.* 5.28; Prop., *El.*, 4.7.52). Kepler certainly did know Latin poetry very well, however (see OG x, pp. 506-7; xi, p. 16 for the exchange with Galileo).

together, or as the *Metamorphosis* of Ovid contains a *Method*" (KGW xi.2, p. 233). He once complained about a superficial analogy in Ptolemy in the same terms – "not firm, nor legitimate and logical enough, but rather symbolic and similar to the sort of consecution or connection of the fables in Ovid's *Metamorphosis*" (KGW, xxi.2 p. 39).

Kepler stands at the bridge of a chiasmus in the history of science. Astrology eventually falls into decline on the basis of critiques such as his. This decline is a rule by which we measure the progress of the Scientific Revolution and the emergence of our own modernity. For Kepler himself, however, a reformed astrology remained the central object of scientific research. Kepler was against idolatry and against importing the *Metamorphoses* into natural philosophy, but he was nonetheless an astrologer – "a Lutheran [i.e. iconoclastic] astrologer", as he put it (KGW xiii, p. 184). He had his own interpretation of the religious significance of the supernova and his own theory of the nature of planetary influence, which he compared to magnetism.[3] This influence, Kepler explained, operated on us constantly, affecting us in imperceptible but profound ways. Shades of Ovid returned here as Kepler emphasised that sensitivity to this influence – uncanny, uncontrollable – was "common to the Stag along with Actaeon" (KGW i, p. 319). Yet this was the very same force, operating on the earth and planets, which ensured that they continued to rotate and to orbit the sun in an orderly fashion. Its discovery by Kepler and the expression of its operation in mathematical laws constituted the first definitive proof that the Copernican hypothesis was the right one. In short, Kepler had laid his finger upon the force that Newton would later describe as the force of gravity. Kepler's astrology thus serves as a reminder that astrology was not always the purely poetic fiction that it appears to be today. On the contrary, for a long time – Kepler marks a late stage in this development – astrology had stood in the vanguard of the gradual encroachment of natural philosophy upon medieval theology.[4]

[3]Kepler elevated the importance of the aspects of the heavenly bodies (their angles of separation). The 'influence' exerted by the angles of separation was, until it caused some effect in a natural body, almost entirely abstract and mathematical: nature responded to it through a partly unconscious and inbuilt sensitivity to mathematical proportion (Rabin 1997).

[4]Westman (2011) has sought to portray Copernicus' motivations as primarily astrological, rather than astronomical – not without controversy (Westman 2013).

The foundations of astrology were provided by a range of texts, among which Ptolemy's *Tetrabiblos*, first translated in the twelfth century, was of particular importance. At the beginning of this text, Ptolemy had enunciated a vital distinction between two sciences of the stars. The first is that "whereby we apprehend the aspects of the movements of the Sun, moon and stars in relation to each other"; the second is that whereby "by means of the natural character of these aspects themselves we investigate the changes which they bring about in that which they surround [i.e. the earth]". Whereas the first was a "sure" and "unvarying science", the second, because it regarded effects in the sublunary realm, had to be conjectural (*Tetr.* 1.1-2). Astrology was, in other words, the science which connected "divine, unchangeable destiny" to "natural and mutable fate" (*Tetr.* 1.3). This intermediate position was the source of its special promise, but also its special danger. A foolish commitment to conjecture would lead to natural and mutable signs being mistaken for the divine identities they only weakly expressed. Kepler's language of idolatry and iconoclasm harks back to that of the Christian fathers who protested against astrology in similar terms. Augustine associated astrology with the mistake of "taking signs for things" (*signa pro rebus accipere*) that for him characterises pagan religion in general (*De Doctr. Christ.* ii, 21.32, iii, 7.11). To read one's fate in the stars was to fall prey to the deceptions of demons (*De Doctr. Christ.* ii, 23.35).[5] These strictures never lost their force, for conjecture never lost its ability to mislead. But the growth of natural science required, on occasion, setting them aside.

The rehabilitation of astrology in European culture in the twelfth and thirteenth centuries, spurred on by the translation of Arabic texts in Sicily and Spain, thus holds a deeply ambiguous place in our narrative of the Scientific Revolution: it was at once a superstition that had to be destroyed, and the foundation of the progressive attitude to nature that would make this destruction possible. God was no longer simply beyond every visible sign; instead he could, in some way, be approached through them. Astrology became "the bond [*ligamentum*] of natural philosophy and metaphysics" (Zambelli 1992, pp. 218-220). In practice, this

[5]These sentiments found a new life in the late sixteenth century, when astrological determinism was condemned in a series of papal Bulls.

meant combining Arabic astrological traditions with Plato's intimation in the *Timaeus* that the stars had been entrusted with the fabrication of mortal bodies and Aristotle's observations in *On Generation and Corruption* about the role of the celestial bodies, particularly the sun, in stimulating earthly change (North 1986). At the same time, the animism of the *Timaeus*, which had inspired the errors of the Stoics, and the latent atheism of Aristotelian teleology had to be carefully avoided: the stars could not be presumed to dictate fate on the basis of their own natures – they were merely the *instrumenta* of God, mechanically carrying out his will. As I shall argue, it was this problematic status of astrology that encouraged readings of Ovid in astrological terms, while simultaneously generating suspicion as to the appropriateness of reading Ovid in this way. After briefly sketching some of the background of the relation between Ovid and astrology in the twelfth century, I shall take as a case study Albert the Great of Cologne (1206–1280), tutor of Thomas Aquinas (1225–1274) and perhaps the most prolific and influential Aristotelian of the thirteenth century. The first stage of my argument shall be to show that Albert's reading of Ovid depends on the interplay, examined in Chapter 1, between transcendence and immanence, fantasy and naturalism, in the *Metamorphoses* itself.

After Albert, the story of Ovid's relation to astrology becomes more complicated. In the second stage of my argument, we shall see that the tensions in Albert's readings of Ovid find themselves mapped onto disputes that arose between the radically different interpretations of the relation between nature, the stars and God that ensued. In particular, I identify two different paths along which the rehabilitation of astrology proceeds. The first path rose from the stars towards heaven, aiming to approach God through the stars – that of the Neoplatonists, inspired by Marsilio Ficino (1433–1499). The second path led from the stars back down to the sublunary world, towards a more comprehensive system of astral causality – this was the route epitomised by the influential Paduan Aristotelian, Pietro Pomponazzi (1462–1525) and exemplified in one important respect, as we shall see, by Roger Bacon (1214–1292). Each understanding of the position of the stars grappled with the fundamental

tension of astrology in different ways and incurred its own particular problems. Each was related to a correspondingly different way of reading Ovid. Whereas Aristotelian astrologers tended to emphasise the mechanical activity of the planets, doing so partly to distinguish this activity from the divine will that ultimately directed it, Platonists criticised Aristotelian astrology because it appeared to extend a mechanical determinism over too much of nature.[6] They associated this mistake with the sin of taking Ovid's poem too literally, as if the gods really were planets with divine powers, and so distanced themselves from physicalist allegories of Ovidian metamorphosis. At the same time, they did not reject the physicality of the gods entirely, but proposed a reformed astrology in which the physical efficacy of the stars was preserved as a poetic fiction, conveying the non-mechanical activity of divine beings, such as angels and demons.

Thus, even as Ovid was adopted to control tensions between a commitment to the realism of conjecture tantamount to idolatry and a purely instrumental use of Ovidian myth as mere heuristic fiction, the reality of this commitment to the *Metamorphoses*, like the stag bursting out of Actaeon, could not be contained. If philosophers criticised confusions of Ovid with science in others, they often found themselves subject to the very same reproach because of the literalistic attitude to astrological fictions implied by these very criticisms. Kepler, for example, in rejecting what he saw as an "Ovidian" anthropomorphisation of the planets, reduced the poetic fictions of the Platonists, originally proposed to some extent as heuristic devices, to literal facts; at the same time, he carried this literalness into his own notion of astral causality, which became "Ovidian" in a different way. Kepler's astral forces are inescapable, mechanical and dehumanising – they are also non-existent in the exact form he proposed. Rather like Actaeon, then, Kepler was transformed from spectator into the object of spectacle, from predator into prey. Whether this transformation is deserved or undeserved (whether Kepler truly does confuse Ovidian fiction with fact) will remain a subject of debate,

[6]For how medieval philosophers negotiated Aristotle's own concept of heavenly "animation", see Dales (1980). While the notion that the stars were moved by intelligences was fairly common currency, the equation of these intelligences with souls was a far more controversial notion, since it threatened the proposition that the heavens were moved by *separate* intellectual substances.

depending on whether Kepler's astrology is looked at through its derivation from traditional astrology, or its anticipation of Newton's laws, just as, in the debate over the justice of Actaeon's transformation "each side found reasons" (*Met.* 3.255). By focussing on the twists and turns of Ovidian reception in debates over astrology we catch our first glimpse of the way in which the philosophical tensions that Ovid had built into the *Metamorphoses* ensured that what appeared as mythology to one philosopher would appear as science to another. Finally, having uncovered this complexity, we shall be better placed to understand the phenomenon of Ovidianism in the philosophers that we associate more closely with the Scientific Revolution.

2.2 Ovid between idolatry and astrology

The divinity of the stars was, as Seznec showed, one of the most important means by which pagan gods had persisted in art and popular belief throughout the Middle Ages: "The gods survived as sidereal demons" (Seznec 1953, p. 63). The gods of Ovid's *Metamorphoses* persisted alongside them, and, from the end of the eleventh century, connections between the two began to be drawn with increasing regularity, both in commentary on the poem and through the blending of iconographies.[7] Fundamental to this connection was the phrase from the cosmogony in which, echoing the *Timaeus*, Ovid had described how "the stars and forms of the gods hold the floor of heaven" (*Met.* 1.73). At the same time, Ovid's poem contained in the Phaethon episode one of the most vividly animistic descriptions of the zodiac in all ancient literature, so vivid that it has been called "catasterism in reverse" (Barchiesi 2009, p. 164, citing Galasso 2000, p. 812). The default medieval attitude to fables of gods and animals in the sky was of course suspicion, and from a certain perspective Ovid

[7]The first chapter of Pierre Bersuire's (a.k.a. Berchorius, 1290-1362) *Ovidius Moralizatus* (circa 1350), entitled *De Formis Figurisque Deorum*, became one of the most influential sources for the iconography of the gods. Bersuire based his iconography upon the tableaus of the gods in Petrarch's *Africa*, but altered the order of exposition so that it would correspond to the order of the planets and included astrological properties in his description. See Desmond (2001, p. 7) and Barkan (1986, pp. 173-4) for specific examples of cross-pollination between the Ovidian and astronomical traditions.

represented a particularly debased version of astrology, not just in the Phaethon episode, in which Ovid presents "the backfiring or implosion of didactic astrology" (Barchiesi 2009, p. 164), but throughout, in his particularly debased depiction of the gods – in Juno's jealousy that Callisto "occupies the sky instead of me", to give one example (*Met.* 2.513). In a scene that could only be interpreted as a representation of demonolatry, Ovid had even depicted Medea praying to the stars to accomplish magical effects on earth (*Met.* 7.193).

By having the constellations and even the gods transform into animals, therefore, Ovid had not merely represented the stars as gods, he had depicted a continuous degeneration from the worship of stars to the worship of terrestrial objects. As the anonymous author of an 11th or 12th century commentary on the *Metamorphoses* (*Hauniensis* 2008) explained, this slippage was the origin of paganism: "finally forgetting the creator, they [the pagans] worshipped his creation, first the celestial creatures like the moon and sun and other planets; then descending gradually they were converted to wood and stones" (Dronke 1985, p. 181). Ovid's very language occasionally made it unclear just where in the cosmic hierarchy his gods were positioned. The encyclopaedist Gervase of Tilbury (c. 1150–c. 1228), for example, interpreted the line usually taken to refer to the planetary gods as a reference to a lower rung of aerial demons: "Ovid indicated that the spirits that the pagans worshipped were in the air when he said "the stars and forms of the gods hold the floor of heaven" (Gervase of Tilbury 2002, p. 100, citing *Met.* 1.73). For the Cistercian monk Thomas de Vaucelles (also known as de Perseigne, 1190—1246), metamorphosis was the name of diabolical species of "wisdom" that deformed the image of God into a beast (PL ccvi, col. 249a). This degeneration would eventually lead to the worship of purely man-made images. Thus the Benedictine schoolmaster Conrad of Hirsau (c. 1070–1150) wrote in his popular guide to ancient authors (*Dialogus Super Auctores*) that Ovid "practices idolatry for the most part in the Metamorphosis" (Huygens 1970, p. 114).

On the other hand, precisely the fact that this descent had begun from the stars and only passed to lower natures from there, facilitated Ovid's growing popularity in the twelfth

century: it implied the possibility of ascent by the same path. The author of *Hauniensis* 2008 suspected that Ovid had not succumbed to polytheism himself, but had simply reflected the way in which natural philosophers, lacking the strength to investigate God directly, had sought to approach Him through nature. The possibility of interpreting Ovid's gods as "celestial creatures" was thus proof that Ovid "knew that there was only one god" and had adopted the apparatus of polytheism for the sake of convention (Dronke 1985, p. 181). Such an interpretation was rendered more likely by the very same debasement of the divine image that led others to charge Ovid with idolatry: so absurd was Ovid's depiction of the gods that it appeared as a diagnosis of the absurdity of idolatry rather than the practice itself. Above all, the possibility of seeing the notion of celestial gods as a mere conceit was built into the Platonic frame, which presented a single god not subject to the stars, but their creator. Elsewhere, the superiority of the divine to the whole of creation, including the stars, is clearly marked: Jupiter "moves the earth, the sea, the stars" (*Met.* 1.180). Similarly, the superiority of the human soul to the rule of the stars is expressed by Ovid's proclamation of his own destiny: he will "be borne above the high stars, eternal" (*Met.* 15.875-6).

Ovid, who had expressed the contingency of the representation of celestial gods and creatures particularly well, thus helped facilitate the increasing popularity of astrology, which had to be careful not to take its polytheistic implications too literally. Conversely, the rise of astrology in the twelfth century facilitated the rise of the concept of "metamorphosis" in philosophy more widely, along with allegorising interpretations of the *Metamorphoses*, as a means of access to the divine. An example of this synthesis is furnished by the famous twelfth century Platonising Ovidian poem, the *Profuit Ignaris*, which emphasised the stars as the first level of communication between God and nature. The poem is, in Dronke's words "a triumphant affirmation" of "the merger of the earthly and the heavenly" (1968, p. 237), a merger made possible by the transmission of souls to earth through the stars. Contemplation of this downward migration produces a corresponding mental ascent:

> When we examine the sky, when we philosophise about the course of the planets, that the seats of souls are in the stars, that they must go forth into things from there when they are born, so as to undergo an appropriate fate, migrating here and dwelling here in bodies...we fly to the stars in our mind
>
> (Dronke 1968, p. 456)

It seems likely, however, that many would still have taken a rather dim view of the blatant polytheism of the *Profuit Ignaris*. It was more common for the rise of metamorphosis to be balanced by a careful suspicion of metamorphic idolatry. Alain de Lille (c. 1116–c. 1202) made metamorphosis an upwards as well as a downwards vehicle for the soul, explaining that man can pass out of his state by "descending into vice or ascending into heavenly contemplation; and such passing over [*excessus*] is called *extasis* or *metamorphosis*" (PL ccx, col. 6073c-d). At the same time, in the *Regula de Sacra Theologica*, Alain cited the errors of "metamorphosaters" as a reason not to apply corporeal terms to God: "although these things [corporeal terms] could be said *per causam* about God, they are removed in order to remove suspicion from God, because of the idolaters, who imagined that the natures of things were gods, and the heretical metamorphosaters,[8] who believed that God was distinguished by corporeal lineaments" (PL ccx, col. 638a). While there was a sense in which corporeal terms could be validly predicated of God, to do so was misleading and dangerous. Astrology could defend itself against this danger to the extent that it held itself forth as a purely conjectural science. One could, in the same way, emphasise that – in the line which Gervase quoted, for example – Ovid had not placed the gods themselves in heaven, but merely "the forms of the gods".

It was thus that Ovid became known in the thirteenth century as the *ovum dividens*, the one who divides the cosmic egg and shows us its elements.[9] As Bynum relates, "the

[8] *Metamorphositae* – the word seems to have been coined on the analogy of *anthropomorphitae* (those who worship anthropomorphic gods).

[9] First appearing in the vulgate commentary of c. 1250 (Coulson 1991) and then c. 1290 in the *Commentaire du dialogue de Placides et Timéo* (Thomasset 1982), this etymology becomes a commonplace (see also the *Ovide Moralisé* 1.199-202). See Dronke (1985, p. 166). For more on Ovid in the Middle Ages, focussing on the *Ovide Moralisé* see Harf-Lancner, Mathey Maille and M Szkilnik (2009).

complex sense we find in Isidore and much later in Pietro d'Abano and Giles of Rome that matter is fertile, maternal, labile, percolating, forever tossing up grass, wood, horses, bees, sand or metal, was enhanced in the high Middle Ages by the enormous influence of two works: the opening and closing books of Ovid's *Metamorphoses*, a paean to "bodies changed into new forms" and Aristotle's essentially biological model of change in his *On Generation and Corruption*" (Bynum 2011, p. 233). The image of the cosmic egg, expressing the analogy between microcosm and macrocosm, again hints at the fundamental role of the stars as the motors of this corporeal flux. Yet Bynum shows that the renewed interest in the transformative power of nature is combined with a "profound resistance to metamorphosis" as far as personal identity is concerned, a resistance manifested, among other ways, in a commitment to "a kind of Platonic-Pythagorean outflow and return" (see especially 2001, pp. 79-111). I would add the following two points to Bynum's account. First, the resistance to metamorphosis was expressed not simply through the concept of "outflow and return" proper to the Stoicising (Neo-)Platonism of the *Profuit Ignaris* and its ilk, but in part through the continuing importance of traditional theology, which insisted on a fundamental divide between nature and the creator. Second, Ovid's poem does not fall purely on the side of corporeal change. In associating his more overtly philosophical opening and closing books with a series of mythological metamorphoses, Ovid himself had pointed to the transience and ultimate unreality of corporeal forms. There was a parallel perspective from which the rise of astrology, insofar as it was premised on a finally ineradicable distinction between corporeal flux and divine perfection, pointed in the same direction.

2.3 "Fables or tables" in Albert the Great

It was not the custom of Albert the Great to support his scientific arguments with mythological allegories. His chief guide, Aristotle, had discouraged him from this practice – fables were "vulgar reasonings, which are outside the bounds of philosophy" (EC xvi.2 p. 544, l.



Figure 2: Ovid displays the cosmic egg (Ovide Moralisé, Bruges, late 15th century).

63-4). Thus, while there are scattered references to myths throughout Albert's vast oeuvre, there is – with one exception – nothing that could be described as a systematic application of Ovid to natural philosophy. This exception occurs in a commentary written by Albert on a Pseudo-Aristotelian text about the interaction of the stars and four elements, one in which, as we shall see, the tension between natural philosophy and theology became particularly acute: the *De causis proprietatum elementorum* (1251–4). Albert accessed this text, which was probably composed in Basra in the ninth century, through the popular translation of Gerard of Cremona (1114–1187), one of the most prolific translators of the period. While the *De Causis* covered a great variety of topics, its longest argument was devoted to disproving the hypothesis that sea and land would change their places over the course of thousands of years. Surprisingly, however, this was not the hypothesis that Ovid was summoned to defend, as he would be by the geologists of the eighteenth century. Albert agreed with his author that such a transformation was impossible, given the speed of even the slowest of the celestial revolutions. Since the only possible mechanism for such changes was astrological influence, movements of the sea, if they were occurring, would have affected coastal cities in recent history.

Instead, Ovid appeared in the explanation of a subsidiary point raised in this argument, namely, the cause of the great flood in the time of Noah, which Albert believed to be reflected in the tale of Deucalion and Pyrrha. As Pseudo-Aristotle had correctly (in Albert's view) stated, this flood was a result of a conjunction of planets in the sign of Pisces. Albert claimed that Ovid had known this explanation and expressed it in his *Metamorphoses*. His discussion of the Biblical flood then opened onto two further questions – the causes of the "flood of fire" recorded in the time of Phaethon and the explanation for the regeneration of the animals after the deluge. Ovid was brought to bear on this sequence of topics in an increasingly cautious way. In fact, on the question of the regeneration of the animals, Albert finally produced two directly contradictory readings of the poet. Many factors surely coalesced to bring Ovid to Albert's attention on these topics. Plato's discussion of Deucalion

and Phaethon in the *Timaeus* was important, as was the use that Seneca had made of the *Metamorphoses* in this context in the *Natural Questions* (see Chapter 1, section 4).[10] But I would emphasise in particular the radical incursion upon the terrain of theology that Albert's explanation of the flood represented. Albert explains at the beginning of his exposition:

> There are those who attribute all these things to the divine disposition and say that we should not seek any cause for them except the will of God. We agree in part, because we say that they occur at the nod of God, who governs the world, for the punishment of the evil of men. But we say that God does this by means of a natural cause, of which he himself is the first mover, who gives all things to be moved.
>
> (EC v.2, p. 76, l. 75-82)

This was a daring undertaking. Albert's opinion would, for example, be listed around twenty years later (1277) in a series of condemned doctrines, focussed on astrology, published at the University of Paris. According to one commentator, his account "annihilates faith in the universal deluges having occurred and occurring through divine retribution" (Hissette 2001, p. 875). It is probable that Albert was exceptionally drawn to Ovid on this occasion because of the theological difficulties generated by his naturalising explanation. Without relinquishing the objective of natural philosophy, he sought to minimise the damage by insisting that he was not seeking the "causes of God's will" but only the *instrumenta* through which that will was accomplished. To do this, he mobilised the two complementary tendencies in Ovid's poem analysed in Chapter 1. On the one hand, the envelopment of Ovid's gods within the natural world suggested that the operation of the divine will could be sought in natural objects. On the other hand, the very materiality of these gods could be emphasised to prevent any confusion between the transcendent Christian God and his

[10] Albert knew the *Naturales Questiones* extremely well, as is demonstrated by his *Meteora*. He borrows phrases from it in order to describe the conflagration. Seneca reports a doctrine of Berossus according to which a conjunction of all the planets in the sign of Cancer would bring the flood of fire, in the sign of Capricorn the flood of water (*QNat.* iii, 29.1).

instrumenta. In practice, therefore, Albert combined an astrological interpretation of Ovid's myths ("fables or tables", as he joked elsewhere; AMB viii, p. 154) with several warnings about their inaccuracy. This bivalent interpretation made it possible for later astrologers to hold directly opposing opinions about just what was "naturalising" about Albert's account – the treatment of nature as a divine instrument or the absolute distinction between the instrument and God himself. It also allowed the allegorisation of Ovid to be both attacked and defended in different ways on both sides.

Albert dug deeply into the details of the Ovidian language in order to illustrate his theory of celestial influence on the elements. Ovid depicted Jupiter descending to earth because floods are not triggered by celestial events alone, but occur only when there is the requisite combination of celestial and terrestrial conditions. The council of the gods was an astrological conjunction of all seven planets, and Ovid's lines on the hierarchy of gods expressed the hierarchy and co-operation of celestial powers (*Met.* 171-4). To be more specific: "the people of the gods and the overturning of the house of Lycaon" expressed the burning effect of the rays of the assembled planets on two subordinate bodies, Pisces and the moon, which, in turn, being watery, endow these rays with a power over terrestrial waters (EC v.2, p. 79, l. 4-26).[11] Turning to the causes of the conflagration, we learn that the four horses of the sun (*Met.* 2.153-4) represented the four "causes that the sun has for moving fire" (EC v.2, p. 82, l. 68-71).[12] The myth of Phaethon of course represented the conflagration, and, again, Albert drew specific details from Ovid: in the case of fire, the lower elements were not causes (Jupiter did not descend), but it was necessary for the vapours which were opposed to fire to be overcome. Ovid's remark that the fire gave illumination in the absence of the sun – "there was some use for the disaster" (*Met.* 2.332) – made the point that the

[11] *Populus deorum et successio domus Lycaonis nihil aliud fuit nisi immissio luminis stellarum in signis Piscis et in luna: quia stella dicitur combusta, quando est sub radiis alterius, et maxime solis.* The translation of *successio* is somewhat forced, but it seems clear enough that Albert is describing the *vindica flamma* (*Met.* 1.230) with which Jupiter assails the house of Lycaon (emending to *secessio* hardly helps).

[12] According to a common allegory the four horses represented the sun's four positions in the sky (De Conches 1997, pp. 112-3): Albert is unique, as far as I am aware, in interpreting these positions in terms of the astrological affects generated by the sun's alignment with other bodies.

fire was indeed able to overcome these vapours (EC v.2, p. 84, l. 62-65). Nonetheless, the denser vapours were not banished so much as set alight, whence various comets were produced "and this is why the poets wanted to say that a spark from the incineration of the world reached even as far as Phaethon [the star]" (EC v.2, p. 84, l. 69-71). Albert continued: Sol's retirement signified the eclipse that brought an end to the fire, and it lasted for a day because the effects of an eclipse last longer than the eclipse itself. A contributing effect was the smoke that rose from the earth, creating thunderbolts and rain: hence the lament that Ovid had put into the mouth of the earth and Jupiter's answering bolt.

Despite the amazingly close correspondences between the Ovidian text and the details of Albert's theory, Albert emphasised that key aspects of both the Deucalion and Phaethon myths were entirely misleading. The ways in which they were misleading were, moreover, closely related. With regards to the myth of Phaethon, its central content as explained by Plato – the theory that the fire had been caused by a deviation in the path of the sun (*exorbitatio*) – was impossible. The true cause was, as in the case of the flood, a planetary conjunction, this time in a fiery star-sign. Observation showed that the sun never wandered so far as the star of Phaethon in its epicycles. Albert noticed that the theory of *exorbitatio* resembled a mythical theory about the heavens that had been mentioned by Aristotle (EC v.2, p. 83, l. 43-46; p. 83, l. 84-p. 84, l. 13), namely, the theory contained in the myth of Atlas that the motion of the heavens was sustained by a soul (*Cael.* ii.1, 284a15-284b5). As Albert put it in his commentary on the *De Caelo et Mundo*, the inventors of the myth of Atlas "did not mean that a giant holds up the heavens and stops them falling, but rather that there is a *soul* which suspends them, as a soul suspends the foot or wing of an animal. And this soul they said to be the same kind of soul as in animals" (EC v.1, p. 108, l. 20-22). Following Aristotle closely in the *De Caelo*, Albert discounted this theory (which Aristotle had said would subject the soul of the heavens to the torment of Ixion) in favour of the theory of sempiternal natural motion. The suggestion in the *De causis* was that the Atlas myth presented *exorbitatio* as a kind of trepidation in the effort exerted by the soul sustaining the

motion of the sun. It is probable that in adding this detail to the Aristotelian interpretation, Albert read Aristotle's allegory of Atlas directly into Ovid.[13] The error of Ovid's Phaethon myth could, in any case, be identified with the error of attributing a soul to the heavenly bodies.

Although it had accurately expressed the astrological causes of the flood, the Deucalion myth contained a closely related problem in the way in which it portrayed the restitution of life afterwards. Albert weighed up the opposing theories of Avicenna and Averroes on the question of how this restitution occurred.[14] According to Avicenna the stars had the ability not just to move the elements, but even to animate them, and indeed not just to create the souls of the imperfect animals – flies, worms, and suchlike – but also of complex "perfect" animals, including human beings. Averroes, on the other hand, maintained that the power of the stars could generate only imperfect life. Albert agreed with Averroes that stars could not generate humans "because a rational soul is not educed from matter, but, according to the philosophers, is given by the first giver" (p. 86, l. 72-4). He equated Avicenna's position with an aspect of the *Timaeus* that the Stoics would later appropriate, according to which "the god of gods made there be a seeding of the universe and handed it to the stars to be embodied and followed out [*exsequendum*]" (p. 86, l. 19-21).[15] This remark followed immediately upon an allegorisation of the stones of Deucalion and Pyrrha, which thus interpreted the animation of the stones as the effect of an immanent divinity transmitted by the stars:

[13]Viarre assumed this to be the case, noting that Albert calls the myth a *fabula Pithagoricorum* (EC xii, p. 52, l. 26-27), and comparing Albert's phrase *quod mundus totus est unum animal* with Pythagoras' *est animal tellus* (EC xii, p. 52, l. 28-29; *Met.* 15.432).11 But Aristotle discusses a Pythagorean theory that likens the universe to an animal immediately after treating the Atlas myth (*Cael.* 284b6-34); hence, Aristotle may be the sole source. In support of Viarre's claim we may note that the theory related by Albert is reminiscent of Ovid's description of Atlas during the fire: "Atlas scarcely sustains the falling axis of the world on his shoulders" (*Met.* 2.296). It is also worth noting that in Nicole Oresme's (1320–1382) later discussion of the same Aristotelian *locus* the fables of both Atlas and Ixion are illustrated with Ovidian quotations (Oresme 1968, pp. 302, 304). Given the Ovidian context of Albert's references to Atlas in the *De Causis*, then, it is certainly not unlikely that he attributed the error of the Atlas myth directly to Ovid.

[14]On the conflict between Averroes and Avicenna on this issue, see Bertolacci (2013)

[15]See *Timaeus* 41c9; Albert alludes to the translation by Calchidius (*ego universi generis sementem faciam vobisque tradam*), which itself bears the marks of the Neoplatonic appropriation of Stoicism.

> In all these ways, and others similar, Avicenna argues that the primary substances of any animal are able to be produced by stars, and then multiplied by coitus. The fable about Deucalion and Pyrrha seems to say this too. For the great mother, whose bones they were ordered to cast behind them, is earth, and the bones stones, in which the primary mixture of earth with moisture appears; and they are coagulated when, first, warmth and dryness extracts their moisture and fluid, and then when cold forces moist vapour into them. Because of this stones are icy cold. And they [sic] wanted to say that their posterity was behind their backs in the mixture of the primary qualities and elements and with the virtue of the stars, which is understood to be moving in the divinity [*numine*] that moves Deucalion and Pyrrha.
>
> (EC v.2, p. 86, l. 4-18)

Ovid had erred in both the myths of Deucalion and Phaethon, then, by attributing soul or animating influence to natural objects which, on Albert's view, were merely the lifeless *instrumenta* of God. After discussing the application of the myth of Atlas to that of Phaethon in the *De Causis*, Albert had been moved to make a more general warning about philosophising with fables:

> And although all these things are fabulous they also have something of the truth. Still, because it does not belong to the philosopher to speak in this way, but properly [*proprie*], therefore let them be dismissed and let the truth, as it is, be unfolded.
>
> (EC v.2, p. 84, l. 10-13)

If Albert's turn to Ovid in the *De Causis* was mysterious in light of his avoidance of myth elsewhere, this rejection of myth in the full flow of Albert's allegorical exposition is a mystery within a mystery. Far from abandoning myths, Albert continues after this determination to outline the several truthful elements in Ovid's description of the fall of Phaethon, which I have discussed above. I would interpret this slippage as a sign of the tensions that motivated

the appeal to Ovid in the first place. Albert in effect concedes that even allegories of myths have the tendency to convey the false notion of an animistic or purely autonomous nature implicit in the myths' outer form. The process of allegorisation, although it is a method by which in theory one can strip away the misleading element of the myth to arrive at the proper projection of divine power beyond the purely natural objects that manifest it, does not dispense entirely with the shell of the fable that is allegorised, but the impropriety of the fable continues to be felt even after its truth has been revealed. This was precisely the reason for Albert's avoidance of allegory elsewhere. At the same time, Albert was in the process of demonstrating the way in which nature could act without divine intervention to accomplish God's will. There was therefore some genuine value in the mistake which identified the power of the heavenly bodies with the power of the divinity that transcended them. Albert thus proceeded with his allegories, even as he rejected not only the outer form of the fables, but the propriety of the allegorical method *tout court*, underlining both that allegory is always incomplete, and that it ought to be completed.

Although Albert never elaborates on his reason either for rejecting or for continuing with the allegories, we can shed some light on his thinking by looking more closely at the source from which this rejection of myth was derived. Albert appears to have had an eye on the passage about Atlas in the Latin translation of the *De Caelo* by Gerard of Cremona, which followed up with a similar denunciation of the use of metaphors and myths within philosophical argument (omitted from our modern editions as an interpolation). In his commentary on this passage of the *De Caelo*, Albert had repeated Gerard's claim that when they framed the myth of Atlas the mythologists "spoke by crossing [*transeundo*] what they said, referring the sky to these lower things [i.e. animals] through a fictional similitude [*per similitudinem fabulosam*]" (EC v.1, p. 108, l. 20-23). Gerard himself had gone on to compare this "crossing" to the false analogy by which there was understood to be a multitude of gods: "they said this in a *crossing* style [*sermone transeunte*], as in the multitude of the gods, since they did not speak with sufficient rigour" (p. 108, l. 75-7). In doing so, however, he had

conflated two Aristotelian passages that were in fact quite different in tenor. The remark about polytheism was indebted to a passage in the *Metaphysics* about the tendency of the mythologists to imagine the celestial movers as gods in human form (*Metaph.* 1074a37-b14). As Albert judged in his commentary on this passage, Aristotle meant in this instance to underline that the myths were not deceptive – rather, the images of the gods were helpful for comprehending the fact that the motor of natural change had to be "a separate intellectual substance" (EC xvi.2, p. 520, l. 16).[16] By contrast, the Atlas myth was not a helpful similitude, it was one which concealed a theory that was itself based on a false similitude between God and created nature. In this instance, the philosophical content of the myth had been contaminated by the mythical image in which it was expressed. In other words, Gerard conflated passages expressing two different ways in which the comparison of the stars to deities could be understood: either as a useful analogy for understanding the separation of the divine from nature, or as a mistaken attribution of divine qualities to nature itself.

By himself failing to clearly differentiate between these two approaches to myth, Albert made it very difficult to disentangle the extraction of "mere" analogies from Ovid (consonant with a separation between nature and divine will) from a commitment to literal polytheism and animism. But, on my reading, the entanglement of these two perspectives was the whole purpose of the turn to mythology. Ovid's myths were called upon to serve a double function. They offered, on the one hand, a naturalising explanation for events hitherto understood only in terms of divine will: this involved, despite protestations to the contrary, taking the content of the ancient mythology, to some extent, literally. On the other hand, they showed that connecting divine will to its natural effects could easily be misleading. Although the instrumentalisation of the universe for God's purposes endowed it with a kind of divine activity, the universe was not an animal and the stars resembled the divine precisely because their form was most abstract, rational, and devoid of the changeableness of sublunary matter.

[16]Fables "give knowledge of certain physical things in a fashion appropriate to the vulgar" (*faciunt vulgariter innotescere quaedam physica*; EC xvi.2, p. 519, l. 81). Similar interpretations of the Aristotelian passage are offered by Yaffe (1979) and Bodeus (2000).

These two functions had to remain inseparable, since God's will was at once expressed by his *instrumenta* and not reducible to them. Thus, Albert stripped away one interpretation of Ovid's gods as purely natural powers in order to restore them as representations of a divinity separated from nature, but this rejection of one naturalistic interpretation was all along intended to serve another – the astrological one – in which the divine and the natural were inseparably intertwined.One can therefore see Albert either as using allegory to express a mistaken attribution of divine powers the stars, or as presenting this mistake as such by insisting on the allegories' impropriety.

In the case of the animation of the stones, the interdependence of the natural and the mythological produced several years later an inversion of Albert's original interpretation of the myth. The supernatural metamorphosis which had earlier been interpreted as expressing a dangerous seepage of the divine into nature was now reclaimed as natural precisely on the basis of the essential role it had reserved for divine providence. Thus, in the *De XV Problematibus* (c. 1270), Albert focussed specifically on the fact that it was necessary for the couple to survive:

> The perfect animals cannot be born from the constellations alone; hence Plato in the book of the *Timaeus* and Ovid, when speaking about the floods of the elements which resulted from the deviations of the stars, also say that Pyrrha and Deucalion were saved so that the future seed of human generation would be preserved. And since man is the image of the first cause, it is more probable that man was constituted by the first cause than that he proceeded into being in some other way.[17]
>
> (EC xvii.1, p. 38, l. 54-65)

[17]There is also a second, less violent contradiction in the allegory of the myth that Albert mentions in the *De Mineralibus*, and attributes to Empedocles (AMB xvii, p. 6b). Accord to Albert (possibly extrapolating from Aristotle's *De Anima* 4010a4-7), Empedocles took the labelling of stones as *ossa* to indicate that stones are generated by digestive heat in the same manner as bones. In that passage, as in the *De Causis*, Albert insists on a contrary (less animistic) hypothesis in which stones are generated by cold.

Albert's two readings of this myth were again accommodated by the intricacy of Ovid's own interweaving of myth and science. Ovid had deliberately juxtaposed the miraculous story of the stones of Deucalion and Pyrrha with a Lucretian account of the spontaneous generation of the other animals (*Met.* 1.416-421; cf. *Lucr.* 5.797-808), mixing mythological and natural scientific motifs in both accounts. For example, he had included in the metamorphosis of the stones an aetiology for men and women which invited interpretation of the miraculous transformation in terms of the conservation of seed (Deucalion's stones produced men, Pyrrha's women). This had been noticed by, for example, Arnulf of Orléans (fl. 1175), who interpreted the tale in strictly biological terms: "Physics is touched on here. For in the union of man and woman if the sperm of the man is predominant a male is created; if of the wife, a woman is created" (Ghisalberti 1932, p. 202). Ovid had also described the metamorphosis of stones in chemical language – "the part that was moist with some fluid and earthy is converted into the use of a body" (*Met.* 1.407-8) – language which Albert apparently picked up and explained in the remarks on the origin of stone he inserted into the middle of his first interpretation of the episode.[18]

This earlier interpretation involved transforming what was originally a mythological explanation of the origin of humans into a naturalistic one, more like Lucretian spontaneous generation. Yet for Albert, it was precisely the naturalism of the account that made it fantastical, since the origin of the soul had to be sought in a higher cause. Here too, he was anticipated by Ovid, who implicitly remythologised the theory of spontaneous generation by associating it with the production of the mythical Python (*Met.* 1.438-40). The second allegory inverted this inversion, reinterpreting the supernatural aspect of the preservation of Deucalion and Pyrrha, which could be co-ordinated with the divine origin of the soul, as the basis for its reconciliation with natural philosophy. Thus, Albert responded to Ovid by offering not simply a naturalisation of myth, but rather two natural philosophical interpretations departing in two different directions: one, the interpretation of the animation

[18]Aristotle had explained bones as originating from the earthy parts of food in *On the Generation of Animals* (*Gen. an.* 743a4).

of the stones in terms of spontaneous generation caused by the stars was to be regarded as mythical just because it denied the moment of supernatural intervention in which God himself creates man; the other, according to which God saves Pyrrha and Deucalion in order to circumvent the necessity of creating humans anew was to be regarded as truly natural just because it preserved the supernatural account of human creation. Similarly, astrology in general would soon depart in two different directions, which would develop on the basis of Ovid's own conflation of the mythological and the natural opposing interpretations of what was naturalistic in Ovid's poem. Through this shared encounter with Ovid, each path would reveal what separated it, as well as what bound it to the other.[19]

2.4 Roger Bacon and the naturalisation of religious history

"The masses cling to [him] as to angels, and think that [he] knows everything..." remarked Albert's contemporary, Roger Bacon (1214–1292), of Albert's reputation at the University of Paris. But, continued Bacon "his writings are full of infinite falsities and vanities. Never was there such abuse in this world" (1859, pp. 327-3). Bacon's criticisms related primarily to what he perceived as the neglect of experimental science and especially mathematics in Albert's work.[20] But one wonders whether Albert's allegorisation of myths from the *Metamorphoses* also fuelled his distaste. Bacon was particularly intolerant of Ovid. In his great compendium of philosophy, the *Opus Maius* (early 1260s), he numbered Ovid among the "vain and prurient poets, who want to give pleasure and do not give care to providing any benefit". In the *Opus Minus*, as an example of the ignorance of many interpreters of the Bible,

[19] According to an adage that acquired some popularity in the nineteenth century, in the course of his life Albert had turned from theology to natural philosophy and then back to theology again, so that Albert himself underwent a double metamorphosis: *Albertus repente ex asino factus philosophus et ex philosopho asinus.*

[20] Bacon's comments are directed against an anonymous *auctor* and the identification with Albert has been doubted, although it seems probable (Hackett 1980).

he cited the misapplication of a line of Ovid to a passage of Ezekial which, on the basis of the parallel, was understood to refer to sex: "the scripture of God is ridiculously and impudently converted into Ovidian license and baseness" (Bacon 1859, pp. 355-6).[21] Similarly, in the *Opus Tertium* (c. 1267), he lamented that children were brought up on "Ovidian fables and insanities", in which "they hear the multitude of gods, and that men and the stars are gods, and other creatures, and infinite errors about the future life..all superstitions are found in them as a religion, and all corruptions of morals". Bacon apparently saw no useful purpose whatsoever in such errors, by which, he complained, "young men conceive evil morals from their youth, and once they have tested them, grow up in them unceasingly" (1859, p. 55). Yet he was deeply sympathetic towards pagan philosophy (Hackett 1991) and shared almost all the assumption of Albert regarding the vital role of the stars as the first instruments of God's will.

What would be the consequences of a rigid adherence to Albert's dismissal of fables from philosophy in favour of "the truth, as it is", if astrology nonetheless remained the central preoccupation of philosophy? From one perspective, certainly, the result would be the elimination of myth. But from another perspective, in the case of Bacon, the result would be the substitution of certainty for conjecture, and thus the further encroachment of the naturalism of the astrological outlook upon the traditional domain of religious revelation. From this perspective, in other words, Bacon's rejection of myth increased the hold of the myth of astrology itself, whose literal truth became amplified. In particular, Bacon accepted from the Arabic doctrine of great conjunctions, according to which the meetings of Jupiter and Saturn determined particularly significant events in world history, not just the explanation for natural events like the flood, but even the explanation for the rise and fall of religions. The main authority on the astral causes of religious history was the Baghdadi astrologer Albumasar (Abu Ma'shar, 787–886), who had suggested that in the year of a great conjunc-

[21]The line *sedisti in lecto pulcherrimo et mensa ordinata est* (Ezekial 23:41) was compared to Ovid's *Et quia nuda fui, sum mensa paratior illi* (note, *mensa* is now corrected to *visa*; *Met.* 5.603). Bacon observed the *lectum* more probably referred to a dining couch than a bed.

tion, a meeting of Jupiter with another planet would determine the advent of a new religion, with characteristics corresponding to the planet.[22] In his section on "moral philosophy" in the *Opus Maius*, Bacon provided one of the first substantial endorsements of this belief. But there was a problem: Albumasar himself was a heathen and his subordination of religion to the heavenly motions served no apparent moral purpose. Indeed, it threatened to place Christianity, as if it were a merely worldly phenomenon, on the same level as the other religions of Albumasar's scheme, Judaism (Saturnine), Zoroastrianism (Martian), Egyptian religion (Solar), Islam (Venereal), Christianity (Mercurial) and the religion of the anti-Christ (Lunar). The potentially mythological aspect of Bacon's naturalism was registered by the fact that in seeking to reconcile his extension of astrological influence over religious affairs with the transcendence of the Christian God, Bacon drew, curiously enough, on a second Ovid: not the Ovid of the *Metamorphoses*, but an Ovid imagined by a contemporary Christian, the pseudonymous author of a popular poem in three books entitled *Ovidius De Vetula seu De Mutatione Vitae.*

The *accessus* to the *De Vetula* declared that the manuscript had been discovered in Ovid's tomb,[23] "consumed by no time" (a refutation of Pythagoras' image of *tempus edax*: "consuming time"), though all but the most cursory of readers perceived that the work was not by Ovid.[24] The real author may have been Richard de Fournival, who might have composed the poem around the same time as Albert wrote his commentary on the *De Causis Proprietatum Elementorum.*[25] For someone as hostile to the author of the *Metamorphoses* as

[22]The relation between the Jupiter-Saturn conjunctions and the conjunctions of Jupiter with the other planets is a little unclear. In Burnett's translation from the Arabic, Albumasar writes "the differences of faiths in the periods, religions and dynasties are from [Jupiter's] mixture with Saturn and the mixtures of the other planets with it [Jupiter]" (Ma'shar 2000, vol. 1, p. 45). The Latin translation reads: *diversitates legum in temporibus et in hominibus sectarum et in vicibus regnorum fiant ex complexionibus Saturni vel ex complexionibus ceterorum planetarum cum eo* (Ma'shar 2000, vol. 2, p. 28).

[23]Colker (1970, p. 323) observed that the motif of the *capsula eburnea* in which the author says the poem was found was based on the story that a medical text of this name had been found in the grave of Hippocrates.

[24]It is often assumed that Bacon believed Ovid to be the author, but Bacon only says that the work is "ascribed" to Ovid (*in libro qui ascribitur* Ovidio: Bacon 1900, p. 252).

[25]The complete work survives in over thirty manuscripts and several printed editions, the earliest from Perouse (circa 1474, P. Pétri and Jo. Nicolai) and Cologne (1479, J. Koelhoff). The attribution to de Fournival rests on a single source and has been doubted (Klopsch 1967, pp. 84-9). Among many works, de

Roger Bacon, the poem appealed precisely because, in it, "Ovid" described how – after a bad experience with a *vetula* – he had come to reject his immoral ways and embrace the coming of Christianity (the *mutatio vitae* referred to in the title). The new Ovid explicitly proclaims the unity of God (*De Vet.* 3.69) and rejects the doctrine of metempsychosis (*De Vet.* 3.451-457). Thus, unlike the tradition of allegory, which for Bacon confused Ovid's myths with Christian truth, this poem polarised the pagan and Christian Ovids, apparently tracing a mutually-exclusive conversion from the one to the other. While in the first and second books, Ovid tells of his formerly dissolute lifestyle and romantic adventures, in the third he introduces us to his new, more respectable, pursuits and produces a lengthy dissertation on natural philosophy. In particular, he explains his intention to pursue God through the study of astrology:

> Then I mean to hunt the creator through his creatures
> And finally to seek, through the causes of things,
> The supreme cause, with its transcendent intellect,
> To know through these that he is to be revered above all.
> I shall devote myself to him with a perfect heart
> And shall consume my days in the things which the signifiers
> As instruments through which the first cause rules all as it desires,
> Have given [to be seen?], at the nod of he who moves all.[26]
>
> (*De Vet.* 3.34-41)

At the climax of his natural philosophical treatise, Ovid discussed the doctrine of great conjunctions in terms echoing those of Albert (compare *De Vet.* 3.594-610 with *De Causis* 1.2.2). But he significantly altered the implications of what Albumasar had written regarding the associations of the religions with the planets. As Burnett (2006, p. 137) has noted "it

Fournival also composed an astrological autobiography (*Navitas*) and a *De Arte Alchemica*, neither of which are published. See Paris (1841) for an overview of his life. Mozley (1938) provides a useful summary of the *De Vetula* and Lefèvre (1861) a medieval French translation.

[26]The translation is difficult: *diesque / consumpturus in hiis, quos nutu cuncta moventis / Significatores, velut instrumenta, dederunt / Per que prima quidem regit omnia causa, prout vult.*

was not Abu Ma'shar's intention to arrange the religions of the planets in chronological order, let alone suggest that each one succeeded its predecessor in a providential way." The author of the *De Vetula* transformed the planetary associations of the different religions into a providential scheme that could provide an explanation for Ovid's own conversion. Ovid interpreted the Venereal religion, with its promotion of pleasure, as that of his own times and claimed that he had himself witnessed a conjunction of Jupiter and Saturn in the sign of Virgo (a Mercurial sign) from which he was able to infer the coming of Christ. It was this transformation of the original doctrine that attracted Bacon to the poem, which he quoted liberally in the *Opus Maius* (Bacon 1900, pp. 253-267; Burnett 2006, p. 137).[27] As the Florentine Neoplatonist Giovanni Pico della Mirandola (1463–1494) later put it, Bacon "used the testimonies of no author more gladly" (Della Mirandola 2004, vol. 1, p. 66). On the one hand, then, astrology had been bent into the service of Christianity in order to underwrite the separation of the Christian from the pagan Ovid. On the other hand, the means by which this Christian supremacy had been proven were highly suspect. The subjection of religion to the physical world could hardly escape censure and – whether by deliberate artistry on the poet's part, or merely the logic of *mutatio* – the reformed Ovid could not be entirely separated from his less immaculate forebear.[28]

Part of the complexity of the *De Vetula* lies in the ambiguity of Ovid's "Venereal" religion, originally Islam, which was associated by Christians with paganism because of its apparent preservation of various pre-Islamic gods and rituals, but was nonetheless monotheistic. When pseudo-Ovid argues for the unity of God, it is not quite clear whether he is doing so as a Roman or as a proto-Christian. Despite his intimations of the coming of Christ, Ovid professes himself unable to fully understand its significance (*De Vet.* 3.669). Perhaps the

[27]The philosophy of the *De Vetula* corresponds in other respects with that of Bacon (particularly its cosmogony of light), encouraging Burnett to speculate that Bacon could have been the author. Hackett (1991) argues conversely that the *De Vetula* was the source of these other aspects of Bacon's natural philosophy. It seems most likely, however, that Bacon and the author of the *De Vetula* had a common source in Bacon's teacher, Robert Grosseteste (c. 1175–1253).

[28]Godman (2000) views the supposed conversion as ironic: for him the whole poem is a satire on the hollowness of learning. Perhaps the fullest reading of the *De Vetula* as a literary work is that of Miller (2010), who focusses on Pseudo-Ovid's obsession with bodily flux.

central difficulty was that the decision to "hunt the creator through his creatures" rather than pursue theology was itself inherently problematic. Indeed, astrology is even marked as atavistic by Ovid's description of the Egyptian religion, which consisted in the worship of the stars (*adorent militia caeli*, *De Vet.* 3.536). It was on this subject that pseudo-Ovid had come closest to endorsing the *Metamorphoses*, specifically the idea explicitly criticised by Bacon, that the stars were gods:

> Although something about these [the stars] is found in my greater book [the *Metamorphoses*]
> Where I said, following the words of Plato
> "Lest any region be deprived of its animals
> The stars hold the celestial floor and the forms of gods"
> I do not want to say here anything but what is certain; wherefore
> It is not now necessary to decide, since it is not clear
> Whether the celestial bodies live; nor is it necessary
> To affirm what it is rash and uncertain to deny.
>
> (*De Vet.* 3.42-49)

Demats says, in line with his claim that "there exists no relation" between the philosophy of the *De Vetula* and that found in more conventional Ovidian allegoresis (1973, p. 134, n. 136), that these lines are "refuting" the quotation from the *Metamorphoses* (1973, p. 134, n. 122). But such a refutation in fact seems explicitly to be judged "rash", and despite the *De Vetula*'s polarisation of pagan and Christian Ovids, the poem clearly does draw on some of the same assumptions as the allegorical tradition. For example, pseudo-Ovid explains his earlier promotion of metempsychosis as a concession to the "vulgar" (*De Vet.* 3.457) and interprets the multiplicity of gods as a way of speaking (*idiomalis*) about "particular forces" (*De Vet.* 3.81). These complexities are ignored by Bacon, and while Bacon's interpretation was followed by some, many others were far less enthusiastic about calling this poem into

the service of Christianity.[29] Even Pierre D'Ailly (1351–1420), otherwise a staunch defender of Bacon's astrological providentialism, attacked Bacon's attachment to the *De Vetula* in his *De legibus et sectis contra superstitiosos astronomos* (1410). While D'Ailly believed that the rise and fall of false religions could be attributed to the stars, he insisted that the true faith had a supernatural cause. Moreover, he disliked on principle the recourse to fiction in matters of simple fact: "if the Law of Christ had been foreseen by Ovid, it would have been attributed to him [i.e. by the ancients]. But our Law is most true – it does not need false worship." (Gerson 1706, vol. 1, p. 784). The German philologist Thomas Reinesius (1587–1667) summed up the majority view of the poem in later times: "learned enough, but too much given to astrological vanities" (Reinesius 1670, p. 204). No one objected more strongly to the astral determinism of religion than Pico: "the piety of true religion is offended by no error more", he wrote (2004, vol. 1, p. 134).[30] For Pico, Bacon's adoption of the *De Vetula* to mark a strong distinction between Ovidian myth and a properly Christian astrology had brought him close to dispensing with God altogether.

2.5 Pico, Ficino, and animistic astrology

In other quarters, the rejection of Ovidian myth within an astrological framework led in a very different direction from that of the comprehensive astral causality of Roger Bacon.

[29]Wenzel (2011) says that Ovid's description of the conjunction heralding the birth of Jesus was used in at least four sermons (no sources given). The poem was still cited positively in the sixteenth century by, for example, Cardano (1654, sig. **6r). Some reasons for both the popularity and contentiousness of the *De Vetula*'s astrological scheme are discussed by Pomian (1986).

[30]It is testament to the complexity of the poem that pseudo-Ovid was not unfurnished with defences against such criticisms. The theologian Francesco Giuntini (Junctinus, 1523–1590), for example, quoted the *De Vetula* in a defence of judicial astrology *against* Pico: "And Ovid in the *De Vetula* rejects fate, saying "And fools follow foolish fate" (*De Vet.* 1.513; Junctinus 1581, vol. 1, p. 1154). This rejection of fate occurs not in the context of astrology but in the discussion of games of chance in the first book. Ovid had also included a specifically astrological reflection on fate, however: "[The stars] are moved by certain numbers and certain law. / It is clear that this is what the elemental motion of the world obeys / As long experience teaches. / And those who, out of whatever ignorance, despise them / And dare to lacerate them with teeth of envy / Cannot oppose their motions. / They are the organs of the first, the instruments of the supreme. / If I acquire his sympathies, after death / I shall be held obliged to none of the gods" (*De Vet.* 3.58-67). Bacon had included a similar disclaimer: "the will is not compelled, but the body is altered by the forces of the skies and then the soul, joined to the body, is strongly excited and effectively induced, although compelled in nothing" (1900, p. 267).

Pico's *Disputationes adversus astrologiam divinatricem* (1496) represented the culmination of a long tradition of critique of astrology which also often highlighted the *Metamorphoses* as a source of error. For philosophers of this bent the promotion of astral causality in the manner of Bacon did not so much lead away from Ovidian myth as directly reproduce it: Bacon remained, as it were, an unconverted Ovid. According to the Parisian scholastic Nicole Oresme (c. 1320–1382), for example, zodiacal astrology was "almost completely founded upon the fables of poets who feigned that good princes or some other things were transformed into stars". This is clear, according to Oresme, "from the ancient histories and books which make mention of the original of these names, like Aratus, Ovid and Fulgentius, and many others" (Oresme 1952, p. 88). Pico composed the *Disputationes* under the influence of the puritanical reformist Savonarola (1452–1498), whose hostility to Ovid resembled Bacon's: "Oh, you will say the *Metamorphoses* of Ovid is pure good. I shall respond: fantastical Ovid, crazy Ovid, which I shall say just like that."[31] Within a general critique of the "parabolical similitudes" governing astrological reasoning, Pico repeatedly likened the doctrines surrounding the Zodiac to poetic fable: "Let me properly state my final judgement about these inventions: they have arisen from corrupted philosophy and the fables of the poets" (2004, vol. 2, p. 272).[32] Pico's older contemporary, Marsilio Ficino, deployed the same trope in his only recently published *Disputatio contra iudicium astrologorum* (1477), where he pointed to the origin of astrological beliefs in "puerile similitudes". "All of this is poetic metaphor, not reason or science", Ficino argued (Kristeller 1937, vol. 2, p. 43).[33] In

[31]These words are from a sermon delivered in 1496 (Savonarola 1962, vol. 2, p. 88). See also the criticisms of the poets in the posthumous *Compendium Totius Philosophiae* (1982, vol. 1, p. 263). The accusation that Pico had operated as a mouthpiece for Savonarola was made, for example, by Bellanti in his reply to Pico (1502, sig. Aiir, Qr, Qiir-v).

[32]Cf. "Instead of the heavenly bodies [you shall see] portentous effigies, and stars transformed into animals and a sky full of fables, nay, for the true sky, a made-up sky, not made by God, but invented by astrologers" (vol. 1, p. 42); "Everything has been taken from a certain human similitude, against the nature and dignity of the heavens, deduced not by philosophical reasoning, but by poetic license or mere fables and arbitrary fictions" (vol. 2, p. 78)".

[33]As an example of such puerile similitudes arising from Ovid's *Metamorphoses* that Ficino would certainly have known, we could take Boccaccio (1313–1375), who applies an astrological (Macrobian) interpretation of the poetic gods to Ovid's story of the transformation of the Gods during the Typhonomachy. According to Boccaccio, "Ovid says that Jupiter changed into a ram so that he could describe the nature of Jupiter in this way". Like a ram, Jupiter is a "mild and meek planet" as well as the "leader of the flock" of gods.

the case of Pico and Ficino in particular, however, the condemnation of traditional astrology as mythological was associated with the promotion of a "true astrology" in a different guise, and an Ovidianism of a different kind.

Consistent with Pico and Ficino's careful criticism of pagan myth and astrology in favour of "pious" philosophy was a certain mistrust of Ovidian metamorphoses. As Ficino explained in his treatise on the immortality of the soul, natural transformations follow a strict principle of order. "Otherwise", he emphasised, "things would never stop until they were transformed into God, who is the first principle of all." That is, there would remain no embodied nature: "or if they were never transformed into god, they would be moving blindly and pointlessly. So they do not seek any cause, but a proximate one." (FPT iii, p. 182). In other words, transformations occur in a way proper to the individual object being transformed, such that the object does not lose its identity in the transformation: "For all things strive towards [God] as their end *according to the capacity of their nature*, and desire to become similar to him *in their own way*." (FPT iv, p. 226-8; my emphasis). Ficino never mentioned Ovid as any kind of philosophical authority. A rare reference to the poet in one of Ficino's letters informs us that Ovid's muse was Euterpe – goddess not of history or philosophy, but pleasure (Farndell 2006, p. 48). He uses the term metamorphosis only twice and without great seriousness: once in an analogy between the transformative power of patience and alchemical metamorphosis (Ficino 1576, vol. 1, p. 803), and once as he jokes that he will have to transform Monte Vecchio into a magnet in order to compel his iron-hearted friend to visit him (1576, vol. 1, p. 844). The one instance, well known, where Ficino has been thought to draw on Ovid – in his interpretation of the fable of Narcissus – is in fact inspired by Plotinus and mistakenly attributed by Ficino to "Orpheus" (Ficino 1944, p. 100; cf. 1576, vol. 1, pp. 843, 925).

Given the overwhelmingly spiritual motivations of Pico and Ficino, why do we speak of "metamorphosis" as the "central image" of Ficino's philosophy (Barkan, 1986, p. 231).

The sun became a crow because both planet and animal are connected to divination, and so on for the other gods (2011, pp. 612-617, interpreting *Met.* 5.327-331).

Why has Ficino been hailed as the "most significant theoretician of myth in his epoch" and held to have "infused new life into the pagan myths and instilled a new sense for the Renaissance of their utmost seriousness" (Allen 1984, p. 137)? Why was he lambasted by one contemporary critic for "the invention of Platonic godlets" (Erastus, 1574, p. 36) and another for "everywhere poison[ing] the sacred with the profane" (Crispo 1594, p. 106)? The Ovidianism in scholarship, poetry and art – indeed the entire rediscovery of poetic mythology that characterises the Renaissance – would draw heavily from the Ficinian revival of Platonism. Spenser and Chapman are famous examples of this tendency in English poetry; Michelangelo in art. But the relation of such readings to Ficino himself is deeply ambiguous. In many cases, Ovid is perhaps mobilised not so much as a representative of Ficino, but as a challenge to Ficino's Platonism. Poliziano's *Favola di Orfeo*, for example, is sometimes interpreted as such a response (Coleman 2012). Writing of Chapman's *Ovid's Banquet of Sence* (1595), Kermode went as far as to claim that "Ovid, in fact, is the counter-Plato" (2013, p. 102). A minor symptom of this tendency can be found in the Aristotelian Agostino Nifo's (1473–post-1538) refutation of Ficino's claim that beauty can only be enjoyed by the higher senses (thought, sight, hearing). Nifo quoted a line of Ovid to show that all the senses have this capacity.[34]

There is an important (possible) exception to the rule of transformation according to nature in Ficino: the human intellect. The intellect has no proper nature but is characterised instead by the ability to receive the forms of all things. In striving towards God, therefore, the intellect becomes all things – "since the intellect seeks to understand all things and in understanding is entirely clothed in their forms, it seeks consequently to become all things." (FPT iv, p. 246). Pico was more explicit in locating the metamorphic powers of the human being outside the strict constraints of natural laws. In his famous *Oratio de hominis dignitate* (1486), he imagines God addressing Adam thus:

[34]These instances 'mistaking' Ficino for a pagan sensualist are drawn from Kraye (2002). Nifo refers to Ovid's description of Galatea: "sweeter than a ripe grape, softer even than down of a swan and thickened milk" (1549, p. 102, citing *Met.* 13.795-6).

> The nature of the other creatures is defined and constrained within the laws that I have set down. You, constrained by no confines, will determine your own nature by your own free will. I have placed you in its hands.
>
> (Della Mirandola 2012, p. 117)

He went on to cite the "famous metamorphoses among the Hebrews and the Pythagoreans" as springing from the same idea (Della Mirandola 2012, p. 124). But Pico's central concern was not, strictly speaking, man's ability to transform himself into a different nature – it was not "the vision articulated by Pythagoras at the end of Ovid's *Metamorphoses*", as his editors suggest it was (2012, p. 76). Rather it was man's power to take himself outside of nature entirely – to become a god (Copenhaver 2002). It was this otherworldly impulse that produced the hostility towards astrology: "let us spurn the terrestrial, disdain the celestial", he proclaimed in the same oration. "Disregarding all that is of this world, let us fly off to the otherworldly court that is near to the most eminent Divinity" (Della Mirandola 2012, p. 134). Similarly, insofar as Ficino ever speaks of a substantial transformation of the intellect or anything else, it is not a transformation into any other nature, which would be impossible, but a transformation into God. As he goes on to say of the intellect, "it strives to become God, in whom all things are, while it strives to become all things" (FPT iv, p. 246). A word search in Ficino's *Opera Omnia* reveals that instances of *transformatio* or *conversio* in Ficino are almost always associated with the phrase *in deum* ("into God"). This, the only true transformation, takes place outside the bounds of nature and perhaps even only after death.[35] Pico and Ficino thus generally avoided naturalistic interpretations of "metamorphosis". Where dealing with fables of transmigration, they interpreted them in line with medieval Platonism as referring to the condition of the soul. Pico's follower, the Cabbalist Johann Reuchlin (1455–1522), was entirely in tune with Pico when he declared of Pythagoras (in a work included with Pico's *Opera Omnia*) that he could not "be brought to

[35]Ficino vacillates as to whether the donning of a likeness is a true transformation, whether the intellect somehow "touches", or simply mirrors God, and whether such a transformation can ever occur before death (FPT iv, pp. 224-5). Insofar as the transformation involves a passage from the natural to the supernatural, it is "unthinkable" or "beyond understanding" (FPT iv, p. 28, 40; vi, p. 132).

believe that a man so excellent in omniscience and so serious taught Ovid's fable about the transmigration of souls" (1517, sig. G5r).

Two characteristics of Ficino's attitude to myth are especially worth emphasising. The first is myth's subordination to religious revelation. Ficino popularised the concept of a *prisca theologia* (or *philosophia pia*), which served to explain the concordance between paganism and Christianity. According to Ficino, a tradition of pious philosophy had begun with a divine revelation (albeit not Christian) obtained either by Hermes Trismegistus or Zoroaster, and had been transmitted by a succession of sages to Plato.[36] As Ficino put it, all of these sages "covered up the sacred mysteries of the divinities...with poetic shadows [*poeticis umbraculis*]" (TP vi, p. 6).[37] Ficino's promotion of this concept was in line with his development of the notion of *furor poeticus* as a strictly supernatural inspiration. If Ficino allowed that poets could "sing the divine mysteries", they did not owe this gift to anything in the physical world (like the stars). Rather, the poet had to "subject his soul to God" (2008, p. 50; cf. Falco 2007). Both the *prisca theologia* and the *furor poeticus*, insofar as they legitimated myth, did so by reaching beyond it to an original moment of divine illumination substantiating the "poetic shadows". The second characteristic of Ficino's theorisation of myth worth noting – really just an aspect of the first – is its overwhelming focus on divinities as the objects of allegorical interpretation. Ficino's main sources for allegories of the gods were the writings of Plato and the Neoplatonists (especially the theologies of Proclus and Hermias) and the

[36]In the preface to his translation of the *Hermetica* (Ficino 1576, vol. 2, p. 1836), Ficino gave the following sequence: Hermes, Orpheus, Aglaophemus, Pythagoras, Philolaus and Plato. In the *Theologia Platonica* the order given was: Zoroaster, Hermes, Orpheus, Aglaophemus, Pythagoras, Plato (FPT vi, p. 6). For a discussion of this discrepancy, see Walker (1972) and Idel (2002).

[37]Though this remark seems most appropriate to Orpheus as the sole *vates* among the sages, Ficino's phrasing suggests that all of the philosophers made use of "poetic shadows". Pico develops this implication more explicitly, as in one of his *Conclusiones*: "Aristotle himself concealed that diviner philosophy [i.e. "the mysteries of the Cabala"], which the ancient philosophers veiled beneath fables and myths, under the appearance of philosophical speculation" (Farmer 1998, p. 546). In the *Disputationes* Pico suggests that all philosophy is "almost" fable because of its detachment from Christian truth: "the Christian truth does not need these fables [referring to the link between Christ's birth and celestial events]; according to the Christian truth, even the serious articles of philosophy are almost fables" (2004, vol. 1, p. 104).

hymns of Orpheus. A "poetic shadow" means for him, by and large, an anthropomorphic divinity.[38]

To appreciate why Ficino and Pico became associated with Ovid, we must summon back into service a now somewhat suspected tradition of interpretation, which Copenhaver (2002) has labelled "Kantian" (grouping under this title Warburg, Cassirer, Kristeller, Randall and Yates, spanning a period very roughly from 1900–1975). This interpretation argues that the drive to escape the confines of the material world so evident in Pico and Ficino is really just the condition, or result, of a more significant turn *towards* the material world. As Cassirer put it, "this turning towards the whole of the cosmos always implies the ability not to be bound to any one part". By seeing the physical world as an ordered whole, the human being recognised the way in which his intellect transcends it; or by extracting himself from the physical world, he created it as a coherent object in its own right. At the same time, "this duality [between subject and object] is not allowed to become an absolute dualism of the Scholastic-medieval variety. For the polarity is not an absolute, but a relative opposition. The difference between the two poles is only possible and conceivable in that it implies a reciprocal relationship between them" (1963, p. 86). The division of subject and object is, in other words, not absolute, but the intellect still infuses nature and vice-versa.

The signature of Pico's "true astrology" (Farmer 1998, p. 552), as expressed in the *Conclusiones philosophicae* and the *Oratio*, is the interpretation of the celestial spheres in a spiritual sense as symbols of the successive emanations of the Sephirot (the ten primary aspects of God in the Cabbala). Among the many different possible significations of the Sephirot, Pico often focussed on the association of each level with angels. Thus, in place of any physical influence on human nature, he substituted a purely intelligible one:

> Just as he [God] rules and governs the elementary mass, inasmuch as it is worse, through the celestial mass, which is better, so it is appropriate that human things

[38]The philosophical tales or *apologi* scattered throughout Ficino's writing present a rather different image, since they incorporated mythographical material from a wider variety of sources, including sometimes literary ones (though not, by my reckoning, Ovid). But it remains the case that these were tales with a moral or religious message rather than natural philosophical allegories.

> be governed not through the mystery of bodies, but of angels, which in nature and dignity are between us and God. Thus, when you descend from God to earth, descend through the sky; when you descend from God to men, descend through angels.
>
> (Vol. 1, p. 442-444)

At first glance, the distinction between the world of angels and of stars produces a neat dualism, but both the intelligible and physical levels emanate from God and meet again in the human being. For both God and man, they are different aspects of the same world. Thus, the impulse to move beyond the stars into the realm of angels produces, through the very motion of transcendence, the mixture of angels into the physical world. This twist guaranteed the operative dimension of "natural magic", since it ensured that purely intellectual processes would have physical implications, just as physical processes could impact the divine world (although Pico remained far less interested in the physical operativity of natural magic than Ficino). It also converted the wariness of poetic metamorphosis and the criticism of astrology as poetic into an apparent affirmation of the truth of the *Metamorphoses*, since it meant that the corporeality of the gods was not entirely deceptive.

An example of such an affirmation can be found in Reuchlin, his hostility to Ovid's Pythagoras notwithstanding. In the first book of his *De verbo mirifico* (1494), Reuchlin followed Pico in subordinating knowledge obtained by observation of the stars to that obtained through "right faith" (*recta fides*): there is no real knowledge, says Reuchlin, but by divine revelation (1514, sig. b6v). This claim prompted an attack on the Epicureans and a digression on the practical possibility of the communion of men with gods, in which Ovid provided the main examples. Reuchlin mentioned Apollo chasing Daphne, guarding the herd of Admetus and serving Laomedon, Jupiter and Mercury visiting Philemon and Baucis, and the transformations of Jove, adding:

> Indeed, nearly the whole book of the Transformation is nothing other than the communion of gods with men or, what will be rather ridiculous, with beasts,

> metals, stones and the rest – [or] even their transmutation [into these things] – so that it must seem even more amazing to the Epicureans that the poets sing that Jove, the greatest, is mingled with all things, even the more lowly.[39]
>
> (1514, sig. c2r)

Thus, the paradox of the otherworldly strain of astrology represented by Pico and Ficino is that the location of causes beyond the physical stars in more spiritual entities led to the "drawing down" (*deducere, trahere*) of these more spiritual entities into nature. At the same time, Copenhaver's criticisms of the "Kantian" interpretation are valuable, for while the reality of the dialectical relationship is undeniable, it does not necessarily take sufficient account of what differentiates the otherworldliness of Pico and Ficino from, say, philosophers in the Aristotelian tradition.[40] The particular identity of Pico and Ficino's Ovidianism, such as it is, derives from the fact that this oscillation of immanence and transcendence, while in theory it expands over the whole ladder of being, down to inanimate objects, is nonetheless in practice focussed upon the highest beings, the stars and the gods of pagan mythology. While apparently admitting that the pagan gods have walked the earth, Reuchlin identifies their transformation into beasts, metals and stones as "rather ridiculous". The dialectical shift described by Cassirer thus produced a natural world very different to any recognisable by Kant – specifically, it was a world populated by angels and gods, the "fictitious planetary spirits" criticised by Kepler.

Pico never produced anything that would conventionally be described as a work of natural philosophy. Ficino did, however – the *De Vita Libri Tres* (1489) – and it is therefore here that the consequences of the rejection of physicalist astrology for natural philosophy are most clearly seen. The *De Vita* was a medical treatise advising scholars what to do to lead healthy and long lives. It began with what appears to be a rather puzzling contradiction regarding its relation to poetry. The opening lines of the proemium presented an allegory

[39]Reuchlin also referred to the "*Metamorphoses*" for a description of the fourfold division of man (into *carnis*, *spiritus*, *manes* and *umbra*), but the lines to which he referred are spurious (1514, sig. g3r).

[40]One might add that despite the similarities between Pico and Ficino when compared to Aristotelians, the rejection of the physical world is generally felt more strongly in Pico than in Ficino.

of Bacchus, signifying the priest (Ficino himself), born again through divine illumination, but Ficino immediately emphasised that in the present work such "sacred mysteries" would be put aside. Instead the focus would be on "physical aid". Just a few sentences later, however, he begs the pardon of his patron if, while attempting to play the medic, "though not wanting to be, I am – even if often not a very good one – a poet" (Ficino, 1989, p. 104). This shift appears motivated by Ficino's remarks that the *De Vita* would need to be read in combination with his work on the immortality of the soul (the *Theologia Platonica de Immortalitate Animorum of* 1482). Whereas the *De Immortalitate* was dedicated to Plato, the *De Vita* would be dedicated to Galen; the former would be the soul of his philosophy; the latter, its body. The implication would appear to be that natural philosophy, because of its detachment from divinity, is inherently "poetic". And yet Ficino had begun as if the turn to "physical aid" entailed a rejection of his initial poetic allegory.

Much of the medicine of the *De Vita*, particularly in the third book, *De Vita Coelitus Comparanda*, was astrological medicine, and concerned methods for drawing down benefits from the stars. In practice, many of Ficino's subsequent invocations of the gods (like the invocation of Bacchus as the sun at the end of Book II) did resemble "sacred mysteries" precisely because they were invocations of the stars.[41] The explicit assumption of the "poetic" status of this astrology functioned just as it did for Albert, to gesture towards the contingent, conjectural nature of knowledge of the physical world. Anything said about the stars in a physical sense would have be taken as a symbolic expression of their divine nature. This assumption of poetic license is surely the best way of understanding the old question of why in the *De Vita* Ficino apparently gives up the concerns he expressed in his earlier piece against astrology.[42] But, at the same time, that divine interpretation had been deliberately

[41]Ficino further compounded the difficulty of separating the sacred from physical allegory by producing a second "sacred" interpretations of Bacchus in his proemium – a "more humble" allegory equating him with wine. If such a "humble" physical allegory was to be included among the rejected "sacred mysteries", how much more sublime must we reckon the equation of Bacchus with the sun?

[42]In 1494, i.e. some time after the *De Vita*, Ficino was still praising Pico's and Poliziano's assaults on astrology. He wrote to Poliziano that in the *De Vita* he had "wandered rather freely and perhaps rather wildly, mixing poetry with philosophy" (Ficino 1576, vol. 1, p. 958).

foreclosed in the work's opening lines rejecting "sacred mysteries". Or rather, it would be supplied only by the *De Immortalitate Animorum*, not the *De Vita* itself. What, then, could one make of the deities of the *De Vita* in their own purely natural sphere? If they could no longer be allegorised as shadowy expressions of a divine truth, they would be directly applicable to nature. So we find the corporeal realm is populated directly by gods in possession of a nature altogether more substantial than conjectural.[43]

The dialectic between the immaterial and material worlds in the *De Vita* takes place through a number of mediating entities, perhaps the most important of which is the *spiritus mundanus*. This "world spirit", a substance between the world's soul and body, is described as "a body *quasi* non-body" (Ficino 1989, p. 256).[44] By its relative spirituality, it ensured that the physical activity of the heavens would remain the dependent instrument of more metaphysical powers; while, at the same time, by its relative corporeality, it permitted a greater acceptance of the physical efficacy of traditional astrological forces on terrestrial matter, through that matter's more spiritual parts. In theory, physical forces could be said to determine human nature through their impact on the human *spiritus* without jeopardising the freedom of the soul, which maintained strictly immaterial. But the introduction of *spiritus* as a layer of corporeality between the soul and body severely complicated any neat distinction between a transformation in the soul and a transformation in the physical world. As Ficino described the spirit in his work on the immortality of the soul, it could be physically influenced by the moral content of the soul:

> If it is asked what the figure of this body [the spirit] is, we reply, following the Mages, that various simulacra of different animals arise from vapours in the same way. For the soul makes itself especially like the animal whose life it has imitated

[43]Kaske and Clarke interpret Ficino's assumption of the label of "poet" to refer only to those mythological elements that lie beyond the standard association of the gods with the twelve planetary spheres; the latter they call "practical" rather than "poetic/rhetorical" (Ficino 1989, p. 39). I do not think that this distinction can hold much force, however, since it is not mentioned by Ficino and the non-standard allegories also link the gods to natural powers.

[44]For an introduction to Pico and Ficino's astrology, see Yates (1964, pp. 64-116). Further analysis of Pico is supplied by Rabin (2007) and Rutkin (2008), and for Ficino see the introduction to Ficino (1989).

> in its morals: an entirely similar character and disposition would appear [in the soul], if it could be discerned by any sense. Likewise, in a certain way, it fashions a similar figure in its shadowy body [the spirit], if at any rate a subtle body can be coloured and shaped by the forceful character and disposition of the soul.
>
> (FTP vi, pp. 193-4)

This theory elicits a somewhat grudging concession to unspecified tales of bestial transformation: "And thus perhaps the transformation of men into beasts among the ancients should be understood" (FTP vi, p. 4). But the full extent of this link between intellectual and physical metamorphoses – advanced here quite tentatively – is only fully realised in Ficino's advocacy of astral magic in the *De Vita*, particularly in his theory of talismanic images. Ficino suggested in this work that by manufacturing appropriate images in gross materials, under the right celestial conditions, one could attract higher powers into those materials.[45] This would be almost literally to transmute deities into metals and stones. Such a practice had been described by Albert, but Albert's student, Aquinas (1225–1274), emphasised that Augustine had sternly warned against it:

> What Porphyry believed is false, as Augustine says in *De Civ. Dei* x [11], that "by observing the motion of the stars in the whirling heavens, men can fabricate matching powers of the stars on earth for achieving various effects – with herbs and stones and living things and certain specific sounds and voices and figures and certain images": as if the effects of the magical arts come forth from the power of the celestial bodies. But as Augustine adds there: "this whole matter pertains to demons, who play games with the souls that have submitted to them."
>
> (*Summa Theologiae* 2a, 2ae, 96, ad 2; *Ed. Leonina* ix, 332a-b)

Conscious of such strictures, Ficino carefully denied "even the shadow of idolatry" in the *De Vita* (Ficino, 1989, p. 343). He embraced the use of such talismans only as part of

[45]The main discussion of this topic as far as Ficino was concerned was in the possibly pseudo-Albertian *Speculum Astronomiae*, though it is also touched on in the *De Fato* (EC xvii.1, p. 76, l. 38-43) and *De Mineralibus* (AMB v, esp. 51b-52a); see Rutkin (2012). Following Zambelli (2010) many scholars now believe the *Speculum* to be genuine, though possibly written in collaboration.

a purely natural magic.[46] Yet he also repeatedly referred to "demons" in his explanation of how such magic worked. The word "demon" had various meanings in Ficino's Platonic sources: a kind of guardian angel, a part of the human soul or the soul itself, a celestial or elemental creature, or a messenger between the celestial and terrestrial worlds. At times, the medial position of demons in the cosmic hierarchy seems to have served to underline that the celestial forces attracted by natural magic were part of the physical cosmos: "Let no one think that by the matter of the world certain divinities completely separated from matter are being drawn down, but rather demons and the gifts of the animate world and of the living stars." At one point he seems to equate demons directly with the *spiritus* of the stars (1989, p. 351).[47] Yet just as *spiritus* itself is invoked not just for its materiality, but also its relative *immateriality*, so there are other moments in which it appears that Ficino invokes demons for contrary reasons: not for their proximity to matter, but rather for their almost divine nature. He notes, for example, that the Egyptian practice of making "gods" by drawing demons into statues was designed by the magi as a means of convincing the masses that there were divinities beyond the physical world: "they would show that there are gods [*numina*] by luring demons into statues" (Ficino, 1989, p. 389). Ficino adds that Plotinus had called the very forces entrapped in these statues "seminal reasons" and "gods" (Ficino, 1989, pp. 385-6), yet he usually locates seminal reasons in the world's soul, beyond its spirit. Like the pagan gods with which they are associated, Ficino's demons are only physical to the extent that they represent the metaphysical, and only metaphysical to the extent that they act on the physical.

We shall have the opportunity in the next chapter to examine the widespread cultural association of the *Metamorphoses* with demons, which did much to associate Ficino with

[46]Ficino exploits a concession of Aquinas, who had suggested on the basis of a similarity between figure and substantial form that a carved figure could perhaps dispose the material in which it was carved to the eduction of a corresponding specific form (Copenhaver 1984). But for Aquinas, in line with the restrictions on astrology mentioned above, it could not determine any individualising accidents of this form. Ficino appears to have endowed such talismans with a greater power.

[47]As Kaske and Clarke comment "daemons seemed to his own religious conscience to be preferable as agents because their relative corporeality (as Neoplatonists defined them) allowed them to be allured by mere sympathy with natural objects" (Ficino, 1989, p. 69).

Ovid. Ficino himself, unsurprisingly, did not make this connection, though he did allude to the famous powers of Medea. In particular, he used the assumption that Medea's herbs could work upon "the motions of the mind [*motus animi*]" (albeit only "in part") to suggest that images could have similarly powerful effects (1989, p. 351).[48] So Ficino's support for astrology, his invocation of demons and his envelopment of minds "in part" within the physical world all contributed to the analogy with the *Metamorphoses*. Finally, the figuration of *spiritus* was not the only interpretation of the tales of transformation Ficino presented in the *De Immortalitate Animorum*. It was immediately followed by a second interpretation which connected the myths of transformation to the theory of talismanic magic in the *De Vita*:

> And thus perhaps the transformation of men into beasts among the ancients should be understood. But certain people say that the soul does not properly form such a body, and feel through it, but rather is bound as demons are bound to statues in the art of magic, by a certain disposition of the statues accommodated to certain demons, as Mercury confesses along with Plotinus. Thus by a divine law, souls which gave themselves to bodies, are given over to water or fire, and in such a servile way that they are thus vehemently offended and suffer.
>
> (FPT vi, p. 194)

Ficino does not here deliver any judgement as to the wisdom of the "certain people" who say this. As in the *De Vita*, the whole discussion of the embodiment of the soul here is placed under the sign of "poetry".[49] But the consequence of Ficino's transcendent impulse was that the vehicles of allegories of the higher world – far from being simply cast away – became the literal truth of the lower. It was thus that, perhaps despite his intentions, Ficino came to represent the practitioner of a kind of magic normally associated with the

[48] While Walker (2000) maintained that Ficino's magic was designed to operate only on spirit, it has since been shown that Ficino also conceived of ways in which magic would operate on souls through the spirit (Hankins, 2007).

[49] "it is pleasant sometimes to converse with the ancients" (FPT vi, p. 102); "it is delightful to play poetically from time to time with the ancients" (FPT vi, p. 112; see Hankins, 2005).

denizens of the *Metamorphoses*. The same impulse that led to the rejection of astrology for its Ovidianism produced an Ovidianism of a different kind. In the next chapter we shall unpack different ways in which Ficino's own Ovidianism could be read, examining various explanations of magical effects. Belief in magic was frequently coupled with an investment in the historicity of various mythical transformations, among which those of the *Metamorphoses* featured prominently. Belief in magic, like belief in astrology, often involved mistaking mere resemblances for essences with effective powers. But just as Ficino started to invoke demons in part because he rejected the superstition of physical astrology, so we find that the promotion of one form of magic was often inextricable from the critique of another. We shall consider a range of different explanations for magical effects, including the astrological, the demonological and the medical, explanations which criticised each other for confusing science with Ovid's *Metamorphoses*, whilst promoting naturalistic interpretations of the *Metamorphoses* in different ways themselves.

Chapter 3

Demonology and Magic

3.1 The rise of demons

Early modern Europe reeled under a sustained demonic assault. The popularity of astrology was, for some, only one small symptom of the widespread influence of the devil. But those who sought to diagnose this onslaught and protect against it were faced with a dilemma. As William d'Auvergne (1180/90–1249) complained already in the twelfth century, those who attributed magical phenomena to demons "were removing the force which accomplishes such things from the creator and even from nature itself". This was a move fitting only for "men ignorant of science" – that is, ignorant of "natural magic" (1674, p. 69). Thus, a misplaced belief in the power of demons could itself be conceived as a consequence of demonic influence. While Augustine had made the activities of demons an important component of his explanation for the historical phenomenon of paganism, he had made it clear that renouncing demonolatry implied recognising that demonic powers were severely circumscribed. Augustine repeatedly dismissed the mass of reports of demonic activities as conscious fictions. Those that he credited he stressed were not miracles, but deceptions masquerading as miracles. Through most of the Middle Ages, the distinction between the demonic and the divine had been relatively secure on these grounds; the *Canon Episcopi* written in the tenth

century regards demonic deception as a fairly impotent form of trickery. The atmosphere of the Early Modern witch hunt was different, however: the fierce criticism of demonolatry necessarily fortified demonic powers, often beyond what Augustine had been willing to countenance. Those who put their weight behind the witch hunts thus found themselves in an extremely difficult position: not only had they to paint a world filled to the brim with deception, whilst remaining undeceived themselves, they had to explain by what powers such deceptions were achieved. Natural philosophers, lawyers and theologians agonised over where the limits of demonic power should be placed. Following Augustine, these limits were for the most part identified with those of natural law. But if natural law described the limits of demonic power, then the upswell of demonic activity implied that the forces of nature were themselves more powerful than hitherto suspected.

Ficino's invocation of demons in the *De Vita* – whether as mere synonyms of *spiritus* or as truly supernatural agents – was particularly badly timed. A year after the *De Vita*, there appeared the work which did more than any other to prepare the ground for the witch-craze that was about to envelop Christendom. Kramer and Sprenger's *Hammer of Witches* (*Malleus Maleficarum*, 1487) emphasised the ubiquity and potency of demonic deception, and bore as its preface a papal Bull authorising the persecution of demoniacs. Both Pico and Ficino were compelled to publish additional justifications for their magic in which they rejected all commerce with demons: "nor is there any word uttered here about profane magic, which relies on the worshipping of demons", Ficino emphasised, "but there is mention of natural magic, which, by natural means, harnesses the gifts of the celestials for the prosperous health of our bodies" (1989, p. 396). Many magicians influenced by Ficino were, however, less circumspect. The German abbot Trithemius (1462–1516) was reputed (if perhaps unfairly) to have adopted the invocation of supernatural demons as an essential part of magic.[1] Dispensing with Ficino's reservations about metamorphosis, Agrippa von

[1]The controversy over Trithemius centres on the formulas for the evocation of spirits in the *Steganographia* (written c. 1499), for which the mathematician and theologian Charles de Bovelles (1475–1566) accused him of demonolatry, a judgement apparently condoned by Zambelli (2007, pp. 2-9). But Trithemius encouraged

Nettesheim (1486–1535), author of one of the fullest and most widely read compendiums of natural magic, insisted that not only "passions, apparitions and imaginations are induced by artifices of this kind [i.e. magic], but even the things themselves and people are truly altered and transfigured into various forms, as poets narrate about Proteus, Periclimeneus, Achelous and Metra [sic], the daughter of Erysichthon" (von Nettesheim 1992, p. 171).[2]

In reported cases of metamorphosis there was particular scope for debate over whether the effects were the result of substantial transformation, true demonic deception, or empty rumour. Following a position negotiated by Augustine, those who troubled themselves with this question usually clung to the essential veracity of reports of transformation, but attributed the reports to demonic deception rather than substantial alteration. The discussion of the nature of such deceptions, however, had shifted somewhat from the time of Augustine. Augustine had attempted to reduce his reliance on poetic fictions for evidence of demonic behaviour, citing Varro instead. Discussing the metamorphosis of the companions of Diomedes he assures us – followed word for word by Isidore and later encyclopaedists such as Vincent de Beauvais (c. 1190–1264?; 1964, p. 2390) – that we learn of such things "not through a fabulous and poetic lie, but by historical attestation" (*Civ. Dei* xviii, 16).[3] At best, Augustine had seemed willing to entertain the possibility, which he considered remote, that the *Metamorphoses* of Apuleius were an autobiographical record of genuine delusions (*Civ. Dei* xviii, 18). Apuleius' philosophical writings no doubt lent an air of seriousness to his accounts of magic there. As is evident from the passage of Agrippa cited above, however, the increased potency of demonic power in the early modern period was aligned with an increased willing-

the persecution of witches and some later readers, such as Hooke, regarded his spells as innocent experiments in cryptography (Brann 1999).

[2]Agrippa famously went on to renounce all belief in magic his *De Vanitate Scientiarum et Artium* (1530), and thus influenced later demonologists with a naturalising tendency, such as Johannes Weyer. But, rather typically, Agrippa's real beliefs cannot be determined because of an inscrutable decision to expand and publish his work on occult philosophy some years after his renunciation of it.

[3]Like Augustine's later readers – but *contra* Carver (2013, p. 241) – I do not regard this claim of historical attestation as ironic (except insofar as the substantiality of the transformations are undermined). Carver's is a persuasive discussion of how Augustine uses Apuleius to stress the "fictional" aspects of his own commitment to Platonism (i.e. its aspects that involved a commitment to paganism): it was precisely because of this allegorical treatment of poetic metamorphosis that the truth of deception had to be defended by appeal to a *historicus* rather than a poet.

ness to accept that poetic metamorphoses referred to substantial transformations. Poetry thus entered the mainstream of demonological debate. The earliest work I know of explicitly to set Ovid and Apuleius on the same level as the lives of the Holy Fathers as evidence of demonic metamorphoses is the *The Mirror of True Penitence* by the Dominican monk Jacopo Passavanti (1302– c. 1357; Passavanti 1863, p. 305). In the *Malleus Maleficarum* we find Ovid's description of Circe quoted as evidence for the powers of witches (Sprenger et al. 1580, p. 636).

Between Ficino's naturalistic explanation of magic and the supernatural trickery imagined by the Christian establishment, it is clear, at first glance, where modern sympathies must fall. And yet the provision that demons acted only within natural law meant that while "natural and demonic magic were at opposite ends of the moral spectrum", they were, as Clark has put it, "epistemologically indistinguishable" (1986, p. 364). The parallel treatment of Ovid by both sides provides a remarkable confirmation of Clark's thesis: each side criticised the other for a naive belief in Ovidian metamorphosis, while promoting Ovid on its own terms. Those seeking every justification for the persecution of witches were particularly likely to be willing to turn to poetry to shore up their supply of evidence for demonic activity. This was a major avenue through which, in part by its resemblance to Apuleius' work, the *Metamorphoses* of Ovid enters scientific discourse in the register of fact. But, I shall argue, on closer examination, the incorporation of Ovid into the literature of demonology is motivated largely by Ovid's inclusion of various naturalistic explanations for metamorphoses, which served to mitigate the danger of attributing too much potency to demons. Conversely, those who disagreed with the persecution of witches and sought to minimise the supposed power of demons, or deny the existence of demons entirely, often extended the potency of a purely natural magic beyond the limits of what orthodox demonologists were willing to allow to demons. Aligned with this greater faith in nature, we sometimes find in exponents of natural magic a promotion of Ovidian metamorphosis that reproduces or exceeds that

found in the demonological literature. Thus, when Ficino rejected the invocation of demons, he was rejecting one confusion of Ovid with natural philosophy, but inviting another.

Because the condemnation of one superstition occurred through the privileging of another, the critique of the application of Ovid to science became inseparable from his incorporation within it. Two Ovids developed in parallel: one natural magical and one black magical (depending on commerce with demons), each one offering a naturalistic explanation of metamorphosis and each one unnatural from the perspective of the other. Nor is the natural magical Ovid a monolithic entity. Within the naturalistic current itself we find different approaches which present different and conflicting ways of responding to the *Metamorphoses*. Against the ambiguous naturalism of Ficinian demons, some expounded a kind of natural magic purged of even allegorical demons, and even within this subset there were significant differences. We shall contrast the different visions of a non-demonic natural magic propounded by the scholastic Aristotelian Pietro Pomponazzi and the more eclectic and experimentally inclined Neapolitan, Giambattista Della Porta (1535–1615), both of whom drew significantly on Ovid. For later readers, the memory of this multiply branching history would overlay and enrich the original tensions between the magical and the natural in Ovid's own text. It is partly for this reason that the use of Ovid to ground a critique of resemblances or superstitions could linger well after the development of more rigorous forms of critique in the seventeenth century. There was no moment at which Ovid's metamorphoses were not simultaneously natural and supernatural. Hence, as natural magic or demonology – one could not say which – metamorphosed imperceptibly into natural science, metamorphosis would remain a crucial point of reference for the articulation of the continuing dependence of identities on resemblances in the Classical Age.

3.2 Demonologists on the limits of nature

Citation of Ovid for evidence of demonic activity was so common that the *Metamorphoses* became almost, as one polemical protestant put it, "the Pope's Scriptures, whereon he groundeth his groundless inventions to torment the Christian World" (Ady 1661, pp. 94-5). So, for example, the general equation of demons and pagan gods permitted the identification of the affairs of mortals with gods as encounters with succubi, as we find in Pico's nephew, Gianfrancesco (1469–1533), or in the Cordoban lawyer Francisco Torreblanca Villalpando (?–1645),[4] who cites Ovid for various details of pagan cult and, more densely, in his account of demonic metamorphoses. Villalpando mentions, along with Apuleius turned into an ass, Procne and Philomena, "Antaeon" (Actaeon) turned into a stag, and the judge Cragalus into a stone (see *Met.* 13.714-5). The French lawyer and statesman Pierre Le Loyer (1550–1634) identifies reports of a certain kind of demon responsible for snatching babies with similar stories about nymphs taken from Ovid and other sources (1605, p. 19v).[5] By far the most popular passages from the *Metamorphoses* were Ovid's accounts of the transformation of Lycaon, and the powers of Circe and Medea, though less obvious magical figures such as Orpheus and Mycale, and other metamorphoses, were also sometimes mentioned.[6] The appeal to Ovid's descriptions of such figures could become quite technical. Le Loyer cites Circe's words to show that herbs are ineffectual unless combined with spells (1605, p. 136v). The French judge Pierre de l'Ancre (1553–1631) cites the description of the nymphs surrounding Circe (1612, p. 51) as proof that witches are aided by demons, and Medea's prayer to Hecate as proof that they have a pact with them (1612, p. 51, p. 170, citing *Met.* 7.194-200). The English preacher Nathanael Homes (1599–1678) cited the *Metamorphoses* for instances of

[4]Succubi: Pico della Mirandola (1523, sig. G3v-Givr); Villalpando (1623, p. 242). Pagan cult: Villalpando (1623, pp. 107, 118, 150, 292, 418). Metamorphoses: Villalpando (1623, p. 242).

[5]For Le Loyer's Ficinian inspiration, see Toussaint (2007).

[6]For Lycaon, Circe and Medea see, for example, Visconti ([1460] 1490, p. 11), Sprenger et al. (1580, p. 636), Pico della Mirandola (1523, sig. E4r), de Nynauld ([1615] 1990, pp. 69, 104), Del Río ([1599] 1604, vol. 1, pp. 113, 192; vol. 2, pp. 4, 55), Gastaldo (1652, vol. 3, p. 171), Villalpando (1623, pp. 99, 251, 332), von Nettesheim ([1533] 1992, p. 239), Weyer (1660, p. 162), de l'Ancre (1612, p. 51, p. 170), de Castro (1549, p. 74), Scribonius (1588, sig. 67r). For Orpheus, see Del Río (1604, vol. 1, p. 34) and for Mycale, de l'Ancre, (1612, p. 52).

"diabolical divination" (Cadmus hearing a voice and the oracle of Themis; Homes 1650, pp. 52, 62).

Just as often, however, we find that demonologists, following Augustine, maintain their distance from such fictions. The magistrate Nicolas Rémy (1530–1616), author of one of the most popular manuals of demonology, warns us in this spirit that his "intention is not to bring the ass of Apuleius onto the scene, nor to protect and defend with new examples the fabulous Metamorphoses that the Poets devise, but to bring into the open what is attested by the statements of many people and I hold to be proved by experience itself." (Rémy 1597, p. 224; copied almost word for word by Elich 1607, p. 148). A short "judgement" on werewolves by Lutheran clergyman Zacharias Bachmann (Rivander, 1553–1594), begins: "What the poets write of such a *Metamorphosis* or Transformation of humans into wild animals we let be fables, and this is not the place to talk about them" (Rivander 1611, p. 132). After discussing Lycaon, the Corbach academic Wilhelm Schreiber (Scribonius, 1550–1600) adds that "of these μεταμορώσεων [sic], such as of Actaeon into a stag, and others into other beasts, the fifteen books of this poet Ovid are full, which, as they are mostly fabulous, are not relevant here" (1588, p. 67). Even Jean Bodin (1530–1596), who was unparalleled in the credulity he extended to reports about demons – and virtually the sole establishment believer in substantial metamorphosis – marks his distance from Ovid: "I pass over the metamorphosis of Ovid because he has mixed the truth up with many fables, though what he wrote of Lycaon, King of Arcadia, is not incredible" (1580, p. 99v). Ovid "goes over the top" in his description of Circe's powers: "these would be truly strange feats, if they were true; yet it is a great thing to so charm and fascinate people that they think, from what they see, that all of it is true" (1580, pp. 60v-61r). This separation from Ovid is usually specifically directed towards denying the reality of substantial metamorphosis, as in the case of Rémy:

> I shall omit to mention the stories that Homer spun out about the companions of Ulysses, Lucian about the golden Ass, and Apuleius, after the so numerous

> metamorphoses of Ovid. For if anyone wishes to judge at all rightly about this matter, even if he is led by the notions and reasonings of nature alone, he must concede that the forms and species of all things are established in such a way, after they are once inborn, that they cannot be changed except by their death
> (Rémy 1597, p. 229; cf. Prieur 1596, p. 71v)

Many demonologists thus saw the rejection of poetic fable as part of the process of establishing the limits that nature imposed on demonic power although, they did not deny that impressions of such transformations were really created.[7] When we examine more closely the use of Ovid as evidence we find that the apparent acceptance of metamorphosis is in fact often expressed through Ovid precisely because Ovid himself characterises metamorphoses as illusory. The rejection and the appropriation of Ovid thus turn out to stem from the same impulse, namely, the need to reconcile demonic phenomena with the divine order of nature. We noted, for example, that Villalpando mentions a number of Ovidian metamorphoses. One of three main ways he says these illusions are accomplished (the explanation derives from Augustine) is through the manipulation of vapours so as to produce images. Here Villalpando found support in Ovid's description of Circe's fashioning of a phantom of a boar, "an image without a body" (Villalpando 1623, pp. 244, citing Met. 14.358-9). In a similar way, King James the 1st (1566–1625), perhaps following the Dutch physician Johannes Weyer (1515–1588), compared the powers of demons to the pre-eminent fabricator of empty images, Morpheus (James I 1597, p. 40; Weyer 1660, p. 39).

[7]Gerald of Wales (1146–1223) vacillates between considering metamorphosis as change of substance and change of appearance (Brewer 1867, vol. 5, p. 106-7). Jean Bodin (1580) is extraordinary for his virtually unequivocal belief in the power of demons to enact substantial change; yet as Clark (1999, p. 212) points out, Bodin's position is undermined by its fideistic justification (demons are unknowable: therefore we should believe everything about them). Two less well known examples are cited by Villalpando (1623, p. 242): the major French poet and Homeric commentator Spondanus (Jean de Sponde, 1557–1595; 1583, pp. 137-8) and Paracelsus in the *Philosophia Magna*. I have been unable to locate with certainty the precise passage of Paracelsus referred to by Villapando. It could have been Paracelsus' remarks about the wolflike nature of man in the *De Lunaticis* (PSW i.14, pp. 53-4). Robert Burton is incorrect to put Girolamo Zanchi (Zanchius, 1516–1590) in the same company (Zanchi 1602, pp. 244-6 holds to the Augustinian line). We may add, however, Paul Skalic of Lika (1559), whose apparently literal belief in substantial transformation was criticised by Weyer (1660, p. 603). Pomponazzi is another case that shall be considered in due course.

Folk magic has a more pervasive presence in the *Metamorphoses* than its Vergilian theological apparatus might lead one expect. As Viarre (1964, pp. 144-208) has shown, many of the metamorphoses caused by the Olympian gods are evoked in terms suggestive of the magical powers that are also accessible to humans. This levelling of divine and human power is an important aspect of Ovid's merging of the dimensions of immanence and transcendence: "the material and the spiritual can become confused" (1964, p. 197). Diana and Proserpina use a sprinkling of water to effect transformations; Ceres uses a drink made for her by an old woman; Minerva uses a herb to transform Arachne; Mercury uses his magic wand; Glaucus' divinity is consecrated by a magical ritual conducted by Oceanus and Tethys; there are many other examples (1964, pp. 180-1). Gildenhard and Zissos note *à propos* of Medea, that "Ovid resolutely sidelines conventional deities from his account, thereby opening up a narrative space in which magic and sorcery would seem to hold sway over both the human and the natural realms" (2013, p. 90). The magical aspect of metamorphosis would of course be developed much more extensively by Apuleius for whom it serves a similar function. Apuleius' demonology permitted him to allegorise the poetic gods as natural forces: "From this kind of demon mostly, the poets, not far from the truth, are accustomed to imagine gods that hate or love certain men" (*Socr.* 12.1-4). Such gods were resolutely physical: in fact, so as not to "seem to fabricate incredible things in the manner of a poet" Apuleius describes their cloud-like bodies in lines borrowed pointedly from Lucretius (*Socr.* 10.1-25). This strategy recalls Ovid's use of Lucretius to describe fantastical metamorphoses and, again, it was precisely such Lucretian language that made Ovid a fruitful source for demonologists anxious to emphasise the naturalism of demonic metamorphoses.

A typical example of Ovid's juxtaposition of divine and natural interpretations of a phenomenon is his narration of the sex-changes of Iphis, Tiresias and Caenis, granted by gods, alongside that of the hyena, which was thought to occur naturally (*Met.* 15.409-410). As sex-changes were an important province of demonic activity, Ovid's hyena was often seized upon to point out that such changes could only be genuine insofar as they

were accelerations of a natural tendency (Villalpando 1623, p. 248; Guazzo 1608, p. 126). The Spanish theologian Martín Del Río (1551–1608), author of the most popular *summa* of demonology after the *Hammer of Witches*, cites both the miraculous examples from Ovid, and the natural example as their explanation (Del Río [1599] 1604, vol. 1, pp. 190-192). This sort of juxtaposition, through Ovid, of the strange and the natural can be traced to Isidore's simultaneous treatment, under the title *De Transformatis*, of transformations ascribed by Augustine to demonic deception and natural transformations described by Ovid's Pythagoras (*Orig.* xi.4). Later readers of course noticed that these demonic transformations – Diomedes' companions, Ulysses' men, Lycaon – were also described by Ovid. For example, writing at the beginning of the fifteenth century, Pierre D'Ailly (1351–1420) quoted Isidore's examples, but conflated the magical and natural metamorphoses, attributing both to Ovid: "wonderful effects happen in wonderful ways *in nature* through the magic arts or in another way [*vel alio modo*]...the great book of the *Metamorphoses* of Ovid testifies to this in many places" (Chappuis 1993, p. 84; my emphasis).

De l'Ancre included in his *Tableau de l'Inconstance des Mauvais Anges et Demons* an analysis of a report of the arrest of a werewolf in 1603 that develops this response to Ovid at particular length. On the one hand, de l'Ancre subjects such reports of transformation to intense doubt, and cites examples from Ovid – Lycaon, Hecuba and Actaeon – to underline their fabulous nature (1612, p. 266). On the other hand, we are warned not to underestimate the power of the devil: "As for disguisements and changes of body in appearance, one should not believe any more than disbelieve" (1612, p. 272). Ovid also offers a means of sustaining our faith in this respect since, as well as furnishing doubtful stories, he is cited as providing a mechanistic explanation for the metamorphosis of Iphigenia: substitution (1612, p. 267). Similar appeals to Ovid follow, as de l'Ancre undertakes to clarify his position by dividing transformation into five kinds: fabulous, divine miracles, natural, imagined, and sorcerous. Although de l'Ancre reminds us once again that he "will not talk about the fabulous kind, of which the poets are full, because its nature is revealed by its name" (1612, p. 272), Ovid

is cited for several instances of *natural* metamorphosis. The primary example of natural transformations is the generation of animals from mould described by Pythagoras (1612, p. 275, citing *Met.* 252-253, 362-3). But all the kinds of generation mentioned by Pythagoras are listed individually, and Ovid's words on the coral, and even the river of the Cicones, are quoted (1612, p. 276).

The account of natural metamorphosis is itself twofold. On the one hand, de l'Ancre cautions that natural metamorphosis can only explain the generation of small animals and will not explain the appearance of a wolf (1612, p. 282). Nor can the werewolf be explained by imagination (induced by melancholia), because it was seen by multiple people (1612, pp. 283-5). In such cases, sorcery – that is, demonic deception – is the only possible explanation. On the other hand, de l'Ancre expands at length in the section on natural transformation on how demons use their extensive knowledge of nature to accomplish feats that appear magical, but that are in fact natural. It is through demons that practitioners of "natural magic" acquire their powers; and among such practitioners we find listed not only Albert the Great, Ramon Llull, Trithemius, Ficino, and Fernel, but also Medea (1612, pp. 277-80). Ovid's Pythagoras is once again quoted to underline the fact that such transformations merely germinate seeds (identified with Augustine's "seminal reasons") that are already present in nature (1612, p. 281). Owing to the digression on the powers of natural magic, by the time sorcery is introduced as the explanation for the werewolf, the difference between sorcery and natural transformation appears extremely thin.

As de l'Ancre goes on to discuss the ways in which properly sorcerous demonic deceptions are accomplished, the difference between natural and genuinely supernatural transformation is eroded even further. Demons may animate corpses, but that "only though a local [i.e. mechanical] movement, and not a vital movement"; they can create phantoms, but only by exploiting "some occult and unknown virtue" of air to condense it into vapours and shape it; they can overwhelm the vision, but this again by an "occult virtue of nature"; more prosaically, they can use animal skins to effect disguises (1612, pp. 289-90). We thus

have a vastly elaborated version of the conflation of the magical and natural instigated by Isidore. The overall impression is that de l'Ancre leans towards a naturalistic interpretation of metamorphosis that places the powers of demons within natural limits. The examples of sorcerous metamorphoses again come from the poets – the metamorphoses of Circe (quoted from Vergil), Apuleius' conversion into an ass, and the transformation of Dipsas into a bird (Ovid *Am.* 1.8.13-14) – (de l'Ancre, 1612, p. 286) sources he expressly disclaimed at the beginning of the discussion. But de l'Ancre is unwilling to abandon the supernatural aspect of demonic deception entirely. Indeed, four years before writing the *Tableau* he had put his beliefs into practice and conducted an extensive witch-hunt in the Labourd, resulting in a large number of executions (Bernou 2005).

De l'Ancre's analysis follows a pattern that is repeated through the centuries: Ovid, standing for myth or superstition, is separated from true knowledge or science, while the naturalistic component of Ovidian metamorphosis is retained. The case of demonology shows us particularly clearly that the discourse that results from this process can be highly superstitious itself. So the process repeats, with the Ovidianism that was preserved twisted into its opposite by subsequent readers. Natural magic practices this interpretation on conventional Christian interpretations of demons, just as the more conservative demonologists tend to practice it on natural magicians. In the next two sections we shall see that the naturalising interpretation of magical phenomena experienced even within itself a schism akin to that which divided natural from demonic magic. One kind of naturalism, that of the Paduan Aristotelian and courter of Stoicism Pietro Pomponazzi, was predominantly astrological.[8] Another kind, that of the famous Neapolitan naturalist Giambattista Della Porta, is perhaps best characterised (very broadly) as medical. While pursuing their critique of conventional demonology, and each other, both types of naturalism incorporated Ovid into their philosophy in a way that left them vulnerable to accusations of superstition. Later, the concern to separate Ovidian metamorphosis from demonic metamorphosis, then demonic

[8]For Pomponazzi's filtering of Aristotle through the Stoics, see Sellars (2006, pp. 140-141) and Ramberti (1997).

metamorphosis from natural magical metamorphosis, merges insensibly into the critique of natural magic by the likes of Galileo and Descartes. In turn, as we shall see, these philosophers preserve traces of Ovidianism that speak for the continuing importance of certain kinds of rational superstition.

3.3 Pietro Pomponazzi against demonology

Pietro Pomponazzi described himself as the flea on the elephant of Thomas Aquinas (2013, p. 984), an honour he accorded himself in the *De Immortalitate Animae* (1516) for attacking Aquinas' doctrine of the immortality of the soul. For Pomponazzi, reasoning that remained "within natural limits" (2013, p. 926) had to recognise an absolute distinction between the divine and the physical realms, which implied that, according to purely natural reason, the soul was mortal.[9] There could be only a single line of communication between these realms – that provided by the celestial motions. Pomponazzi thus developed a strong theory of astral causation, hinted at as early as 1503 (2011, p. lv), but first extensively developed in his work on miracles, the *De Incantantionibus* (1520), in which he wrote, for example:

> No effect can come from an absolutely immaterial agent unless through a mediating body midway between the eternal and the generable and corruptible, as is clear from *Physics* VIII, *De Generatione* II, and is maintained in an infinity of other passages [of Aristotle].
>
> (2011, p. 72)

The stars, being eternal yet varied in their motions, provided the only possible such instrument. There was nothing else that would allow an immaterial soul – or any other immaterial entity – to move its body. Thus, "every effect here below is reduced either through itself or through an accident to the sky" (2011, p. 73). Here, Pomponazzi offered as empirical proof a number of predictions that astrologers had delivered to Roman emperors, all

[9]Pomponazzi always maintained the superiority of revealed truth over natural reason (e.g. 2013, p. 1100; 2011, pp. 167-169), but has rarely been taken at his word on this point.

of which, he said, had come true. This credulousness with regards to astrology was mirrored by Pomponazzi's attitude to a range of natural magic effects, including metamorphosis. Just as in Chapter 1 we saw that Bacon's rejection of Ovid's polytheism could be correlated with an extension of astrological determinism that was Ovidian in a different way, so in the case of Pomponazzi, we find a similar rejection of Ovid, conditioned especially by Pomponazzi's rejection of the immortality of the soul, producing a much more thoroughgoing deterministic vision of the universe. But whereas Bacon's Ovidianism was confined to the doctrine of the astral determinism of religion to the stars, we shall see Pomponazzi expressing support for the strictly physical possibility of a much greater range of events normally explained as supernatural, culminating in metamorphoses of humans into animals.[10] This more extensive Ovidianism was a direct result of Pomponazzi's apparently modern understanding of the soul as inextricably bound up with the system of natural determinism.

Although Aquinas and the tradition of scholastic theology in general was often Pomponazzi's explicit target, Pomponazzi also maintained a constant, if muted, dialogue with the Florentine Neoplatonists, who conditioned the basic structure of his anthropology. The *De Immortalite Animae* began in terms strongly reminiscent of Pico's *Oratio* with the declaration that man's nature is "ambiguous" (*anceps*), having been "placed as a medium between the immortal and mortal" (2013, p. 928). Therefore, Pomponazzi explained,

> Three kinds of people are found. For certain are numbered among gods, though very few; these are those who have subjugated their vegetative and sensitive faculties and have been made, as it were, wholly rational. But certain through total neglect of the intellect, falling upon the vegetative and sensitive faculties alone have, as it were, transmigrated into beasts. And perhaps this is what the Pythagorean fable intended, when it said that human souls have crossed into various beasts.

[10]Bacon's letter on natural and unnatural magic (*De secretis operibus artis et naturae et de nullitate magicae*) gives a naturalistic explanation for some metamorphoses, but they are accidental rather than substantial changes: a wolf striking a man dumb, a hyena preventing a dog from barking with its shadow, fruits causing other fruits to ripen, and, above all, the spread of diseases (Bacon 1859, p. 529).

(2013, p. 928)

Aquinas realised that the soul was in some respects mortal and in other respects immortal, but took its immortal aspects to be essential, its mortal aspects accidental. In fact, Pomponazzi argued, the immortal aspects of the soul (intellect and will) are far less commonly exercised than the mortal aspects: "out of many thousands of men, scarcely one is found who is studious and dedicated to the intellect" (2013, p. 968). Moreover, the intellect taken in itself offered no evidence of an immortal nature, since, according to the Aristotelian dictum, "it is necessary that someone thinking contemplates some sensible image [*phantasma*]" (2013, p. 968). And yet the notion of the soul's immortality had arisen from a valid observation of the superiority of the intellect over the faculties of beasts. Just as there were three kinds of people, there were, Pomponazzi explained, three "modes of separation from matter" involving three "modes of cognition". The souls of beasts required a body as both "subject" and "object", since they were unable to abstract from sense impressions. The souls of the stars, i.e. the heavenly Intelligences, possessed thought entirely separated from matter both subjectively and objectively. In between, human souls were capable of abstracting from immediate sense impressions and forming universal concepts. They were therefore separated from the body as "subject". But because their abstract thought still depended on sensible images, they still required a body as "object", namely, a sensible image (2013, p. 986).[11]

Pomponazzi often spoke of these three modes of cognition as proper to beasts, men and "gods". Human thought could "participate" in that of either beasts or gods, but, he stressed, this did not mean that it could become in essence divine or bestial. Its intermediate position was not the result of a flexible blending of the extremes, but determined a distinct and immutable nature in between: "it seems unable to be transmuted" (2013, p. 986; cf. 1028). Pomponazzi repeatedly used Ovid and Pythagoras to characterise the error of those who mistook the soul's purely accidental participation in immortality as indicative of a divine

[11]Pomponazzi here reinterprets a distinction that had already been made by Aquinas (Brenet 2009). Note that in scholastic terminology, "subjective" and "objective" have more or less the opposite to their modern connotations – an "object" is a mental representation.

essence, doing so in two ways. First, he mobilised the the language of the Neoplatonists – particularly the flirtation with "Pythagorean metamorphoses" – against itself, as if Aquinas had mistaken a resemblance to God for an identity:

> To speak as those do who affirm that the human intellect is absolutely immortal, that this intellect has two modes of knowing, one without a sensible image and another with a sensible image, is to transmute human nature into the divine and this is too little distant from the fables of Ovid in the book of Metamorphosis.[12]
> (2013, p. 1010; cf. 1012)

Second, he argued that the transmigration of souls was the logical consequence of any consistent doctrine of immortality. His reasoning here relied on the incommensurability between the infinite life of the eternal soul and the finite existence with which we are familiar. If the intellectual part of the soul did separate from its mortal components at death, then it would find itself disembodied for infinitely more time than it had been embodied. Since the finite and the infinite lack any proportion, the embodied and disembodied souls could not be considered the same thing; or, what amounts to an identical point, if they were the same thing, the transition from the one state to the other would be "against the order of nature". Therefore, it would be necessary to posit "the fables of Pythagoras" instead (2013, pp. 972-976; cf. 984, 998).[13] An objection concerning the multiplication of souls led in the same direction. Unless souls die, eventually either "there will be given an infinity [of souls] in act, which Aristotle everywhere explicitly denies, or it will befit us to have recourse to the fables of Pythagoras" (2013, p. 980). Even if Aquinas and the Platonists might have resisted the claim that they had simply posited the fables of Ovid and Pythagoras, then, their very own principles nonetheless bound them to such a position.

[12]The Christian doctrines of immortality and resurrection are "so irrationally pronounced that they do not seem appropriate to people entrusting themselves to philosophy, but more to poets, the common men and even legislators, who care not for truth, but for making a man good and compliant" (Pomponazzi 2013, p. 1290).

[13]With his frequent references to the "fables of Pythagoras" Pomponazzi may be thinking of Aristotle's phrase in the *De Anima*, τοὺς Πυθαγορικοὺς μύθους (407b22).

Towards the end of the *De Immortalitate*, Pomponazzi raised an important empirical argument for immortality: "there are many written testimonies and felt experiences that certain people are troubled by demons...which say that they are the souls of the dead" (2013, p. 1048)". Pomponazzi's final response to this argument would be to deny the existence of demons entirely (again, according to merely natural reason), but it was only in the *De Incantationibus* that he fully expressed and supported this claim. The denial of demons was closely related to the denial of immortality and Pomponazzi employed similar rhetoric regarding poetic fable, associating belief in demons particularly with the Platonists. "As the poets imagine fables which are not possible taken literally, but contain an inner truth", just so, "Plato in fact introduced demons not because he believed in them, but because it was his purpose to instruct uneducated people" (2011, p. 110; cf. pp. 61, 161).[14] Aristotle, by contrast, had rejected the existence of demons because he had rejected the use of fable in philosophy: "That kind of philosophising through enigmas, metaphors and fictions greatly used by Plato, Aristotle bitterly condemned and cast it utterly away. Wherefore it is no wonder if Plato was exalted by the vulgar and the priests, but Aristotle was repelled and repressed" (2011, p. 112; cf. 143). Pomponazzi followed Aristotle, but just as in the *De Immortalitate* he retained the basic framework provided by the Neoplatonists, while turning it upon itself, he did not so much dispense with the myths about demons as set them upon a naturalistic footing, specifically an astrological one. In several ways, this move involved restoring to Ovid some authority in the domain of natural philosophy.

The pretext for the *De Incantationibus* was a letter from the medic Lodovico Panizza asking Pomponazzi's opinion about the mechanism of several magical cures (for example, the extraction of an arrow from a wound by incantation alone). Pomponazzi explained why he rejected the traditional explanation in terms of demons, proposed his own explanation, then

[14]The invention of these fables served two purposes according to Pomponazzi. On the one hand, the masses, like beasts, "cannot understand anything but what is corporeal", so that through the corporeal forms of demons they could be made to understand the nature of the celestial Intelligences. On the other hand, they were also supposed to understand their own immortality – particularly, the punishments and rewards to be expected in the next life (2011, p. 110). Thus, the fables had (always with regard to purely natural reason) a communicative and a deceptive aspect, respectively.

moved on to discuss what he called a *grandis dubitatio* provoked by that explanation (2011, p. 63). Namely, he had not so far explained the numerous reports about oracles, omens, geomancy, love-charms and hauntings, which still seemed to suggest the activity of demons. Having dispensed with these phenomena, he considered certain even more difficult cases. We shall examine, in particular, his discussion of reports of miraculous metamorphoses. Perhaps the most troubling aspect of Pomponazzi's argument at each stage is the apparent credulousness with which he assembled reports of miraculous phenomena from every conceivable source. He could only sustain this credulousness at the cost of discounting his own explanation for stories of demons (namely, that they were deliberate fiction). Instead he argued that "what those denying these experiences [*experimenta*] usually say is not safe nor said according to modesty, namely, that these things are made up by men like the fables of Aesop, for the instruction of the masses" (2011, p. 69). Pomponazzi was certainly not unaware of this tension, noting that "someone will perhaps fault us because we profess philosophy, but compose history, since we have cited Plutarch, Livy, Suetonius and often many others; nay, what seems more heinous, we have cited the poets who are the furthest removed from the truth" (2011, p. 120). As Perrone Compagni has observed, however, this apparent credulousness was a conscious tactic springing from Pomponazzi's Aristotelian scientific method, according to which empirical study had to precede the abstraction of universal concepts (Introduction to Pomponazzi 2011, p. xvii).[15] It was this empiricism, resolute to the point of nonsense, that in the first instance served to merge the domains of *fabula* and *philosophia*.

The three degrees of miracles we have identified (first, miraculous cures, second, oracles, omens, geomancy, love-charms and hauntings, and third, metamorphoses) then each overturned Pomponazzi's careful separation from Ovidian myth in different ways. In order to explain miraculous cures, Pomponazzi first observed that hidden powers could be found in natural beings (stones, plants and animals) to achieve any conceivable cure. Miraculous

[15] "Although it is the task of the philosopher to give the cause of natural effects, this cannot happen when the 'that it is' [*quia est*] is unknown, as is written in Book II of the Posterior Analytics [II, 1, 89b33-35]. But such effects are most rare. Therefore it was necessary to declare them. And no art is better or more suited to do this than history" (155).

cures accomplished by incantation, he argued, were due to a similar power found within the chanter. The healing properties of the particular natural virtue present in that person could then be transmitted by the physical application of a cure (*alterando passum*), or by vapours naturally emitted from the body (*vaporem transmissum*). This argument rested upon the Neoplatonic doctrine of man's ability to take on aspects of other natures. But whereas Pomponazzi had earlier insisted such transformations were purely moral, he now used them to explain how humans could take on the physical properties of other natural entities:

> Since man is all things through his participation both in things above and things below, it makes sense that one person is found similar to one animal having such-and-such a property, another to such-and-such a herb having a different property, another to a different kind of stone in some other property. This appears clearly in mens' morals, for some are like gods, as the heroes and holy men; some are like lions, some wolves, some serpents and so on for the rest. Thus, nothing prevents that they be assimilated to them also in their properties.[16]
>
> (2011, p. 29)

We may add as an aside that Pomponazzi subsequently departed somewhat from his strict interpretation of metamorphosis in the *Expositio super primo et secundo De Partibus Animalium* (1521-23). Here, he seemed to briefly condone what he had explicitly denied in the *De Immortalitate*, namely that man could experience a genuine transmutation into god or beast: "the generable and the corruptible, *with the exception of man* [my emphasis], although they change, are yet not properly transmuted from one nature into another"...But it is to be imagined that God and nature have said to man..."I left it to your free will that you can transmute yourself into a god or into beasts!"." This apparent admission of transmutation

[16]Perrone Compagni rejects a recent claim that Pomponazzi exhibits a "serious compromise with Platonism" (Landucci 2005, p. 62) and argues instead that Platonism functioned as "a research hypothesis" (introduction to Pomponazzi 2011, p. xxxv). See also Perrone Compagni (2010). Lazzarin regards the engagement with Ficino as "polemical" (2010, p. 101, n. 50), which of course it had to be. But the common use of Ovid shows not only that the adoption of a hypothesis is a serious compromise, but that from the perspective of the physical world, Ficino's Platonism was just as "hypothetical" as Pomponazzi's.

was, however, immediately qualified: "you should know that when it is said that man can be transmuted into god, it is not meant into his substance, since that is impossible, but it is meant according to morals [*mores*]" (2004, pp. 109-110). The admission of transmutation in this work is correlated with a positive allusion to Ovid. Pomponazzi refers to Lycaon as an example of bestial transmutation (2004, p. 110) and quotes Ovid on man's divinity: "Man alone participates in divinity. For, as Ovid says, *sanctius* etc." (2004, p. 282). The tension created by such an allusion is demonstrated by the fact that Nifo quoted the very same line in a refutation of Pomponazzi's mortalism.[17]

Let us return to the explanation of miraculous cures. In passing, Pomponazzi mentioned some twins endowed with miraculous powers whose only explanation was "an occult property, which both received from the sky" (2011, p. 30). Although any special powers of plants, stones or human beings ultimately did owe their genesis to celestial influence (2011, p. 131), it was not necessary at this stage to seek any explanation beyond that of human nature. In considering oracles, omens, and the rest, however, which involved apparitions or the animation of inanimate objects, it became essential to involve the stars. It was at this point that Pomponazzi set out the vision of astrological causation described at the beginning of this section. Assimilating magicians, prophets and poets, he explained how their inspiration resulted from the imprint of the particular celestial configuration at their birth, thus naturalising the Ficinian theory of *furor poeticus* (2011, pp. 74-81). His materialistic theory of the soul permitted him to extend the same explanation to apparitions (where a form was imprinted in the air rather than the human imagination; 2011, p. 91). Love magic carried the deepest associations with witchcraft and demonic influence (Pomponazzi alluded to Ficino's discussion of love several times) and the naturalising reading of Ovid is here at its starkest. Pomponazzi eliminated any involvement of demons in love magic on the

[17]"Pomponazzi, can a force which is not elevated above bodies seek so many absolutely incorporeal things, cultivate them, venerate them and heed them? If you desired to read these things in the book *On Beauty* by Plato you would understand much better why, as Pythagoras rightly says, when God made man, he elevated him from the ground and raised him to the contemplation of his creator so that he could examine the sublime, the religious and the pious [the citation of Ovid follows]" (Nifo 1518, sig. 9r, col. 2).

principle that even a demon would require a corporeal instrument to carry out an effect, which would therefore be accessible to a human as well.[18] But he added that given the need for a corporeal instrument it was doubtful that such effects could be produced at all. This was a rare moment of scepticism regarding the tradition of reports about magic. Far from eliminating the evidence of Ovid, however, it was on this point, Pomponazzi noted, that Ovid "seems to agree" (2011, p. 103). He quoted Apollo's lament from the *Metamorphoses* – "love is treatable with no herbs!" – as well as a passage from the *Heroides*, and noted that Ovid had depicted the beauty of Jason and Ulysses as more powerful than the herbs of Medea and Circe, respectively (2011, pp. 103, 108, citing *Met.* 1.522-534, *Heroid.* 5.147-150, *Met.* 7.18-19, *De Rem. Am.* 1.259-290).[19]

Expanding on the causes of apparitions (and referring in particular to a recent miraculous appearance of Saint Celestine in Aquila, witnessed and agreed upon by thousands), Pomponazzi added that such powers or effects could wax and wane, appear and suddenly disappear, for the heavenly bodies could exert their influence "in many and an almost infinite number of ways" depending on their position and the material of the subject (2011, p. 125). Above all, however, it was the explanation of the efficacy of prayer – Celestine had appeared to answer prayers for fair weather – that encouraged Pomponazzi to develop further this theory of astral causality. How was it that prayers addressed to different saints in different places – and, at one time, prayers to the pagan gods – had all elicited results? Among various possible responses, Pomponazzi marked the "better" answer as that which

[18]This is a central point to which Pomponazzi often returns, dubbed by Perrone Compagni the principle of "equipollence" (of humans and demons). This is its first full enunciation, however.

[19]Pomponazzi's acceptance of the model of astral causality rejected by Pico and Ficino is paralleled a few decades later by Pontano, who has an equally ambivalent relation to Ovid. Pontano's mythological didactic poem on astrology, *Urania* (written 1476-79, published 1505), made little use of Ovid: the most obvious Ovidian borrowings occur in its cosmogonical sections (Tateo 1995), even though it included a number of catasterisms. Soranzo (2008) has argued that Pontano adopted mythological expression because of the conjectural status of astrology; perhaps, then, he preferred Vergil and Manilius as models for fear that Ovid would take conjecture too far in the direction of fiction. There is, however, one example of a reader who conflated Pontano's mythology with that of Ovid: the Ovidian commentator Georg Sabinus. Sabinus (1554) interpreted many of Ovid's tales in astrological terms and illustrated such interpretations, in every case, with quotations from *Urania*, despite the absence of textual connections between the poems of Ovid and Pontano.

included religion itself as a phenomenon generable and corruptible and therefore subject to the governance of the stars (2011, p. 135). So, for example, the specific form of the prayer at Aquila had been conditioned by the celestial bodies in order for it to have certain effects: "for the celestial bodies favouring such a Law [i.e. religious practice] at such a time and while such influence lasted order this medium [prayer] so that it will produce such an effect". Albert's talismans, which acquired their power at particular times, were a further example of the temporal specificity of certain powers (2011, p. 151). Thus, Pomponazzi came out in favour of the doctrine of Albumasar.

Pomponazzi did not interpret the affirmation of historical astrology in the manner of the *De Vetula*, however. The doctrine was less an attempt to consign Ovid to the past than a guarantee that his religion might return. By inferring from the eternity of the world an eternal repetition of generation and corruption, Pomponazzi argued that "the rites which exist now have existed (according to species) an infinity of times and will exist an infinity of times. There is nothing similar which has not been before and which will not be again" (2011, p. 150). The potential of this doctrine to carry radical implications was clear for, "in the time of the idols, nothing was more honourable than the name of Jove" (2011, p. 151).[20] Pomponazzi did not associate his doctrine with Ovid at this juncture, however. For that we must turn to an extract of Pomponazzi's lectures on the *Physics* (1517-18) recently published by Perrone Compagni, entitled *Quaestio de genitis ex putri materia*. Here, Pomponazzi cited Albert's *De causis proprietatum elementorum* for the doctrine of catastrophic floods caused by the stars, and added that Ovid had posited this doctrine when he described the succession of ages from gold to bronze in the first book of the *Metamorphoses* ("just as first the stars were malign, so, afterwards, they were benign", Perrone Compagni 2011, p. 207).

This short treatment of spontaneous generation is also relevant for the final element of Pomponazzi's naturalisation of magic that we noted – the discussion of miraculous meta-

[20]Giglioni (2010) interprets this passage as implying that religion has the status of an "image" for Pomponazzi – it is the way in which the masses understand reality, but not fit for a philosopher. Pomponazzi provoked particular controversy by referring to the prophets of any religion as the "sons of God" (2011, p. 150).

morphoses. Of particular note is Pomponazzi's rejection of Albert's criticisms of Avicenna's claim that human beings could be generated without coetus by the stars. Pomponazzi did not claim in response that Avicenna was certainly correct, but put the arguments in his favour before deciding that there was simply not enough empirical evidence to decide the issue. He noted that "nearly all the poets" were of Avicenna's opinion, citing Hesiod, Juvenal and Ovid (Perrone Compagni 2011, p. 206), but the main argument was the one implied by Albert (*vir fabulosus*, *tamen...vir gravis*): namely, that if a universal deluge would at some point annihilate the human race, it would be necessary for the stars to produce a new generation. One consequence of this implicit re-evaluation of Albert's allegory of the stones of Deucalion and Pyrrha was that it permitted Pomponazzi to defend himself in the *De Incantantionibus* against the argument that the metamorphosis of a human into a wolf violated the principle of reproduction by species: "if it should be said: "a wolf is generated from the seed of a wolf, not therefore from a man", it will be replied that a mouse is generated both from the seed of a mouse and from putrified earth; wherefore our case is also possible. And for Avicenna it is especially clear that one cannot support such an argument, since he posits universal deluges" (2011, p. 147). Various different elements, marked as Ovidian in different ways – the astral causation of religion, spontaneous generation and metamorphosis – thus coalesced into a coherent explanatory framework.

Let us close by examining more closely Pomponazzi's discussion of metamorphosis. The cases he sought to explain were those that, since Augustine, had been repeatedly cited as evidence for the activity of demons: the metamorphosis of Arcadians into wolves, of Circe's victims into various beasts and of the companions of Diomedes into birds (*De civ. D.* xviii, 16-17). Pomponazzi first argued that these stories were either "lies of poets" with an unknown purpose, or moral transformations which had produced a physical alteration in appearance according to the principles of physiognomy (*mores variant effigies*). He added that it was possible that these moral transformations had themselves been caused by magicians through the same methods as love magic (2011, pp. 143-44). Thus he once again found himself

inclining towards a relaxation of the strictly moral interpretation of the Neoplatonic figure of man's omniformity. Finally, he proposed a third mechanism, qualified in the same way as the doctrine of spontaneous generation (*non...impossibilem*, 2011, p. 145), in which he made use of Albert's doctrine of the "powers of place" (*virtus loci*). The notion here was that such metamorphoses might have been triggered spontaneously by the powers embedded in certain places or substances by the direct influence of the stars (Perrone Compagni 2006).

This third theory, at once entirely naturalistic (involving no demonic or human agency) and entirely supernatural (hanging from the celestial Intelligences), also involved a physical interpretation of an Ovidian metamorphosis, if rather more subtly. Specifically, Pomponazzi argued that such transmutations were possible by citing a list of marvellous petrifactions from Albert, including that of coral. The difference between animals and stones, he observed is greater than that between different species of animals, so that, assuming one also admitted the possibility of spontaneous generation, it was not impossible – it was even *multum persuasibile* – that at some time a man might have turned into a wolf. The metamorphosis of coral was not only one of the most obviously naturalistic metamorphoses in Ovid's poem, in the *De Mineralia* Albert had explicitly interpreted the myth of the Gorgon – his source is surely Ovid – along these lines. Pomponazzi quoted this passage:

> The fable of the Gorgon testifies to this, which is said to have converted to stones those looking at it. They called Gorgon that powerful force of minerals: and they call looking at it the disposition of the humours of the body towards the lapidificative force
>
> (2011, p. 146; AMB v, p. 21b)

Thus, Pomponazzi explained one marvellous metamorphosis (Lycaon) through another (petrifaction) that was, at least according to him, even more marvellous.[21] It did not matter

[21]This strategy conditions the *De Incantationibus* as a whole, i.e. the wonders of ordinary nature made the acceptance of miracles easy: "it seems truly risible that the celestial bodies with their Intelligences, since they govern and conserve the universe, move such a great mass, generate and transmute so many men, so many different animals, so many plants, so many metals, could not accomplish such trifling and inconsequential effects, since they are most rare and of almost no importance (nay, they are nothing in comparison to the universe)" (Pomponazzi 2011, p. 160).

how much more marvellous it was because it could nonetheless be explained, through the intermediary of the *virtus loci*, by appeal to the influence of the stars. Pomponazzi's commitment to naturalism thus produced a vision of nature that was in some ways considerably less modern than those who believed in the demonic, and therefore fundamentally deceptive nature of such metamorphoses. Some of Pomponazzi's readers in fact regarded him simply as one of the more egregiously credulous proponents of unnatural magic. Pomponazzi was, for example, frequently grouped with Paracelsus, who, along with his (alleged) belief in substantial metamorphosis, admitted a singularly teeming gaggle of demons and mythical sprites into the natural world (Suavius 1568, p. 260, Erastus 1572-1573, vol. 1, p. 54, Del Río 1604, vol. 3, p. 148, Garasse 1623, p. 849). His denial of the presence of immaterial entities within the natural world, his separation from "the fables of Ovid" in this respect, appeared from another perspective as a more rigorous subscription to those fables.

3.4 Natural magic and similitudes in Giambattista Della Porta

Della Porta's *Magia Naturalis sive de miraculis rerum naturalium* (1558, revised and expanded in 1589) stands as the most famous example of a work of natural magic that has been purged of the traces of demonolatry that linger in Ficino and his followers.[22] The treatise comprises a vast compendium of instructions and recipes for the production of various wonderful effects, blending elements of the encyclopaedic tradition of natural philosophy represented by Pliny and the emerging interest in controlled experimentation. Della Porta also produced several works on physiognomy which shed much light on the basis of his natural magic. These include the *De Humana Physiognomia* (1586, revised and expanded in 1602), the *Phytognomonica* (1588), the *Metoposcopia* (written 1590-94 and never published), the

[22]Citations from the first version of the *Magia Naturalis* (in four books) will be from the Latin edition, Della Porta (1560). For the expanded version (in twenty books), I shall quote directly from the English translation, Della Porta (1658).

Coelestis Physiognomia (1603) and the *Naturalis Chironomia* (probably composed shortly after 1603, but not published until 1677). The *De Humana Physiognomia* was especially popular and was cited as an authority on human physiognomy into the nineteenth century. Della Porta devoted further books to cryptography, optics, meteorology, the mathematics of curvature, memory, automata, munitions, distillation and farm management, most of which subjects are touched on to some extent in the *Magia Naturalis.* Finally, he complemented this prolific technical output with several plays, mostly comedies (from 1589). The eclecticism of Della Porta's work makes it impossible to assign him a definite theoretical position, unlike the card-carrying Aristotelian Pomponazzi or the Platonist Ficino. Della Porta can be contrasted with Ficino in that he makes no appeal to demons and even attributed some demonic phenomena to natural causes, which brought him into conflict with the Church. He can be contrasted with Pomponazzi in that he was, at times, a critic of astrology. To be sure, he was not a constant or consistent critic (such that we find considerable dissent among scholars about his true position) but this very inconsistency separates him from Pomponazzi. At the same time, despite Della Porta's attacks on demonology and astrology and despite the proximity of his investigation of natural wonders to the nascent experimental science, the *Magia Naturalis* has been called "the best example of Ovidian influence" in the period (Findlen 1990, p. 311).

Findlen's perception of Ovidian influence probably has at least as much to do with Foucault as with Della Porta. Foucault based much of what he had to say about the Era of Resemblances on Della Porta (e.g. Foucault 2005, p. 21), whose work on physiognomy in particular presents a vertiginous expansion of analogical inferences, linking planets, plants, humans, animals and stones. Della Porta's willingness to infer the hidden properties and virtues of natural beings from what we now recognise as spurious similitudes, combined with occasional references to Ovidian metamorphoses as evidence supporting these inferences, produces the impression of an indiscriminate confusion of appearance with essence tantamount to a confusion of Ovidian myth with natural philosophy. The illustrations from the

De Humana Physiognomia (1586) in particular have become a textbook example of what narratives of modernity often refer to as the "analogical habit of mind" (Doran 1964). Findlen takes Della Porta's references to nature as a theatre or marvellous display as a positive commitment to this mode of philosophising, as if Della Porta regarded nature as an endless play.[23] But the proliferation of resemblances is only one side of Della Porta and only one side of his Ovidianism. It is to be emphasised that in the introductory chapters of the *De Humana Physiognomia*, Della Porta rejects the Pythagorean doctrine of metempsychosis – illustrated by an Ovidian quotation – as inconsistent with the principles of physiognomy. "Never has an animal been so made that it can have the form, let alone the soul, of another animal" (1586, p. 6). Metempsychosis renders the whole notion of inferring the nature of something from its similarities with other beings absurd, since it implies that there is no determinate relationship between soul and body (1586, pp. 7-8). This rejection of metempsychosis underlines that Della Porta's similitudes, like the conjectures of the astrologers, have a provisional, heuristic character: as appearances, they must be distinguished from the essences that they represent. At the same time, they must truly represent, not merely resemble those essences, or the propriety of soul to body would be uncertain and metempsychosis would become a real possibility.

The *Magia Naturalis* is a particularly problematic example of the sort of Ovidianism that Findlen has in mind, since this work contains some passages – rather exceptional in Della Porta's work – which suggest that behind Della Porta's physiognomy lies a kind of Platonism in which resemblances are grounded in immutable identities. This evidence occurs in the theoretical introduction to the work, entitled in the later editions "Of the causes of wonderful things", which borrows many elements from Ficino, Pico and Agrippa (Zambelli 2007, pp. 28-34). Here, Della Porta presents the cosmos as a chain of being depending on the stars and, ultimately, on God. He tells us that the origin of natural properties lies not in matter or in the particular mixture of its qualities ("temperament") – "Whoever has a

[23]For the theatricality of Della Porta's natural science, see also Kodera (2012, 2014).



Figure 3: Image from the *De Humana Physiognomia*.

mind little given and accustomed to speculations thinks that everything is accomplished by temperament and matter, since [effects] are produced through these as through instruments". Rather, properties derive from "form" – "the form does the most, strengthening the rest, and if it were lacking the rest would be rendered vain and would be stymied". In turn, the primacy of form is explained through its privileged derivation from the stars – "*since [the rest] do not suffice for capturing heavenly gifts*" (1560, p. 5; my emphasis). On the basis of this theoretical introduction, Della Porta's natural magic is often regarded simply as a non-demonic version of Ficinian natural magic, with the ambiguous entity of the demon-star replaced by the more conventional structure of stars guided by divine Intelligences. The strict hierarchy of this model of astral causality, if rigidly upheld, ought to have promoted the same hostility to metamorphosis that we saw in Ficino. Indeed, consonant with Della Porta's rejection of metempsychosis in the *De Humana Physiognomia*, we find almost no

concessions to metamorphoses of species in the natural magic. Della Porta is less "Ovidian" than Pomponazzi in this regard.

The metamorphoses of plants offer a possible exception. Della Porta does describe some ways in which plants can "forsake their own natural kind and be quite turned into another kind" (1658, p. 61). Even here, however, the examples Della Porta gives are almost all transmutations of secondary qualities (colour, taste, etc.). Transmutations which initially seem more radical, he qualifies in their description. For example, mint can be turned to pennyroyal, but "in savour only, for the fashion of the mint remained" (1658, p. 62). Oaks can be changed into vines, "but we must not think that this change is made while those trees or boughs last, but when once they are putrified, then the nature of the ground works into them and changes them into vines" (1658, p. 63).[24] As we might expect, then, most of Della Porta's appeals to Ovid in the *Magia Naturalis* have nothing to do with the kind of species-bridging similitudes suggested by the illustrations from the *De Humana Physiognomia*. There is only one reference to Ovid that does fit that pattern – the information that the ancients sacrificed dogs to the dog-star (see *Fasti* 4.901-52) is cited in evidence of a natural connection between dogs and the star (1658, p. 13). The other quotations from Ovid are concentrated in the Second Book, "Of the Generation of Animals" and come mostly from Pythagoras' words on spontaneous generation (*Met.* 15.361-390). These had been included among conventionally natural transformations since Isidore: that the sun breeds animals from mould, that mud turns into frogs, that snakes grow from the marrow of men's backs, that buried crab claws will breed a scorpion, that dead oxen generate bees, that a decaying horse will produce

[24]The question of whether plants could be transmuted was discussed in scholastic philosophy. Roger Bacon, for example, argued that such transmutations were only of "accidental differences and properties" not "essence and specific difference" (cited by Newman 1991, p. 23). Treating the transmutations of plants in the *Phytognomonica*, Della Porta briefly implied that animals too could be transmuted: "earth and sky do not only change the qualities *of animals and plants*, but make it so that one passes into the other: for when the aliment is changed, the qualities are changed along with the form" (1588, p. 44; my emphasis). All of the examples he provides are of plants, however, and there is no clear instance of Della Porta countenancing any animal metamorphoses except those that fall under spontaneous generation.

hornets (1658, pp. 27-30).[25] Other tidbits include the strange powers of various waters, the knowledge that a dog can be crossed with a wolf or a lion, and that cornel-berries can be preserved in lees (a detail lifted from the dinner of Philemon and Baucis; 1658, pp. 22, 36-7, 133).

It perhaps stands in favour of the Foucauldian interpretation that the perfectly hierarchical natural order presented in the first book of the *Magia Naturalis* is almost completely invisible in the much larger practical section of the work. While Della Porta does adduce several concrete examples of how to exploit stellar influences in his introductory book (the sacrifice to the dog-star being one example),[26] there is no mention of "capturing heavenly gifts" in the books that follow. The picture is complicated further when we consider the negative assessments of astrology to be found elsewhere in Della Porta's writings, above all in the *Coelestis Physiognomia* (1603). This is a work in which "astrology is refuted and shown to be empty and imaginary", as the frontispiece prominently declares. Della Porta repeats a single style of attack throughout. He first lists the characteristics which the astrologers say are bestowed by a particular star or conjunction, then argues that the causes of these characteristics are in fact not the celestial spheres, but rather bodily temperament (i.e. the particular balance of material qualities, hot, cold, dry, etc.): "what [the astrologers] say, that there is nothing they do not subject to the power of the planets, we subject to the elementary qualities from which the human body is constituted." The argument is, in other words, almost the exact opposite of the remarks quoted above from the introduction to the *Magia Naturalis*. We shall discuss different ways of interpreting this shift. I would emphasise at this stage, however, that Della Porta does not overtly embrace a profusion of correspondences of equal ontological weight. Instead, we have in each case a reductive

[25] Via Isidore, the same citations reappear in a number of medieval writers: for example, Vincent de Beauvais (1964, p. 2390), Gerald of Wales (Brewer 1867, p. 66) and, implicitly, Alexander Neckam (1157–1217), whose grouping of the generation of bees, wasps and frogs is indebted to Pythagoras (1863, p. 271).

[26] Most of the concrete examples are gathered in Chapter XV, "That a force is born from the sky and stars and that many things come from thence". For instance, we are told that trees planted while the moon is in an earthy star-sign will have strong roots, while those planted when the moon is in an airy star-sign will have many branches (Della Porta 1560, p. 19r).

insistence on a particular cause, whether astrological or earthly. The absence of astrological causality from the practical sections of the *Magia Naturalis* thus does not necessarily imply an abandonment of natural identities in favour of resemblances: rather, we see a transition to the more earthly model of causality presented in the *Coelestis Physiognomia.*

An important example of how Della Porta sets this reductionist streak against contemporary beliefs about magic is his naturalistic explanation for the nocturnal transportations of witches. In a section on "obscure and tumultuous dreams" (1560, p. 19r), Della Porta provided some recipes for what he called "witches' salve" (*lamiarum unguenta*). He explained that the witches' convictions that they had attended a sabbath and cavorted with devils were nothing but the product of an imagination rendered melancholic by this concoction of herbs and juices (a medical explanation deriving from Cardano). He had personally presided over one witch as she slept in order to verify that no magical transportation took place (apparently deciding that the best way to convince the witch that her night travels were delusional was to beat her while she slept and then confront her with her bruises). Della Porta's claims achieved notoriety when they were taken up by Johannes Weyer in his *De Lamiis* (1577) as part of Weyer's attack on the judicial treatment of witches, which relied heavily on the concept of melancholic hallucination (1660, p. 220).[27] One of Weyer's greatest critics, Jean Bodin, whom we noted as a rare believer in substantial demonic metamorphosis, construed Della Porta's dabbling in such matters as clear evidence that he had himself succumbed to demonic influence. Bodin opined that this "great sorcerer" deserved to be thrown to the flames (1580, p. 91v). Della Porta had in fact been brought to the attention of the Inquisition in 1577, probably in connection with this passage (Aquilecchia 1968), which was in any case removed from subsequent editions of the *Magia Naturalis*.

The muffling effect of the Inquisition makes it difficult to determine the extent to which Della Porta himself credited the conventional accounts of demons. It is in any case clear, whether or not he was as radical on the question as Pomponazzi, that he was interested

[27]For a fuller exposition of Weyer's views, see Giglioni (2013) or Valente (2003).

in providing naturalistic explanations for alleged demonic activities.[28] Moreover, the naturalistic explanation in this instance is not constituted by any appeal to ungoverned correspondences and similitudes: it is the deterministic and entirely corporeal explanation of the doctor. Given that Della Porta explains the belief in witchcraft as the effect of a corrupted imagination, it is also worth noting that Della Porta inherited from Ficino and ancient sources a belief in the physical operativity of imagined images – for example, a pregnant woman could shape the foetus into the likeness of various animals (1658, p. 51). But in the *Coelestis Physiognomia* he explicitly attributed these transformations to the presence of humours similar to those found in the animals. He even denied the utterly conventional doctrine that the imagination could imprint birthmarks and moles (1603, pp. 156-157). Although Della Porta does not himself associate the witches' superstitions with Ovid in the *Magia Naturalis*, his influence on the witchcraft debate ensured that in this respect he contributed indirectly to the separation of Ovid from natural philosophy. The parliamentarian Reginald Scot (1538–1599), for example, produced an influential attack on demonology, *The Discoverie of Witchcraft* (1584), in which he argued that Ovid is "Bodin's poet", for "he maintaineth for true the most part of Ovid's *Metamorphosis*" (1584, p. 92). Scot copied out Della Porta's recipe "because it greatly overthroweth the opinion of M. Mal. [*Malleus Maleficarum*], Bodin and such others as write so absolutelie in maintenance of witches' transportations" (1584, p. 184). Just as Della Porta denied real transmutations but cited Ovid for instances of spontaneous generation, so, despite the association between the *Metamorphoses* and demons, Scot, Weyer and Della Porta also all quoted Ovid positively for his entirely naturalistic explanations of witchcraft.[29]

[28]There remained in the *Magia Naturalis*, as far as I am aware, only one other experiment with a potential connection to demonic deception, a trick with a magnet so impressive that "all that saw it, believed the Divel was the cause of it" (Della Porta 1658, p. 205). A later work entitled *Criptologia* would have engaged more substantially with demonic phenomena (2013, pp. 101-122), but was abandoned unfinished when the censors refused to approve it.

[29]In the *Criptologia*, Della Porta referred to the *Fasti* and *Remedia Amoris* for some natural remedies against bewitchment (2013, pp. 106, 119-120). Johannes Weyer reproduced word for word the same examples as Pomponazzi, underlining the polemical significance of reading Ovid in this way: "Although the assertions of the poets, or rather their contradictions, has little weight with me, still, in order to satisfy the curious I am inclined in a small aside to return these arrows with the same bow" (1660, p. 165). Scot cites Ovid's lines

Before we examine in more detail the meaning of the Ovidianism that we find in Della Porta's physiognomic works, it will be illuminating to compare some evidence from Della Porta's dramatic output with his notion of a theatre of nature. If we may be guided by Della Porta's comedy *L'Astrologo* (1606), it would appear that Della Porta differentiates strongly between a deceptively artificial and a naturalistic model of theatre. *L'Astrologo* concerns the doings of one Albumazzaro Metereoscopico, an astrologer, physiognomist and practitioner of natural magic whose art is "theatrical" in an entirely artificial sense. The plot revolves around the desire of the octogenarian Pandolfo to resuscitate his (apparently) drowned friend Guglielmo, in order that Guglielmo may grant Pandolfo a teenage bride. To this end, Albumazzaro arranges a *maravigliosissima metamorfosi*: using astral magic, he will transform the peasant Vignarolo into Pandolfo's dead friend. In this case, however, the metamorphosis is simply a theatrical trick orchestrated to fleece Pandolfo. The possibility of real metamorphosis is undercut throughout the play, as when the lackeys of Pandolfo and Albumazzaro face off:

> GRAMIGNA: In a moment he makes a pair of horns bigger than a stag grow on the head of a man.
>
> CRICCA: Every married woman knows how to do that.
>
> GRAMIGNA: He makes men become beasts, asses and billy goats [*becchi*, i.e. cuckolds], and women cows and sows.
>
> CRICCA: They become these every day without art.
>
> (Della Porta 2002, p. 337)

In this case, a "theatrical" astrologer means a fraudulent astrologer. The suggestion that the stars might really effect such transformations is "thoroughly contained" by the plot resolution, in which the deception is discovered and the original roles restored (Reeves 2014, p.

on the *os sublime* as proof of man's celestial origin, and hence of the impossibility of converting his nature into a beast (1584, p. 101), and quotes some lines from the *Medicamina faciei feminae* in which Ovid "saith against himself", that is, in which the powers of witches are explicitly denied (1584, p. 251). As Fox (2007, p. 177) remarks: "unable to search Ovid's mind to determine whether his metamorphoses are "jesting" and "trifling" with the ignorant, Scot cannot decide whose side Ovid is on."

326). As Reeves emphasises, even the possibility of a merely social transformation is refused: Vignarolo disguised as the wealthy Guglielmo simply cannot keep up his performance. Thus, the play exploits the analogy between astrologer and playwright in order to draw a sharp distinction between empty performance and natural order – between the failed playwright Albumazzaro, and Della Porta himself. Here, metamorphosis is firmly on the side of the deceptive theatricality of Albumazzaro, not the truly natural magic of Della Porta.

None of the attempts to resolve or explain away the contradiction between the astrological worldview of the opening chapters of the *Magia Naturalis* and the sustained attack on astrology in the *Coelestis Physiognomia* are satisfactory. In my view, the contradiction must be fully embraced as characteristic of Della Porta's particular attitude and his reception of Ovid considered in a corresponding fashion. Therefore, we must first digress slightly from the topic of Della Porta's reception of Ovid to consider the different ways the contradiction has been dealt with. In the *Coelestis Physiognomia*, Della Porta appears to insist on the absolute conformity between astrological doctrine concerning the powers of the planets over human character and medical doctrine concerning the characters produced by different bodily temperaments, while, at the same time, proclaiming the absolute causal priority of the latter. He says his approach is aimed to shore up his attack against a vulnerability that has ruined past attempts to debunk astrology, namely, an apparent ignorance of the empirical data on which astrology is based. Thus, Della Porta accepts as valid the astrologers' observations about the "aspects, shapes, sizes, colours, motions and other accidents" of the planets (1603, p. 20), but rejects only the causal efficacy of these accidents. So, for example, that Saturn is dark, slow, and melancholic means that humans who are dark-skinned and slow are also likely to be melancholic – not because they are influenced by Saturn, but because they happen to share its temperament. In light of Della Porta's acceptance of the astrologers' empirical findings, some have maintained that Della Porta remains faithful to a model of astrological causality and that the refutation of astral causality is a mere "sop to the inquisition" (Zambelli 2007, p. 28). Badaloni (1960), for example, argues that the stars

provide an indispensable foundation for the orderliness of nature and natural form, just as they do in Ficino. Orsi has analysed the problem similarly. She writes that unless the stars provided the foundation for natural forms, Della Porta's theory of physiognomy "would have rested on a basis of accidental similarities" (1997, p. 258). Della Porta's predecessors in the science of physiognomy (e.g. Michel Scot, Michel Savonarola, Pietro d'Abano, Achillini) had deemed the stars the origin of character for just this reason.

One passage in particular gives the impression that the Inquisition may have been an important motivation for the composition of the *Coelestis Physiognomia*. Della Porta appears to allude to the papal bull of 1586, which condemned judicial astrology, as the cause of a volte-face with regards to astrology: "from the beginning of my childhood...I dedicated myself wholly to this science. But after it was removed from the sciences of Catholics by the order of the highest officials....I eliminated it from my mind" (*proemium*, Della Porta 1603). Nonetheless, the notion that Della Porta should have composed the *Coelestis Physiognomia* in the form of a refutation merely to appease the Inquisition in my view overestimates the extent to which he bound himself to the Inquisition's programme. Consider the freedom with which Della Porta continued to produce apparently pro-astrological writing after 1586. The *Phytognomonica* (1588), concerning the divination of the natures of plants from their similitudes with other parts of the cosmos, contained perhaps more (unrefuted) astrological lore than any of Della Porta's works. The entire eighth book is dedicated to similitudes between plants and the stars in which the similitudes have an explicitly causal force: "I would not want the botanist [*phytopta*] to be ignorant of sidereal science," Della Porta explains, "so that he is at any rate not ignorant of the strength which the stars possess in our humours and limbs" (1588, p. 305). The re-edited and vastly enlarged 1589 edition of the *Magia Naturalis* made no disavowal of its astrological doctrines, but in fact elaborated on them. For example, Della Porta added a new chapter entitled "how to attract and draw forth the virtues of the superior bodies", which brought in passages from Ficino's *De Amore* and the chapter on talismans in the *De Vita* (though Della Porta avoids mentioning the

talismans themselves; 1658, pp. 13-15). Della Porta included astrological advice in his *Villa*, a work on farm management published in 1593, and published a translation of the first book of the *Almagest* in 1605 (Ptolemy 1605).

Considered in isolation, this apparent abundance of astrology might seem to prove that Della Porta remained faithful to the vision provided in the opening book of the *Magia Naturalis*. But, as within the *Magia Naturalis* itself, astrological and "temperamental" explanations are insisted on with equal force at different moments throughout this period. Objections to astrology are found not just in the *Coelestis Physiognomia* but already in the *De Humana Physiognomia*, for example. In the 1602 edition, Della Porta added a chapter in which he explicitly stated that all possible ways of conjecturing about physiognomy "come down to temperament" (1602, p. 44).[30] We find such objections even in Della Porta's unpublished work on palmistry (*Naturalis Chironomia*), a branch of physiognomy which typically depended more heavily on the hypothesis of invisible astrological causation (1677, p. 43). Likewise, the *Phytognomonica* contains a chapter on "the science of the Genethliacs [i.e. the casting of birth horoscopes]", of which Della Porta writes "we approve of this less and it is not the subject of our work" (1588, p. 17). Hence, some have quite reasonably taken Della Porta's rejection of astrology at face value (Trabucco 1995, Paolella 2004). Still others argue that Della Porta switches freely between astrological and temperamental modes because he is more interested in drawing analogies between celestial and terrestrial realms than providing a causal explanation for one in terms of the other. In this vein it is sometimes maintained that Della Porta rejects a causal astrology but supports a "semiotic" astrology (Vasoli 1990, pp. 45-6). This position is effectively that of Foucault and his many followers, although the distinction between causal and semiotic astrology is often deliberately blurred. The problem with this view, when the distinction is clear, is that in trying to reconcile Della

[30]Della Porta betrays an attitude similar to that found in the *Coelestis Physiognomia*: "The most learned Ptolemy, even if he said that the habits of men come from the configurations of the stars, also [*et si...etiam*] said things which will square with our purpose" (1586, p. 16). The later Italian edition of the *De Humana Physiognomia* even incorporated some text and illustrations from the *Coelestis Physiognomia* (1610, pp. 38-40).

Porta's insistence on the special causal significance of the stars with his insistence on the primacy of temperament, it does justice to neither.

Those who argue for the ongoing centrality of astrology to Della Porta's worldview often cite the chapter from the *Coelestis Physiognomia* entitled "that they could have more correctly investigated the forms of men from the aspects of the planets", but what this chapter really reveals is just how desperately convoluted Della Porta's position is. In the preceding chapter, Della Porta has described the supposed influence of Saturn upon the character, citing from Ptolemy, Maternus and others. Following the usual pattern of presentation and rebuttal, our "more correct" chapter ought therefore to offer Della Porta's own view, an expectation compounded by the fact that he refers the reader to his own *Phytognomica,* where we indeed see a very similar passage (1588, p. 17). But there is no mention of temperament, as we normally find. Rather, Della Porta notes that God has painted the occult virtues in the stars and that therefore Saturn is "like [*quasi*] an indicator of a terrestrial property" (1603, p. 20). In language indistinguishable from the astrologers, he says that Saturn is dark and therefore "begets" (*procreat*) people of dark skin. Nonetheless, the following chapter, entitled "that the forms of men come from temperaments, not from the stars" reasserts the usual pattern (as Trabucco 1995, p. 287 points out). Della Porta apparently disclaims everything he has just said: "we have gathered their opinions not because we approve of them, but we reject them as old wives tales" (1603, p. 21). We have had, in other words, a double correction: first Della Porta replaces the astrologers' analysis of the stars as causes with a physiognomic analysis correlating celestial and terrestrial signs, at once suspending the investigation of causes and treating similitudes as causes themselves. Next the similitudes are reduced to temperament in a manner which, because of its implied determinism has perhaps more in common with the astrology it is designed to refute. We cannot say which style of correction is Della Porta's: they both are.

This contradictory insistence on both deterministic, causal explanation together with, to some extent, a free play of similitude, can be found in different forms in all of Della

Porta's work. In the introduction to the *Magia Naturalis,* in which the seeds of both style of correction are present, Della Porta addresses the relationship between similitude and cause programmatically, but still does not describe a consistent approach. In one moment, Della Porta expatiates on the usefulness of similitudes for determining causes, borrowing heavily from a chapter of Agrippa entitled "how we should investigate and make trial of [*experiri*] the virtues of things by the path taken from similitude". Following Agrippa, Della Porta declares his intention "to teach the things which occur through an occult property, disagree through enmity, and are bound by a tie of friendship, and how they are to be tested [*experienda*] through similitude" (1560, p. 6r). Along these lines, we find that the special connection between form and the stars is guaranteed not by the need for the mediation of incorporeal influence, as in Pomponazzi, but rather by a similitude: both form and the stars "stand above" that which they govern: "the property of a thing comes not from the temperament, but from the form itself, and as the most outstanding [*praestantissima*] of all, *it comes also from a like place*, from the highest sphere, therefore, and next to this, from the Intelligences, and finally from God himself [my emphasis]" (1560, pp. 5-6). Della Porta thus appears to be treating the similitude as if it implied a cause (form "comes" from a "like" place), just as he appears to maintain in the *Phytognomica* that the stars cause the properties of plants that resemble them.

As the discussion progresses, however, a different conception of what it means to investigate through similitudes emerges: in this conception, the appeal to a similitude consciously suspends the search for the cause. Still following Agrippa (in whom the contradiction is also present), Della Porta explains that the occult forms, which derive from the stars "are occult because they cannot be known by certain demonstrations. For this reason the ancients decreed a certain limit should be established beyond which they could not progress with reason". Here follows a typical example of Della Porta's occasional theatrical language: "Nature wanted [these phenomena] to be admired rather than known" (1560, pp. 7v-8r). The recourse to similitudes is framed as a remedy against this ignorance of the forms them-

selves: although we cannot know the forms, we can measure similarities in their effects and so make conjectures about how such powers could be exploited. This consequence is stated more clearly in the 1589 edition: "when once we find one thing at variance with another, presently we may conjecture, and in trial so it will prove, that one of them may be used as a fit remedy against the harms of the other". Della Porta provides an example: vines do not grow on coleworts: therefore we conjecture that coleworts cure drunkenness (1658, p. 10). This way of reasoning in theory involves no conjectures about the original cause of the property of curing drunkenness. It thus stands in tension with Della Porta's claim that magic "concerns the knowledge of things and causes" (1560, p. P2r [*Dedication*]), or "probes the causes, principles and elements of things" (1560, p. 2r).

This tension between a purely pragmatic conjecture that remains within the realm of mere similitude and a conjecture about a true cause emerges more clearly, in a different form, in the physiognomic works, and conditions the reception of Ovid therein. In the *De Humana Physiognomia* Della Porta provides a general exposition of the method of the science of physiognomy, based largely upon pseudo-Aristotle's *Physiognomica* (an exposition repeated in part at Della Porta 1588, p. 23). Particularly instructive is Della Porta's refutation of a method of physiognomy he attributes to Plato: "Plato thought that if a person's body, if it were completely similar, as a whole, to an animal, would also be impressed by the same morals and affects as the animal" (1586, pp. 13). Della Porta first observes that no two bodies are completely similar, but comparison must be by parts. He then explains the pseudo-Aristotelian distinction between "proper" signs, which belong to only one kind of animal, and "common" signs, which are shared, before rejecting both. First, common signs:

But common signs aid Physiognomy little or not at all, because they show affections that are common, which are the same for the lion, the deer and the boar. And if anyone shall be compared by these common signs, why should he be compared to the lion rather than the deer or the boar? Therefore proper signs come to be chosen.

Proper signs, however, turn out to be no more satisfactory:

> But these also provide nothing to purpose. For proper signs are proper to, and accord with nothing except that to which they are proper. They show their proper passion. If they accorded with another, they would not be proper signs. And since there is no effect proper to any of the animals from which we practice Physiognomy, they will have no peculiar sign. For not only is the lion brave, but also the bull and the boar, nor is just the deer timid, but also the hare and the cat.
>
> (1586, p. 13)

Similar parts, then, are shared out between all the animals, and if one interprets "proper" to mean proper to the animal as a whole – so that such a sign would reliably indicate the co-presence of all the other qualities of the animal – there are no proper signs: "Thus, if someone wishes to use common or proper signs, his labour is in vain, nor shall his desire be fulfilled." Della Porta presents his own method as one which identifies correspondences not between signs and species, but between signs and particular characteristics represented by those signs (which are therefore "proper" only to the sign itself):

> Rather, we ought to consider the animals which are marked by some common affection, and the signs to be noted come from these – they are the signs which are common to these animals alone and not to others. And this sign will not be altered when the effect is shared, so that whatever has the sign, will also have the affection, and whatever has the affection will also have the sign, and the animals which are free from affections of the same kind will also lack the signs by which these affections, truly, are indicated.
>
> (1586, p. 14)

The affections indicated by these signs, since they are not proper to any particular species, do not tell us about the inner form of the animal in which they appear; they are a particular property of that form, which may or may not be accidental. Physiognomy proceeds by examining as many instances as possible of a particular sign and checking whether or not it is

associated with a particular characteristic. Although conventional determinations of species do often provide the starting material for such comparisons (Della Porta gives the example of looking at the race of lions, to which the quality "strength" is attributed, and seeing that they share the sign of having large limbs), the correlation between strength and large limbs tells us first about large limbs, and only indirectly about lions, which may well have other more important characteristics. The refutation of Plato thus seems intended to show precisely that physiognomy is based on accidental similarities; or, at least, on similarities whose relation to the form of the whole animal – that is, the substantial form given by the stars – is not to be inquired. It is perhaps for this reason that Della Porta says his refutation of Plato has also dispensed with the astrologically-based physiognomy of Trogus, which he declines to discuss in more detail ("lest we produce boredom": 1586, pp. 15; cf. the mention of Trogus on p. 9).

Despite its separation from first causes, the similitudes which physiognomy identifies are far from random or uncontrolled. Della Porta's method clearly includes an eliminative component: signs which are found to indicate a certain effect in a group of animals must belong "to these animals alone, *and not to others*" (my emphasis). In other words, if it were found that ivy, say, avoided vines like colewort, and if it were also found that ivy did not cure drunkenness, then according to Della Porta's method, the property "avoiding vines" would lose its status as a sign indicating the power to act against alcohol. The ability to eliminate misleading similarities restricts the free play of resemblance and, in theory, ensures that the same signs will always be referred to the same content. The refined reliability of signs so restricted perhaps encourages Della Porta to speculate about their natural basis – at one point he says that the proper signs "follow immediately from the substantial form" (1602, p. 45). At the same time, the programmatic separation of the content of the physiognomic sign from the form of the species itself means that this naturalism is not consistently applied. This conflict between the naturalism of physiognomic signs and their separation from natural

species is irresolvable[31] and, I would suggest, the main reason for the oscillation between naturalisms of different kinds – astrological and medical, primarily – which in turn, because of this very oscillation, are both liable to be disregarded in favour of a purely empirical study of similitudes.

Bearing this complicated theoretical equivocation in mind finally puts us in a position to assess the nature of Della Porta's references to Ovid in the physiognomic works. They are as variegated as we might expect. They can be grouped into three classes. First, many are purely descriptive, in the sense that Della Porta simply quotes an apt description of a natural entity: Ovid described important characteristics of the woodpecker, gecko, the *mergus* (a kind of diving bird), the red lily, bats, frogs and ivory (1588, pp. 114, 132, 181, 216, 230, 248, 285). To these descriptions, Della Porta adds his own analogies – e.g. Ovid describes the *mergus* as having a curved neck; the bramble *smilax* looks similar; both cure poisoning. Or rather more wonderfully – elephants draw serpents out of caves; Pygmalion was attracted to an ivory statue; elephants have a magnetic force. Some of the references are both descriptive and interpretative, in the sense that Della Porta finds in Ovid not only a description of a property but an analogy linking the property to something else. Of these analogies, some inform us about naturalistic processes, like the references to Ovid in the *Magia Naturalis*. Others imply transgressions of the bounds of natural species. Most of the examples concerning naturalistic processes draw on Ovid's depiction of the emotions and are cited in the *De Humana Physiognomia*: the physical appearance of Sleep (1602, p. 161) and Envy (pp. 9, 192, 199, p. 262) indicates the proper signs of those psychic states; the savagery of Tereus is explained by the harshness of the landscape in which he grew up (p. 24); some rivers are imbued with dyes, which change the colours of those who drink them, as the Chrates, mentioned by Pythagoras (p. 34);[32] the bone structure of Hercules, as

[31]Caputo (1982) discusses this tension, which he frames as a conflict between Aristotelianism and Platonism (especially pp. 84, 90), although the problem is also inherent to Aristotelianism itself.

[32]Della Porta notes that the fact about the Chrates originates from Theophrastus, perhaps suggesting that Della Porta was reading Ovid here through Seneca: Seneca cites Theophrastus for an example of a river that dyes sheep white (*QNat.* iii, 25.4).

described by Ovid, betokens strength (p. 122); and Byblis displays the physical symptoms of love (*calor, macies*, etc., p. 182). The *Phytognomonica* mentions the generation of scorpions from crabs, signified by their physical similarity, and the ability of the lynx to petrify what it ingests (1588, pp. 185, 235).

The references to supernatural transformations are more interesting, since it is with these that we see the limits, or the true extent (depending on your perspective), of Della Porta's playfulness. One such transformation, that of Lycaon, relates to the demonological debate. In a chapter on the powers that dusky flowers have against melancholia, Della Porta restated his controversial assertion about the melancholia of supposed demoniacs (taking care to differentiate this from "true" demonic possession). One kind of melancholy, called lycanthropy after King Lycaon, is hidden in the fable of transformation narrated by Ovid (1588, pp. 112-3). Weyer seized on Della Porta's text and added a sentence making Ovid's own medical credentials more explicit: Ovid "adds the symptoms of the disease of melancholia...for it is often the case that the ridiculous fantasies of the poets have natural causes" (1660, p. 336).[33] Thus, in this case, the miraculous metamorphosis is merely the "wrapping" (*involucrum*) for a process whose cause can straightforwardly be assigned to corporeal temperament. In fact, nearly all the references to unnatural metamorphosis have this form. Thus, when the metamorphosis of Ascalaphos (*Met.* 5.549) is invoked to explain that the similarity of the emperor Vitellius to an owl (having a large head) betokens block-headedness (1602, p. 49), Della Porta jettisons Ovid's suggestion of an intervention coming from outside the natural order and provides a natural explanation for the connection between an affect and its "proper" sign: "there is a natural reason for this inasmuch as the size of the head indicates an excess of matter rather than excellence of virtue" (1602, p. 49). Another example is Della Porta's reference to Cycnus, the timorous warrior who was slain by Achilles and transformed

[33]Although Weyer does not refer to Della Porta explicitly, he employs the same phrase *alienatio humanae mentis* to describe the disease and quotes the same lines of Ovid. Weyer goes on in the same vein to explain that the metamorphosis of Tiresias was based upon the similarity between the male and female sex-organs (1660, p. 337-9).

into a swan (*Met.* 12.144-5): those of a timorous disposition have a moist temperament and so "truly are white, and have skin soft like down" (1602, p. 241).

On some occasions, the naturalistic explanation is absent and the metamorphosis is simply listed among the series of analogies which proves a connection between affect and sign without suggesting any particular cause. An example is Della Porta's citation of the metamorphosis of the insolent Cercopes to monkeys to illustrate that a "pointy" head betoken impudence (1602, p. 56). Similarly, Della Porta notes that the power of the hyacinth to delay puberty is indicated by the fable that the flower was once a young boy, and by the fact that both boys and hyacinths are "smooth", but provides no cause for the effect (1588, p. 132). References like these, in which a marvellous metamorphosis is offered as a pure similitude, without any causal explanation beyond the similitude itself, are nonetheless in the clear minority. In general, if Della Porta does offer a pure similitude, it is one that governs a relation whose causal explanation is obvious and therefore implicit (the symptoms of envy or love, for example, are implicitly natural). If he refers to an unnatural metamorphosis, he usually provides an explicit natural cause. Della Porta's use of Ovid thus cannot be chalked down simply to a playful indulgence in the pursuit of similitudes for their own sake. For all that, given the occasional absence of causal explanations, the search for natural causes cannot be the sole motivation either. The willingness to turn to the *Metamorphoses* for purely "descriptive" references may be significant, even if the particular metamorphosis from which the descriptive observation is drawn is irrelevant. Della Porta's explicit methodology included an eliminative component, but that does not mean the eliminative component was diligently applied – indeed, it was flagrantly ignored. Even the early critics of natural magic, such as the German chemist Andreas Libavius (1555–1616), attacked Della Porta for this failure (Libavius 1615, p. 120 [misprinted as 102]).

As we have seen throughout this chapter, the reception of Ovid in natural magic is a result of the expanding domain of various forms of naturalism – whether demonic, astrological or "temperamental". If it is also redolent of an outdated mode of "analogical thinking",

in which fact and fiction become confused, that is not because these forms of naturalism were explicitly based on such a methodology. The conflicts between the various different interpretations of natural magic, each of which tended to reject the Ovidianism of the other, show that the critique of fictions and false resemblances was as important an endeavour as the promotion of veridical ones. Della Porta is no exception – indeed, the increasingly modern appearance of Della Porta's attitude to nature, his criticisms of demonology and astrology, is directly linked to his promotion of physiognomy. That the analogies Della Porta used to interpret human physiognomy still appeared convincing to the eighteenth-century physiognomist Johann Caspar Lavater (1741-1801) is testament to how difficult the eradication of Della Porta's errors would be. Ovid had an afterlife in Lavater through Lavater's quotations of Della Porta's quotations of Ovid,[34] but also more abstractly through the principle of physiognomic expression itself, which Lavater named "metamorphosis".[35] At this point, however, metamorphosis was no longer to be grounded in astrology or humoral theory: as an avid reader of Gottfried Leibniz and Charles Bonnet, Lavater threw behind his concept of metamorphosis the whole weight of the post-Cartesian understanding of natural law. In doing so, he responded to the scientific element of the Ovidian tradition that had been present from the beginning. At the same time, from the perspective of our modern awareness of physiognomy's falsehood, he revealed his inheritance of the mythological aspect of that tradition.

For Foucault, who stresses the "archaeological" foundations that link seemingly opposing doctrines within a single *episteme*, the difference between demonologists, Platonists, Aristotelians and the practical magic of Della Porta vanishes almost entirely. We should,

[34]Lavater cites Ovid for descriptions of Sleep and Envy (1806, vol. 9, p. 248, 263), the pride of a horse (1806, vol. 9, p. 225) and the stupidity of a bear (ix, p. 164; the latter two quotations derive from the pseudo-Ovidian *Halieutica*). All of these Ovid citations appear in similar contexts in Della Porta and are certainly lifted directly from him; see, respectively, Della Porta (1602, pp. 161, 262, 247, 266).

[35]For Lavater's references to metamorphosis see first Lavater (1806, vol. 1, p. 180), and compare Lavater (1806 vol. 4, p. 178, 228, vol. 5, p. 256, vol. 7, p. 182). At around the same time as Lavater was compiling his investigations, the Dutch physician Petrus Camper (1722-1789) was developing an ostentatiously mathematical method for "metamorphosing" (Camper 1792, p. 57) animals into one another on physiognomic principles, a cow into a bird and a horse into a human.

however, resist the temptation to regard the Renaissance as an era in which Ovidianism and science are always neatly interwoven, as against the Classical Age, which tears them definitively apart. The kinds of claims made against resemblances and against Ovid in the Classical Age are already made in the Age of Resemblance and even form an indispensable element of the machinery that allowed the physical significance of resemblances and the *Metamorphoses* to be defended. So, for example, Della Porta's programmatic separation of the content of physiognomic signs from the substantial forms of species, designed precisely to avoid Ovidian confusions of form and substance, gave him a misplaced confidence in the reliability of his empirical method that resulted in speculation about essences on the basis of insufficiently investigated resemblances. Similarly, in criticising a 'naively' Ovidian belief that demons could effect substantial metamorphoses, demonologists highlighted the deceptive or naturalistic aspect of such metamorphoses within the poem itself, to propound their own vision of widespread demonic deceptions. Conversely, those who criticised even this manner of belief in demons as superstitiously "Ovidian", such as Pomponazzi, sometimes ended up reinstating the notion of the possibility of substantial metamorphoses. The more scientific concept of metamorphosis that was to come would thus hardly dispense with the tensions in this older, explicitly Ovidian – yet naturalised – understanding of metamorphosis: it would intensify them.

Chapter 4

Alchemy, or the Chaos of the Sages

4.1 Alchemy and corpuscular mechanism

In the previous section we argued that Della Porta's parallel and conflicting explanations of similitudes in terms of either celestial influence or corporeal temperament remains deliberately unresolved: the lack of resolution reflects an effort to make specific conjectures about causes while recognising that, because such conjectures are themselves supported by purely empirical similitudes, they remain, precisely, conjectures. The presence of parallel celestial and material explanations is also a common feature of alchemical texts, as implied by the widespread naming of the metals by the seven planetary gods (iron is called Mars, copper Venus, lead Saturn, tin Jupiter, gold Apollo, silver Diana, and quicksilver Mercury). The alchemists aim at something from which Della Porta retreats, however: that is, an explicit commitment to the coincidence of these contraries, to the identification of the higher and lower worlds, and thus of astrological and temperamental explanations. Many alchemists referred to their art as a "lower astronomy" (*astronomia terrestris* or *astronomia inferior*) – they did not mean only that the art depended on exposing terrestrial materials to the right kind of influence from the stars, although they did sometimes mean this. They meant, in addition, that alchemy dealt with the celestial bodies as their substance was conceived to

be literally present in terrestrial matter, generating and shaping it from within.[1] Alchemy's obsession with the coincidence of contraries can be evoked by a few commonly repeated mottoes, here quoted from the *Pretiosa Margarita Novella* (1330) of Petrus Bonus (fl. 1340), which we shall examine below: "Nature makes bodies from spirits and spirits from bodies (Bonus 1608, p. 277)", "What is below is as what is above, and what is above is as what is below" (1608, p. 252), and "Let it be not precious unless it is common, not common unless precious" (1608, pp. 121).[2]

As we shall see, one consequence of this obsession was that, in a specific way, the restrictions Della Porta placed on the free play of similitudes were relaxed and the distance he maintained from the more unnatural Ovidian metamorphoses collapsed. The specific manifestation of this free play of similitude was the alchemists' passion for myth and symbolism, which led them not only to present their own work through symbols, but to interpret all symbols that had come before in terms of their own art. The alchemists thus drew on the *Metamorphoses* more eagerly than any other group of scientists or philosophers: "The chemical philosophers who have made use of fables to veil their Art have made particular use of those of Ovid", noted the alchemically-influenced royal surgeon, David de Planis Campy (1589–c. 1644), in the heyday of alchemical allegory. He went on to add that not just Ovid's, but "all the fictions of the poets are a veil by which the Philosophers hid the physical Work" (1633, pp. 66-7).[3] The role of alchemical myth and symbolism in illustrating and reinforcing similitudes between different parts of nature (especially stars, living beings, and metals) was influentially highlighted by Hélène Metzger in a ground-breaking history of chemistry that had a major impact on Foucault's view of the Renaissance. By symbolising chemical operations with fables about animals, for example, alchemists could express the notion that

[1]See Rampling (2013) and Clulee (2001). Many alchemists were thus "noticeably cool to [conventional] astrology", despite proclaiming their art as astrological (Newman 2001, p. 18-22). Forshaw (2013) cites a number of Paracelsians interested in astrology in more conventional ways; cf. Burnett (1992) on the Arabs; Telle (1992) cites Paracelsian passages critical of conventional astrology.

[2]The fullest study of the motif of the coincidence of contraries in alchemy remains Jung ([1944] 2014).

[3]De Planis Campy (1633, pp. 66-75) mentions specifically the following myths or symbols: Daedalus and Icarus, Midas, Phoebus and Phaethon, Typhon, Gorgon, Perseus and Pegasus, Cerberus, the Hydra, the Garden of Hesperides, Scylla, the Naiads and Neptune.

metals too "lived", and therefore could be derived from, or used to cure, other living beings. For Metzger, the advent of the mechanical-corpuscular matter theories of René Descartes (1596–1650) and Robert Boyle (1627–1691) spelled the end of such analogies, and thus of mythical thinking in general: "It was not very long ago that all the reasonings of Chemistry were nothing but kinds of poetical fiction, living, animated, agreeable to the imagination, unintelligible and unbearable to reason," noted Fontenelle in 1710. But finally, "Sane philosophy appeared, which undertook to reduce this Chemistry, mysterious and in a certain fashion so proud of its obscurity, to simple corpuscular mechanism" (quoted in Metzger 1923, p. 250).

The puzzling freedom the alchemists bestowed upon themselves to give seemingly any symbol (even Biblical imagery) an alchemical interpretation is, however, in an important way that distinguishes their approach from Della Porta, severely restricted. They did not display Della Porta's ambiguity about the causal explanation grounding the determination of such similitudes, poetic or otherwise. Instead, following the famous alchemical *dictum* "all is one" , they seek precisely the material in which all such ambiguities would be reduced to oneness: all symbols are consistently reduced to a single Hermaphroditic, astral-terrestrial matter, containing in itself the forms of its own transmutations. There is, therefore, a remarkable consistency in the way that the alchemists use myths: even if the specific chemical operations that the myths are taken to conceal shift unreliably, the central notion that the myths are myths about matter, and a single kind of matter at that – and that this interpretation is to be opposed to moral, astrological, demonic, or any other interpretation – remains remarkably constant. In highlighting this aspect of their hermeneutics, we begin to see a certain similarity between their materialist reductionism and that of Descartes and Boyle. Indeed, Reacting against Metzger's dualism, several scholars have recently argued that aspects of the seventeenth century corpuscular mechanism were anticipated, and indeed directly inspired by the theories of matter developed by alchemical writers (Principe 2000, Newman 2006, Clericuzio 2000uw). The alchemists thus have a particularly polarised legacy,

at once providing the most notorious instances of supposed pre-modern analogical or superstitious thinking and anticipating what is commonly regarded as one of the characteristic achievements of the Scientific Revolution: the analysis of transmutations in terms of the rearrangement of a single unchanging material.

Interpretations of the function of alchemical symbolism have generally remained polarised according to this double aspect, with some emphasising the origin of the symbolism in religious mysticism, whose aim was to unite contradictory aspects of nature, others treating the symbols as code that can be literally deciphered in order to reveal specific metallic transformations. The principal of the former camp was Karl Jung, whose understanding of alchemy as a way of resolving spiritual conflict found some purchase in Dobbs' (1983) interpretation of Newton. Although Jung is now in disfavour, because he neglected the alchemists' physical work, the theory of the religious origin of symbolism is still popular. The use of coded names (*Decknamen*), symbolism and extended allegory can all be traced to the early Egyptian alchemist Zosimos of Panopolis (fl. 300 AD), where they appear to have been motivated by Gnostic influence (Linden 1996, Nummedal 2013, Sheppard 1957). Some of the Islamic alchemists, who enriched the Greek tradition and transmitted it to the Latin West, cited religious reasons for the adoption of a practice known as *dispersa intentio*: the deliberate dispersion of true teaching through several tracts brimming with irrelevant or misleading information (Principe 2012, pp. 44-45). By contrast, in the new historiography which has revealed alchemy's influence on corpuscular chemistry, interpreting alchemical allegory is more usually a question of "decoding" it – that is, casting it aside – in order to reveal the analytical chemical investigations underneath (Newman 2003b, pp. 54-78, 118-33, Newman 2005, pp. 179-197, Principe 2001, p. 406).

The explanations offered for the use of symbolism by proponents of the new historiography therefore tend to frame it as a compromise or as an element extraneous to the real business of alchemy, certainly unrelated to any anticipations of corpuscular theories. Principe leans primarily on the desire to shield the art from hostile criticism and official scrutiny

(2012, p. 62-3). Nummedal similarly highlights the role secrecy played in preserving professional autonomy (2008, pp. 119-146). Newman has suggested that in the Early Modern period codes and allegories were mere "diversions" comparable to crosswords and Rubik's cubes (2005, p. 181), or used to create "an aura of authority" (2003b, p. 117). Despite the steady growth in the popularity of alchemical symbolism from thirteenth to the seventeenth centuries, peaking at the very moment the theories of Boyle and Descartes are being articulated, Newman nonetheless considers this growth to represent "a loss of intellectual rigour" (1991, p. 39). By focussing on the popularity of the *Metamorphoses* I hope to provide a contrasting narrative that emphasises the interdependence, as well as the opposition between modern methods and symbolic expression. The *Metamorphoses* certainly licensed the misappropriation of mystical and therefore insignificant similitudes between stars, metals and animals, but, at the same time, it could be read as offering a vision of nature more like that of the corpuscular philosophers, in which these different kingdoms had a single material origin – chaos. This double aspect of the poem reflected the formation of European alchemy by the synthesis of two traditions – one, corpuscular and purely metallurgical, associated with Franciscan monk Paul of Taranto (a.k.a. "Geber", fl. late 13th C.), the other mystical and invested in cosmic analogies, primarily associated with the names of Arnald of Villanova (c. 1240-1310), Ramon Lull (c. 1232–1315), John of Rupescissa (?–1366) and, in the Renaissance, Paracelsus (1493–1541). Corpuscular philosophy as it emerged in Descartes and Boyle was likewise, I shall argue, indebted to both these traditions, since it required on the one hand , a corpuscular theory of matter, but on the other, a theory of matter that could be applied to explain the origin of any part of the cosmos.

The key example of the alchemical anticipation of corpuscular theories is the *Summa Perfectionis* of "Geber", who named himself after the Arabic alchemist Jabir. Geber drew on Book Four of Aristotle's *Meteorology* and the Jabirian corpus to argue that in the special case of metals, the natural alterations brought about by mixture were not wholesale mutations of substance or essence (as in the theory of mixture Aristotle developed in the

De Generatione et Corruptione), but could be explained by an alteration in the spatial configuration of the "smallest parts" (*minimae partes* or simply *minima*), which themselves remained unchanged.[4] Geber may have developed this line of thought partly in response to a famous argument for the impossibility of transmutatory alchemy penned by Avicenna, but often attributed to Aristotle, the so-called *Sciant artifices* (Newman 1989, p. 433-437). Avicenna argued that "one metal cannot be converted into another unless the compound is broken up and converted into the composition of that into which its transformation is desired" (Holmyard 1927, pp. 41-2). The Latin translator, Alfred of Sareshel, rendered this concession "unless perhaps they are reduced to prime matter [*materia prima*]" (Holmyard 1927, pp. 41-2, 55). Geber's response, then, was that the alchemist could in fact proceed to treat his or her metals in precisely this manner, separating out the most basic ingredients (*prima materia*) – whose identity could be determined by experimentation – to produce a "medicine" which would be capable of penetrating the other other metals *per minima* and thus altering their composition. Geber argued that the best medicine – the philosopher's stone – was pure mercury, since its corpuscles were the smallest and thus the most penetrating. It is to be noted in favour of the separation of Geber's corpuscular mechanism from the tradition of alchemical symbolism that, although Geber begins his treatise by repeating the conventional claim that knowledge of alchemy requires divine illumination and ends with a warning about his own obscurity, he has relatively little use for allegory or concealment in his work. In line with his corpuscular explanation of transmutation, he is also clear that the alchemist does not depend on correspondences between particular planets and metals (Newman 2001, p. 22), although he does use the conventional planetary names.

The problem with such a separation, however, is that several alchemists who did produce allegorical interpretations of the *Metamorphoses* proclaimed Geber as one of their highest authorities. The *Summa Perfectionis* has a peculiar status inasmuch as it is at once quite different from many other alchemical works and a major influence in the tradition (Calvet

[4]For a broader survey of medieval corpuscular theories up to Sennert, see Pyle (1997, pp. 188-231).

2010). This peculiar status creates difficulties for Newman who attempts to distinguish Geber from equally popular authorities who, although they may adopt corpuscular explanations derived from Geber, undergird these explanations with quite different conceptions of change, which, whether vitalist (hylozoic) or Aristotelian, seem to depend on analogies between metals and living beings. Newman and Principe have been at pains to point out that some alchemists applying concepts such as "seeds", "growth", "digestion" and "coitus" to chemical processes nonetheless explicitly disclaimed a vitalistic theory of matter: "among many alchemists these [vitalistic, reproductive] images are merely metaphorical or heuristic" (Newman 2001, p. 413). Principe quotes some explicit remarks of the sixteenth century French alchemist Gaston DuClo (a.k.a. Claveus) to that effect (Principe 1998; see TC iv under Gaston Dulco). However, DuClo also explicitly denied that the corpuscular rearrangement described by Geber could effect a true transmutation without a coincident substantial change conceived in the Aristotelian fashion (Principe 1998, p. 190). Clerucuzio (2000, p. 13) has maintained on this basis, against Principe (1998) and DuClo's own assertions, that DuClo's vitalistic language is not purely metaphorical.[5] In fact, almost all the theorists Newman discusses (e.g. Philalethes, Andreas Libavius, Jan Baptista Van Helmont, Daniel Sennert) continue to speak of mixture as a form of transmutation irreducible to purely mechanical explanations (Klein 2007, Clericuzio 1997). Obrist (2009) extended this argument to critique Newman's interpretation of Geber himself.

The tradition to which Geber's corpuscularianism is in theory primarily opposed is that of the groups of alchemists who wrote under the names of Arnald of Villanova and Ramon Lull, and the real individuals John of Rupescissa and Theophrastus Paracelsus. These alchemists were primarily interested not in a "medicine" that would perfect metals, but in a medicine that would perfect living bodies and thus prolong human life (Pereira 1995).

[5] As we saw in Chapter 2, Bynum describes Aristotle's theory as an "essentially biological model of change" (2011, p. 233), though in fact Aristotle makes clear distinctions between the organic and the inorganic realms. His key *explanandum* was perhaps not life itself, so much as the apparently teleological order it displayed, and which could also be found throughout nature, including in inanimate objects – even the elements have a proper form which determines their motion.

The key method to be used in obtaining this medicine was distillation, characterised as a process of "separation". One immediately perceives the possibility of a rapprochement with Geber on the basis that in these cases too, the alchemist separates and combines unchanging substances rather than producing new ones by generation or corruption in the Aristotelian sense. The distillate was always present as such within the original substance, "occulted" by mixture, but in full possession of its form. And yet the matter "manifested" by distillation – because it perfects living beings too – cannot be the mechanically-acting material apparently described by Geber (Pereira 2002). Rather, as John puts it, it is a "root of life" (*radix vitae*). It contains a divine energy and activity which its seekers describe with a bewildering amalgam of Platonic, Stoic, Aristotelian, Galenic and idiosyncratic terminology. Those writing under the name of Lull – who formed the largest and most influential group – named it "quintessence", the very substance of the stars, or simply "heaven" (*coelum*). For these alchemists the *prima materia* referred to in the *Sciant artifices* meant *prima materia* in the absolute sense, that is, the matter underlying not just metallic transmutations, but any conceivable transmutation.[6] Following the famous eighth century alchemical fragment known as the *Emerald Tablet*, this matter was often identified with the prime matter of creation (Pereira 2000, Clark 2006). Alchemy was the business of extracting this matter and "fixing" it in a permanent substance.

Newman described Lullian alchemy as "a fusion of alchemy and religion that was wholly alien to the rational spirit of the *Summa*" (2003b, p. 98). At the same time, he has traced the influence of Geber in Lull's peculiarly "reified" distinction between occult and manifest matter (occult matter being actually present, rather than in potency), which, in turn, he sees as the root of the properly corpuscularian equation of form with spatial organisation (Newman 1996). When we consider the alchemical reception of Ovid, however, it becomes clear that we must recognise the interdependence and even identity of the supposedly irra-

[6] *Prima materia* often carried this ambiguity: Duns Scotus schematically analyses *prima materia* into two senses, the absolute (*simpliciter*) and the relative, i.e. the most immediate common substrate of the substances under discussion (*materia proxima* or *materia propinqua*) (*Summa unica* cap. V).

tional and corpuscularian aspects of Lullian alchemy. One of the key features of seventeenth century corpuscular theories is that they were, like the Lullian theory, universalising – they purported to describe not just some specific kind of matter, but matter in general. Geber was clear, however, that his explanations pertained only to metals: the transformations of living beings had to be understood in an entirely different fashion, specifically in relation to soul (Newman 1991, pp. 284-6). By restricting his corpuscular models to metals, Geber implicitly accepted the impossibility of explaining deeper forms of change in the same way. According to one definition of vitalism, this difference would make Geber the vitalist, not Pseudo-Lull.[7] One aspect of Lullian alchemy, then, which associates it more with scientific rationality, as Newman appears to understand it, than with mysticism, is the universalisation of Geber's corpuscular theories. The tendency to extend vital powers to the very basest elements of nature can be seen simply as a corollary of this move, necessitated for the same reason that Geber refused the corpuscular analysis of living beings.

What was that reason? As a good scholastic, Geber would have known that in *On Generation and Corruption*, Aristotle had refuted those who tried to explain all change as the qualitative alteration (ἀλλοίωσις) or rearrangement (κίνησις κατὰ τόπον) of an unchanging substance. Some kinds of change were more than alteration – they were true "generation and corruption" because they involved a change of the matter and form of the substance as a whole (*Gen. corr.* 317a17-27; cf. *Cael.* 305a33–b26). Aristotle's philosophy is sometimes labelled "hylomorphism" because its key postulate is that substance is compounded of matter and form, where matter is a capacity or potentiality for change, which underlies a change from one form (actuality) to another. Because only the form bestows actuality, when the form is changed, the matter does not stay the same, but in an absolute sense is transmuted into the new form. The ability to explain perceptible forms in terms of substance,

[7]We read in the *Routledge Encyclopedia of Philosophy*, for example, that "vitalists hold that living organisms are fundamentally different from non-living entities" (Bechtel and Richardson 1998). This is the sense in which Georg Ernst Stahl (1659–1734) considered himself a vitalist: Stahl famously separated chemistry from medicine on the basis that the former dealt with mechanistic corpuscular interactions, the latter with vital principles. Alchemy he regarded as an immature and illegitimate combination of the two (Chang 2011).

and therefore order, was the strength of Aristotle's theory and the key weakness of the corpuscularian theory. Indeed, the conception that the alterations wrought by alchemists were mere rearrangements was often used to argue that alchemists transmuted appearances, not the substances of metals. The extent to which alchemists were under suspicion for perpetrating merely illusory transmutations can hardly be overemphasised (*pace* Nummedal 2008, esp. pp. 147-175).[8] The alchemists thus found themselves in a double-bind, one which had been clearly articulated by none other than the real Ramon Lull (himself sceptical of alchemy): on the one hand, wholesale mutations of prime matter could not be accomplished by artificial means because prime matter as Aristotle conceived it could not be physically accessed; on the other hand, the mere rearrangement of unchanging matter (as by melting and remoulding metals) did not amount to transmutation because the matter remained the same.[9] A corpuscular conception of matter was necessary if the ingredients of compound substances were to be artificially recoverable and compoundable; but a conception of wholesale substantial change was equally necessary if the transmutations so produced were to be credited as anything more than illusory (i.e. mere rearrangement or alteration). The pseudo-Lullian alchemists countered Lull's objections by insisting that matter was indeed something more tangible than pure potency and so could be artificially manipulated. Respecting as far as possible the Aristotelian position, the only way of reconciling this appeal to corpuscularianism with the empirical fact of change and variation was to simultaneously grant the corpuscles a power of substantial growth.[10]

[8]The alchemists were sometimes accused accused of requiring demonic aid to accomplish their transmutations. Aquinas adduced scholastic arguments against the possibility of metallic transmutation in order to show that demons could not transmute species (Newman 1991, pp. 30-31). For more on the link between alchemy and demonic activity see Newman (2005, pp. 54-62).

[9]"In artificial work there is no transmutation of one form into another form or of one matter into another matter, and consequently there is no transmutation of one essence into another, as we see in a silver cup, for if it is melted down and then cast again, the first form is entirely destroyed and another form is made, without any change in the identity of the matter" (*Liber Chaos* in MOG iii, p. 250 [internal pagination, p. 12]). The key issue here, as Newman explains, was that in the hylomorphic framework the matter of a substance and the matter of the ingredients or proximate material of that substance had entirely different forms (like a chicken and an egg), so that the former could not be artificially produced from the latter (Newman 2006, pp. 50-54).

[10]Telle concludes his comprehensive survey of alchemical allegory with the claim that the persistence of alchemical allegory into the seventeenth century demonstrates "the unbroken power of a symbolical thought

Alchemists interested themselves in Ovid precisely because he appeared to show this coincidence of the corpuscularian and dynamic models of change: he both described the ability of divine forces to accomplish marvellous metamorphoses, and had simultaneously provided such metamorphoses with an explanation in terms of purely material alterations. More than that, he had shown how, if transmutations were to be more than merely apparent, but also artificially reproducible, each of these conceptions demanded to be supplemented by the other.[11] Two features of the *Metamorphoses* were especially important in this regard: its dualistic cosmogony, in which a designing god acts upon a chaotic mass described in Lucretian terms, and its treatment of subsequent metamorphoses in terms evocative of that primordial encounter between matter and artificer. As Wheeler (2000) has amply illustrated, a tension runs throughout the poem between a Lucretian vision of metamorphosis as a symptom of the persistence of underlying chaos and a Stoic or Platonic vision of metamorphosis as the result of divine design, whether transcendent or immanent – *deus aut melior natura*. The poles of this tension are both opposed and mutually enabling, inasmuch as the continuity afforded by the persistence of chaos is precisely what enables continued re-creation. It is, in other words, precisely the failure of the demiurge to eradicate chaos that makes second creations possible, while this failure also condemns them to a like impermanence. So, for example, Ovid depicts Circe's herbarium in transition from chaos to *opus* by allusion to both the cosmogony and the *sphragis* (Wickkiser 1998, pp. 127-8, citing *Met.* 14.264-270): Circe's microcosmical "creation" implies that her magic possesses the transmutative power of the demiurge, while the momentary resurgence of chaos, which she must place once more into order, hints that such power may be merely illusory, since chaos remains ever present. Just as often as the gods or humans impose some form by effecting a metamorphosis, chaos threatens to erase

attached to analogy, that granted images the character of referring to the processes of the animated and ensouled material world they represent, and in which the organic and the inorganic, the physical and spiritual, the inner and outer mixed, and the worldly transformed itself in the likeness of the otherworldly" (1980, p. 151). I would not dispute this conclusion, but it does not sufficiently recognise the interdependence of that "symbolical" thought and the development of corpuscular or atomistic philosophies.

[11]The reason for attributing alchemical knowledge to Ovid was thus deeper than that adduced by Willard (2007, p. 153), namely, that he was considered a universal authority.

whatever change has occurred. Indeed, as metamorphosis itself is destructive as well as creative, the generation of a new form itself takes on a chaotic aspect.[12]

The alchemists' interest in Ovid spring directly from this interest in chaos as a response to the central difficulty it creates: the threat to the persistence of form and thus to the possibility of re-creation it is intended to ground. Although alchemists would intentionally reduce their work to chaos in order to effect a genuine act of creation, the persistence of chaos threatened to undermine their efforts. Ovid had anticipated this problem, as the Dutch alchemist Van Helpen implies:

> I governed my philosophic egg with such great imprudence that the four Elements (which began by fermenting very peacefully in my chaos and conduct their operation according to the course of nature) elevated themselves *in gradu intenso* (like the Giants in Ovid) the one against the other with so much vehemence and violence that my philosophic egg reproached me for my idiocy according to my deserts, by collapsing.
>
> (Van Helpen 1686, p. 108)

The anonymous author of an unpublished work entitled *Traité de la Chrisologie Chimique* (1624) opposed Ovid's notion of chaos to the peripatetic concept of matter. The quotation with which chaos is illustrated, however, comes not from the cosmogony but from the the flood – a second version of primordial chaos:

> The chemical philosophers, having firmer foundations than the Peripatetics, know well that there was, at the beginning of the world, a created chaos...and all was hidden in the humid nature and at the beginning, as Ovid says, *omnia pontus erat* [sic].

[12]Cf. "Chaos still prevails in the forms of nature, and its violence seems to become more deeply embedded in the cosmos with each new change (Tissol 1997, p. 195; cf. Myers 1994, p. 158); "a human's transformation into a rock or a tree is a reversion to origins" (Feeney 1991, p. 194); "a poem on change has a vested interest in the repetition of chaos" (Hardie 1993, p. 61); "chaos in the *Metamorphoses* is not merely a temporary *phase* in the evolution of the physical world but a more permanent *aspect* of that world" (Tarrant 2002, p. 351). Cf. Feldherr (2010, p. 61): "every act of creation depends on a process of recontextualization with the power to limit as much as to exalt."

(BnF MS.0.369, fol. 306v)

At the same time as chaos threatens to perpetually return, the mythological sequence which follows upon its organisation connects it to a world seething with activity and the most remarkable metamorphoses. If the analogy with the giants recalls how they threaten to reduce Jove's work to a formless mixture of elements, it also grants those elements, as giants themselves, an intrinsic formative power or "ferment". If Ovid sunk the entirety of nature into a humid chaos, he also describes the origin of particular waters: the author of the *Chrisologie Chimique* allegorises Byblis and Cadmus as ingredients of wine (fol. 350r).[13] This aspect of chaos was highlighted by the Antwerpian alchemist Willem Mennens (1526–1608) in his *Aureum Vellus* (1604):

> And since that [i.e. chaos] is the prime matter which lurks beneath the word "nature", it is especially liable to corruption and likewise most fitted for generation, and it is loved by Phoebus, or celestial heat, under the name of Daphne, the daughter of the river Peneus, who while she is desperate to evade rape, or the force of the aforementioned heat of Phoebus, is said to be transformed into a Laurel tree, and that because the aforesaid prime matter is by nature especially fit to be brought over into a vegetable substance. And in this way it is imagined to have preserved its virginity, since plants do not have sex like animals, for they possess a seed of both the male and female conjoined. Finally this vegetative nature is transformed into an animal, and finally into the greatest perfection, that is, into the human form
>
> (TC v, p. 383)

Alchemists could thus draw on Ovid's myths in parallel to his chaos to balance change against material continuity. They were encouraged by a striking array of resemblances

[13]Cadmus represents a hot spirit and Byblis a phlegmatic fluid named *vin biblien* which must be separated. The reference appears to be to Hesiod's *Works and Days* (line 589) where find a passing reference to "bibline wine" (i.e. wine from Byblos).

between various Ovidian myths or images and conventional alchemical motifs. The most important of these motifs surrounded Jason's quest for the golden fleece, a myth connected with alchemy as early as John of Antioch (7th century).[14] Medea's rejuvenation of Aeson, for example, bore obvious similarities to the alchemical motif of the dismemberment and resurrection of the King. Gold features prominently in a number of further myths: Midas, the apples of the Hesperides, the golden bough. Ovid provides a detailed account of the Hermaphrodite and includes several other symbols with alchemical resonances: the phoenix, the wolf, the lion, the tree, the crow, the labyrinth, the dragon,[15] the hyacinth, the eagle, the winged man, besides, of course, the planetary gods. Several minerals of interest to alchemists, or animals and plants thought to be related to those minerals, are mentioned at various points: Martin Ruland's (1569–1611) popular lexicon of alchemy (1612) cited the *Metamorphoses* in relation to amber, bitumen, pumice, pyropus, halcyonium, lyncurius and saltpetre. Add, finally, that alchemical wisdom had been placed into the mouth of Pythagoras in one of the most widely disseminated alchemical texts of the Middle Ages (the *Turba Philosophorum*), and the case for reading Ovid alchemically on purely empirical grounds was already potentially convincing. It was setting these myths in relation to Ovid's chaos, however, which provided the essential theoretical justification for giving weight to these empirical similarities.

4.2 Timeline of alchemical allegory

One figure looms larger in the history of alchemy than any other: the erratic and brilliant Swiss physician, Philippus Theophrastus Aureolus Bombastus von Hohenheim, otherwise known as Paracelsus (1493–1541). With good reason, the Italian philosopher Giordano

[14]See Faivre (1993) for a survey of the history of the alchemical interpretation of this myth. Sixteenth century writers often cited John of Antioch's allegory, mentioned in the *Souda* s. v. Δέρας (Δ 250 Adler), as evidence of the antiquity of alchemy. Wygant (2007, pp. 37-47) has discussed the alchemical Medea focussing mainly on later sources.

[15]Although no alchemist appears to have noticed the ouroboros at *Met.* 3.68-9: "[the dragon] twisted its head towards it back and saw the wound and bit the embedded spear".



Figure 4: A page from Salomon Trismosin's *Splendor Solis* (this MS dated 1582). Its caption reads: "Ovid, the ancient Roman, indicated the same when he wrote of the ancient Sage, who desired to make himself young once more, that he should allow himself to be dismembered and decocted to his complete decoction, and no more, and then his limbs would unite themselves again and be young in much strength" (Harley Ms. 3469, fols. 21r-v). An English translator of the work interpolated a second reference to Ovid for the "philosophical poet's" description of "the black Stigian lake" which the alchemist must traverse (i.e. by reducing the matter to chaos; William Blackhouse, M S. Ashmol. 1395).

Bruno (1548–1600) described Paracelsus as having reaped the fruit of the seeds "hidden" (*occuluit*) by Lull (BOL ii.2, p. 234).[16] The basic structure of Paracelsus' matter theory is the same as we find in Pseudo-Lull, but it is explicitly generalised, with the specificity of its metallurgical origins denied. It is applied with a greater attention to pharmacological practice in particular (Bianchi 1994), augmented with a dazzling array of neologisms and, most importantly, updated in a manner that reflected other intellectual trends – for example, the rise of demons, of Ficinian Neoplatonism[17] and natural magic and of Protestant Biblical hermeneutics. Paracelsus' writing, when systematised and augmented by his early interpreters, resulted in a distinctive "chemical philosophy", sometimes called "iatrochemistry" or "chymiatry" (implying a fusion of Galenic medicine and alchemy) or "spagyrics" (implying an art of separation and combination). This philosophy exerted a massive influence, thoroughly conditioning the development of other philosophical movements, notably Epicurean atomism, after its revival by Gassendi in 1649. The tremendous intellectual energy devoted to the elaboration of Paracelsus' teaching, combined with the rise of Ovid's popularity in Renaissance culture more generally – particularly in relation to Ficinian Neoplatonism – means that the majority of alchemical interpretations of Ovid derive from the post-Paracelsian period. The history of the alchemical interpretation of Ovid, like the history of alchemy itself, can be divided into two parts: pre- and post-Paracelsian. Nonetheless, taking account of these differences, we shall see that the reasons which led the alchemists to impute knowledge of their art to Ovid remained broadly consistent as medieval alchemy grew into the chemical philosophy.

Although Paracelsian works had first begun to be published in the 1550s, the definitive arrival of chemical philosophy on the European stage is often dated to the publication of the first systematisations of Paracelsian philosophy, the *Compendium* (1567) of the Parisian diplomat Jacques Gohory (a.k.a. Leo Suavius, 1520-1576) and the *Idea Medicinae* of the

[16]Cited by Pagel (1982, p. 245; cf. pp. 258-278). See also Ganzenmuller (1941) and Daniel (2008).

[17]It has been debated to what extent the apparent Ficinian influence on Paracelsus is a case of physical influence or of mere correspondences and similarities (see Daniel 2015). Paracelsus' followers certainly assimilated the two, however.

Danish physician Petrus Severinus (1571), which was followed a year later by Erastus' comprehensive critique of Paracelsus (Debus 2013, p. 28, Shackelford 2004). The number of alchemical works containing allegorisations of Ovid which appear to display no awareness of Paracelsianism is in fact relatively small:

1. Albert's allegorisation of the Gorgon in his *De Mineralibus* (written 1251-1254, first published 1495), quoted in the previous chapter, is perhaps the earliest example of an interpretation of Ovid in a mineralogical context (AMB v, p. 21b). Albert also claims that Empedocles took his theory that stones were generated by heat from the equation of stones with the "bones of the great mother" in Ovid (*Met.* 1.383); Empedocles believed that bones were generated by heat and he transferred this opinion to stones "taking the assertion from the fable called *On Deucalion and Pyrrha*" (AMB v, p. 6a). Albert's work was one of the first attempts to harmonise the newly translated alchemical texts with Aristotelian teaching.

2. The *Pretiosa Margarita Novella* (probably written 1330; published 1546) by the Ferrarese physician Petrus Bonus contained several Ovidian allegories.[18] Bonus mobilises a detailed knowledge of scholastic Aristotelianism in an attempt to produce a consistent interpretation of a great range of alchemical sources.

3. Jacques Lefèvre d'Étaples (1450–1536?) included detailed alchemical interpretations of the myths surrounding Hercules in his never published *De Magia Naturali* (written between 1492 and 1495), an elaboration of Ficino and Pico's astrological and cabalistic magic.

4. Augurello's (c. 1454–c. 1537) *Chrysopoeia* (1515) is a Latin didactic poem on alchemy which includes allegories of various myths, but without any particular attention to Ovid. Opinions differ as to whether Augurello's engagement with alchemy was serious (compare

[18]The work was translated into Italian (Venice, 1547), reprinted many times (e.g. Basel 1572, Montbéliard 1602, Strasburg 1608) and included in the alchemical miscellanies of Zetzner (TC v) and Manget (MBC). Note that the English translation of the work by Waite (1894) is rather free and severely abridged. Though the author of the *Pretiosa Margarita Novella* claims to have written the book in 1330 in Pula in Istria (with some manuscripts recording 1338 or 1339), it has been suggested that another Petrus Bonus from the late fifteenth century may be responsible. Scholars generally accept the earlier date (Vasoli 1971, pp. 654-655), although the lack of other examples of Ovidian allegory before the middle of the sixteenth century is somewhat strange.

Haskell 1997 and Von Martels 2000), although the poem was immensely popular (published in over twenty editions) and certainly enjoyed by serious alchemists.

5. The *Chrysopoeia* was often published along with Augurello's earlier poem dedicated to Jason, the *Vellus Aureum* (1505), an alchemical interpretation of the quest of Jason. The unpublished *Vellus Aureum* (1560) of Johannes Agrippa (the son of the famous magician), the *De Alchemia* of Chrysogonus Polydorus and the *De Auro* of Gianfrancesco Pico Della Mirandola (written in 1527 and first published in 1587) take up the same theme. Pico cites a line of Ovid to justify the alchemical interpretation of the golden fleece (Della Mirandola 1586, p. 94; TC ii, p. 234).[19]

6. *Le Grand Olympe* (dated, most recently, to 1530–40 by Kahn 1995, and never published), is an alchemically-themed reworking of the *Metamorphoses* in verse, modelled on the *Ovide Moralisé*, and supplemented by prose commentaries. The work is attributed to the so-called "alchemists of Flers" (Pierre Vitecoq, Nicolas Grosparmy and Nicolas de Valois). Its technical content is predominantly Lullian.[20] Kuntze (1912) speculates that the authors based the poem an earlier manuscript of the *Metamorphoses* with alchemical annotations.

7. Solomon Trismosin's famous alchemical emblem book, *Splendor Solis* (1532–1535) contained an alchemical interpretation of Medea's rejuvenation of Aeson, attributed to Ovid. The work was first published as part of the *Aureum Vellus* (1598-99). Trismosin was one of Paracelsus' teachers.

8. *Il Legno della Vita* (1542) and *Espositione di Geber Philosopho* (1544) by the Brescian doctor Giovanni Bracesco (c. 1481–c. 1555?) are interpretations of Lull and Geber, written

[19]One could add Gohory's *Hystoria Jasonis* (1563) here, but Gohory had certainly digested Paracelsus by this date: he was one of Paracelsus' earliest promoters. The theme was also taken up in the *Argonautica* (1601) of the poet Angelo Ingegneri (1550–1613) celebrating the alchemist Giocomo Antonio Gromo, but republished (1606) with the addition of a prefatory "palinode" *Contra l'alchimia e l'achimisti*.

[20]The most convenient way to access details of this work is still through Kuntze (1912) as the critical edition of Chapuis (2001) remains unpublished. Chapuis lists ten manuscripts containing the complete work – MS 232 (Bibliotheque Municipale de Flers), MS 1811 (Bibliotheque de la Sorbonne), Mellon MS 130 (Beinecke, Yale), MS 2516 (Arsenal, Paris), MS 84444 (formerly 159, Bibliotheque Municipale de Rennes [prose only]) MS Fr. 20019 (BnF), MS Fr. 12299 (BnF), MS 06 (Karl-Gustav Jung Library, Zurich), MS 15544 (Bibliotheque royale de Belgique), MS 4903 (Wellcome Library) – and three further manuscripts containing abridged versions.

as dialogues between a master and pupil. They allegorise several Ovidian tales which they do not, however, attribute explicitly to their author.[21]

9. William Bloomfield's popular alchemical poem *Bloomfield's Blossoms* (1557) refers to Ovid's chaos for a description of the alchemical prime matter (Ashmole 1968, p. 420).[22]

10. The *De veritate et antiquitate artis chemicae* (1561) of Robert Duval, canon of Chartres (Vallensis, 1510–c. 1584?), asserts that a number of Ovidian tales can be read alchemically, without actually providing specific interpretations (Vallensis 1593, p. 31).

11. Another Brescian, Giovanni Baptista Nazari (1533–1599) recounts in *Il Metamorfosi Metallico et Humano* a vision of eight carved mythological scenes, mostly from the *Metamorphoses*, concealing the alchemical work. Specific interpretations are not provided (Nazari 1564, pp. 23-4).

12. In a work only recently published (1996), entitled *Auriloquio sottilissimo* (composed 1560–1570), Vincenzo Percolla provided alchemical interpretations of over two hundred symbols or fables, some of which were probably derived from Ovid, although Ovid holds no special status for Percolla.

This list may be incomplete, but it is really only after the diffusion of Paracelsianism that alchemical interpretations of Ovid become too widespread to comprehensively catalogue. The most famous instances of Ovidian allegory by a Paracelsian are those of Rudolph II's physician and counsellor, Michael Maier (1568–1622), especially in his *Arcana Arcanissima* (1613), *Atalanta Fugiens* (1617), *Symbola Aureae Mensae* (1617), *Themis Aurea* (1618) and

[21] These work were reprinted three times in Italian (1551, 1552, 1562) and three times in Latin (1548 in Lyon and Nuremberg; 1671 in Hamburg), besides their inclusion in MBC. Unless otherwise indicated, citations are from Grataroll's Latin translation, the *De Alchemia Dialogi Duo* of 1671, which confusingly prints the later dialogue first. The mythological section of Bracesco's *Il Legno della Vita*, upon which the discussion in the second dialogue is modelled, has been published online in French translation by Van Kasteel (2008). There is also an unpublished seventeenth century English translation of *Il Legno Della Vita* which includes some of the mythological passages from the *Espositione di Geber Philosopho* in the form of notes (Sloane MS 3614, fols. 123-127).

[22] Ashmole's collection also includes an anonymous and undated poem *A Discription of the Stone*, consisting of an alchemical interpretation of the fable of Apollo and Daphne (1968, p. 420) and an undated translation of *Dastin's Dream* (a fourteenth century Latin poem) which improves the original with references to Aeson and Medea and Jupiter and Danae (Ashmole 1968, pp. 264-5). These works are both likely to date from the late sixteenth or early seventeenth century, however.

Cantilenae Intellectuales (1622). Maier is particularly notable for his influence on the authoritative *summa* of alchemical allegory for the Enlightenment, Antoine Joseph-Pernety's *Fables Egyptiennes et Grecques devoilées* (1736). Telle (1992) also mentions as containing mythological allegories (not necessarily Ovidian) works by Johann Rudolph Glauber, Joachim Tanck, Evangelista Quattrami, Cesare Della Riviera, Maier, De Planis Campy, Pierre Jean Fabre, Jacob Toll, an anonymous author of a *Dictionnaire Hermetique*, Etienne Libois, Dethlev Cluver and Johann Barchusan. Matton (1991) notes Blaise de Vignère, Henri de Linthaut, Clovis Hesteau de Nuysement and Jean Vauqelin des Yveteaux. Cases from the eighteenth century are discussed by Matton (1995b). Other examples containing specific references to Ovid I have identified are – besides those we have already mentioned or shall mention below – the Pseudo-Paracelsian *Liber Azoth* (PSW xiv, p. 582), a poem by Edward Nowell (BM Sloane 256), Alexander Suchten's treatise on antimony (1604, pp. 458-9), *La Nature au Decouvert* by the anonymous *Le Chevalier Inconnu* (1669) and the alchemical poem of Johannes Furichius studied by Reiser (2011). We shall cite further examples as they are relevant. It is worth noting that Glauber focussed particularly on Ovid (1689, vol. 1, p. 266, vol. 2, p. 203, vol. 3, pp. 18-19, 42-50, 53).

Paracelsian alchemists tend to refer back to Bonus and Bracesco in particular. Kuehlmann (2002) has studied Bonus' influence on Michael Maier (1568–1622), although Maier himself mentions only "Bracesco, Robert Duval and a few others" as his precedents in the field of allegorical interpretation (1614, sig. a2v). We can also note the anonymous *Liber de principiis naturae et artis chemica* [sometimes called *Aureus Liber*], which contains allegories closely echoing certain of Bonus' phrases (Rhenanus 1625, pp. 38, 43, reprinted as Anon. 1647, pp. 48, 54). The physician to Louis XIV, Pierre Borel (c. 1620–1671), justifies the inclusion of the *Metamorphoses* in his bibliography of alchemical literature (published 1654) by referring to Bonus, Flamel and Bracesco (Borellius 1969, p. 164).[23] One

[23]On the influence of Bracesco, see Matton (1991 and 1995a, pp. 299-308). Pseudo-Flamel produced a famous explication of several alchemical emblems, but made only a fleeting reference to "the poets", assimilating a dragon motif to the dragons guarding the apples of the Hesperides and the golden fleece, as well as to the serpents strangled by Hercules (Flamel 1612, pp. 64-5). Borel also refers to a "A book of Ovid

overlooked example of Bracesco's influence is an alchemical eclogue entitled *Fabula*, by the Paracelsian physician Martin Copus (a.k.a. Cephalus), which retails almost all of Bracesco's allegories, putting them into verse with slight alterations (Cephalus 1600, pp. 108-122). Copus was quoted by an alchemist who we shall introduce in the next section, Basset Jhones (1613/14–?). The popularity of Bonus and Bracesco results from their relatively systematic approach to their interpretations: their allegories are neither random, nor based on pure similitudes, but are firmly rooted in the alchemical theory of matter. Only *Le Grand Olympe* adopts a comparably systematic approach with a specific focus on Ovid, but it appears to have had little influence as it was never published.

4.3 Terrestrial astrology

At first glance, many of the authors catalogued in the previous section would appear to practice a form of astrological allegory consanguineous with that of Pico and Ficino. The most obvious example is Jacques Lefèvre d'Étaples, whose *De Magia Naturali* was devoted mainly to an elaboration of Ficinian astrological magic. His alchemical interpretations of Hercules are in fact digressions in the course of a systematic exposition of the powers of the different planets and constellations. Ovid features sporadically alongside d'Étaples' main source, Manilius, in the purely astrological parts of this treatise: for example, Ocyrhoe's transformation into a mare indicates that gifts of prophecy, such as she possessed, are bestowed by Pegasus (Rice 1976, p. 23). The alchemical interpretations of Ovid are barely distinguishable from such strictly astrological allegories. D'Étaples' turns to alchemy in describing the constellation of the crown, which, according to Ovid, Bacchus had removed from the head of Ariadne and placed between the constellations of the kneeling man (traditionally assimilated to Hercules) and the serpent bearer (*Met.* 176-182). The network of associations between the three symbols leads d'Étaples to conclude that these constellations are those

called *Donum Dei*, beginning *omne datum optimum*" which he says is the same as the fourteenth century *Donum Dei* attributed either to John Dastin or John Damascene (versions of which can be found in Sloane 3738 and Harley 3542), although I have not found this work attributed to Ovid.

which instil the alchemical elixir with its perfective power. For example, he allegorises the serpent of the serpent-bearer as the vegetative spirit transmitted by the stars, assimilating it to the dragon guarding the apples of the Hesperides as well as to the dragon guarding the golden fleece, which Ovid had described as wakeful (*vigila*) because this spirit is "especially active" (Pierozzi 1996, p. 208). D'Étaples notices that Ovid compares an apple transmuted by Midas to a Hesperian apple, encouraging him to enrol Midas along with Hercules among the number of the alchemists. As Pierozzi and Mandosio, who have edited these passages, remark, this interpretation of Midas is probably also suggested by the Bacchic origin of both his gift and the katasterism of the crown (Pierozzi 1996, p. 240). Thus, the apparent tendency here is to assimilate Ovid's divine powers to celestial forces acting on matter from above.

D'Étaples was far from the only alchemist to justify his allegories in Neoplatonic terms, although he has the most fully astrological apparatus. Bracesco, for example, referred to Pico's *Oration* to back up a remark attributed to the Arabic alchemist Rasis, that "in order to hide this divine science, the ancients used so many names, similitudes, fables and enigmas that hardly and with great difficulty could anyone find new inventions to conceal it" (Bracesco 1544, p. 82v). While Bracesco cites Pico as something of an aside – such that the reference was actually left out of the most popular Latin translations of his work – Robert Duval placed a reference to Pico prominently in the title to his chapter dealing with alchemical allegories (Vallensis 1593, p. 31). Despite these references to Pico, neither Duval nor Bracesco appeared to consider astrology or cabbala as much relevant to the art. To find another case of astrologically-motivated alchemical allegory of Ovid we must look to those influenced by Paracelsus, who had seemed to embrace Ficinian astral medicine in his *Archidoxis Magica* (a work probably actually written by Gerard Dorn in 1570). One particularly radiant example is the *Lithochymicus* of Bassett Jhones, surely the most pleasing of all the alchemical poems of the Renaissance. Jhones wrote this poem in 1650 as a "paraphrastic translation" of the doctrines he had presented in more conventional form in his Latin treatise

Lapis Chymicus (Jhones 1648). In it, he appears to support a conventionally hierarchical understanding of the cosmos:

> Nature's Ens transcendent gave comaund
> All thinges in order heere below showld stand
> Subordinate, as beinge all composd,
> And in theyr right subordination closd
> ...Thus doeth the spright
> Descend through all these Spheres subordinary
>
> (Jhones 2013, p. 245)

The fifth chapter of the poem, in which the philosopher Allslagen purports to explain the wonderful curative properties of the elixir, displays strong Ficinian influence (with Ficino and Plato cited at Jhones 2013, pp. 308, 312; cf. p. 317). Allsagen begins by evoking several examples of the power of the stars – their "influence prognostic" (i.e. their ability to predict disease), the so-called "weapon salve", the magnet, the works of "Felgenor" (Paul Felgenhaur, a millenarian astrologer) as well as the simple phenomenon of reflection – before launching into an allegory of Prometheus as an astrologer who figuratively brought down a cure from heaven: "astrall plagues sure showld / Theyr astrall cures expect" (2013, p. 291). This allegory causes the "Author" to interject: "It seems by this" that various fables "hidd in theyr scales / Ideall have our woorke" (2013, p. 293), inciting further allegories of Apollo and Daphne, Arcas, and Jupiter and Io. Finally, Jhones warns us that Ovid speaks of far more besides the fabrication of the elixir:

> And yet in readinge Ovid marke this one Rule,
> That he ringes not out this woorke alone,
> But gen'rally the full transmutinge knell
> Of all the other planetts e'en as well.
> ...

And note that these conversions have noe share
In this our woorke, but meerly on a bare
Lust by Position raysd doe ground theyr love,
As firme experience doeth it playnly proove.
For when our Harper playes his Sheepheards-swayne,
Though each of those sixe planetts ne're soe fayne
Aproach his circle would, yet for theyr Eies
Dare they not touch what soe enchaunted lies.
Wherfore they daunce it round, and, as the Pricks
About the rose, as these theyr Antique cick
Soe wildly ore, each with his oposite
In place from th' Center seekes himself t' unite,
Therby to gayne Perfection: soe the sone
Of Vesta, with his frozen beard, the Moone
Layes howld on; Mars, in season drie or wett,
Cares not whoe sees him Naked in the Nett
With Venus; and the God of all the Skie,
Narcissus like, doeth Kisse his Mercurie.
Soe, by the comon rules in Chymistrie,
Without our stone's diviner Energie,
Saturne transmuted is unto the Moone;
To Venus, Mars; and Jove, Maia's sone,
And all in Synechdochic sense to th' Sun,
By this gradation thus I have begun.

(2013, pp. 294-6)

The "Ideall" hidden in the fable is thus connected to the Sun, which governs the sympathies of the planets, while remaining by virtue of its transcendence only synechdochically

expressed. Unlike the treatise of D'Étaples, however, Jhones' poem is primarily alchemical, rather than astrological, consisting mostly of descriptions of chemical operations. This means that the "diviner Energie" of the stone, even if its provenance is heavenly, is to be obtained not from the heavens, but from terrestrial matter, "the low / Planetts". Such was the realisation of Prometheus:

> Weyghinge how th' starres all force receaved from
> The Sun, with what stronge Sympathie the low
> Planetts had with the heavenly bodies, whoe
> Become not us to handle, soone resolvd
> How he that liveinge Kernell, closely 'nvolvd
> Within the marrow of the minrall Sun,
> Might thence extract, on with his woorke to run.
>
> (2013, p. 291)

Insofar as the cycle of metallic transmutations can be perfected and completed by the artist, then "firme and Universall is the love" – then the gods shall manifest their derivation "from th' influentiall virtue from above" (2013, p. 297). In its transcendence and separation from the other planets, the "minrall Sun" relates to them as the heavens do to earth; and yet, it is among them – in fact, emerges from them – as a material object. His engagement with alchemy compels even d'Étaples to grant the heavens a terrestrial aspect: he tells us that the serpentine spirit must be "slain" by a "metallic club", implying a material decomposition. The alchemist will then be able to pluck his golden apple "by hand". Jhones follows Paracelsus in arguing specifically that the Sun is present on earth in the form of a salt, to which bodies can be reduced by burning and dissolution: "the forme of every thinge / (In which the sowle resides) doeth allwayes klinge / (I speake of thinges subordinate) unto / Th' Essentiall salt" (2013, p. 263). Ovid's gods represent the divine Sun insofar as they are divine, but the "comon" terrestrial metals in which it is buried, insofar as they act like ordinary humans motivated by "bare / Lust".

It is thus only when we examine this terrestrial aspect that the real motivation of the Ovidian allegory becomes clear: it is not just that Ovid represents transcendent divine forces in the manner of astrological myth; he simultaneously depicts these forces as emerging from material processes. Jhones' comparison of the "the God of all the Skie" to Narcissus perhaps hints at the eventual identity of the metallic and celestial layers of allegory, since it is difficult to make sense of the comparison unless it refers not to Jupiter the metal (tin), but rather truly to the celestial god embracing his terrestrial form. As we remarked above, Jhones conceives the relation between the celestial and terrestrial in terms of reflection, arguing that the stars "are the world's Eies, and eies (Unlesse in paynted pictures) to devise / Without reflection, were all Sympathie / And virtuall contaction to denie." (2013, p. 289).[24] Unlike Ficino, however, he does not treat the reflection of the soul in matter as a kind of darkening or diminution – and hence the kiss of Narcissus as an error – but emphasises the unstinting generosity of the Sun, which bestows itself on matter "infinit...sans diminution" – "nor is [the Sun] much / In body hotter then this stone to toutch" (2013, p. 312). Overlaid on the astrological allegorisation of Ovid we thus find an interpretation of his metamorphoses in terms of the mutations of a material chaos – the "Essential salt" – which functions as a living mirror of the "*Ens* transcendent".

Jhones interprets "Medea's art upon Duke Aeson's age" as the reduction of a body to this "pure Salt" (2013, p. 261), which contains the form of the King simultaneously in its basest state – "Confused, as of ould the Chaos lay" (p. 264) – and in a condition of the utmost astral purity. The analogy with chaos here picks up Ovid's tendency to describe such metamorphoses in terms reminiscent of the chaos at the start of the poem. Medea adds to her cauldron "a thousand substances without name" and "confused everything [*omnia*

[24]In 1667 the physician of the Prince of Orange, Johannes Fredericus Helvetius, published the *Vitulus Aureus*, a short tract in which he described the successful transmutation of lead into gold (Helvetius 1667). It was translated into English and dedicated to Robert Boyle (Helvetius 1673, p. A2), "to persuade [him] (by these experiments from a true Adeptist) of the reality of the Philosopher's stone." (1673, p. C5). Here we find a long list of Ovidian allegories (1673, p. 5), culminating in the following pronouncement, which appears to describe a similar conjunction of terrestrial and celestial: "you do not know...in what mirror the metals see with the eyes of Narcissus the possibility of their transmutation, or from what rays adepts collect the fire of perfect metallic fixation"

confudit]" (*Met.* 7.278). The elemental composition of chaos is evoked when "fire", "water" and "sulphur" are mentioned as ingredients in Medea's rites (*Met.* 7.261) and the evocation of corporeal confusion is further underlined by the parallel between the episodes of Aeson (revived by a potion poured into his veins) and Pelias (dismembered and boiled in search of rejuvenation, but not revived: *Met.* 3.349). Thus, when Ovid's tale is mentioned by alchemists it is usually assumed that the dismemberment and rejuvenation pertain to the same individual.[25] Jhones goes on to equate the meaning of the tale with that of the "minc'd mess" Lycaon served up to Jupiter, and of how his house was subsequently "burn'd" and at last "washed" by the flood (2013, pp. 268, 329). However, Jhones equates Lycaon's victim with Arcas rather than the Molossian hostage (probably on the basis of Pseudo-Hyginus, *Astronomica* 2.4, where we find the same confusion). The reduction of the body to chaos thus coincides with a metaphorical katasterism to produce the "glistering starres of Archas", that is, the pure salt in its divine aspect (2013, p. 293). In Jhones' interpretation of the death of Hercules the reduction of the metal is explicitly to its constituent atoms:

> "Now Sir, the only marke you may by this
> Perceive of perfect dissolution is
> When that the bodie thus disjoynet lies
> By loveinge pysonous draughts in attome-wise
> For then the principle hath found the end.
> Which, of a perfect action all comend
> As certeyne sign (and naught save *dust* to be)
> ...And what else meaneth that Ovidian shirt
> Of Hercules with Venom soe beguirt
> (Attracted from the snake of *Lerna* cold)
> That what he from his mother's blood did howld
> It soone consumd.

[25]See Figure 4 above as well as, for example, Ben Jonson's *Mercury Vindicated* ([1616] 2012, p. 411) and the anonymous *Communication einer vortrefflichen chymischen Medicin* (Anon. 1700, sig. b12v).

(2013, pp. 249-251)

Ovid, for his part, had described the poisoning of Hercules as a literal dismembering (the tainted shirt tears apart his flesh as he attempts to remove it) and as a process of combustion (the venom is first excited by an altar flame and repeatedly described in terms of fire). He had even incorporated a metallurgical simile, as the boiling of Hercules' blood is compared to the sizzling of a hot blade dipped in water (*Met.* 9.170-171). At the same time, the poison that destroyed Hercules is "loveinge" because the dissolution takes place not simply to reduce him to atoms, but so that by means of this reduction "his heavenly part / (on which the thunder-thumpinge *Jove* his art / Had showen) might be extolld". This duality derives from Ovid, for whom the climax of the story is also Hercules' apotheosis, and in whom, as in Jones' vitalistic conception of metallic interaction, Deianira gives Hercules the shirt because she is literally in love with him. Thus, what at first sight appears to resemble Ficinian astrological allegory in fact takes the dialectic between the ideal and the material in quite a different direction. Whereas we observed in Ficino a general wariness of Ovidian metamorphoses coupled with a tendency to restrict the embodiment of the divine to intermediary demonic beings, in Jhones, the divine springs from the very basest elements in nature.

4.4 Origins of the alchemical Ovid

The difference between the anagogic astrological allegories of Ficino and the terrestrial astrology of Jhones appears in sharper relief when we examine in more detail the distinct tradition from which the latter derives. The main proponents of Ovidian allegory before the Paracelsians – Bonus and Bracesco – were both deeply influenced by texts in which alchemy had acquired a divine aspect, but, setting out primarily from the basis established by Geber, had little interest in astrology. In both cases, the allegories are allegories of the alchemical matter, as opposed to heavenly powers, although that matter itself has a double

terrestrial and celestial aspect. Following Geber, Bonus emphasises that alchemy is about the transmutation of metals, and nothing more general (1608, p. 4). Accordingly, the prime matter of the alchemist is simply the proximate matter of the metals (*materia prima et propinqua*), which is "pure quicksilver alone". He explicitly rules out the organic substances promoted by medicinal alchemy: blood, sperm, urine, hair, feces, egg, ferments (1608, p. 128; cf. pp. 297-306). But he also insists that, in order for the stone to be completed, the practitioner requires a "miracle": an intervention "above nature" from God, who adds what is variously dubbed a "fifth essence", a "ferment", an "occult stone" or "intellectual stone" (1608, p. 141).[26] This double perspective is never properly reconciled and produces various inconsistencies; in particular, it results in a double justification for the allegorical interpretation of Ovid. Part of Bonus' attempt to render alchemy comprehensible involves explaining its use of concealment and symbols. The main reason he gives – the "oneness" (*unitas*) of alchemical matter – he explains in two different ways, seemingly unable to choose between the natural and divine perspectives.

Thus, Bonus sometimes argues that because only one specific matter – i.e. quicksilver – will produce the desired results, there exist countless plausible possibilities which are false. The various symbols and names employed by the alchemists are, according to this explanation, either false positives or, following the practice of *dispersa intentio*, deliberate deceptions. The panoply of alchemical symbolism is, in short, simply a record of error (1608, pp. 129-130, 175-6). Conversely, however, the "oneness" of this matter at times seems to imply that all such misleading names have a common origin in the truth, as if its "oneness" now implied a divine monism. Bonus frequently emphasises that the matter is hidden because of its divinity (1608, pp. 123, 158-9). The divine component is cited as the principle reason for the "difficulty" of the work (1608, pp. 117, 141). The first mention of Ovid occurs in a section entitled "That the stone is similar to all the things of the world", in which Bonus cites the work's divinity as a justification for the claim that:

[26]For a discussion of the dual aspect of the stone according to Bonus, see Thorndike (1923–1958, vol. 3, pp. 147-162) and Crisciani (1973).

> The divine art assumes for its limits all the things which are and which are not, and it speaks of all things according to analogy in its books, and all other things can speak about it, not only philosophy, but also Astrology and Geomancy and the art of images [i.e. star-signs?]...the whole art has also been made poetical and historical and fabulous...Whence, whatever there is about the creation of the world and the transmutations of things, both outlandish and impossible, in the book of Ovid's *Metamorphoses* and others who knew this art, is about this
>
> (1608, pp. 165-6)

Like the divine essence itself – a "super-excellent similitude of all things", according to Aquinas (*De Pot.* q. 7, a. 7, ad 6) – the stone has a similarity with all the things of the world. Hence, "it is necessary for infinite names for this stone to arise,[27] which are all true according to the philosophers of Alchemy, although they are fictions [*ficta*], that is, similitudes." (1608, p. 168). Ovid appears again in a chapter entitled "On the ferment", that is, the divine substance added to the alchemical matter which "conquers all things and converts them to it. And this is the truth hidden by the poets in the fable of Gorgon"" (1608, p. 208). Bonus here goes on to allegorise a number of Ovidian (as well as Vergilian) tales – Phaethon who "advanced to heaven", the labyrinth with "one entry and exit according to truth" and "many according to falsity", the minotaur into whose throat Bonus says Theseus "projected" (an alchemical term for the addition of a chemical) globs of tallow and wax, the old man (Pelias) dismembered and boiled up by Medea in order to be rejuvenated, but who died from overcooking when a guard fell asleep, the dragon killed by Jason whose teeth bred armed men, and the mulberry which, like the alchemical stone, turned from white to black and red (1608, pp. 209-10). All of these tales, Bonus says, are symbols of the ferment: the supernatural gift grants the stone the power to assimilate itself to anything, not just metals.

Despite his emphasis on supernatural intervention, Bonus' explanation of the way in which the stone acquires its infinite similitudes is firmly rooted in his theory of matter.

[27] A treatise on the names of the stone by William Gratacolle, published in 1651 by one H. P. (probably Henry Pinell) lists around 150 names (Pinell 1652, pp. 65-8). Bachelard counted 602 names (1993, p. 232).

Insofar as the ferment is a component of the alchemical matter, the similitudes which the stone contains are still grounded in the nature of the alchemical matter itself: "the work proceeds from one root alone and afterwards expands into many things, then is returned to one: whence by looking deeply, the philosophers always say one thing and dwell on it, and repeat this one thing in different words" (1608, p. 136). This material foundation, which is expressed by the ongoing commitment to Geber, is what ensures that the allegories are "true" although they are "fictions". In fact, in a passage that will later be echoed by Bracesco (1673, p. 83), Bonus explicitly directs us away from mistaking Ovid's poem for an allegory of anything but matter. His sights are on the tradition of moral allegory:

> Some who came after [Ovid and Vergil], having only the principle matter (*materiam principalem*) that was manifest in painted, ornate and fictitious words, or drawing it tropically to the morality of the human body and soul, and ignorant of the principle matter that was hidden and true, set out their sayings and narrated the same fables and others that were similar, and tasted nothing of the hidden root.
>
> (1608, p. 210)

By exposing what he variously calls the "hidden gold", "hidden matter", "hidden root", "hidden truth" or "fundament" of Ovid's tales – which in all cases is literally the alchemical prime matter insofar as it is endowed with the ferment – Bonus, on his own account, eschews "tropical" interpretation. That is, he does not allegorise the "manifest matter" except through what physically constitutes it, i.e. the "hidden matter", which manifests itself through various similitudes. It is to be noted, however, that the detail of the balls of tallow and wax is found not in Ovid himself and was probably drawn from one of the very commentaries which Bonus is decrying (it is found in the *Ovide moralisé*, which it is just about possible Bonus had encountered).[28] Bonus takes more from such religious allegory than he

[28]Bonus has *massae plurimae de sepo et de cera*, which does not imply "a large weight of gold" as Willard (2007) translates: wax was a common alchemical ingredient. Meech (1931, p. 197) notes the appearance of the motif of the choking ball in one commentary from the 11th Century and a few others which postdate

says, insofar as it is only the stone's divinity which bestows upon it its similitudes. At the same time, the commitment to the Geberian "quicksilver alone" theory of alchemical matter – however incompatible with the addition of the supernatural ferment – ensures that the alchemical matter is never mistaken for some abstract principle that could not be produced in an alembic.

In Bracesco we find similar tensions between the Geberian perspective and a divine perspective now identified with Lull. Nominally, Bracesco's first dialogue, *Il Legno della Vita* (1542), was dedicated to Lull, and the second, the *Espositione di Geber Philosopho* (1544), to Geber: however, the second is roughly an expanded version of the first, reusing much of the same text, while eliminating some Lullian passages. *Il Legno della Vita* begins in a Lullian vein with a discussion of the concept of "radical moisture" or "quintessence" as a substance prior to the elements, the source of the permanence of all compounded things, and hence a medicine able to prolong human life. The course of this discussion necessitates a distinction between philosopher's gold (the occult quintessence hidden in every substance) and ordinary gold. In turn, we learn through the explanation of this distinction that every ordinary metal has some "occult" metal which corresponds to it and which designates an essential ingredient of all metals in general. Drawing upon Albert's account of a theory of metals attributed to Anaxagoras and Hermes in the *De Mineralia* (AMB v, p. 70a), Bracesco associates the notion of occult metals with that of the Anaxagorean "latency of forms": "all metals according to similitude, virtue, names, colours and properties are in any metal" and "the denomination comes from the predominant one" (1673, p. 184; cf. pp. 207-8). The latency of forms explains why the quintessence has the power to heal every part of the body, since it contains the virtues of all the stars which exert an influence on every part of the body (1673, p. 185). It thus also explains why the stone has acquired "all the names of the word":

Bonus. The *Ovide Moralisé* was written sometime between 1316 and 1328 (De Boer 1915), whereas the *Pretiosa Margarita* claims to have been written in 1330. Thus Bonus could not have read Bonsignori, whose moralising *Ovidio Metamorphoseos Vulgare* appeared in 1375, nor Bersuire, whose *Reductium Morale* was first circulated in 1337, but he may have known the Bolognese commentator Giovanni del Virgilio's *Allegorie Librorum Ovidii Metamorphoseos* (1322–23).

it actually contains the forms of all the things which are assimilated to it (1673, p. 209). Following on this point, the interlocutor requests an explanation of what the poets intended by their myths and there follows the lengthy allegorical section (1673, pp. 215-235). The progression of thought is thus from the concept of the "latency of forms" to poetic allegory, as confirmed at the conclusion of this section, when, after the interlocutor casts doubt upon the reality of Bracesco's elaborate allegories, Anaxagoras is raised once more: "if you do not deny the opinion of the ancients that I told you of, that every metal is contained in every metal...you will not deny that this was the true intention of the ancient poets" (1673, p. 94).

The particulars of Bracesco's allegories are highly involved and a more detailed study would be necessary to disentangle them fully, if indeed they will admit a consistent interpretation. Bracesco combines a tendency to assign different personages to different metallic principles with a tendency to nest these principles one within the other. His basic teaching, which he presents as an interpretation of Geber, is that all metals are formed from vitriol – this is the *prima materia.*[29] Vitriol emits a dry vapour called quicksilver and moist vapour called sulphur and metals are formed when these vapours interact with a different kind of sulphur found naturally in stone. The sulphur of vitriol, which is the "subtlest" sulphur, is called variously gold, brass, Venus and arsenic. The other sulphur is called iron, fire or Mars, and is said to be "crasser". Although quicksilver and the two sulphurs are in theory distinct, Bracesco tends to describe them as generated or extracted from each other. For example, Jupiter signifies the dry vapour called quicksilver as it rises, Ganymede the sulphurous vapour within it (1673, p. 85). Likewise, the chariot of Phaethon is a solution of vitriol which bears aloft the subtle sulphur (the Sun) in its vapour (1673, p. 89). Since it rises above its solution and has both male and female aspects, the subtle sulphur is depicted as Pyrrha and Deucalion in their boat, but the stones of Deucalion and Pyrrha depict the generation of the crasser sulphur and quicksilver respectively. The subtle sulphur is also

[29]This interpretation of Geber obviously differs from that of Bonus: it is itself dependent on the interpretation of Geber's quicksilver as a *Deckname* for salt. See Rampling (2014) for a discussion of the alchemists' tendency to continuously revise their interpretation of *Decknamen*.

meant by Theseus born by black sails, the sails referring to the black substance in which this sulfur is coagulated. Aegeus is said to be the crasser sulphur which not only loves, but also fathers Theseus. Likewise, Daedalus is said to be the crasser sulphur which fathers Icarus, the subtle sulphur, as these rise together in distillation. Thus, despite frequently insisting on the difference between them, Bracesco seems to think that the subtle sulphur may be generated or extracted from the crass – he sometimes calls the subtle sulphur "a part of Mars" (1673, pp. 86, 222).

Bracesco's justification of his allegories displays a paradox similar to the one we find in Bonus. The doctrine of Anaxagoras is supposed to show that "the names of gods, their genealogy, loves and metamorphoses" (1673, p. 215) simply describe forms latent in the alchemical matter. The only doctrine Bracesco directly affirms, however, is not that "all things are in all things" but that "all the metals are in all the metals", a notion he explains, after Geber, in terms of the physical structure of metallic salts.[30] The range of similitudes that could be accounted for by the latency of forms ought thus to be restricted to the appearances of the metals themselves. In the second dialogue dedicated explicitly to Geber, we indeed find the passages in the first dialogue proclaiming the identity of the purified prime matter with the healing quintessence have been removed. In particular, the progression that leads from a discussion of the sympathy of the quintessence with all of the stars to the assertion that the stone possesses "all the names of the world" is broken. Instead, the discussion of the containment of all the metals in all the metals is framed as an explanation of the possibility of transmutation, and while the assertion that the stone possesses "all the names of the world" is still included, it now follows somewhat awkwardly. Nonetheless, the derivation of the analogies between sulphur and the procreating gods still depends on

[30]Bracesco does mention that Anaxagoras said "all things are in all things", but in such a way as to imply that the phrase describes metals only. Here he is simply quoting Albert directly: "Hermes, Gilgil, Empedocles, and almost all that Turba Philosophorum say that in every metal there are many species and natures of metals and one is occult, another manifest, one within, another without, one in the depths, another on the surface (as those who spoke of a latency of forms) and they said that all [things? metals?] are in all, as pleased Anaxagoras...And in this way they are correct to enunciate the opinion of Anaxagoras, that all the metals are in all the metals." (pp. 207-8, AMB v, p. 69b).

there being some divine, animate element within that sulphur to correspond to the mythical similitudes, while the tendency to nest the elements of metals within each other contributes to the construction of a monist perspective. As in Bonus, the restriction of the model of the latency of forms to metals encourages us to interpret the doctrine in a corpuscular fashion even as this model is simultaneously denied and extended by the allegories into the realm of organic life – indeed, into the whole of creation.

4.5 The cosmogonical analogy

In order to convey the concept of a material that is simultaneously natural and divine, Bonus relies on the analogy between the alchemical work and creation:

> But in substance, from the beginning of the world, there is only one element, which is the prime matter from its division. Because of the repulsion of the four qualities the four elements were generated in act, which were there in potential. Similarly in the birth of this stone the four elements are in one in potential, which is prime matter, and are divided and grasped by an inexplicable artifice. Further, we deem this stone to be perpetual and incorruptible by fire not only because of the balance of the four elements in their powers, but because of the conjunction of the fifth element with them: because just as the macrocosm is composed out of four corruptible elements and one incorruptible element, which is called quintessence, so the art, by divine power, has joined the four corruptible elements of the stone by the bond and knot of one incorruptible element, which is called quintessence
>
> (1608, p. 234)

Proposing a heuristic analogy rather than an opposition or an identity enables Bonus to convey this double aspect of the material: it is, on the one hand, simply the proximate matter of metals; and yet it is like the prime matter of creation. At the beginning, Bonus

explains, there was one element, which was separated into four by division. At the same time, there was the addition of the quintessence, which somehow knotted the elements into a cosmos. These two aspects of creation, whose exact relation is unclear, correspond to the natural and supernatural aspects of the alchemical matter. Like the alchemical matter, the matter of creation was both a simple element, or mixture of elements, and, insofar as it had the fifth element, a cosmos. The analogy is suggested, on the one hand, precisely by the absence of the ferment from prime matter before its formation; but on the other hand, by the conjunction which occurs right at the birth of this matter:

> Nature generates by ministration of art a simple matter, nude, not joined to its form, which the ancients called prime matter, because of its similitude with the prime matter of the world, before it was informed, about which Plato says in Book III of the *Timaeus* that when we imagine the prime matter we feel as if we are dreaming, and this matter needs conjunction with its form, which is the ferment, which ferment is hidden in its womb. This conjunction should occur right at the birth of the matter, so that the matter remains and perseveres: for nature alone cannot make this conjunction
>
> (1608, p. 219)

Bonus goes out of his way to redeem the doctrines of various pre-Socratics – Parmenides, Anaxagoras, Empedocles – who seemed to argue that "matter alone was the substance of all things" (p. 320). He chides Aristotle for not realising that although these philosophers described the alchemical matter in purely materialistic terms, they were speaking "allegorically" or "mystically":

> For the matter of Alchemy, which is called prime matter and Chaos, according to the ancients, in which all things are in confusion, is figuratively the quicksilver of the Philosophers generated by a certain proper digestion, which is the sought-for stone, occult to the sense and manifest to the intellect [i.e. the quintessence, the ferment], which is the form and flower of gold

(1608, pp. 320-321; cf. pp. 174-5, 235)

The alchemists evidently associate their prime matter with chaos because as an ordinary metal reduced to its simplest elements it too is a mixture without form. Part of the value of the analogy is thus its accommodation of the Geberian perspective, in which quicksilver is simply the ordinary matter of metals separated into its base components. At the same time, since Bonus claims the pre-Socratics were deliberately speaking mystically, the allegory is predicated on the assumption that the pre-Socratics too recognised the activity of a ferment in their mixture of elements. In fact, the reduction to prime matter and the addition of the ferment are simply parallel perspectives on the same process: "it behooved them to treat especially of matter above all things because when this is truly and infallibly known, the form of gold is also immediately known" (1608, p. 321). The allegory helps to simultaneously tease apart and identify these two aspects of prime matter.

Insofar as a gap between the alchemical matter and the prime matter of creation is at once erected (because the alchemical prime matter is a specific substance, mercury) and collapsed (because this substance can become all others, like the prime matter of creation), the analogy with creation is no different to the mythological allegories, simultaneously "fictional" insofar as the gap is erected and "true" insofar as it is collapsed, to use Bonus' terms. But in another respect, it has a peculiar status, as suggested by Bonus' division of the *Metamorphoses* into two parts when he first brings it up, mentioning "the creation of the world and the transmutations of things". The truth of the myths of transmutation is guaranteed by the possibility of reducing their various forms to a single matter, of which they are "fictional" variations in the sense of different garbs. The matter to which they are reduced is therefore the cosmogonical matter (the divine ferment), although that is confused with the alchemical matter (ordinary quicksilver). In the case of the cosmogony itself, however, the analogy is directly between the cosmogonical matter and the alchemical matter, so that while the gap between fiction and truth is maintained, it is reduced to its minimum distance. The allegory of creation thus marks the point at which the divine and natural aspects of the stone

– and hence the "true" and "fictional" aspects of the allegory – are most fully reconciled, grounding the more tendentious reconciliation of truth and fiction that sustains the allegories of transmutation. In other words, the relation of chaos to the mythical metamorphoses justifies their interpretation in terms of matter insofar as it is the divine ferment, but the duality of chaos itself – resembling both ordinary matter and the ferment – is what associates this ferment with ordinary matter.

The fundamental role of the analogy with cosmogony in justifying the allegories of transmutation are particularly clear in the *Grand Olympe*, whose author sets out by criticising too literal an understanding of Ovid's creation. Only "the mundane rustics" think Ovid's poem to be "made and built on the subject of the creation of this great universal world". Instead, the author tells us, the creation refers to "the great magistry commonly called by the sages the philosophers' stone." This distinction resembles Bonus' insistence on the specific identity of the alchemical matter, which differentiates it from the matter of creation. Yet, like Bonus, the author in the end decides, while rejecting the literal interpretation, to "keep to this similitude [of creation]", citing the literal presence of the alchemical matter in all things by way of explanation: "because – as the blessed Turba says – in all things there is only one beginning and one nature which by itself suffices to multiply itself to infinity." (Prose text to verses 1-24, cited by Kuntze 1912, p. 128; cf. MBC i, p.464). As in Bonus, the ensuing allegories are based on the persistent presence of a single unchanging matter: "Just as we see one single man in different clothes represent different characters, here you have as many repetitions of one identical thing under different fictions." (Prose text to verses 1744ff, cited by Kuntze 1912, p. 86). This protean matter can only be the prime matter of creation and yet it is explicitly something more restricted. The author thus attempts to convey the fact that it is not some abstract principle, but rather is physically accessible in a laboratory.

The analogy with creation is equally important to Bracesco, although he does not refer to Ovid's creation story. Bracesco concludes both of his dialogues with an allegory of Demogorgon, the ancestor of all the gods according to Boccaccio, and even gives the same

name to the pupil-figure in his dialogues. Boccaccio, probably interpreting a textually corrupt account of the *Demiourgos*, had described Demogorgon as coeval with eternity and chaos. Bracesco explains that Demogorgon is ordinary iron, from which the prime matter of the metals can be most easily extracted. Chaos is that prime matter, the salt vitriol; eternity is the quintessence. Bracesco describes chaos as containing "all the metals" in the Anaxagorean fashion. At the same time, it is "entirely without form", and the elements are "born" (*nascuntur*) from it as from a womb (1608, pp. 150-151, 262). As in Bonus, it is not clear where exactly the analogy with the alchemical material lies: in the concept of an extraction of forms already present or of an organic development from formlessness to form. Moreover, just as Bonus never neatly resolves the parallel existence of the initial single element and the quintessence, it is not clear how the chaos and the quintessence relate in Bracesco's account. They are coeval and yet they are not the same thing.

By contrast, in the account of creation offered in the foundational text of pseudo-Lullian alchemy, the *Testamentum*, chaos and quintessence are clearly fused.[31] God is said to have "created nature *ex nihilo*" "in" a single substance, first named "quintessence", but also called "chaos" (TC iv, p. 75).[32] Next, he forms the angels, the heavens and "this world" by dividing quintessence into three parts of differing "purity", with the angels formed of the purest quintessence and the world the least pure. The quintessence of the world he then divides into four parts, again of declining purity, for each of the elements, reserving some of the undivided matter for the fabric of the material heavens (confusingly also named quintessence). Finally comes the Fall, when the elements made of quintessence themselves depart from their original purity, such that the element we now call earth is no longer the "true" element, but an impure mixture in whose "centre" the true element is nonetheless lurking (TC iv, pp. 7-9). As the only matter of the universe, quintessence provides an unchanging substance in which alchemical transmutations can occur. Yet by some mysterious

[31]This work was composed in Catalan some time in the fourteenth century and translated into Latin probably in either 1432 or 1455, according to Pereira (1989, p. 23).

[32]The combination of the concepts of "creation in" with creation "*ex nihilo*" makes it rather unclear whether or not this quintessence was itself created.

mixing with what can only be itself, it is in some parts more spiritual, in other parts more material. It is always matter, yet in its purer parts, it is more like form than matter (it is indeed said to be "like the form of forms"; TC iv, p. 80) since it determines the nature of the grosser body in which it lies.

Lull's reference to quintessence as a chaos may draw upon an association of the term chaos with the Neoplatonic (and originally Aristotelian) concept of "intelligible", as opposed to corporeal matter (*hyle noetike*). Intelligible matter is the substrate supporting the multiplicity not of formed bodies, but of the forms themselves. In Plotinus, for example "intelligible matter" is in a sense the cause of the emanation of the forms and thus – despite its similarity to ordinary corporeal matter – superior to them (Rist 1962). In a pseudo-Iambichean text from the fourth century we even find the Monad itself labelled "chaos":

> There is a certain plausibility in their also calling it [the Monad] 'matter' and even 'receptacle of all,' since it is productive even of the dyad (which is matter, strictly speaking), and since it is capable of containing all principles; for it is in fact productive and disposed to share itself with everything. Likewise, they call it 'Chaos,' which is Hesiod's first generator, because chaos gives rise to everything else, as the Monad does.
>
> (De Falco 1922, p. 39)

Intelligible matter was dubbed *chaos incorporeum* by the untimely Neoplatonist John Scotus Eriugena (c. 800–877), as Yates noted, "its formlessness not the disorder of evil, but near to the divine informity" (1960, p. 19). It is, however, largely absent from the Latin philosophy until the revival of Plotinus by Ficino, whom Pico followed in observing that "mind could rightly be called a chaos" (Pico *Commento* 2.14; cf. Ficino *De Amore* 5.10, 1.3). An exception is the work of Ramon Lull himself. As Pereira has pointed out, the main reason for associating the alchemical cosmogony with the name of Lull is likely to have been Lull's own derivation of the created world by a series of "transmutations" occurring

within "one being [*ens*], one existence [*esse*], one substrate, which we name Chaos".[33] The elements of Lull's chaos, which include "causal seeds" (*semina causalia*), are characterised by a twofold striving in contrary directions, both towards their own proper perfection (*ad intra*), which is unity with God, and towards an extrinsic perfection through other beings (*ad extra*; Lohr 2002). They are at once drawn towards and away from themselves as they seek to approach God by combining with other things. Chaos is thus both emanative – it originates all which derives from it in the manner of a divine essence – and combinatorial or mechanistic – the emanations of chaos are produced by its indifferent self-combination with each of its own parts. In other words, Lull's chaos, like the alchemists', acts as a substrate for its own formative power.

The concept of a single quintessence that is simultaneously elemental and emanative was taken over by Paracelsus and served to ground a more consistent identification of the literal and metaphorical levels of alchemical allegory – that is, of the corpuscular and vitalistic or divine aspects of matter. The Lullian cosmogony is set before the alchemist so that he may recognise that by properly purifying the elements it will be possible to obtain the quintessence in the laboratory (TC iv, p. 10). The alchemical matter is now completely identified with the cosmogonical matter: there is no longer an analogy with creation, but a literal reproduction. This identification has two consequences: on the one hand, Ovid's chaos can be identified directly with the alchemical matter, removing some of the tension in the double layer of allegory we saw in Bonus (wherein the myths are referred to the alchemical matter through the cosmogonical matter, which is itself merely like the alchemical matter). This may be one reason that the alchemical allegory of Ovid grows in popularity after Paracelsus, together with the doctrine of signatures or similitudes. The Anaxagorean containment of all within all is explicitly extended to cover the whole of creation, not just the metals. According to the Marburg Paracelsian Oswald Croll (1563–1609), the most influential exponent of the doctrine of signatures, "in the night of Orpheus and Orcus of Hippocrates [alternative

[33] "Things are said to be created from it [chaos] because from it all things can arise through different transmutations" (*Liber Chaos* in MOG iii, p. 250 [internal pagination, p. 2], cited by Peirera 2002, p. 95).

names for chaos], all things are nothing but one, as the Anaxagorican *panspermia* testifies, by Aristotle badly understood and unjustly accused." (Croll 1609, p. 54; cf. PSW 1.iii, p. 41-2, 1.viii, p. 163, 1.ix, p. 94). On the other hand, the whole of creation is reduced to the alchemical matter, which still retains its corpuscular aspect, so that from another perspective these similitudes and analogies can be dismissed as superficial ("fictions"). As we remarked in the opening section, the Paracelsian development is at once the extension of a corpuscular model of change throughout the whole of nature and an identification of that model with an Aristotelian or vitalist dynamic model of change. The literal identification of the alchemical matter with Ovid's chaos depended on the identification of both of these perspectives in Ovid himself. In the next section we shall examine how the history of the interpretation of Ovid's chaos made this double identification possible.

4.6 Ovid's chaos

Ovid had posited a chaos which is apparently uncreated and eternally pre-existent, a feature of the Paracelsian text *Philosophia ad Athenienses* (published 1564).[34] As Paracelsus' first major critic, Thomas Erastus, put it, "Paracelsus thinks that all things came *ex mysterio magno* (thus he names prime matter) not through creation, but through separation...this uncreated Mysterium was nothing other for him than Anaxagorican Chaos" (1572-1573, vol. 1, p. 4). We should not be misled into giving this aspect of Ovid's cosmogony too much weight, however: it was an obvious heresy and one which most alchemists (including Paracelsus, in other passages) rejected. What primarily interested the alchemists – even those who subscribed to an uncreated chaos, one suspects – was not the pre-existence of chaos itself, but the pre-existence of elements *within* chaos. Ovid had described chaos as a "body" (*Met.* 1.18) composed of the "discordant seeds of things" (*Met.* 1.9), a phrase with Anaxagorean and Lucretian associations, but which he goes on to explain in terms

[34]The text may be pseudonymous, for Paracelsus elsewhere suggests that prime matter is in some way created (see Pagel 1960, pp. 142-8).

of the strife of the four elements (i.e. the elements of Empedocles). Because of the pre-existence of elements in chaos, the generation of the world can occur by a process of simple rearrangement or "separation" of the elements or seeds enacted by "god or better nature" (*deus aut melior natura...diremit*, 1.21). Such a concept was congenial to the alchemists insofar as they adopted a Geberian perspective. Whether the pre-existing elements were Democritean, Anaxagorean or Empedoclean did not matter as much as the fact that whatever made up chaos was actual, not pure potency, and simply waiting to manifest itself. Such a cosmogony could be easily reconciled with creation *ex nihilo* if desired: one only had to suppose, as Lactantius noted already in the fourth century, that Ovid's *deus* had first created chaos itself (*Inst.* i, 5.8). This is the aspect of chaos highlighted by William Bloomfield in his alchemical *Blossoms*:

> Chaos is no more to say (this is doubtelesse,
> As Ovid witnesseth in his metamorphosyn)
> But a certaine rude substance, *indigestaque moles*,
> Haveing divers natures resting it within,
> Which with the contrarie, wee may out twine
> By philosopher's arte.
>
> (Ashmole 1968, p. 420)

As in the case of Lull, however, the unchanging substance which is "separated" in the Paracelsian cosmogony is not the static, inert substance which the corpuscular model of transmutation implies and which Erastus makes it out to be. (Pseudo-)Paracelsus tells us that:

> The mysterium magnum was not elementary, although the elements were in it. Nor was it fleshly, though all kinds of men were grasped therein. Nor was it wood and stone. But it was a material that had the potential in it for every mortal

> thing, without distinction [Erkenntnis] its its essence, and in its separation it gave each thing its being and form.[35]
>
> (PSW xiii, p. 392)

The real value of Ovid's cosmogony was that this emanative aspect of prime matter could also be located in it together with the elemental. The association of the term chaos with an "architectonic" principle, which Paracelsus took over from Lull and reinforced,[36] prepared the way for this double identification. But a second factor played the decisive role: namely, the tradition of interpreting Ovid's *semina rerum* in terms of "seminal reasons" (Lull's "causal seeds").

The equation of chaos with a mass of undeveloped seminal reasons (meaning incorporeal forms shaping matter from within) goes back to Augustine's influential interpretation of Genesis. The first verses of Genesis describe the creation of "heavens and earth", but add that the earth was "without form and void" (*invisibilis atque incomposita*) and that there was "darkness upon the face of the deep" (*abyssi*). Augustine took these "heavens and earth" to refer to prime matter (*materia informis*), which he glossed as "chaos" (Gen. c. Man. 1.5.9), and which he conceived as a pure potentiality unable to exist without form (as in hylomorphism), and hence an "almost nothing" (*prope nihil*, *Conf.* 12.6.6). Because matter is incapable of existing except joined to form, Augustine argued, God must have created matter and form simultaneously, the six days denoting pre-temporal conceptual moments: these forms were not all fully actualised at the instant of creation, however, but present as "seminal reasons" whose actuality is still unfolding. Thus, he explains that the *materia*

[35] Hedesan (2014) offers a survey of interpretations of the *mysterium magnum* demonstrating a history of interpretation that enfolds this double perspective.

[36] Paracelsus uses the word chaos frequently and with a wide variety of meanings; sometimes, as the element in which a creature or substance subsists, sometimes as the astral principle or "arcanum" of that substance, sometimes simply as "air", the specific abode of the macrocosm. See Pagel (1960, pp. 161-3, 1961, 1982, pp. 84-5). The phrase *chaos architectonicum* comes from Paracelsus' follower Van Helmont, who famously coined the term "gas", probably as a variant of chaos, to describe the spiritous principle of a substance (Van Helmont 1652, p. 546). However, as Hirai (2005, pp. 445-446) notes, Van Helmont also sometimes speaks of chaos as a jumble of atoms: "we should not dream that all of these things, so ordered, have flowed from confused chaos or from a chance cloud of atoms flitting through the void: they have rather gone forth to their fate constituted by the eternal treasuries of wisdom" (Van Helmont 1854, p. 52).

informis is labelled "heavens and earth" because it is itself "as if [*veluti*] the seed of heaven and earth" (*De Gen. ad litt. Imperf.* 3.16).[37] Augustine's concept of prime matter was then associated with the formless entity into which the demiurge of Plato's *Timaeus* copies the forms, the *chora* ("place") or *receptaculum*, and in turn, the concept of seminal reasons was read into in the *Timaeus*.[38] Plato had described the *chora* as generating within itself the "traces" of the elements, which move about in it chaotically (*Ti.* 52a8-53c4). Since Plato also describes the *chora* as a womb, it was no great leap think of these traces as "seeds" and the *chora* itself not as a completely passive and formless receptacle (Aristotle's interpretation at *Gen. corr.* 329a), but as the combination of receptacle and seeds. This interpretation of the *Timaeus* emerged in strength in the twelfth century, and clearly influenced both the *Pretiosa Margarita Novella* and the *Testamentum*.

The vivid activity of Ovid's seeds partly accounts for the well known popularity of his cosmogony among the twelfth century Platonists (Bynum 2001, pp. 87-89, Viarre 1966, pp. 37, 46-53), for whom – as Bernard Sylvester wrote in his great poem, *Cosmographia* – chaos "contains the original natures of things diffused through her vast womb" (Wetherbee 2013, p. 68). Equally important as the seeds, of course, was the presence of the demiurge, which helped assimilate the poem to a hylomorphic framework (insofar as the demiurge bears most of the responsibility for giving form to matter) and thus defuse the resemblance of Ovid's seeds to atoms or elements.[39] Apart from Bernard, Hildebert of Tours (1055–1133), Baudri of Bourgeuil (1046–1130), Alain de Lille, Gerald of Wales, Alexander Neckam, and Philippe de Thaon (fl. 1120–1140), borrow heavily from Ovid's cosmogony in particular (Viarre 1966,

[37]The concept of intelligible matter also appears in Augustine – it is the "heavens", on this interpretation, whereas corporeal matter is the "earth".

[38]The receptacle was labelled as a chaos at least since Philo of Alexandria (*De Eternitate Mundi* 490), and has a long history of reconciliation with the unformed matter of Genesis (e.g. Calch. *In Tim.* 167.6, 280-281), for which, see Viarre (1975).

[39]It should be noted that it was just as much the orderliness of the cosmos *after* the action of the demiurge that made Ovid's cosmogony a point of reference. Here there was little problematic from a Christian point of view. William is happy to approve Ovid's description of the orderly disposition of the winds description of the winds (De Conches 2006, p. 137). Oresme approvingly cites Ovid's description of the layering of the elements (1968, p. 400, citing *Met.* 1.45-61). Perhaps the chief early example of this tendency is Gervase of Tilbury, who cites Ovid a total of sixteen times in his description of creation (Tilbury 2002, pp. 22-38, 52, 68, 78), noting his harmony with Genesis (Tilbury 2002, p. 36).

pp. 89-94, Wright 1999). This treatment of chaos experienced another surge in popularity during the Renaissance. Jeanneret (2000, pp. 81-103) quotes a number of poets who draw on Ovid in order to emphasise the dynamism and intrinsic activity of chaos: Maurice Scève (1501–1564), Simon Goulart (1543–1628), Pierre de Ronsard (1524–1585), Guillaume de Salluste Du Bartas (1544–1590). We might add any number of further examples: Milton's chaos of "pregnant causes mixed" (*Paradise Lost* 2.913) and Spenser's "chaos which supplyes / the substances of natures" (*The Fairie Queene* iii, 6.36), for example.[40] Finally, it is worth noting that the Pico-inspired concordist Francesco Giorgio (1466–1540) cited Ovid in support of the Augustinian doctrine of simultaneous creation because his creation story lacks temporal markers. By omitting the metaphor of the six days, Giorgi claimed, Ovid had been even more precise than the Bible (2010, p. 216).

Maurach has argued that the rise of Aristotelianism in the thirteenth and fourteenth centuries effectively eliminated the elemental interpretation of chaos – and perhaps even the Platonic interpretation as well: Aquinas equated chaos with pure potentiality considered in isolation from all form, including seminal reasons (Summa Theol. I, qu. 66, art. 1, 3). Thus, Maurach argues, "the problem of Chaos became so sublimated, that Ovid lost his significance"– he became "*belles lettres*" (1979, p. 146). But, in fact, the equation of chaos with Aristotelian substrate *per se* (as opposed to substrate implanted with seeds) increased the likelihood that his chaos would be interpreted in elemental terms. Precisely by making it harder to interpret Ovid in a manner consistent with hylomorphism (since Ovid's chaos indisputably contains seeds) it reinforced his association with the interpretation of chaos opposed to the hylomorphic one. This was a crucial step in endowing Ovid's chaos with alchemical appeal. The alchemical chaos is not only productive, it is also producible.

[40]It is possible that the preponderance of Protestants on this list reflects the Protestant inclination to take *Genesis* literally, implying a successive creation from chaos over six days, rather than a single creative act conceptually divided into six aspects, as most Catholics (after Augustine) interpreted the story. However, those who did take *Genesis* literally in this fashion did not tend to associate the *terra incomposita* with prime matter, preferring instead to imagine a fully formed earth imperfect in other ways. As Aquinas noted in reference to the Church Fathers who had pursued this line of interpretation, they "understand by formlessness, not the exclusion of all form, but the absence of that beauty and comeliness which are now apparent in the corporeal creation".

Hence, the doubleness of the Ovidian tradition gave it an advantage over the Platonic from an alchemical perspective. Even if the *Timaeus* already boasted a significant ambiguity about whether the Platonic receptacle was empty or brimming with seeds, Ovid, embracing contradiction, had managed to instil his chaos with the attributes both of the Platonic receptacle and the pre-Socratic mixture of elements.

Thus, Ovid did not lose his significance in the thirteenth and fourteenth centuries: he simply came to represent an opinion incompatible with Aristotelianism. The elemental interpretation of Ovid's chaos persists most obviously in the tendency to turn Ovid into the particular butt of Aristotle's arguments against the generation of the cosmos from pre-existing elements in the *De Caelo* (*Cael.* 279b12-31, 300b17-21).[41] Already in the 12th century, Bernard's pupil, William de Conches (c. 1090-1154), drew on these arguments to argue that a chaos of elements was impossible. While William was happy to excuse Plato's chaos as a "potentiality" that was never in realised as such, he used Ovid to illustrate the concept he was rejecting (De Conches 2006, p. 29; see also P. L. clxxii, *De Philosophia Mundi* 1.21).[42] Similarly, while Albert the Great notes the correspondences between the *Timaeus* and Ovid's account, he is willing to extend the Timaeus, but not Ovid, an Augustinian interpretation (AMB xxxiv, p. 738). Ovid, he said, had "followed Anaxagoras and Empedocles" and all three had "obviously lied" (AMB xxxiv, p. 737; cf. EC iv.2, p. 560, l. 72-3); elsewhere, he claims that Ovid followed "the Epicurean philosophers" (AMB xxxi, p. 513). Oresme, writing roughly a century after the death of Aquinas, quotes Ovid in his commentary on the *De Caelo*, again to illustrate the concept he rejects (1968, p. 254; cf. p. 588). The same pattern is witnessed in 1615, when the devotee of Pomponazzi, Cesare

[41] Aristotle had argued that if the cosmos had been generated from a chaos of pre-formed elements, we would have to expect the state of chaos to return. Furthermore, if there already existed elements with their own natural motions, they would have separated themselves without divine assistance. Thus Aristotle argued that the cosmos had no beginning.

[42] The quotation of Ovid occurs in the *Dragmaticon,* a philosophical dialogue with the Duke of Normandy; the parallel discussion in the *De Philosophia Mundi* is somewhat more detailed but does not mention Ovid. Note that the latter work is wrongly listed under the name of Honorius Augustodunensis in the *Patrologia Latina*. See also the remarks in William of Conches' unpublished manuscript on Boetius cited by Viarre (1966, p. 97).

Vanini (1585–1619) refutes the opinion he attributes to the *Timaeus* that the world arose from the "separation" of chaos. Presumably because of the proximity of Plato's *chora* to the Aristotelian substrate, he quotes Ovid in order to "explain" this interpretation of Plato (Vanini 2010, p. 358).[43]

The tendency to perceive the similarities between Ovid and the *Timaeus*, while often allowing the *Timaeus* a degree of proximity to hylomorphism denied to Ovid, demonstrates just how slender the line dividing the elemental from the seminal interpretation really was. It is thus not so strange that the alchemists were willing to adopt both simultaneously. We may regard the period of Aristotelianism as having played an essential role in facilitating the conflation of the seminal and elemental chaos, precisely by clarifying what was at stake in the distinction. Ficino inspired the widespread revival of the seminal interpretation of Ovid's chaos in the Renaissance by once more attributing a "robust and entitative reality" to prime matter (Snyder 2008, p. 194) as a womb for the seeds (*semina*) of forms (FPT iii, pp. 172, 224). He also identified the alchemical elixir with the *spiritus mundi*, precisely that most tenuous substance – like a soul, yet still a body – which is the "seminary" power implanted in matter.[44] This equation of the elixir with spirit was then taken over by the chemical philosophers, who explicitly equated this seed with the alchemical prime matter. For example, in a chapter "On nature or the world spirit and its common seminary" the iatrochemical atomist William Davison (1593–1669) equated spirit with the god which separates Ovid's chaos, but which he interprets as acting from within chaos itself (1640, p. 306). Eventually the concepts of seed and matter in alchemy become interchangeable: "the prime matter of the chymists is the seed [semence] of bodies", writes Joseph Pernety under *Matière* in his alchemical dictionary (1758, p. 269). Thanks to the long history of interpretation surrounding Ovid's chaos, by simply associating chaos with the name of Ovid, a chemical

[43]Vanini appears to borrow chunks of this passage, including the conflation of Ovid and Plato, from Cardano's *De Subtilitate* (Cardano 1663, vol. 3, p. 408).

[44]Newman (2003a) stresses the great influence of this identification; cf. Forshaw (2011). Kodera (2012) has argued that Ficino's cosmos is inspired by the alchemical model of a single material distinguished by different degrees of rarefaction and density, where rarefaction also implies spirituality. For more on the concept of seed in Ficino, see Hirai (2002).

philosopher could instantly conjure up the duality of organic development and elemental or atomic composition that his or her art required. "So as to say it in a word", writes the iatrochemist Francis Glisson (1599–1677), the prime matter of which Ovid is the "foremost" (*prae aliis*) exponent in his description of chaos "embraces not only that stable subject which persists in all mutations, but even that very mutability itself, and its various garbs" (1672, p. 86). That is, his chaos contained within it unchanging matter, a principle of transformation, and the forms into which that matter can be transformed, all at once.

Chapter 5

Critics of Alchemical Allegory

5.1 The metamorphosis of the alchemist

In this chapter we shall examine two roughly contemporaneous critical responses to the alchemical interpretation of Ovid and to the Paracelsians in general, those of the Saxon chemist Andreas Libavius (1555–1615) and of the sometime Lord Chancellor and spiritual father of the Royal Society, Francis Bacon (1561–1626). Libavius' reputation in the history of science is broadly similar to that of Francis Bacon: he was a reformer and "protoexperimentalist" (Vickers 1986, p. 135) who protested vigorously against obscurity and false analogy in natural philosophy (Hannaway 1975, Forshaw 2008). His belief in the need for a clear and methodical exposition of alchemical procedures drove him to compile what is generally referred to as the first "text book" in chemistry, the *Alchemia* of 1597 (*Alchymia* in subsequent editions). Libavius is also often considered as an important vehicle for the transmission of corpuscularian ideas to Daniel Sennert (1572–1673) and Robert Boyle (1627–1691). Both Bacon and Libavius, despite their criticisms of alchemical allegory, in different ways continued to incorporate Ovid into their philosophies. This retention of Ovid reflects the way in which Ovid himself had provided the materials for his own critique. By a shift of emphasis, the coincidence of contraries became a conflict of contraries, in which the scien-

tific and mythological aspects of Ovid's poem were no longer harmonised, but rather pitched against each other. At the same time, the unwillingness to eliminate Ovid entirely speaks for the ongoing interdependence of the scientific and mythological aspects. This interdependence is further underlined by the fact that despite their similarities, Libavius and Bacon pursued their agendas of reform from opposing perspectives. Whereas Bacon, at least on the surface, sought to demolish the apparatus of scholastic learning and construct a "New Organ" (*Novum Organum*) for the interpretation of nature, Libavius promoted scholastic learning as the very means by which clarity could be injected into alchemical discourse. The ways in which both Bacon and Libavius rejected Ovid and then continued to incorporate him into their philosophies were correspondingly opposed.

One of the most striking features of Paracelsus' work was the savage vituperation of classical authorities. The scholastic theory of matter which so kindled Paracelsus' ire was summarised by one of his supporters, Joseph Duchesne (a.k.a. Quercetanus, 1544–1609), thus:

> All things come from the four elements as if from primary and most universal sensible principles, mixed with a certain fitting proportion, from the symmetry of which mixture the health of living beings arises: but its asymmetry excites disease. The virtues and faculties of all things flow from that mixture of elements or what supervene on the mixture.
>
> (Duchesne 1603, *praef.* p. 2)

The Paracelsians dismissed the traditional Aristotelian elements and Galenic humours, regarding them as "dead bodies" concealing the true principles of substance. The true principles were usually described as some configuration of three types of entity: "inner elements" (incorporeal versions of the classical Aristotelian elements), the *tria prima* of salt, sulphur and mercury, also conceived as forces rather than physical substances, and incorporeal seeds or seminal reasons (Pagel 1982, pp. 82-95). As Duchesne explains:

> They ascribe causality not to the vulgar or commonly known proportions of elements and mixts, but having gazed upon and contemplated the things themselves, they aver the cause is to be sought more effectively where its fount and spring is: and they think this is not in the extrinsic and universal elements of the world, but rather in the inner ones.
>
> (Duchesne 1603, *praef.* p. 4)

Succumbing to the popular confusion between Democritus the atomist, who had likewise elicited Aristotelian scorn for deriving the elements from invisible seeds, and the Hellenistic Pseudo-Democritus, who had been a practicing alchemist (Luthy 2000), Duchesne had described Democritus as "the prince of the Chemists of his age" (Duchesne 1603, p. 5). Libavius too regarded the Paracelsian philosophy as "Democritean" and criticised it as "Ovidian" on this basis, defending the edifice of Aristotelian and Galenic teaching as the result of centuries of empirical experience. Bacon, however, championed Democritus in terms evocative of Duchesne as a means of penetrating beneath both the *signaturae rerum* of the Paracelsians and the scholastic categories of analysis, which he regarded as inappropriate abstractions from sense experience. But Ovid resurfaced in both philosophers when it became necessary to address what either the Democritean or scholastic account of nature seemed to leave out. Thus, Libavius too recognised the need to "tear apart and break through the structures of mixts...penetrating into the inner chambers of composite things" (1606, p. 77). He sought to reconcile Duchesne's interpretation of Democritus with Aristotle, and hence was himself interpreted as a proponent of corpuscularianism. Conversely, Bacon recognised the ineliminable necessity of abstracting from surface appearances in order to make conjectures about the invisible processes beneath them, in such a way that his empiricism remained coloured by the specific conjectures of the Paracelsians.

Recall that Newman describes the vitalist language in which some corpuscular theories are clothed as "merely metaphorical or heuristic" (2001, p. 413). The incorporation of Ovidian myths by reformers such as Libavius and Bacon, who criticise that very practice,

can be explained away in a similar manner. The articulations of tensions between surfaces and depths, Democriteanism and Aristotelianism, and the simultaneous rejection and appropriation of Ovid mean that the Ovidianism we find in Bacon and Libavius does not have quite the same literal intent as in the examples discussed in the previous chapter. Insofar as Ovid is appropriated, his myths may be taken to express something conceptually useful, such as the concept of a material flux underlying apparent changes. But we are forbidden from confusing the heuristic status of this concept with the literal truth by the simultaneous criticisms of the Ovidian allegory of the Paracelsians. At the same time, insofar as such concepts truly are useful, it becomes difficult to distinguish what is merely heuristic from what is a genuine ontological commitment. The opposing perspectives of Bacon and Libavius demonstrate that opposing perspectives on what constituted scientifically useful interpretations of the *Metamorphoses* were actually adopted. In turn, from the perspective of later generations, incorporating the *Metamorphoses* into natural philosophy at all exposed both Bacon and Libavius to the charges of having adopted an overly literal interpretation of the poem. In both cases, their acceptance of Ovid was still correlated to an apparently literal (as opposed to merely heuristic) acceptance of concepts which would later fall into disrepute – in the case of Bacon, the doctrine of material spirits; in the case of Libavius, various alchemical doctrines derived from a reading of the medieval alchemists.

It should also be noted that the criticism of alchemical allegory is not original with Bacon and Libavius. It is unsurprising that those who were not alchemists themselves were quick to ridicule such liberties. A translator of the *Metamorphoses*, Barthelemey Aneau, was perhaps the first to voice his scepticism (1556, sig. c5), while the author of the most popular mythographical work of the Renaissance, Natale Conti (1520–1582), likewise repudiated "the sooty fallacies of the chemists" (1567, p. 49). Erastus opined that such things were not only "unworthy nonsense", but even "impious and deserving of a most severe punishment" (Erastus 1572-1573, vol. 2, *Explicatio*, p. 102). At the same time, general warnings about the mixture of fables and philosophy had also appeared within the alchemical tradition

itself. Already in the thirteenth century, Ricardus Anglicus (c. 1180–1252) wrote in his *Correctorium Alchemiae* that students of the art should "drink the truth from books, not from made up fables" (quoted in tracts from 1594 and 1611: TC i, p. 143, ii, p. 442, iv, p. 898). A work entitled *Thesaurus Thesaurorum* attributed to Arnald of Villanova specifically exhorts its readers to "believe the natural philosopher [Aristotle] in all things, not fables or lying works completely detached from the works of nature" (Villanova 1603, p. 8). Meanwhile, Grataroli prefixed a miscellany in which he printed his translation of Bracesco, with a quotation from Robertus Constantinus warning that "interpreters drag fables in every direction and everyone can embellish them according to the judgement of his mind" (Grataroli 1572, vol. 1 *Proleg.* p. 7v). In his *Tractatus de Naturae Luce* (1583), the famous Paracelsian Gerard Dorn (1530–1584) echoed Erastus' accusations of impiety. Commenting on the Emerald Tablet's description of the alchemical matter as "the father of all the perfection of the whole world", Dorn observed:

> Is this not much more excellent than any figments of the poets, thought up for idolatry rather than for the knowledge of the one God? Even if by some they have been interpreted allegorically – incorrectly, as if they embraced many famous mysteries – they still sung nothing less than the *magnalia* of one God alone in the names of the Godlets and harlots they dreamed up. Although it seems that Ovid scented something in his Metamorphosis, he mixed it in with many no less frivolous and more impious things which contribute nothing to this matter. How, I pray, do the writings of infidels help our salvation?
>
> (TC i, p. 427)

In fact, the relations between Bacon or Libavius and the Paracelsians, between Libavius and Bacon, or between later chemists and Libavius or Bacon could be seen to act out a common trope in the alchemical literature concerning the misinterpretation of fables: by mistaking allegories or *Deckname* for the literal truth, the alchemist ends up suffering himself

(in respect of wealth or virtue) the metamorphosis which he attempts to effect upon metals.[1] Often, this metamorphosis is specifically illustrated with examples from Ovid. In his *Azoth, sive Aureliae Occultae Philosophorum* (1613), Basil Valentine compared the alchemist who rashly interprets the divine mysteries to "that Ovidian Phaethon", each an unfit custodian of the solar truth (TC iv, p. 541). Some compared those seeking ordinary gold (as opposed to the true elixir) to Tantalus, using the Ovidian line *poma fugacia captant* (TC v, p. 974, Vaughan 1666, p. 212). The most fitting example was of course Midas. The two aspects of his tale – his failure to understand the significance of his chrysopoetic gift and his subsequent acquisition of asses' ears for preferring Pan's music to Apollo's – coalesced into the single motif: the alchemist who suffers metamorphosis for his inability to interpret the mysteries, with this association reinforced by puns on *aurum* and ears (*aures, auriculae*: Von Nettesheim 1630, vol. 2, p. 840, MBC *praef.* p. 5). Libavius compared one opponent unable to understand his work to Phaethon and Icarus (1606, p. 44), others to Midas and Marsyas (1615a, pp. 36, 164). "Having lost the rational office of the mind, you have been made an irrational beast like in the poetic metamorphoses", he told one of the latter detractors (1615a, p. 145). Just as Ovid depicts engagements with images or stories that result in the metamorphoses of their viewers or audiences, we find in the literature of alchemy that what one philosopher propounds as a heuristic fiction transforms him, in the eyes of another, into a credulous beast.

5.2 Paracelsus the Democritean

The centrepiece of Libavius' work is the text-book, first published in 1597 as *Alchemia*, then republished as *Alchymia* and thereafter repeatedly expanded with commentaries, and commentaries upon commentaries, increasingly directed more towards criticism of Paracelsians

[1]Examples of this trope can be found in Gaston Duclo (TC ii, p. 4), Della Porta (1658, p. 160) and Philalethes (1994, p. 453).

than the illumination of Libavius' text-book.[2] This layering of commentary upon commentary is indicative of Libavius' style, polemical and somewhat pedantic. It is also symptomatic of the highly charged atmosphere in which Libavius was writing. The advent of Paracelsian medicine had caused great concern in theological as well as medical circles, with Erastus' comprehensive critique repudiating Paracelsus on both counts. Libavius was sympathetic to Erastus' criticisms and had penned attacks on various German Paracelsians in some of his earliest works, for example, against George Amwald, Johann Graman (Libavius 1594, Libavius 1595) and Joseph Michael (Libavius 1599). But he strongly disagreed with those who would reject either metallurgical alchemy or chemiatry altogether, notably the school of medicine at Paris, which had pursued a political campaign against those offering chemical medicines. The Huguenot takeover of Paris in 1593 had brought well-connected Paracelsian doctors to the city (who were mostly Huguenots), intensifying the pressure on the medical faculty and initiating a period of intense debate fuelled by religious, economic and professional rivalries as much as by philosophical disagreement (Moran 2007a, pp. 163-207,

[2]Since the manner of the publication of some of Libavius' oeuvre is rather confusing it may be useful to clarify the editorial context of certain pieces. In its first instantiation, the *Alchemia* seems to have been sold with (and is sometimes found bound with) a work entitled *Commentationum Metallicarum libri iv*, comprising pieces on the nature of metals, mercury, the philosopher's stone, assaying, and mineral waters. When the text-book was republished in 1606 as *Alchymia*, it was bound with two works *Commentariorum alchymiae pars prima* and *Commentariorum alchemiae* [sic] *pars secunda*, each given separate pagination. The first of these was prefixed with a polemic against the Parisian doctor Jean Riolan, and expanded on chemical procedures while the second was a re-edition of the *Commentationum Metallicarum libri iv*. In 1611 Libavius published a work he subtitled *Pro III Parte Commentariorum Chymiae*, but which bears its own title, the *Syntagma Selectorum undiquaque et perspicue traditorum alchymiae arcanorum*, comprising a much expanded discussion of several chemical substances and processes. The unfurling of commentary did not stop there: in 1613 the *Syntagma* itself was expanded with a second volume, entitled *Syntagmatis Arcanorum Chymicorum...tomus secundus*, made up of four books, the first, *Tractatus Chymicus de Igne Naturae* being a polemic against the Parisian doctor Pierre le Paulmier and the second, *De Alchymia Pharmaceutica* concerning the usefulness of chemical medicines. The third and fourth books were entitled *Apocolypseos Hermeticae pars prior* and *pars posterior* respectively, and attempted to clarify the meaning of various obscure alchemical sources. Finally, in 1615 Libavius added a third volume to the *Syntagma* entitled *Appendix Necessaria Syntagmatis Arcanorum Chymicorum*, containing refutations of the Paracelsians Henning Scheunemann (1570–1615) and Johann Graman and of the critic of alchemy Nicolas Guibert (c. 1547–c.1620). Some of his most famous works are found not in this appendix, but in an appendix to the appendix: yet another volume, this time bearing the title *Examen Philosophiae Novae* appears to have been sold together with the *Appendix Necessaria*, for the tracts it contains are listed on the frontispiece of that work, albeit with slightly altered titles. These tracts were polemics against prominent Paracelsians: Joachim Tancke, Oswald Croll (1563–1609), probably the most widely read of the Paracelsians, Johannes Hartmann (1568–1631), holder of the first ever University chair for chemiatry, and the anonymous author(s) of the Rosicrucian treatises.

Trevor-Roper 2006). When Libavius found himself cited as an opponent of alchemy by the censor of the medical faculty, Jean Riolan the Elder (1539–1606), he felt compelled to intervene, and hence became a target himself. This controversy provided the main motivation for the polemics appended to the *Alchymia*, which continued the assault on the Paracelsians while defending the integrity of alchemy and attacking the university professors for their rejection of all chemical medicines. Libavius was attempting to justify himself to opposing sides, Paracelsian and anti-alchemical.

Let us begin by examining why Libavius associated Paracelsus with Democritus and Ovid. The basis for the association is expressed at many points, but for reasons that will become clear, we shall begin with the third book in the first volume of his *Syntagma Selectorum* (1611), entitled *De liquoribus* (a "liquor" is defined as a solution of something earthy). In the first chapter of this book, entitled *Quid Liquor*, Libavius noted that "As is clear from Book III, chapter 7 or text 56 of *De Caelo*, the old opinion of Democritus and Empedocles was that there is no true generation of elements from elements, but only an apparent one, because when what exists inside something is separated it is called generation." This argument was of course the one that repeatedly drove alchemists to supplement their corpuscular models of change with vitalist or Aristotelian models. But, according to Libavius, Paracelsus had stuck to the Democritean precept: "Paracelsus followed Democritus, since he did not want there to be a transmutation, but an occultation of one thing in another. And he mocks those who say that salt is 'generated' [*gigni*] from brine" (1611a, p. 103). Paracelsus' prioritisation of separation over transmutation, the internal over the external, was implicated in the dismissal of the Galenic humours and Aristotelian elements, for to deny transmutation was effectively to deny that these were true substances as opposed to mere appearances. By so dispensing with the substances whose identity provided in Libavius' mind the basic foundation for the differentiation and order of nature, the Democritean perspective unleashed a free play of resemblance between bodies, metals and stars. Humours, metals and stars now all had to be referred to the same invisible seeds: there was no longer any way of distinguishing

between them. Indeed, not content with noting the presence of salt in brine, the Paracelsians postulated the existence of *everything* within everything else. Hence the stars, indeed the entire world, literally and materially found their way into the human body.

The path from Democriteanism to Ovidianism in Libavius' mind was twofold. Of primary importance were the fantastical consequences of transforming the analogy between microcosm and macrocosm into a literal occultation; second was the equation of the occulted material with chaos. In his commentary on the hexameron in *De Universitate et Originibus Rerum* (1610), Libavius accuses Paracelsus of improperly transferring the chaos of Ovid to the scriptures (1610, pp. 39 [marked 93], 77), maintaining that "the assertion of chaos was rather from Timaeus of Locri, Plato, Democritus, Anaxagoras, Leucippus, Empedocles, Hesiod and Ovid than from the Canonical scriptures" (1610, p. 151). He often associates this belief in chaos with the Democritean denial of transmutation. For example, he begins a book entitled *De transmutatiis variis* in the first volume of the *Syntagma* by recalling the familiar opposition between Democritus and Aristotle in these terms: on the one hand, there were in antiquity those who said that "all things that seem to be generated come from atoms or chaos, just as today they say that what is born comes from a first receptacle and womb, a panspermia of things in which the principles of what grows and dies are lurking". According to these people, transmutation is "mere appearance". On the other hand, there are those who said that "what is born is truly generated, by a motion from non-being into being", in support of which Libavius cites the *De Caelo* and *De Generatione et Corruptione* (1611a, p. 265). Here, Libavius goes on to clearly explain how he believes the tradition of Ovidian allegoresis arose: the Democritean denial of transmutation is what produced the confusion between Ovid's metamorphoses, developing from chaos, and genuine alchemical doctrine.

After outlining the genera and species of transmutation (see Figure 5), Libavius goes on to describe "the sense of Chemical transmutations", drawing on the Paracelsians Gerard Dorn, Michael Toxites and Alexander Suchten. We are informed that in the simple metamorphosis of metals, Paracelsus detected "a transmutation Metaphorical or parabolical, and this was

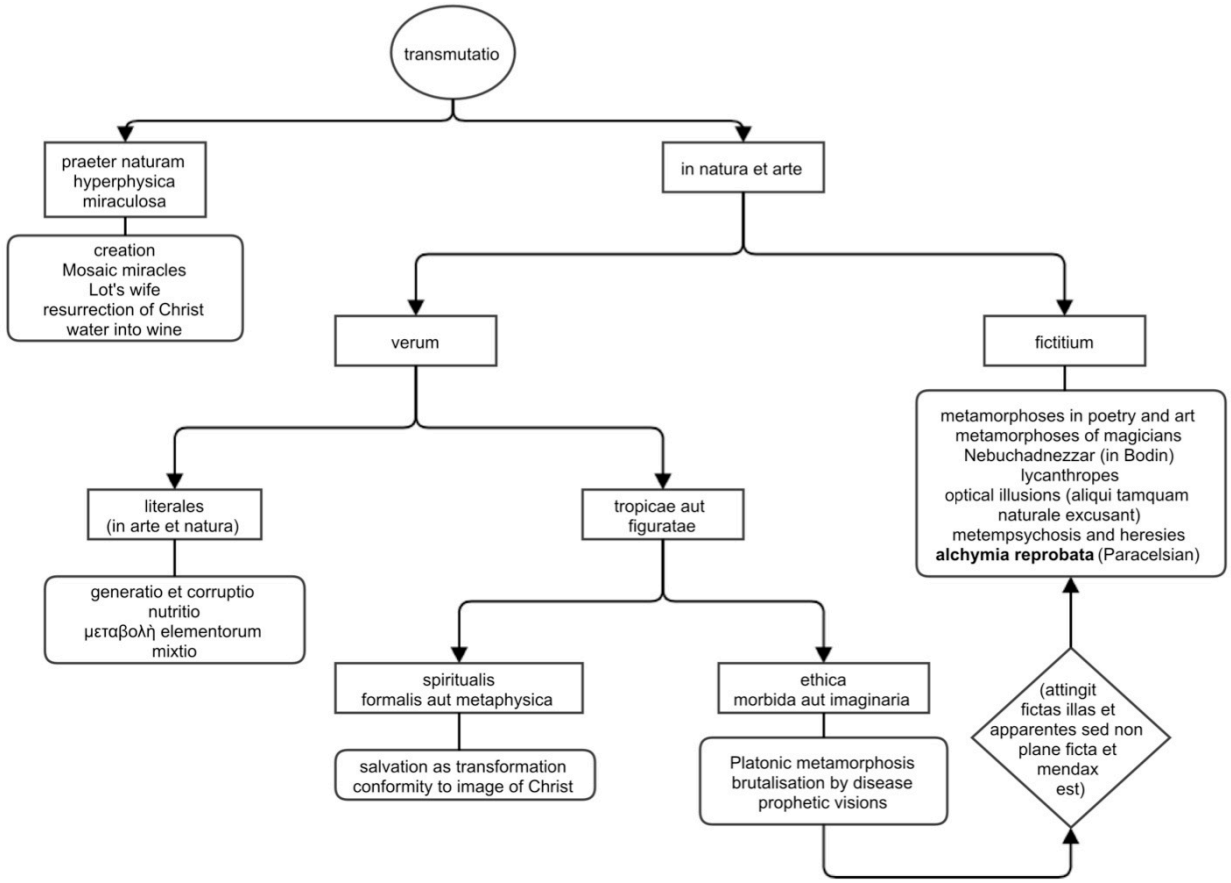


Figure 5: Schematisation of Libavius' outline of types of transmutation in *Alchymia*.

double. First in diseases, when Saturnine, Jovial, Martial, Venereal people were transformed into golden health; then in medicines when from impure lead, iron, bronze, tin arise the pure essences of gold and silver or of the sun and moon" (1611b, vol. 1, p. 268). Similarly, perhaps, "Michael Toxites and Alexander Suchten pronounced transmutation impossible in the literal sense; therefore they feigned a certain magical and philosophical transmutation" (1611b, vol. 1, p. 268). We find a similar denial of transmutation in Paracelsus' astrology:

> He, who carried the stars into medicine and health and diseases and made all things astral on the basis of the harmony of the lower nature with the sky, stole the fundament of the thing from Lull and Ulstadt [Philipp Ulstadt, author of the *Coelum Philosophorum* (1544)], but rejected their reasons and writings,

> explicating them very differently, not converting mars into sun [i.e. one metallic substance into another], but from a martial vegetable, mineral or animal drawing out a Martial star, which he said was the fifth essence, as if treating the similar by the similar. He thought that he could understand what was from the nature of this or that star by his art which he calls *signatum*, and others call chiromancy. He did not transmute the stars, but collected them as he found them among the impurities of the elements, for the Whole Chemistry of that man was to separate the filthy from the pure and to make the celestial arcanum from the earthly. He operated similarly when he turned to minerals...He was brought down even to vegetables and worked to thrust the names of these things equally into man.
>
> (1611b, vol. 1, p. 269)

Not only did Paracelsus interpret alchemical doctrines about metals as if they really referred to human health, but he did not even place the causes of heath in the human body, referring everything instead to the stars. He did not do this as an Aristotelian astrologer would, by pointing to the influence of the stars on the lower bodies, but on the basis of equivocal similitudes postulated a relation at once crassly material (the stars are in the bodies) and completely immaterial (this presence produces a harmony between the two worlds, such that the one can act upon the other without physical contact). All of this, Libavius argued, was the result of simple incompetence in the practical business of studying and transmuting real, empirically verifiable substances. The problem was that the "ancients" (i.e. Geber and Lull, among others) had indeed employed allegorical language – they had used the names of the planets for metals, for example. But this allegory was not equivocal: it had a precise meaning, which the Paracelsians had been unable to penetrate:

> That opinion about the stone of the Philosophers and Chrysopoeia and Argyropoeia [as being astral rather than metallic] was born from the failure, impotence and laziness of Paracelsus. For when they all were greedily carried into the literal transmutation of metals, applying all their strength, and they could not quench

> their hope and cupidity and satisfy their magnificent promises, or arrive at the end of the art of goldmaking, some paid the penalty for their stupidity and temerity, afflicting themselves and the art with infamy. But the more cautious, so as not to show themselves to be liars or any less wise, that is, so as not to betray their inexperience and ignorance in understanding the writings of the ancients, invented another sense, Parabolical, Magical, Philosophical, beneath the letter, concealing the discovery of Lull, of Ulstadt, and of the others whom Paracelsus travestied with his *coelum* and fifth essence, and they sought the support of this matter from the parables of Hermes and of the Philosophers in the *Turba*, from the allegories of the *Rosarium* and others, adopting what is found in Ovid's *Metamorphosis*, the fables of Aesop, the ram of Colchis, the Song of Salomon, and other writings where they found allegorical language.[3]
>
> (1611b, vol. 1, p. 269)

Thus, rather than risk punishment for their ignorance, the Paracelsians had twisted the literal meaning of the ancient alchemical sources, interpreting metals as stars or humours, humours as stars or metals. Because they had not properly deciphered the allegories used by the ancient alchemists, the Paracelsians were unable to distinguish allegories with a genuine alchemical meaning from allegories of other things. There was therefore nothing to stop them interpreting the *Metamorphoses* in the same manner. Indeed, the very arbitrariness of Ovid's metamorphoses incited them in this direction, since their allegories, too, were entirely without foundation. In his discussion of Croll in the *Examen Philosophiae Novae*, Libavius highlights this similarity between the nonsensical equation of planets, metals and humours and the irrational aspect of the transformations of the *Metamorphoses*:

> It is amazing that Croll wants the things invisible in man to be manifest in the macrocosm, as if there were a scientific progression from the manifest to the un-

[3]Cf. the letter to Sigismund Schnitzer of Nov. 1st, 1599 in which Libavius complains that "The primary source of Error is opinion born from misunderstanding the Metaphors and allegories of the [ancient] writers. This is the fundament of the whole of Paracelsus" (Hornung 1626, p. 24).

> manifest. Also, why does the sky confront us as visible, and the celestial fires, or the firmament with its stars, as it was founded by God, if one ought also to seek the sky in the underworld, and the lower globe, because all things exist in all things? Further, that Magic and Cabbala is nothing but a Rhetorical and Poetic tropology, born from logical comparisons through random similitudes, in the same way that I can transform God into a man and man into a god, and permute bestial creatures with rational ones, and produce other wonders by a more-than-Ovidian metamorphosis. But this is to play or to weave words, not to show demonstratively.
>
> (1615b, p. 18)

The same point appears in Libavius' criticisms of Johannes Hartmann in this work: "the Paracelsians, scarcely born yesterday, along with Ovid, transform all things into tropes and exceed the boundaries of science" (1615b, p. 235). On at least two other occasions, he compares the supposed action of the macrocosm upon the microcosm to the magical sympathetic operation of the branch of Althaea in Ovid (1615b, p. 284; cf. Libavius 1615a, p. 5).[4] The citation of Ovid in these cases is surely inspired in large part by the actual citation of Ovid by Paracelsians. For example, Joachim Tancke (1557–1609), the target of the first section of the *Examen*, had composed a manuscript entitled *Medea Spagyrica, seu Metamorphoseos Ovidianae pars ea quae artis physio-chemicae arcana continet.*[5] The refutation of Croll's "more-than-Ovidian metamorphosis" may pick up a reference to outdoing Ovid in the Pseudo-Paracelsian treatise *Libellus de Tinctura Physicorum* (1568), which Libavius knew well:

[4]Libavius similarly compares Paracelsus' frequent equation of the astral body – an invisible body that dwells in heavens – with the soul to various theories that treat the soul as either atoms or an element: those of Pythagoras, Democritus, Plato, Heraclitus and Thales, according to Libavius (1615b, p. 42).

[5]This work is unpublished. The manuscript (Hamburg *Cod. Alchim.* 655) was taken from Hamburg during the war, later given to East Berlin, and then apparently lost in the process of its restoration to Hamburg after reunification. A list of its contents is, however, preserved (May 1720, p. 659), from which it appears that it consisted of twelve emblems with explications, passing in order through the alchemical and Ovidian *opus*.

> It is well enough known in Gastein, how to make copper from Saturn, in Kernten, Moon from Mercury, in Hungary, Gold from Moon. I will say nothing of other *transfigurationes rerum naturalium*, which are well enough known, which appear even stranger than the poet Ovid in his entire Metamorphosis.
>
> (PSW xiv, p. 396)

In all of these cases, the basis for the confusion of analogy with physical containment remains the rejection of the visible humours and elements, along with the stability and order they originated, in favour of an invisible chaos at the root of all things. The Paracelsians' "invisible spheres had to be understood to be shut up in the visible, as if in chests and boxes, on the basis of the panspermia of Anaxagoras or the chaos of the Platonist" (Libavius 1615b, p. 17). As Libavius had stated in one of his earliest works, "to be similar is not to be the same, unless you want to blend everything into the ancient chaos again" (Libavius 1595, p. 122). The Ovidianism of the Paracelsians thus derived in the first instance from their Democriteanism.

5.3 Libavius' corpuscularianism

Let us return now to the chapter entitled *Quid Liquor* in the first volume of the *Syntagma*, in which Libavius states that "Paracelsus followed Democritus". It so happens that here we have a rare moment in which Libavius appears to put aside his hatred of Paracelsus and agree with him:

> And the thing itself persuades the Chemists. For they see the same salt dissolved in waters and brought back when these are separated by distillation or evaporation. The separators of gold and silver and those who dissolve bodies with *aqua fortis* experience nothing else...Thus our liquors, with which we must deal in this book, seem [*videntur*] to be nothing but a humour in earth that has been

> rarified by an ingress and coexistence of water or air, in which the earth is not transmuted, but occulted.
>
> (1611a, p. 103)

This agreement is not all it seems, however. In the next sentence, without warning, Libavius shifts into calling this occultation a transmutation: "Others will perhaps make a rarefaction from this transmutation, and a condensation from its reduction. But about these consult the first chapters of Book 1 of *De Generatione.*" In other words, Libavius is still intent on distinguishing his model of change, along Aristotelian lines, from the Democritean one. The emphasis in the previous sentence must indeed be on "seem": the earth "seems" to be merely rarified, but in fact it has still been transmuted. Libavius immediately continues:

> We do not here accept the word transmutation so precisely and strictly as the physicists when they dispute about the elements. Perhaps we should posit eternal principles for eternal things, as in Book 3 of De Caelo, text 61 [306a10-13], sensible principles for sensible things, and corruptible principles for corruptible things and have principles be exactly the same kind of thing as what they underlie. We too follow this idea in this magistry, and for the sake of teaching [*doctrinae gratia*] posit as transmuted what has emerged from the corruption of something prior, which no longer exists to the sense, whether you wish to call this congregation, segregation, rarefaction, condensation, etc. As for what concerns the argument of reduction [i.e. that salt can be obtained from brine], the Aristotelian will easily reply [to the charge that it is merely condensation], since the elements are transmutable into each other.
>
> (1611a, p. 103)

The quotation from the *De Caelo* concerns Aristotle's critique of Plato's geometrical atomism in the *Timaeus*: Aristotle disputes the construction of sensible elements from incorporeal planes. Libavius' point seems to be that whether or not one treats rarefaction as a transmutation, one must not stray into the error of postulating principles, such as those

of Paracelsus, which do not undergo transmutation at all. What matters is the empirical behaviour of substances: since these are transmutable to the sense, one ought also to posit a transmutation at the level of their principles. The claim is thus not merely that rarefaction is called a transmutation "for the sake of teaching", as if we were meant to separate the empirical transmutation from a real continuity at the level of principles. Rather, precisely because the substance is empirically altered, the rarefaction should also be interpreted as a transmutation at the most basic level.

Despite emphasising the reality of transmutation, Libavius clearly accords the corpuscular analysis some heuristic value here. Indeed, he frequently adopted a corpuscular approach to the analysis of mixtures and chemical reactions (Newman 2006, pp. 72-3). Libavius even sometimes complained that the Paracelsians had wrongly interpreted certain merely accidental alterations as transmutations. In his discussion of the "gradation" of metals in the *Alchemia*, for example, he emphasises that gradation involves only a change of quality or quantity. It can bring these qualities "from the occult into the manifest", but only "with the former species in no way changed". The Paracelsians wanted gradation to have "by itself a force of changing the substance" but in this instance they were "liars and imposters" (1597, p. 77). Given Libavius' apparent admission that the formation of a liquor is simply a matter of rarefaction, then one might detect a similar imposture in Libavius insistence on the substantiality of the transmutations performed by the alchemists. Riolan (1606, p. 113) did precisely that, using against Libavius the same arguments about the impossibility of transmutation within a corpuscular framework that Libavius had employed against the Paracelsians (Moran 2007a, pp. 182-3, Riolan 1606, pp. 16-17, 134-5).[6] One opponent even devoted a tract to the claim that Libavius had experienced a "transmutation" himself into a Paracelsian" (Paulmier 1608, p. 10). "But what is that Metamorphosis of Libavius?",

[6]Libavius' encounter with Riolan begins with the latter's polemic against Duchesne: Riolan (1603). Libavius replied in the *Commentariorum Alchymiae pars prima* (1606), provoking Riolan's *Ad Libavii maniam* (Riolan 1606), which Libavius then systematically refuted in his *Alchymia triumphans* (Libavius 1607).

Libavius wondered. "Has he who attacked the Paracelsians now crept into their camps?" (1613, sig. a3v).

The main grounds for the association of Libavius with Paracelsus, other than his commitment to alchemy, appears to have been his claim that something analogous to the Paracelsian principles of salt, sulphur and mercury could be found in all mixed bodies (Libavius 1607, p. 21). There was therefore an analogy between metallic and organic substances (both contain versions of these principles) which could justify the use of the chemical medicines. Libavius differed from the Paracelsians, however, in claiming salt, sulphur and mercury as principles in an empirical, rather than a metaphysical sense. He refutes Riolan's condemnation of them by quoting the same passage from the *De Caelo* quoted in the chapter on liquors (Libavius 1606, p. 46; cf. Libavius 1607, pp. 155, 713). Whereas for the Paracelsians the principles were incorporeal and shut up inside all mixed bodies along with their seminal reasons, for Libavius they were determinate physical substances, composed of the elements, not prior to them (Klein 2014). Just as the fact that the principles were built of elements did not invalidate their substantiality and individuality, the fact that the metals or humours were built of the principles, or something like them, did not invalidate theirs. The task of the chemist was to investigate the precise composition of things and thus, in a certain sense, to reveal their seeds. But to do so was not to reduce all bodies to an identical chaos, it was precisely to isolate particular species:

> If seeds are in elements, they are not in them as in places [as the Paracelsians said], but as a seed of a tree is in its tree, of a man in a man, of a dog in a dog...If you say: but that virtue is a seminal reason in the Elements which exist in the form of a dissolved liquor or, if they are solid, of a coagulate, then I order you to think that what are designated [by you] innate heat, primitive moisture and vital spirit [i.e. incorporeal seminal forces] are rather essences: and that these are implicated together with the arrangements of the elements in such a way that

> from this seed a substance arises, which grows when nourished by what is similar to it.
>
> (Libavius 1615b, p. 141)

There was certainly a way in which Libavius' emphasis on the discovery of essences by chemical separation and analysis was anti-Aristotelian. It opposed itself to a kind of school learning which treated nature in the abstract, rather than as it was encountered. Riolan had pointed out that the true principles of things, according to Aristotle, were matter, form and privation, which "do not appear to the sense but are known by reason" (1603, p. 63). Libavius mocks these as "figments", "fables" and "playthings of the poets" (1606, p. 54). Clarifying his position later he wrote that "Chemists do not deny these logical causes and privative contraries. But when we are talking about corporeal nature and drawing up a physical science, they see that we should not follow our figments, but posit what sense along with reason and experience demonstrate about the nature of bodies" (1607, p. 715). Libavius had already expressed the difference between his own brand of chemical Aristotelianism and this abstract philosophising in his three books of chemical discussions in epistolary form the *Rerum Chymicarum epistolica forma libri* (1595–1599), a chatty companion piece to the first *Alchemia*:

> Many dispute about the vacuum, the infinite, motion, the eternity of the world and the rest. Where so anxiously they have unfolded each subject they have made no more progress in the specific nature [*singularitate*] of things themselves than perhaps anyone of moderate erudition. The chemist has investigated sympathies and antipathies, causes and effects and the rest in specific natures and so does not know indeterminately and vaguely, but definitely and certainly
>
> (1595–9, vol. 1, bk. 1, p. 39)

Libavius begins to sound very much like Bacon here, as we shall see. In the preface to the letters, he employed a metaphor of which Bacon was very fond, arguing that chemistry "should be brought back almost to its ABCs" (1595–9, vol. 1, bk. 1, *Praef.* p. 4). But

in contrast to Bacon, he explicitly called for a return to the method of Aristotle's *Posterior Analytics*, in which empirical investigation would allow things to be known *per causam*, that is, in their essence. The ultimate aim of chemistry would be the categorisation of the essences discovered according to genus and species (Libavius 1595, pp. 116-124, Moran 2006). Libavius' general orientation is thus conservative, traditional and Aristotelian, even as he adopts a corpuscularian perspective. In two of his responses to Riolan, Libavius produced defences of his own "Democriteanism" that clearly subordinate the Democritean perspective to the Aristotelian. In the *Commentariorum Achymiae pars prima* he says that Democritus did not claim that all things were in all things, but simply that when one thing becomes another, the seeds of the subsequent state must have existed invisibly in the former substance. Had he lived after Aristotle, Libavius argues, Democritus would not have denied that the transition from invisibility to visibility was a passage from potency to act (1606, pp. 3-4). Thus he calls Democriteanism a "symbolical philosophy" (1606, p. 3): the atom functions as a symbol of the simple essence, or seed, which is irreducible in terms of its substantiality although materially it is composed of other elements. As he put it in his *Alchymia triumphans*, Aristotle teaches that new substances do not arise from agglutination alone, but through a substantial change in the mixture: but "what if Democritus should say that his atoms were first mixed by God, and did not lack concretion thence, right from the egg, although they can coalesce with the elements in more robust and coarse bodies?"[7] Thus, when the chemist breaks apart one substance he or she will see not formless corpuscles, but further substances, even if these can endure analysis in turn.

If in *De Transmutatis variis* Libavius had rooted the origin of the alchemical allegoresis of the *Metamorphoses* in a Democriteanism that foreclosed the possibility of a genuine substance and thus of transmutation, Libavius' adherence to his own modified, symbolical Democriteanism drew him into a similar form of Ovidianism. There is one chemical process in particular that Libavius repeatedly explains in terms of Ovidian myths. That is precisely

[7]See also the passages from the *De Mundi Corporumque Mixtorum Elementis* (Libavius 1608) cited by Newman (2006, p. 75).

the generation of a *liquor*: the process of "*solutio* or διάκρισις, which dissolves the continuity and structure of bodies" (1597, p. 29) and is frequently effected together with its opposite, "coagulation". Libavius focusses in particular on the kind of *solutio* called *diliquium*, defined in the *Alchemia* as "the liquefaction of a concrete substance which occurs when external humidity insinuates itself and resolves it so that it flows away", as occurs, for instance when salts are exposed to the air (1597, p. 31). Libavius' reliance on Ovid for his descriptions of these processes results from their exemplary function in the debate over Democriteanism. The equation of *solutio* with διάκρισις is significant, for as Newman has shown, Libavius seeks in the latter term his reconciliation of Aristotle with Democritus: while Aristotle rejects Democritus because his substances arise from mere σύγκρισις (*concretio*) and διάκρισις (*segregatio*), Libavius points out that Aristotle himself uses these terms to describe certain transmutations in the *Meteorology.* Foremost among these, in fact, are the processes of solution and coagulation, as, for example, the evaporation of brine to produce salt (Libavius 1606, p. 3, Newman 2006, p. 310). In the systematic schema of the *Alchemia*, *deliquium* is classed as a "transmutation", though Libavius notes even there that "sometimes the whole coagulate deliquesces; sometimes what in it is soluble, in its humour: and then this operation serves as a kind of abstraction or separation" (1597, p. 31).

These tensions are developed in the *Rerum Chymicarum libri* in a series of three letters addressed to the famous Nuremberg physician Joachim Camerarius (1534–1598) that take up precisely the question of Democriteanism. It is in these letters that Libavius first proclaims that he detects "a certain shadow about the philosophical solution" in Ovid's tales of deliquescence, naming, in the first letter, the tales of Arethusa (*Met.* 5.572–641) and Hyrie (*Met.* 7.380–381). "Let us imagine that Alpheus is water that we have made warm, or the cold and humid air of underground caverns". This "loves" and desires to be joined with crystals of salt or alum, but these crystals "flow away as a liquor and cannot be stopped by the pursuing vapour" (1595–9, vol. 1, bk. 2, pp. 24-5). The next letter is entitled "On the harmony of solution with the physical transmutation of the elements" and begins

by claiming that Aristotle's description of the transmutation of the elements can explain *deliquium*, but ends with a series of considerations both for and against the corpuscularian analysis of such transmutations (1595–9, vol. 1, bk. 2, pp. 37-38). After a letter on the role of solution in the preparation of the philosophers' stone, we return to the question of Democritus with a letter "on coagulation", which begins by noting Aristotle's ambivalence towards σύγκρισις and διάκρισις, suggesting that "with the philosopher himself as judge, the Democritean opinion would not be absurd" (1595–9, vol. 1, bk. 2, p. 41). The possibility that true generation might occur through mere concretion or rarefaction is then confirmed by appeal to Ovid:

> Ovid, who appears not to have invented his metamorphoses, but to have set forth in verse those he received, records that Acis departed into a river, which is that philosophical διάκρισις: that from that water reeds arose by coagulation, which is that Democritean σύστασις καὶ σύγκρασις. The verses contain a certain delineation of the work, or διαγραφή of how it happens by art; they read thus:
>
> > "Scarlet blood flowed from the rock and
> > In a short time the ruddiness began to disappear"
>
> (Put to yourself perhaps the putrefaction of Chelidonium or Symphytum, or of bread and wine, which is preceded by the grinding of the herbs by a stone; when first a ruddy sap emerges from the crushed Acis, then little by little vanishes)
>
> > "It becomes the colour of a river stirred by the first rain
> > And the rock is cleaned"
>
> (He advises that you sprinkle on salt, by which the secretions are better expurgated)
>
> > "Then the whole rock splits
> > And through the cracks rises a tall and living reed"

(Think that the vessel in which the putrefaction is accomplished is opened up and vapours are lured out into the alembic placed over it, which coagulate into an essence, etc. For he adds)

"And a hollow mouth in the rock sounds with the leaping waters"

That coagulation is represented somewhat more closely by the tears of Myrrha and of the Phaethontiades. Likewise for the spring of the Cicones turning what is immersed in it into stone, the generation of coral, the transmutation of the blood of the Medusa into serpents, the concretion of fungi, from which men arose, and similar things.[8] But that most ingenious Poet repeats the transmutation of the elements in almost Democritean words:

"Although they are separated in space, however, they all
Arise from each other and fall back into each other; and earth resolved
[in margin: *vox solutionis*]
Rarifies into liquid waters: attenuated the humour departs
Into breezes and air, and losing also its weight, again
The finest air shines out in heavenly fires;
Then they return in reverse; and the same order is rewoven. [in margin: *coagulatio*]"

(1595–9, vol. 1, bk. 2, pp. 42-4)

[8]In a letter to Hieronymus Vischer Libavius adds the myth of the metamorphosis of the gods during the rebellion of Typhon (*Met.* 5.299-331): "A chemist *descends* when he dissolves something liquefiable, now dry in act and contained in something else, and he melts it by applying heat to the dry; when this is done it withdraws itself and in a certain way slips into something else and escapes its bedchamber. Ovid seems to have represented this business with the fiction of the woman melting headlong, not insofar as she liquefies entirely, for that would be resolution, but insofar as she flows away. Another fable about Arethusa withdrawing herself from the embraces of Alphaeus and immersing herself in the earth, whence she again breaks forth and sees the light in Sicily, is also fitting. What if the fiction of the gods creeping around on earth for fear of the giants should allude to the same?" (1595–9, vol. 1, bk. 1, p. 225). On one occasion, in a letter to the Nuremberg physician Johann Cuno (1557-1610), Libavius draws on Ovid for the inverse operation of sublimation, quoting the metamorphosis of Caesar into a comet to describe the sublimation and coagulation of a spirit (1595–9, vol. 1, bk. 2, p. 158).

Libavius points out in this letter, and in his defences of Democritus elsewhere, that Aristotle uses terms related to separation and coagulation to describe the generation not only of mineral compounds, but even of living beings. Another Aristotelian example frequently cited is the process of lixiviation – the burning of organic matter, followed by the *deliquium* of the ashes, and then evaporation to produce a salt – which suggests the occultation of salts in living beings (*Meteor.* 359b1-4). Returning now to the *De liquoribus* in the first volume of the *Syntagma*, we find in the second chapter, entitled *De materia liquorum*, a resurgence of the same mythology. The reason, of course, is that here too Libavius had begun by expressing support for the Democritean perspective. The emphasis now, however, is on precisely the fact that Ovid describes transitions from the animal or vegetable kingdoms into the mineral:

> Liquors come especially from minerals, brought to their purity and prepared so that they can flow away. Those which are taken from animals and vegetables have either acquired a mineral nature by themselves or must be led into a mineral nature. In the Ovidian metamorphosis people are transformed and melt, as Acis in Book 13, Biblis in Book 9, Hyrie in Book 7, where she melts and makes a lake with her name; and in Book 6 Niobe melts and even now tears flow form the marble; Arethusa in Book 5 is changed into water; And the breast of evanescent Cyane passes into narrow streams. These are thought to have been translated into fables from the Chymical mysteries.
>
> (1611a, p. 104)

The Democritean perspective in this instance thus does to a certain extent undermine the traditional boundaries between the kingdoms. The University's resistance to chemical medicine was based partly on the principle that only organic matter could have a positive effect on organic bodies. Libavius himself used an analogous principle to insist, against the Paracelsians, that a medicine for metallic transmutation had to be made of matter extracted from metals (1599, p. 59). But if a chemist could combine organic and mineral matter to create an effective medicine then such distinctions would lose at least some of their force.

In a certain way, the animal was indeed in the mineral and vice-versa, as the Paracelsians had claimed. Libavius even once summoned Ovid's chaos to his aid in order to suggest the notion of a prime matter that is common to all forms without being completely abstract or possessing them in act. Proteus, Morpheus and Trithemius are never perceived without some shape, he tells us (1615b, p. 109). Ovid's chaos is at once primal and nonetheless has some minimal form, a "face" (*unus vultus*, 1615b, p. 111). Libavius thus uses Ovid to suggest the presence of a material continuity underlying apparent variation, which is, however, never beneath the level of Aristotelian substance itself.

The insistence on this thin veil of substance, corresponding to the *personae* in Ovid's myths of deliquescence, allows Libavius in theory to distinguish his Ovidianism from that of the Paracelsians. The principles of different substances must be investigated separately before their common matter is determined. They cannot be reduced to this matter. There is no general equation of the macrocosm with the microcosm. Yet by allegorising the *Metamorphoses* in terms of processes of transformation rather than specific substances no particular claims are made about what substances Democritean analysis does in fact reveal. Acis is a placeholder for whatever we putrefy; we "imagine" that Alpheus is heated water when presumably he could be many other things. Thus, in these examples, Ovid seems to stand purely for the heuristic value of Democritean analysis. Libavius elsewhere wrote that when investigating causes, the alchemist "does not yet know, but tends towards knowledge" (1615c, p. 36). But without comparing specific doctrinal content about the composition of different substances – without that *singularitas* of knowledge which marks out the chemist – it would be impossible to differentiate Libavius from the Paracelsians at all. Supplying such content was what the *Alchemia* was all about. It was therefore only by giving more precise interpretations of the poem that Libavius felt he could make his Aristotelian intentions clear. We shall examine these more literalistic readings of Ovid in the next section. It turns out that Libavius' acceptance of Ovid did much more than risk confusion with the Paracelsians:

it committed him fully to mistaken empirical claims about the nature of bodies, whether considered from the perspective of his anti-alchemical contemporaries or modern science.

5.4 Libavius' Ovidianism

Libavius' commitment to Aristotelianism against the pretensions of Paracelsus to discard classical authorities reflects his belief that the exegesis of ancient texts was just as valuable a way of uncovering empirical experiences as the investigation of nature herself (Moran 2014): "it belongs to a true philosopher not only to investigate abstruse and unknown things, but also to discuss what has been discovered and investigated and teach it to others" (Libavius 1615c, p. 36). As we have seen, he objected to the Paracelsian allegories of Ovid as the result of a failure to discern the literal meaning of the alchemical sources. Whereas the Paracelsians spun out similitudes with no foundation, the ancient chemists had employed allegorical language, but also clearly indicated its meaning. "Not all things are fictional in them, not all things tropical", he told the Paracelsian Joseph Michael. "The author of the *Greater Rosary* says they do not mix in allegories and Calid says that he will hide nothing unless (obviously) it is not appropriate to say it...Geber at the beginning of the *Summa Perfectionis* writes that he has made manifest in that book what is hidden in other parts" (Libavius 1599, p. 12). Libavius in fact encouraged the use of traditional images and metaphors when their use was "constant and proven, whether they come from Egyptian hieroglyphs, astrology, or from magical or cabbalistic sources" (Moran 2007b, p. 16). Although Libavius never explicitly denies that the *Metamorphoses* has such a constant and proven meaning, he goes on to explain to Michael that it is to be sought above all in texts which are explicitly alchemical:

> The prodigious pronouncements that Michael attributes to the Chemists and all the things full not only of hieroglyphical letters, but even fables and enigmas, are like an empty dream. There was at my house not long ago someone who wanted

> to persuade me that I should not read the books which manifestly display and promise the art, but those which do not even mention it in the slightest word, such as the letters of Seneca to Lucilius, the Song of Salomon, the oracles of the Prophets, etc., and that because nothing was taught in these, all sure things would be found. When I asked him why he thought that by speaking in one way the authors had taught something different – and even the stone – he had nothing beyond empty conjecture [*vana coniectio*]. Likewise, he dared to say that whatever particular words seemed to fit was the matter of the stone [*audebat item dicere, cui rei convenire viderentur dicta praecipua, eam esse lapidis materiam*]. But I condemned the stupidity of the man. For the documents of the art are to be sought amongst the artificers.
>
> (1599, pp. 12-13)

The *Metamorphoses* would thus seem to be excluded. And yet curiously it was not: Libavius believed there were sufficient grounds for concluding that Ovid was just such an artificer. This, then, was the direction in which the great reformer of chemistry was ultimately moving: alchemy could be reformed by disregarding the fanciful allegorical interpretations of the *Metamorphoses* in terms of astrology and medicine and taking it at face value for what it was, a sourcebook in chemistry. As Libavius explained again in his criticisms of the allegories of the Rosicrucians, even Ovid had put aside fiction and tropes in order to declare his alchemical intent:

> There is always an explanation of the essence of the matter [*essentialis expositio*] either added or made clear to pupils initiated in the schools. If you go through the whole Bible, you often notice the Old Testament has types, shadows, and images. There are many parables in the New too. But just as often are added the explanations [*declarationes*] of the Evangelists, and in the New Testament at last all types cease, with certain prophecies in the Apocalypse excepted. What the Egyptians had in their mysteries and removed from the people, Hermes and

> others offered in plain doctrine, nor were they so jealous as not to communicate with Herodotus, Plato and other Greeks. The whole Metamorphosis of Ovid is parabolical, declaring [*declarans*] histories, nature, artifices. But who would deny that the essence even of this is made clear [*eandem etiam declaratam fuisse essentialiter*], just as Aesop explained his fables with morals?
>
> (1615b, pp. 284-5)

It was not easy to put such a literal construction upon the ancient alchemists. Wherever they appeared to approach Paracelsus (very often, in the case of Arnald and Lull), it was necessary to twist their meaning. Rather unpersuasively, Libavius dismissed Arnald's claims for the universal medicinal properties of the stone as "ironic hyperbole" (1599, p. 147). But it is even more surprising that Libavius felt able to make similar claims for Ovid. Against Guibert, Libavius defends the alchemical interpretations of the golden fleece and the apples of Hesperides on the basis of "convenience" (*convenientia*): faced with a variety of interpretations of the fables ("natural, moral, divine and even domestic"), one must decide which interpretation accounts for the greatest number of features in the myth (*propius respondit magisque convenit*), which must then be accepted as "more probable" (*probabilior*). It so happens that a great many traditional alchemical images (gold, dragons, art, trees, gods, labour, fire, herbs, bulls, teeth, etc.) appear together in these fables, so the conjecture of alchemical meaning is, in this instance, "not empty" (*non vane coniecit*, 1615a, pp. 212-3) . And yet one cannot help feeling that in attributing an essential declaration of alchemical meaning to the *Metamorphoses*, Libavius has fallen foul of his own strictures. Mere empirical "convenience" is shaky ground for such an interpretation, just as Libavius had told Joseph Michael. Indeed, Libavius continued in his tract against the Rosicrucians to criticise the reliance upon *convenientia* once more, counterposing the Aristotelian method of demonstration to the inference from equivocal similitudes:

> The argument from concordance fails and something discordant is taken for concordant, and a fictive principle for a true one. How much more correctly do the

> Peripatetics investigate first and unmoved causes, and then construct essential definitions, causal ones and others that are necessary, and likewise demonstrate properties and weave conclusions from a necessary consequence. If something is definitively concluded, this does not happen by way of similitude, but by the force of other causes.
>
> (1615b, pp. 284-5)

As Libavius knew well, Aristotle had asserted that the first causes of *a posteriori* reasoning derive from empirical experience, so that the difference between the Paracelsian and Aristotelian approaches boils down to the consistency of the supporting network of observations ("the force of other causes"). In practice, however, Libavius lacked the conclusive evidence he claimed both for his interpretations of the *Metamorphoses* and many of his interpretation of nature. Whatever their motivations, Riolan, Guibert and the rest were quite correct to dismiss the claims of the alchemists to be able to transmute perfect species. The metallic principles which Libavius regarded as empirically confirmed were in fact just as fictive as the Paracelsian ones. Thus, Libavius appeared to his opponents to succumb to the same confusion of science and fiction that he criticised in others. Riolan dismissed Libavius' arguments for the possibility of transmutation by referring the reader to the impossibility of demonic metamorphosis: "the Metaphysical question discussed by us in our work on the buried causes of nature is pertinent here: if a metamorphosis of completed beings is possible: if by the magic force of words, if demons themselves can permute Apuleius into an ass, Io into a cow, Hecuba into a dog; or whether this is a figment of the imagination, as the Medics say about lycanthropes" (1606, p. 44). Guibert argued similarly that any such transmutation would have to be supernatural: "Ovid himself and innumerable others introduce gods as the transformers of the substances of things" (1614, p. 18).[9] Libavius picked up on this point in his refutation of Guibert, but he did not disown the equation of alchemy with Ovid. Instead, he argued that Ovid's metamorphoses were in fact natural:

[9]Such criticisms draw on Erastus, who had argued that the alchemists "impiously arrogate for themselves the works of divinity" (1572-1573, vol. 2, *Explicatio*, p. 79).

> It is amazing that shame is so lacking in this man that he dares to cite *Ovid* and *Galen* as if he were dealing with men who have not read the writings of either, as if he were dancing about among the servants of cowherds as conductor of the cord [some kind of maypole dance?]. Ovid ascribes transmutations to his gods. What should be said of the head of Medusa? Is this too a god? Circe uses diabolical magic. Are transmutations possible for the devil? What to think of the examples of the XVth Book of the *Metamorphoses*? Bees from the corpse of a bull: a warhorse buried in the ground is the origin of the wasp, etc. See under the scorpion from the crab, the silkworms changed into butterflies, the frogs from mud, the snake from the spine-marrow of a man, etc. Galen denies with Pliny that God can do anything above nature. The Stoics chain him to destiny. Behold the famous testimonies![10]
>
> (1615a, p. 195)

Libavius often appeals to Ovid for specific examples of transformations he considers to be empirically verified: for example, spontaneous generation, the effects of mineral waters and the formation of amber (respectively, 1599–1601, vol. 4, pp. 198-200, 296; 1597, p. 363; 1599–1601, vol. 1, p. 208; 1599–1601, vol. 3, pp. 420, 423). In an essay entitled *Metamorphoses sanguineae*, he suggests that Ovid's own description of the poisoning of Hercules provides a naturalistic interpretation of Pythagorean metempsychoses, namely, as the metamorphoses brought about through infections of the blood (Shackelford 2004, pp. 185-194):

> God forbade the use of the blood of beasts, especially of the warm and still living animal, lest the Jews put on bestial characters and habits. What if the Pythagorean metamorphosis also regards this? The shirt of Hercules polluted with the blood of the centaur Nessus thrust Hercules into madness. Nothing else

[10]Matton (1996, p. 39) cites this passage as an example of the supposed hostility of alchemists towards Stoicism, when in fact it is a criticism of a *denial* of Stoic ideas. It rather supports the view that Stoicism was indeed an important resource.

> is to be expected from leprous blood than leprosy, nothing from the blood of a rabid dog but rabies."[11]
>
> (1599–1601, vol. 2, p. 175)

Though Libavius grazes the truth with regard to leprosy (which unlike rabies can indeed be transmitted through the blood), the essay is mainly devoted to the spurious claim that by drinking the blood of different animals, the complexion of humans can be so altered as to acquire their characteristics (*mores*). Thus, most of the metamorphoses Libavius takes from Ovid are just as fictional as Riolan and Guibert suggest, although they are given a naturalistic explanation. Even the metamorphosis of the silkworm, Guibert had correctly argued, was an unfolding of something already present (Libavius 1615d, pp. 148). Libavius himself was one of the first to observe the presence of the future moth enfolded within the grub, anticipating the discoveries of the famous microscopist Jan Swammerdam (1637–1780), who definitively disproved the notion that insect metamorphosis involved a wholesale transformation. Swammerdam cited Libavius as one of only two predecessors (the other being the Italian physician Marcello Malpighi, 1626–1694) who had "excluded metamorphosis from the genuine course of mutations which the silkworms undergo" (Swammerdam 1738, p. 554). Yet the metamorphosis of the silkworm is one of Libavius' favourite pieces of evidence in favour of conceiving metallic transmutation as an Aristotelian generation (Libavius 1607, p.

[11]The German polymath Athanasius Kircher has a similar though less sympathetic interpretation of the origin of the metempsychosis myth: antediluvian peoples "stupidly thought that by drinking human blood they would attract a soul into themselves through metempsychosis" (1675, p. 175). Histories of blood transfusion invariably record that in the *Appendix Necessaria Syntagmatis*, Libavius made a pioneering suggestion about how to restore youth through transfusion of blood, though in fact Libavius is quoting the words of another and joking about the fate of the victim who supplies the blood (1615a, p. 8). But in the present work on the metamorphoses of blood he cautions that "the renovation [of Aeson] of Medea is fictional" (1599–1601, vol. 2, p. 177). Conversely, John Aubrey (1626–1697) records that the author of the first (possibly) successful transfusion, Francis Potter (1594–1678) told him that "the hint" for his technique "came into his head reflecting on Ovid's story of Medea and Jason" (Aubrey 1898, p. 166). Anton-Francesco Bertini wrote that the doctors "had known how to transmute by an amazing metamorphosis the fabulous inventions of Ovid into a true discovery." (1699, p. 249). The tale was also used as a means to mock the extravagant claims of the transfusers (the fate of Pelias not forgotten): see, for example, the satirical poem "On Agnus Coga, his Povertie" contained in Egerton MS 2982 at the British Library. In his *Tractatus de corde*, Richard Lower (1631–1691), who had developed the technique further, complained that because of the difficulty of the work it had been dismissed as "an obsolete fable of Pythagoras and another rather vain metempsychosis" (1669, p. 182).

260). Libavius illustrated his observations on the silkworm with Ovid's lines on the butterfly (1599–1601, vol. 2, p. 403) so that, again, the quotation of Ovid was associated with a transmutation that analysis ought to have ruled out.

Similarly, although Libavius adopts his myths of deliquescence from Ovid because of his Democritean analysis of the metamorphosis, they are not purely heuristic in the way that, as an abstract philosophy, Democriteanism itself might be. If, in the letter to Camerarius, Acis appears as a placeholder for any kind of substance, Libavius elsewhere presents a much more precise interpretation of the myth – an *essentialis expositio* of his own. The passage in question occurs in the *Apocolypseos Hermeticae pars posterior* from the second volume of the *Syntagma*, a work which attempts to provide precise literal interpretations of various sources on alchemy. Here, Libavius equates all of Ovid's deliquescing figures with one specific substance, philosophical Mercury:

> In Ovid [this mercury] is Acis struck by a rock of Polyphemus and changed into a river. It is Egeria who is liquified into her tears and a spring. It is also exhibited here that Arethusa is mutated into a spring, and the same of Byblis and Cyane. Nay, Proteus and Vertumnus are converted into rivers. The conversion [that produces this substance] happens through a descensory distillation through tartar and brick dust [*farina*], which is the secret of secrets.
>
> (1613, p. 354)

This reference to the distillation of mercury through tartar and brick dust, offered in the context of an exposition of the literal meaning of a text attributed to the Flemish alchemist Anselm de Boodt (1550–1632), concerns not the process of distillation in general, but a specific process which Libavius regarded as the most important stage in the manufacture of the purified mercury. Libavius also refers to Ovid's tales of Hyacinthus and Ajax in this work to explain the Lullian term *hyacinthus*. The origin of the flowers in blood, related by Ovid, explains why pseudo-Lull used the word to designate the red stone (1613, p. 350). One is hard pressed to excuse Libavius' turn to myth on such occasions as a heuristic device. The

manufacture of gold from purified Mercury is itself a mythical transformation, but one that Libavius takes to be essentially and literally true. Ovid is thus adopted as a proponent not simply of a Democritean perspective, but also of particular discoveries that alchemists have made, in terms of substances and essences. However, the very concerns which drove Libavius to criticise the free-ranging similitudes of the Paracelsians are what drove him into these conflations of appearance and substance. Just as Democriteanism unmoderated by Aristotle would end in Paracelsian fantasies, the adoption of the *Metamorphoses* as a source of heuristic fiction was, he decided, insufficiently determinate. While Ovid's Democriteanism did suggest that his work could aid the chemist in finding the substances beneath appearances, the poem could not be read as licensing the reduction of all appearances to an identical chaos, as the Paracelsians believed, without undermining the notion of substance itself. If alchemical symbols could not be referred to specific substances and processes, then alchemy itself would appear as a purely symbolic activity. It was more scientific, therefore, to treat the poem as a body of natural philosophical learning.

5.5 Francis Bacon and the alphabet of nature

In contrast to Libavius, Bacon's writing is distinguished by an insistent hostility to the "webbes of Learning" obscuring the study of nature (OFB iv, p. 24). His exhortations "to utterly abolish the Theories and common Notions and to apply anew a scoured and equal intellect to the particulars" (OFB xi, p. 154) earned him the adulation of the early members of the Royal Society and the praise of Gassendi, Descartes and Mersenne. The tradition of Aristotelian philosophy was one of Bacon's prime targets in this regard: thus, Democriteanism, for Bacon, is not a form of analytical Aristotelianism, but rather precisely a means of penetrating beneath the accumulated fictions of the schoolmen:[12]

[12]It is the Renaissance tradition of Aristotelianism rather than Aristotle himself who forms Bacon's primary target (Pérez-Ramos 1988, pp. 239-269). Paradoxically, one of the charges Bacon does lay against Aristotle is that he proceeded "in a spirit of indifference and contradiction to all Antiquity...undertaking to confound and extinguish all antient Wisdom": Bacon is probably thinking primarily of Aristotle's refutation of atomism.

> The human intellect is carried towards abstractions because of its own nature and it fixes as constant what is fluctuating. But it is better to cut Nature than to abstract it; the school of Democritus did this, which penetrated more into Nature than the rest. Rather [than Forms], Matter should be considered, and its schematisms and meta-schematisms, and pure Acts and law of Act or Motion. For Forms are Fictions [*Commenta*] of the human mind, unless you wish to call laws of Act Forms.
>
> (OFB xi, p. 88)

Bacon's praise of atomism is closely connected to the project, first described in the *Valerius Terminus of the Interpretation of Nature* (by 1603?), of breaking the multiplicity of visible forms down into their constituent "abstract natures, which are few and permanent...as the alphabet or simple letters, whereof the variety of things consisteth" (SEH iii, p. 243). The Lucretianism of this metaphor is sometimes remarked upon (e.g. Schuler 1992, p. 36 and Passanante 2011, pp. 142-144). Indeed, it seems significant that the second instance of the alphabet metaphor occurs in the tract in which Bacon engages substantially with atomist ideas for the first time, the *Cogitationes de Natura Rerum* (before 1605?), which begins: "the doctrine of Democritus about atoms is either true or is usefully applied to demonstration" (SEH iii, p. 15). In the *Novum Organum* (1620), he makes it clear that the primary natures, which "are disposed to Things and Works just as the letters of the Alphabet are disposed to Speech and words" will only be found by "the sort of Experiments much more subtle and fundamental [*simplicius*] than those that we bump into" (OFB xi, p. 40). Later, he draws an analogy between three things: "simple natures", glossed as the *semina rerum* that cause natural processes, the letters of the alphabet which make up words and are "like prime matter", and individual rays of light that unite to provide illumination (OFB xi, p. 180).

The emphasis on the subtlety of the primary natures is enough to consolidate their connection to Democritus. But the *semina rerum* to which the primary natures are compared are certainly not the mechanical atoms with which we are familiar. Bacon states this ex-

plicitly in the *Novum Organum*: "matters are not thus drawn down to the Atom, which presupposes the vacuum and non-fluid [*non fluxam*] material (both of which are false), but to true particles, such as are discovered". The simplicity of the primary natures stands in direct opposition to the atom, in part because, unlike the atom, these natures can be revealed. Bacon continues: "the more the Investigation inclines to simple natures, the more all things will be placed in the open for all to see" (OFB xi, p. 212). The first two invocations of the alphabet analogy in *Novum Organum* (OFB xi, p. 38-40, 180) in fact occur in a context where the point is precisely that letters are "useless by themselves". We are only really interested in the words that they make up. Bacon elsewhere tells us that the school of Democritus which considers the "particles" of things and "the other philosophers" who consider their "fabrics...should be alternated and adopted by turns" (OFB xi, p. 90).

Bacon's notion of the alphabet of nature is thus much less Lucretian than often assumed. In fact, it would be only marginally less accurate to associate Bacon's alphabet with the Cabbalistic use of letters as hieroglyphs channeling divine powers, adopted in Lullian metaphysical combinatorics; or with Paracelsian signatures, which Heinrich Kuhnrath (1560–1605) hailed as "the Physico-Medical alphabet in the book of nature" (1609, p. 152). The "simple natures" which Bacon likens to letters are, in the *Cogitationes*, "the natures and origins of simple motions", in *The Advancement*, "laws of Act", and in the *Novum Organum* "the primary passions and desires" of matter. Bacon gives as typical examples of simple natures things like 'dense', 'rare', 'hot', 'cold', 'heavy', 'light', 'tangible', 'pneumatic', 'volatile', 'fixed'; these are presently "all fantastical and badly defined" (OFB xi, p. 68). In other words, like Libavius, Bacon still regarded Democriteanism as a "symbolical" philosophy.[13] He articulated a theory of matter in which an abstracting, idealising thrust – symbolised by a fondness for atomism – is balanced by an anthropomorphising, concretising thrust, meeting, consummating, but also inverting and scuppering the abstracting tendency at every level of abstraction. "Matter" for him still possesses a double meaning: it is in a

[13]Discussions of Bacon's atomism can be found in Gemelli (1996) and Manzo (2001).

certain way the impersonal and inhuman substance of the natural world, which can only be arrived at by stripping away the idols of the human mind, but it is also, in another way, precisely what matters most to ordinary human life, and thus what is most human, most personal and subjective about the objective world. For Bacon, neither aspect of matter can function entirely without the other. The more relevant, pertinent, that is, *material* to human life things become, the more we find that we have covered up matter as it is in itself. Conversely, the more layers of humanity we strip off, the closer we get to matter itself, but the less and less material, the more abstract, matter gets.

One of the ways Bacon articulated this tension was precisely through his ongoing relation to the classical tradition. There is a not unintuited irony in the championing of classical atomism as the means of sweeping away the false notions of the ancients. But the conflict is played out most dramatically in Bacon's engagements with classical mythology. The earliest of these are found in a companion piece to the *Cogitationes de Rerum Natura* entitled *Cogitationes de scientia humana* (1605 or earlier), which sketches out interpretations of several classical fables. These interpretations were then reprised and augmented in what became one of Bacon's most popular works, the *De Sapientia Veterum* (1609), in which Bacon set out systematically to explain the meaning of thirty-one ancient fables in terms natural, political and moral. Two of the natural fables from the *De Sapientia* – "Coelum, or origins" and "Cupid, or the atom" – were taken up again at much greater length in an unfinished piece entitled *De principiis et originibus secundum fabulas Cupidinis et Coeli* (1612–?). Finally, Bacon's most systematic discussion of how all the branches of human learning should be ordered, *De Augmentis Scientiarum* (1623), reworked fables on Pan ("on the universe"), Perseus ("on war") and Dionysus ("on cupidity") as examples of the three genres (natural, political, moral). Meanwhile, Bacon had incorporated images drawn from mythology throughout his writing, but especially in the *Advancement of Learning* (1605).

In some ways, Bacon was as dismissive of mythology as we should expect him to have been. He explains in the preface to the *De Sapientia* that fables belong to the period of the

"illiteracy" of human culture, when it was incapable of "subtlety", and lacking the analytical skills symbolised by the alphabet: "doubtless, the rude intellects of the men of that time were impatient and incapable of subtlety unless it fell upon their senses. For as hieroglyphics were older than letters, so parables were older than arguments." (SEH vi, p. 628). He had already hinted at this association in the *Cogitationes de Natura Rerum*, drawing a parallel with men of his own time: "as it were, illiterate with regards to the voice of nature and, in the manner of the ancient age (before the invention of letters), they discern composed sounds and voices only, and do not distinguish the letters and elements" (SEH iii, p. 22). In the *De Augmentis*, fables are described as *simulachra* and referred to the faculty of *phantasia*, that is, the deceptive kind of imagination, as distinguished from *imaginatio* (SEH i, pp. 517, 520). In the same vein, Bacon ridiculed the "vanities" of Chrysippus and the Stoics in the introduction to the *De Sapientia*. Above all, however, he lavishes scorn upon the allegories of the alchemists: "more absurdly [than Chrysippus], the Alchemists transferred the games and playthings of the poets in the transformations of bodies to the experiments of the fire" (SEH vi, p. 625). Bacon frequently criticises the alchemists, lumping them together with astrologers and practitioners of natural magic, for an excessive license in the interpretation of similitudes, a fault that is closely related to an overabundance of *phantasia* and the abuse of mythical allegoresis (OFB iv, pp. 27, 88, 96; cf. SEH iii, p. 187). The reference to the "games and playthings of the poets in the transformations of bodies" appears to associate this faulty kind of allegory specifically with the alchemists' reading of Ovid.

It is particularly striking that the several interpretations of fables Bacon wove into the *Advancement of Learning* (1605) express, without exception, morals about the deceptiveness of images. So, by allusion to Icarus, we learn that "divers great learned men have beene hereticall, whilest they have sought to flye up to the secrets of the Deitie by the waxen winges of the Sences" (OFB iv, p. 8). "*Pigmalions* frenzie is a good embleme or portraiture" of those who prefer to study words instead of matter, "for wordes are but the Images of matter" and Hercules punctured the superficial eloquence of the philosophers' when he said in disdain

to an image of Adonis *nil sacri es!* ("you are nothing sacred", OFB iv, p. 23). Most vividly, the transformation of Scylla represents "the Generalities of the Schoole-men," which are "for a while good and portionable; but then when you descend into their distinctions and decisions, in stead of a fruitfull wombe for the use and benefite of mans life; they end in monstrous altercations and barking questions" (OFB iv, pp. 25). The famous image which immediately precedes, of the spider weaving arguments from its own substance, may be based on Plutarch's criticisms of poets and prosateurs who write fables without meaning (*De Is. et Os.* 358e-f). Next, Atalanta is cited as an emblem of science distracted by "luker and profession", particularly alchemy (OFB iv, p. 32). As for superstititous natural magic, "of this kinde of learning the fable of Ixion was a figure, who designed to enjoy *Juno*, the Goddesse of power; and in stead of her had copulation with a Cloud." (OFB iv, p. 89). It is no coincidence that it is in this work that Bacon is at his most sceptical concerning the truth of the wisdom to be found in fables: "I do rather think the fable was first and the exposition devised" (OFB iv, p. 75). From at least the *Redargutio Philosophiarum* (1608; SEH iii, p. 574) onwards, Bacon is happy to assert that such expositions (his own, that is) were intended by the original authors.

Commentators who have attempted to reconcile Bacon's criticisms of allegory with his mythography argue that his aim is to use mythography to develop a concept of heuristic fiction (Vickers 1986, p. 95, Lewis 2010, pp. 386-7, Daniel 1982, p. 227). These interpretations highlight that while Bacon recognised that "there is no proceeding in invention of knowledge but by similitude" (SEH iii, p. 218), he rejected the Platonic-hermetic idea of allegory as a communication of the divinity: "Religion rejoices in the veils and shadows [of fables]...But let us see about human wisdom", he declares (SEH vi, p. 625-6). In particular, it has been observed that the wisdom propounded in the *De Sapientia* corresponds to what Bacon elsewhere called "the Science of First Philosophy, or even Wisdom" [*Philosophiae Primae sive etiam Sapientiae*] (SEH i, p. 540). First philosophy is a repository of analogies linking all domains of knowledge which can guide the experimenter wishing to advance particular

knowledges into uncharted territory (Jardine 1974, pp. 144-148). An implicit warning about misreading such analogies is, however, carried by the name Bacon gives to the experimental procedure: "literate experience" (*experientia literata*). Although it relies on sensual analogies, the fundamental metaphor of the process of *experientia literata* is explicitly *not* the immersion in similitudes and unanalysed sense experience characteristic of the ancient age that communicated in myths: it is learning to spell with the alphabet of nature (Giglioni 2014b).[14] Bacon thus underlines that the knowledge of similitudes must not overdetermine and restrict the course of experimentation. The scientist must immerse himself in the forest of sensual particulars in a manner at once creatively chaotic and cannily directed, a task which Bacon refers to as "the hunt of Pan" (SEH i, p. 623).[15]

This interpretation of Bacon's mythography is supported above all by its close connection to atomism. As he explained in *De principiis et originibus*, these two fables "propose a doctrine not much different from the philosophy that Democritus exhibited, except that it seems somewhat more severe, sober and pure [*expurgata*]." (OFB vi, p. 196). In the same piece he puts his admiration for atomism in the strongest terms: "an abstract principle is not a Being; and again a mortal Being is not a principle; so that a clearly invincible necessity drives mens' thoughts (if they want to be consistent) to the atom" (OFB vi, p. 252). Ancient wisdom is thus simultaneously hieroglyphical and striving to be literate. It is sensual, but a similitude of moving beyond the senses. The equation of the wisdom of the fables with atomism indeed suggests that to follow this wisdom would be to employ it precisely in order to move beyond it. Giglioni (2012, p. 65) remarks that "in the sphere of thought, *fabula* is the equivalent to *materia* in nature." Thus, from one perspective, the return to the prime matter of thought – fables – is indeed a means of stripping away the

[14]Similar tensions have been detected in Bacon's view of the imagination. "Consistently, the "image" as the mind's contact with reality is good; "imagination" as a process of thought is bad" (Cocking 1984, pp. 52-3). Schuler's study of Bacon's attitude to poetry finds "an unresolved tension between science and poetry, reason and the imagination" (1992, p. 10). See also Vickers (1968, pp. 141-201).

[15]The allegorisation of Pan in the *De Sapientia* indeed refers us to the category of *experientia sagaci* (SEH vi, p. 640). Giglioni (2014a) also notes the applicability of the fable of Atalanta, as expressing the dialectic of withdrawal and engagement, pause and activity, proper to creative experiment (OFB xi, p. 110).

burdensome accretions of classical learning against which Bacon railed so often. Reflecting his implicit critique of Ovid, Bacon deliberately detaches the myths he interprets from their embodiment in any particular source. They are "not of the age and invention of the poets themselves, but like sacred relics and the delicate airs of better times" (SEH vi, p. 627). But from another perspective, this most abstracted wisdom is all about the embodiment of abstractions. Myths show us the right way to project our sense impressions upon nature, such that it remains material in the double sense. They are able to do this precisely because they do have a particular form, a form which exists in tension with their abstract message.

At the level of the atom, Bacon takes care to emphasise that prime matter is "formed and endowed", distinguishing it from matter that is "abstract, potential, inform", adding, "that despoiled and passive matter seems to be entirely a fiction of the human mind". Indeed, Cupid is identified not with the atom *in abstracto,* but rather with the atom's primal motion or appetite. The form of matter corresponds precisely to the integument of the fable: "that the prime matter is some form is demonstrated by the fable in that there is a persona of Cupid" (OFB vi, p. 208). In other words, the drive towards the immanent production of form inherent in primal matter is demonstrated by the very fact that matter comes to us masked, in human likeness – embodied in myth. On the other hand, the form of Cupid is explicitly unlike any forms that we perceive; the forms of atomic matter have no relation to the visible forms of the everyday world – hence his nudity: "*Cupid* is introduced into the Parable as a *persona* in such a way that he is, however, nude. And so after those who posit abstract matter, they next err (but in the opposite way) who posit that it is not stripped [*exutam*] (OFB vi, pp. 208-10). Most of the *De Principiis*, as it survives, is concerned with discussing the various ways in which Cupid has been falsely clothed, for example, by those who claim that prime matter has the form of fire, air or water. "We call the garment of Cupid some form attributed to prime Matter, which is asserted to be substantially homogenous with the form of one of the secondary Beings" (OFB vi, p. 218). Only the atomists present him

naked. The fable thus warns us that, although we cannot escape similitudes (since the atom has form), all but the naked form of Cupid is a veil.

Thus, on the standard interpretation of Bacon's mythography, the central message of ancient wisdom would be the need to balance the Democritean stripping-away of appearances against the empirical and therefore analogical basis of investigation. This tension appears again in the *De Sapientia* in the allegory of "Prometheus, or the state of man", also the myth in which Bacon says his allegory touches most closely on divine mysteries (SEH vi, p. 676). In the first instance, Prometheus signifies Providence – the fact that "all things are in the service of man" (SEH vi, p. 670), and are thus conformable to his understanding and transformable at his hand. On the other hand – and this is "the notable [*insignis*] part of the fable":

> Men, in place of gratefulness and thanksgiving, turned to indignation and protest, and made a complaint to Jove both against Prometheus and fire; and this was most welcome to Jove, so much so that because of it he piled new gifts upon men...The allegory means this: that the criticism made by men of their nature and art proceeds from the best state of mind, and ends in good; the contrary is hated by the gods and cursed.
>
> (SEH vi, p. 672; see Barbour 1992)

Whether Bacon thinks nature is itself in some sense inherently mythical, because it embodies itself in forms and schematisms (Barbour 2005, p. 43, Daniel 1990, p. 47, Clody 2011); or he thinks that myth is only a way of inhabiting the limitations of human knowing, specifically, its dependence on images (Rees 1980), ancient wisdom would be primarily a reflection on the capacity and structure of human thought in its relation to nature, and not a revelation of what nature is actually like. In the next section, however, I shall argue that this is not the whole story. If Cupid represents a materialism stripped – embodied, to be sure, but only heuristically or nakedly embodied – there is also a grosser and more material kind of materialism to be unearthed from the wisdom of the ancients. This grosser

materialism is associated with a less distant, less idealised antiquity, one in which in which the primal insight into the nudity of Cupid has begun to be obscured, as ill directed learning has begun to cloak Cupid in his concealing garments, the false analogies between matter and its appearances. In particular, Bacon was impressed by the way in which primal atomism had been incorporated and written into a later corrupt form of mythography, that represented by Ovid's *Metamorphoses*. The corrupt form of mythography was not, it turns out, something that could or should be completely stripped away, but had an integral place in Bacon's empiricism, insofar as theorisation about the ideally heuristic status of conjecture gave way to the need to make specific conjectures, and act on them as if they were true.

5.6 Ovid and the doctrine of spirits

The sources of Bacon's mythography are eclectic, and he is unafraid to invent. A large amount of the content of the physical allegories – including those of Cupid and Coelum – derives from the mythological handbook of Natales Conti (Lemmi 1933). Like Conti, Bacon does not draw from a single model but assembles details and interpretations from a variety of sources. The specificity of the *Metamorphoses* as a source is almost completely obscured in this mass. Nonetheless, those instances where a particular idea can be seen to derive from Ovid have a special significance. Bacon's citation of the alchemists as the worst kind of mythographers alludes glancingly to their fascination with the *Metamorphoses* (*transformationes corporum*). But the connection of Ovid with this tradition also stands for something more general. Ovid is a source not only of false allegories and interpretations, but of literally false particulars – natural historical *materia* which is itself based on the inappropriate application of similitudes. The doctrine of the correspondence of microcosm and macrocosm is the prime of example of such a false similitude. Bacon takes up just this matter in the fable of Prometheus, explaining that "the Alchemists have adopted the exquisiteness of the word Microcosm too literally and corruptly and perverted it, since they

want every mineral, every plant, and everything else, or something analogous to these things, to be in man" (SEH vi, p. 671).[16] The doctrine represents then, that failure to suspect and criticise Prometheus – that is, the overconfidence in the providential legibility of nature – that is hated by the gods and cursed. In other words, to look at the stars and see in their colours, shapes, and motions significant analogies to the human body, is to place far too literal a construction upon the notion that the universe has been made "for" humans. Instead, designs in the universe which appear to express the relation between man and the cosmos should be subjected to doubt and criticism, in case they are mere appearances, and the true designs are concealed elsewhere.

Bacon's attitude to alchemy and natural magic is, however, far from purely dismissive. On the issue of the microcosm, the alchemists have gone too far, but "it remains solid and sensible, as we said, to find the body of man the most mixed and the most organic of all beings; thus the virtues and faculties it takes up and obtains are more wonderful" (SEH vi, p. 671). Elsewhere, Bacon expresses a belief in the possibility of the concoction of gold (SEH ii, pp. 448-450). Similarly, Bacon believes in "the true Natural Magic, which is that great liberty and latitude of operation which dependeth upon the knowledge of Forms" (OFB iv, p. 90). Indeed, first philosophy, according to Bacon, was precisely the office of the ancient natural magic of the Persians, which "noted the correspondences in the architectures and fabrics of things natural and civil". Resorting to Neoplatonic language, Bacon emphasised that these correspondences were not "mere similitudes (such as perhaps might appear to men too little perspicacious) but distinctly one and the same footprint or imprint [*signacula*] of nature impressed on diverse materials and subjects" (SEH i, p. 543).[17] These kind words for alchemy and natural magic are not merely theoretical: Bacon owes a concrete debt to the vitalism of the chemical philosophy in particular. As demonstrated by a well known passage

[16]For a discussion of this fable, see Barbour (1992).

[17]Coleridge (2001, p. 315) developed a Neoplatonic interpretation of Bacon on this basis, associating Bacon's *signacula* with Cabalistic seals. Rossi (1968, p. 16) speaks of an "ingrained affinity of outlook between Bacon and the alchemists" and Weeks (2014) has argued that Bacon's science was modelled on natural magic.

from his natural histories (*Sylva Sylvarum*, 1627) entitled "Experiments solitary touching the secret processes of nature", when Bacon dissects matter what he actually encounters are not atoms, but vital spirits:

> The knowledge of man (hitherto) hath been determined by the view or sight; so that whatsoever is invisible, either in respect of the fineness of the body itself, or the smallness of the parts, or of the subtilty of the motion, is little inquired. And yet these be the things that govern nature principally; and without which you cannot make any true analysis and indication of the proceedings of nature. The spirits or pneumaticals, that are in all tangible bodies, are scarce known.
>
> (SEH ii, p. 381)

Bacon differentiates these spirits from a number of traditional candidates for invisible powers, which are all dismissed as shallow abstractions from appearances, like perspective paintings:

Sometimes they take them for vacuum; whereas they are the most active of bodies. Sometimes they take them for air; from which they differ exceedingly, as much as wine from water, and as wood from earth. Sometimes they will have them to be natural heat, or a portion of the element of fire; whereas some of them are crude and cold. And sometimes they will have them to be the virtues and qualities of the tangible parts which they see; whereas they are things by themselves. And then, when they come to plants and living creatures, they call them souls. And such superficial speculations they have; like prospectives, that shew things inward, when they are but paintings.

Spirits thus appear to fulfil the role elsewhere assigned to atoms. Yet spirits are considerably less abstract than atoms. Indeed, in the *De Principiis* Bacon explicitly mentions resemblance to spirits among the false resemblances that atomism strips away: "Atoms are not similar to sparks of fire, nor drops of water, nor bubbles of air, nor grains of dust, nor the minutiae of spirit or aether" (SEH iii, p. 82). Returning again to the discussion of spirits in the *Sylva Sylvarum* we note that Bacon adds: "Neither is this a question of words, but

infinitely material in nature". That is, the question of what truly are the components of matter matters. "For", he continues, "spirits are nothing else but a natural body". So Bacon himself makes the obligatory pun on material. The question matters because spirits are a body. Unlike atoms, which have only appetite and blind inhuman appetite at that, spirits have particular sympathies and antipathies; they consume and excrete, wax and wane. Therefore these spirits, not atoms, are what matter about matter in practice – in Bacon's embodied science.

Bacon goes on to refers us in this passage to an allegory of Proserpina as spirit in the *De Sapientia*: "as we have figured them in our *Sapientia Veterum*, in the fable of Proserpina, you shall in the infernal regiment hear little doings of Pluto, but most of Proserpina: for tangible parts in bodies are stupid things; and the spirits do (in effect) all" (SEH ii, p. 381). When we turn to the allegory of Proserpina, we find that the transition from the one level of materiality to the other is in fact marked by a sudden short-circuit between truly ancient wisdom, which would be a wisdom of atomism, and Ovid. There are only two Ovidian quotations in the *De Sapientia*. One illustrates the myth of "Atalanta, or gain" (SEH vi, p. 668) – perhaps Bacon's favourite myth, referred to nine times in his oeuvre, and here standing for "the competition of Art [Atalanta] with Nature". The other occurs in the fable of Prosperpina, which:

> seems to pertain to nature, and to examine that force and supply, fertile and fruitful, beneath the ground, from which all we have pullulates and into which it is again dissolved. By Proserpina, the ancients signified that ethereal spirit which is shut up and held within the earth (represented by Pluto), having been torn away from the upper globe; which that poet did not express badly: "Or the new earth, recently brought down from the lofty aether, retained the seeds of its cognate sky" [*Met.* 1.80-81]. This spirit is depicted as raped by the earth, because when it has the time and opportunity for flight, it is barely held in, but it is bound and fixed with a sudden shattering and crushing. Likewise, if someone

should try to mix air and water, he will not be able to do it except by a swift and rapid agitation.

(SEH vi, p. 681)

Both of these myths are among the most frequently discussed in the tradition of alchemical allegoresis mocked in the preface. The rape of Proserpina was a traditional image of the chemical wedding: Paracelsus himself had described the envelopment of spirits in matter as a rape of the nymphs.[18] Bacon even combines the myth with the image of the golden bough offering free passage between the upper and nether worlds, though he explicitly refuses the "onslaught" (*impetum*) of the Chemists as to the latter's interpretation (SEH vi, p. 682). Although Bacon does not mark the fact, the quotation of Ovid in the Proserpina allegory refers to the creation of man by Prometheus, and was often quoted by proponents of the microcosm-macrocosm analogy (e.g. De Nancel [1611] 1640, p. 54). The Ovid quotation thus reinforces an implicit connection between the alchemical doctrine of the microcosm and the existence within matter of living spirits.[19] While Bacon persistently objects to alchemy on methodological grounds, this quotation reveals the significant debt that Baconian science owes to alchemy in practice. Bacon's theory of the universe has been called "semi-Paracelsian" (Rees 1975a, Rees 1975b), meaning that he explains celestial mechanics in chemical terms. If the doctrine of atomism represents a methodological resistance to the

[18]"The nature of air and water, as he [Paracelsus] writes to the Athenians, taking it from the Greeks, is especially promiscuous, and indeed in the first division they withdrew mingled with many other kinds as a chaos. Nor does he, so as to solve the mystery, give his Melosinae and Nymphs of the air and water as a certain dwelling and force spread through them; nor as signs fixed to their base, but as what go forth outside into the other elements, though it pleases him to call this a certain rape (Suavius 1568, p. 39).

[19]Lemmi tends to regard the imposition of vitalism upon Bacon's atomism as an infection deriving from Empedoclean doctrines incorporated into the *Mythologiae* of Conti. He remarks on Bacon's insistence that Cupid is a form that "as in the case of Coelum, Bacon has temporarily slipped from atomism into the philosophy of elements of Empedocles; and once again under the influence of Natalis Comes" (1933, p. 58; cf. p. 76). These Empedoclean intrusions are, I am suggesting, in fact intrusions of Ovidianism, for it is Ovid who sets the precedent in blending Empedocles and Lucretius. Solomon (1998, pp. 207-224) has suggested that Bacon's fables of Cupid and Proteus were influenced by the emblems of Cupid and Proteus in Bruno's *De imaginum, signorum et idearum compositione* (1591). I do not see any particular connections, although it it possible that Bruno influenced Bacon's attitude to myth more generally, and thus also his reception of the *Metamorphoses*.

false similitudes of outward appearances, then the doctrine of spirits is what emerges when that resistance is pitted against the brute necessity of empirical experience.

We can thus trace at least three layers of abstraction in which Bacon interprets ancient myths: in the *Advancement of Learning* as pure allegories of the deceptiveness of allegory, in the *De Sapientia* as allegories of atomism, which penetrates deceptions but is itself ineradicably imagistic (the level of heuristic fiction); but also in the *De Sapientia* as allegories of spirits, which are not only imagistic but, by comparison with atoms, are perilously close to matter that is a projection of purely human desires. Bacon obviously does not set about to read Ovid literally like Libavius. If the gift of Prometheus is to be criticised it is perhaps to be expected that spirits, too, will someday be cast aside as just another integument. Again, Bacon says in the allegory of Cupid that atomism is an "invincible necessity". Ovidian myth cannot therefore replace truly ancient wisdom: the two folds of embodiment at once complement and undermine each other. But the multiplication of layers of embodiment renders the notion of a fiction that is purely heuristic, or only minimally embodied, unsustainable. Living spirits play the role both of subtle components demanding that we look beyond appearances, and powers of organisation which ensure that even despite its subtlety, nature does in fact respond – as the allegory of Prometheus promises – to human comprehension and manipulation. In this way the doctrine can be conceived of as both a heuristic device and an assertion "infinitely material", but never a "merely" heuristic device.

The blending of theory and practice, hypothesis and action, which is the distinctive feature of Baconian science, is not, therefore, (so to speak) merely theoretical. Instead, Bacon asks us to recognise, as the cost of our ability to transform nature, its ability to transform us. He posits a profound link between the desires of naked matter, alien and unfathomable, and our own all too human desires, just as strange and uncontrollable. Bacon introduced this connection in his allegory of Cupid, where he pointed to a link between the ancient Cupid, who according to Orphic hymns was first of all the gods, and the young Cupid born of Venus. The first Cupid represents the atom; the second the "particular sympathies"

of living creatures. The latter depends, Bacon says, "upon principles deep and fatal, as if derived from that ancient Cupid, who is the source of all exquisite sympathy" (SEH vi, p. 656-7). The embodiment of the atom in Cupid thus risks taking our attachments out of our hands. Spirits have the key role in mediating this connection: in Bacon's allegory of Dionysus, who represents desire in the human realm as opposed to the desire of matter, we are told that Proserpina is the nurse of Dionysus (Giglioni *forthcoming*). She transforms the desires of matter into the desires of humans.

The moment at which a philosopher succeeds in transforming bodies is labelled by Bacon "metamorphosis". This is a motion, as he explains in the *Abecedarium novum naturae*, that is "exceedingly noble and rare...the most powerful effect accomplished in nature, inasmuch as through it the power of man (as much as it may be) is most exalted". It occurs when a body is transmuted "from one specific form into another, or in any case from one perfect body into another", not through the natural means of growth from seed or alimentation, but by art, that is "the profound and powerful paths of metaschematisms" (OFB xiii, p. 209). There is some evidence for regarding "metamorphosis" conceived in this fashion as specially linked to the doctrine of spirits. The connections between the different sections of the *Sylva Sylvarum* are notoriously loose, but it may be significant that in the section immediately following that "touching the secret processes of nature", entitled "Experiments solitary touching the power of heat", Bacon invokes the transformations of "this Proteus of matter" which "being held by the sleeves, will turn and change into many metamorphoses" (SEH ii, pp. 382). Although Bacon refers to the transformations of Proteus many times, this is the only time the "metamorphoses" of Proteus are invoked. In fact the word appears in any shape or form in only one other passage.[20] If this connection with the doctrine of

[20]The other occurrence of metamorphosis is in the *Inquisitio legitima de motu* (1607–8?), a list of motions similar in structure to that of the *Abecedarium*, which Bacon may have referred to when composing the latter. Here, under the section entitled "occult Transferral or corporeal Motion", and placed, perhaps significantly, at the end of the list, we find two kinds of motion labelled metamorphosis: "The motion of *placid metamorphosis*, or of a new form proceeding from dissolution" followed by "The motion of *destructive metamorphosis* or of a new form from corruption, or of re-ordering and of triumvirate [???], or the rudiments of vital generation" (SEH iii, p. 629). These two types of motion are said to be "of greater mutation" [*mutationis maior*].

spirits is real, then we have caught a glimpse of the *Metamorphoses* lingering like the shadow of Dionysus beneath the relatively abstract concept of "metamorphoses".

Dionysus, as Giglioni has shown, is a more pervasive and terrifying presence in Bacon's philosophy than has usually been recognised. Let us briefly consider his appearance in the fable of Orpheus. Orpheus, for Bacon, represents philosophy itself; his trip to the underworld the attempt to perfect the restoration of natural bodies, and his subsequent lamentation the erection of civilisation as a remedy for mortality after the failure of that attempt. If desire is what first sets Orpheus on the path towards philosophy, his destruction by Dionysus represents the final triumph of that same desire over civilisation. As Bacon interprets the fable, the Dionysian origins of philosophy itself condemns it to cyclical destruction:

> Men return to the depraved conditions of their nature, and desolation is seen in the fields and cities. And if such frenzies continue, it is not long before letters also, and philosophy, are definitively torn in pieces, such that only its fragments are found, in a few places, like planks from a shipwreck.
>
> (SEH vi, p. 648)

We should not be surprised, therefore, that Bacon has failed to free science from its fatal attraction to the *Metamorphoses*. If Bacon has anatomised this attraction, he has not escaped it.

5.7 The face of chaos

There is a second, fainter, trace of Ovidian influence to be excavated in the *De Sapientia*, this time in Bacon's doctrine of chaos. In the *De Principiis*, Bacon states that "that chaos, which was coeval with Cupid, signified the mass or congregation of matter. But matter itself, and its force and nature, and finally the Principles of things, they shadowed forth in this Cupid" (OFB vi, p. 198). He goes on to put the relation of Cupid to Chaos thus:

Assigned to the former are "distillation, sublimation"; assigned to the latter are "turning into worms, flies, etc." (ibid. p. 631).

"That the prime matter is some form is demonstrated by the fable in that there is a certain persona of Cupid, but matter as a whole, or the mass of matter, was once without form: for Chaos is without form" (OFB vi, pp. 208-10). In other words, matter was created pre-formed, but only at the atomic level: the forms of aggregates, in particular the structure of the universe (the *schematismus magnus*), only appeared later. Bacon insists that "whether it is the philosophy of *Telesio* [1509–1588, a radical Aristotelian who dispensed with the Aristotelian notion of form, explaining all appearances in terms of variations of heat and cold] or of the Peripatetics, or any which forms, balances, fortifies a System in such a way as that it does not seem to have flowed from chaos, this seems a more trifling philosophy, and entirely from the restrictions of the human breast (OFB vi, p. 251). The postulation of chaos seems to be essential for maintaining the emphasis on the subtlety of atomic matter, and is similar to Bacon's insistence on the nudity of Cupid. On the one hand, the atom has form; on the other hand, that form is buried so deep within perceptible structures as to be barely accessible. Likewise, there is a tension between the supposed formlessness of chaos and the formative power (Cupid) implanted invisibly at its core.

At the end of the allegory of Coelum in the *De Sapientia*, Bacon dismisses the notion that order evolved spontaneously and naturally from prime matter as "the fading and failing oracles of sense" – the faulty conclusion of empirical investigation – "for the matter and fabric of the world is referred most truly to the Creator". Hence, "the fable contains philosophy and the philosophy contains, in turn, a fable" (SEH vi, p. 650).[21] This cavil is not empty piety, but rather a reminder that the nudity of Cupid should prevent his interpretation in terms of any kind of sensually apprehensible drive towards order. If the reality of atomic processes are ordered, their order may bear no clear relation to the order of the world as we see it. On the other hand, the possibility that God would have formed matter in such a way as to leave it incapable of evolving order through itself is equally unacceptable; for

[21] Cf. the *Essayes*: "it is a thousand times more Credible, that foure Mutable Elements, and one Immutable Fift Essence, duly and Eternally placed, need no God; then that an Army of infinite small Portions, or Seedes unplaced, should have produced this Order, and Beauty, without a Divine Marshall" (OFB xv, p. 51).

chaos, in this case, would hardly differ from that "abstract, potential, unformed...despoiled and passive matter" (OFB vi, p. 206) of the Aristotelians and Platonists. There is a fine distinction indeed between Plato's "despoiled" [*spoliata*] matter and Democritus' "stripped" [*exuta*] Cupid. Hence, Bacon is more circumspect in the *De Principiis*: "Whether that created matter, through the long circuits of centuries could have from its primary imprinted force collected and converted itself into that best schematism (which it did without deviations thanks to the continual power of the Word) is perhaps not to be asked." He proposes, in the end, a solution that is clearly intended to accommodate both possibilities: having created Cupid and chaos, God operated omnipotently "on motion and time, by anticipating the order of nature and accelerating the progress of being" (OFB vi, p. 251).

For the most part, the relevance of Ovid to the discussion of chaos can only be inferred from the history of his association with this problem discussed in Sections 4.5-6. We should remember that the immense popularity of Ovid's chaos is due in part to his having combined a Lucretian mass of pre-formed *semina* with the organising force of the Platonic demiurge (ambiguously both "god and better nature"). In other words, Ovid had laid the framework for Bacon's perilous navigation between the doctrines of spontaneous evolution from chaos and the exercise of divine control on passive matter. The general significance of Ovid in this regard is underlined, however, by one moment of precise allusion. In the allegory of "Pan, or Nature", Bacon explains that Pan enters into battle (*pugnam*) with Cupid, for "matter does not lack the inclination and the appetite for the dissolution of the world and falling back [*redicivationem*] into that ancient Chaos [*Chaos antiquum*], unless its malice and impetus were restrained by the strong concord of things (signified by Love or Cupid) and driven into order" (SEH vi, p. 639).[22] The reference to a "falling back" into *chaos antiquum* evokes the fall of Phaethon. Bacon points out that Cupid is said to be ultimately victorious; nonetheless, this passage is remarkable for its depiction of Chaos, by allusion to Phaethon's fall, in the form of something like an Empedoclean principle of strife. Strictly speaking,

[22]Bacon refers to Phaethon again in his essay *Of Vicissitudes of Things* (SEH vi, p. 512).

Chaos cannot be a principle; it is an origin and therefore no longer existent. Unlike Cupid, Chaos is supposed to be entirely without similitude: "Chaos is without form; *Cupid* is a certain persona" (OFB vi, pp. 208). "Chaos is never marked out by the ancients with divine honour or a name" (SEH vi, p. 654). Yet here Chaos – or at least the desire for Chaos – does indeed have a persona, and the persona is Pan.

In practice (in his natural histories, that is) Bacon admits both sympathies and antipathies, drives towards unity and drives towards dissolution, as fundamental features of matter and essential explanatory principles. Sympathy and antipathy are "the stimuli of motions and the keys of works" (OFB xii, p. 135). But an important distinction must be made between the sympathies and antipathies of spirits, such as they are observed in nature, and the desires of naked matter. At the theoretical level, Cupid is simply "the appetite or stimulus of prime matter or (to speak more explicitly) the *natural motion of the Atom*" (SEH vi, p. 655). This appetite ought to have, by itself, no particular desire either for order or chaos: "were there only one principle of things, it ought to provide a nature equally inclined towards the generation of things and to their dissolution. For the nature of a principle is that things should resolve themselves into it as readily as they should be produced out of it" (OFB vi, p. 222). The amorality of Cupid's appetite is an essential aspect of his nakedness. For what we perceive as the dissolution of tangible bodies may always in fact be the sudden release and attraction of its atomic constituents, which are, after all, indissoluble.[23] Sympathies and antipathies are thus merely the effects of atomic appetites with respect to certain compounds, just as, from the perspective of the primal life of matter, human life is nothing but a temporary irritation (Giglioni 2005, pp. 130-1). For this reason, Cupid can be the only real force in nature. "And so it happens, by the exceedingly good fate of men and things, that Pan puts this battle to the test as an adversary, and conquered, departs."

[23]Weeks (2007) elides the difference between atomic and compound matter when she says that Cupid's appetite involves both sympathy and antipathy. This can be seen from one of her own quotations, in which dissolution is caused by attraction: "once that spirit evaporates or cold smothers it, then the parts, freed from the control, come together according to their natural inclination" (OFB xi, p. 394).

Likewise, the frame of the world is secured against the temporary insurgencies of Typhon "with adamantine chains" (SEH vi, pp. 639-640).

Whereas in the *De Sapientia*, the victory of Cupid is attributed to "the exceedingly good fate of men and things", Bacon added in the expanded version of the myth in the *De Augmentis*, the parenthetical remark: "or rather, the immense divine goodness" (SEH i, p. 529). Just as the natural origin of matter in Chaos can neither be denied, nor fully endorsed (without invoking supernatural operation), Chaos cannot be countenanced as an active principle for very long; yet nor can its influence be denied. There is, once again, a philosophy in the fable, and a fable in the philosophy. At the precise moment when Chaos seems to emerge as a kind of personified principle, we find that it suddenly appears in the guise of an Ovidian allusion. I would suggest that we have at this moment another intrusion of the type of improper personification of nature for which, in *The Advancement*, Bacon criticises the practitioners of natural magic – those who propound "credulous and superstitious conceits and observations of *sympathies* and *Antipathies* and *hidden Proprieties*" (OFB iv, p. 89). In Bacon's reality, God ensures that Cupid triumphs. But the nakedness of Cupid demands that human cognition not refuse the principle of Chaos, for without such a principle it is likely to remain that "more trifling philosophy, and entirely from the restrictions of the human breast" (OFB vi, p. 251). At the same time, the nakedness of Cupid demands that induction not rest until it has reached the single summary law of nature, the natural motion of the atom, the order buried within chaos itself. But until that law is discovered, spirits with Ovidian powers of transformation, in possession of both creative and destructive urges, will continue to roam the woods of Baconian matter.

Chapter 6

The Mechanical Philosophy

6.1 *Mundus est fabula*

A famous portrait of René Descartes (1596–1650) painted by Jan Baptist Weenix around 1647 displays him holding an open book in which are inscribed the words *mundus est fabula*. While the trope is a hackneyed one, it can be related to one particularly important moment in Descartes' philosophy.

That is, to his composition between 1629 and 1633 of a short tract entitled *Le Monde*, explicitly labelled a "fable", in which Descartes imagined the self-generation of the cosmos out of chaos – a chaos "more muddled and confused than the poets have been able to describe" (AT xi, p. 34; cf. AT xi.b, p. 125 and AT vi, p. 42). This attempt to derive order from chaos by appeal to nothing except rationally deduced laws of motion could stand as an emblem of the aims of the mechanical philosophy that was gaining ground in all sorts of ways at this time.[1] Descartes makes it clear elsewhere that fables are pernicious because they "make one imagine many events to be possible which are not" (*Discours de la méthode*, AT vi, p. 6). Therefore, he claims, "as soon as my age permitted me to escape the subjection of my preceptors, I gave up entirely the study of literature" (vi., p. 9). The fable of *Le Monde*

[1]Probably for fear of the Inquisition, *Le Monde* was only published posthumously, although Descartes' summarised its contents in the *Discours*.



Figure 6: René Descartes, by Jan Baptist Weenix (c. 1648). Centraal Museum, Utrecht.

is different because its unfolding is based on the "clear and distinct" necessities of reason; but it is still a fable.

Mundus est fabula is the inversion of another famous Cartesian motif: the hyperbolic doubt in which the world is equated with a bad dream or a demonic deception. This doubt is the radical extension of the Democritean aim of penetrating nature so as to completely eradicate inferences from misleading similitudes. One of the key aspects of Descartes' philosophy, which he outlines in the opening paragraphs of *Le Monde*, is the distinction between primary and secondary qualities. Primary qualities are those directly apprehensible to the mind – size, shape and motion – of which one can have clear and distinct sensations, and about which one can reason *a priori*. Substance possesses only these. Secondary qualities are those we experience only in our sense organs, such as heat, cold, moistness, dryness – qualities which Aristotelians had imputed to matter, but which now are taken to depend on the sense organs themselves. Inductions from secondary qualities to secondary qualities are therefore no longer permitted, except that they first pass by way of reduction to the primary qualities of the underlying substance. The regime of resemblances, insofar as it treats secondary qualities as constitutive of substance, is overthrown. At the same time, reasoning that remains purely at the level of primary qualities tells us nothing about the world as we experience it. The assurance that the world is not a demonic deception depends on establishing that there is a rational connection between the primary and secondary qualities and the ideas that these give rise to.[2] As is well known, Descartes depends on the transcendence of the *cogito*, with its idea of perfection, to secure this transition. It would therefore be possible to site the birth of the world as fable at the point at which the mind locates the truth of the world not in what comes to it from outside, but in the transcendent condition of its own thinking.[3]

[2]Thus, Hyman (2006) has recently attacked the denial of the reality of secondary qualities as a "myth", noting that it is one with significant purchase among scientists today.

[3]So Nancy (1978), who analyses the *mundus est fabula* motif as a consequence of Descartes' derivation of the transcendental subject from its self-awareness as a creator of fictions: by locating itself in the bare possibility of its own thought, the subject withdraws from the discourse of the world that its thinking grounds. See also Cavaille (1991, pp. 181-245, Bellis 2009, Grimaldi 2006). Cf. Foucault (2005, p. 58):

The treatment of the world as a fable was not the only time Descartes seemed at odds with his own condemnation of fables and literature. Notoriously, Descartes attributed his discovery of the new science to a series of dreams which he appears to have believed came directly from God, and which place not just dreaming and imagination, but poetry as well, at the heart of his intellectual project (Kennington 1961, Browne 1977, Grafton 1996, O'Mahoney 2013). In the third dream, Descartes confronts a dictionary and the popular compilation of Latin poetry, the *Corpus Poetarum*, lying on a table. Opening the *Corpus Poetarum* to a random page, he reads Ausionius' poem "What way of life shall I follow?" (*Quod vitae sectabor iter?*), whereupon a stranger standing by shows him another of Ausonius' works, "It is and it is not" (*Est et non*). Descartes interprets the dictionary as the unfinished body of the sciences and the book of poetry as "philosophy and wisdom joined together", as well as "revelation and enthusiasm". Seemingly, then, at this point in Descartes' career the choice of which path to follow, if that is what is emblematised by a book of poetry and a book of science, appears to be a false one: it is and it is not. At around the same time, Descartes writes in his notebook (*Cogitationes Privatae*):

> It can seem very strange and puzzling, why there are weighty sayings in the writings of poets, more than in those of philosophers. The reason is that poets have written by enthusiasm and the force of imagination...Sensible things are suitable for conceiving things on high (*Olympica*)
>
> (AT x, p. 217, cited by Browne 1977, p. 270)

Descartes had originally planned to publish his dreams in a work entitled *Olympica*, but it remained unfinished, and his flirtation with the visionary is, at least in this explicit form, confined to these early moments of his career. Nonetheless, if the dreams locate poetry as the effaced origin of Descartes' intellectual project, I would emphasise that "poetry" as well

"Though Descartes rejects resemblance, he does so not by excluding the act of comparison from rational thought, nor even by seeking to limit it, but on the contrary by universalizing it and thereby giving it its purest form. Indeed, it is by means of comparison that we discover 'form, extent, movement and other such things' – that is to say, simple natures [primary qualities] – in all subjects in which they may be present."

as "fable" appear implicitly in a number of more particular guises in Descartes' philosophy whenever reason breaks down and hypothesis derived from induction from secondary qualities, necessarily based on the application of possibly misleading similitudes, steps in to fill the gap. The derivation of the lived world from our purely rational concepts of the nature of matter in *Le Monde* is the most comprehensive of such moments. Another might be the suggestion that the pineal gland could function as the privileged site at which bodily processes are assimilated to thought. Another might be the derivation of the heavenly motions from the forces exerted by the motion of particles in vortices; such a derivation proved elusive, paving the way for Newtonianism. Yet another might be Descartes' continued adherence to the old doctrine of the formative influence of the female *vis imaginativa* on the foetus. In general, mechanism experiences its greatest difficulties when accounting for biological phenomena, for which the laws of motion alone are clearly inadequate. To understand the problem another way, consider Timothy Reiss' characterisation of the passage from the era of resemblances to that of identities: he describes it as a shift from the tendency to organise thought around things to the tendency to organise things around thought (1982, p. 30). "Metamorphosis", then, marks the point at which thought continues to be constituted in the image of a thing.

In this chapter I wish only to reinforce the general observation that it is common to find the limits of the mechanical philosophy marked by the word "metamorphosis", and that the appearance of the word is not random. To that end, the following section will show that the word – even deprived of any reference to the *Metamorphoses* – continues to have a close association with the doctrine of similitudes and signatures and thus, implicitly with "Ovidian" science, about which mechanical philosophers who made use of the term must have been aware. Next, I will examine in detail one specific example of the role played by metamorphosis in a mechanical philosopher – that of Galileo Galilei (1564–1642). Galileo in fact anticipated Descartes' distinction between primary secondary qualities in his *Assayer* (*Il Saggiatore*, 1623) and was the first to formulate the principle of inertia (the principle that in

the absence of external force, motion persists indefinitely in the same way), which Descartes later clarified and described as the "first law" of nature.[4] For Galileo, metamorphosis arose when it became necessary to think about how, if all that truly existed in nature was size, shape and local motion, and local motion was inertial and therefore relative to one's frame of reference, any appearance could be anything but a deception. Galileo's interest in metamorphosis is located at the most fundamental level of the passage from the mathematical abstraction of the mechanical philosophy to perceived "things", the point at which relative motion is realised as some specific motion capable of granting a body some specific being with regards to an observer. At the same time, it had a direct "macroscopic" implication in solving the problem of how, if the Copernican hypothesis could only be explained by postulating the relativity of motion (otherwise we would expect bodies carried upon a moving earth to feel its motion), it nonetheless validated a specific interpretation of the relative motions of sun and earth as "true" (the sun still, the earth moving) while rejecting the contrary relative interpretation as "false" (the sun moving, the earth still).

For others not so concerned about the fundamentals of local motion, metamorphosis arises at a range of points where the limits of the purely mechanical interpretation of nature are encountered. One finds a nested series of such limits. For example, the difficulty of passing from the laws of motion, or a corpuscular analysis of matter to the explanation of the qualitative transmutations of chemistry means that many chemists, such as the influential moderniser Daniel Sennert (1572–1637), continue to describe the task of chemistry as the "metamorphosis of metals" (Bonnet 1655, p. 280). In turn, the mechanical explanation of digestion tends to draw on the chemical (Paracelsian) explanation of digestion as division, instead of the Aristotelian explanation of concoction, since the chemical framework is more clearly rooted in matter and motion; but the passage from the chemical to the biological

[4]Osler sees Galileo's discovery of inertia and the separation of primary and secondary qualities as two aspect of a single shift from "essentialism" to "non-essentialism": "The inertial properties of motion in his mature mechanics imply that from a body's motions we can tell nothing of its inner nature; and the doctrine of primary and secondary qualities, as he stated it in *Il Saggiatore*, embodies a new ontology of qualities according to which the appearances a body presents to us do not reveal its essence" (Osler 1973, p. 507).

involves crossing a similar threshold. Hence one finds "metamorphosis" often employed in broadly Cartesian accounts of digestion, for example in Jean Pascal, Claude Clerselier and Daniel Duncan (Pascal 1681, p. 98, Clerselier 1677, p. 165, Duncan 1687, p. 39). Pythagoras may lurk in these instances, as revealed by Descartes' prominent advocate in England, Antoine le Grand (1629–1699), who writes in 1694 that "when the Grains of Corn are changed into Flower, afterwards into Bread, and lastly into Chyle and Blood; there is nothing in all this progress of changes, but local motion; tho' the Species it self may seem to be changed, as Ovid appositly describes the same in the XV. Book of his Metamorph." (Le Grand 1972, p. 476). The area in which "metamorphosis" became best known as a topic for controversy was of course that of biological generation and development (whether in embryology, botany, entomology or natural history); the history of metamorphosis in this area is too complicated for even the most cursory survey here, however. This persistence of "metamorphosis" in mechanical philosophers is susceptible to a double interpretation, either as precisely a marker of a limit – a deliberate indication that further investigation is required, and the salient point of whose emergence is precisely its detachment from the text of the *Metamorphoses*; or as the remnant of a continued adherence to an old order of resemblances, and as an evocation of Ovid.

6.2 Metamorphosis without Ovid?

In favour of the latter interpretation, that metamorphosis expresses a continued adherence to the pre-mechanical order of resemblances, one might observe that, putting Ovid to one side, metamorphosis has a particular association with mystical alchemy continuing well into the seventeenth century. John Dee's widely read *Monas Hieroglyphica* (1564) employs the word "metamorphosis" at key points, to describe the unfolding of the alchemical egg, the transformation of the practitioner into a spiritual being, and the structure of the whole work (Josten 1964, pp. 135, 179, 217). Paracelsus' publisher Adam von Bodenstein published a

number of his alchemical works in a volume entitled *Metamorphosis* (Paracelsus 1572), which was reprinted many times with a wide circulation.[5] At least four further alchemical tracts incorporated "metamorphosis" directly into their titles: Giovanni Baptista Nazari's (1533–1599) *Il Metamorfosi Metallico et Humano*, which does, however, contain some Ovidian allegories (1564, pp. 23-4); Johannes Fanianus' *De Arte Metallicae Metamorphoseos ad Philoponum* (1576; TC i, pp. 30-47); Eirenaeus Philalethes' (a.k.a. George Starkey) *Ars Metallorum Metamorphoseωs* (1994, p. 452);[6] and John de Monte Snyder's *Metamorphosis Planetarum* (1663). In his *Exposition upon the first six gates of Sir George Ripley's Compound of Alchemy* (1677), Philalethes employs the word "metamorphosis" twice, once simply to designate the blackening of Gold under fire, once in a visionary dream sequence to describe the sudden shrinkage and reappearance of Nature, personified as a queen, inside his alembic (1994, p. 198).

The use of the word "metamorphosis" is thus often associated with explicit doctrinal content that most of the new philosophers would have wished to dismiss as myth, such as the operation of vitalistic powers. On the other hand, as we have seen, alchemy even at its most mystical contained traces of what would become the mechanical philosophy. Thus, if one wishes to regard the use of metamorphosis in mechanical philosophy as a heuristic device, one does not need to sever its link to history: one can point to the presence of mechanical explanations within the previous tradition. Another critic of the "fable" of the microcosm-macrocosm analogy and proponent of corpuscular and quantitative chemistry was the Dutch chemist Jan Baptista Van Helmont (1580–1644) (1652, p. 194). But Van Helmont was also an enthusiastic supporter of Paracelsian vital powers. He uses the word "metamorphosis" to describe the transformations of vital spirits ("gases"), for example in the growth and decay of the human body (1652, p. 91), digestion (1652, p. 162), alchemical reactions (1652, pp. 265, 705), the water cycle (1652, p. 545), or marvellous petrifications

[5]Libavius was famously and rather surprisingly favourable towards Dee's highly obscure tract (1595–9, vol. 1, bk. 1, p. 181).

[6]Newman (2005) has shown that Starkey exerted a great influence on Boyle.

(1652, p. 652). Images, understood as impressions of ideas "struck, expressed and sealed" (1652, p. 441) by the Archei play a vital role in such transformations: it is through the imagination of the Archeus imprinting an image on a gas or seed that a transformation is effected (Pagel 2002, pp. 24-5). The human mind, since it is itself a vital principle, is capable of affecting subordinate Archei in the same way, as was thought to happen especially during pregnancy. Van Helmont gives the incredible example of a woman who is so terrified by a duck that its image imprinted in her mind "not only destroys the already formed embryo: but it transforms it into a duck." This "seminal and figurative force" is described as "a power of metamorphosis" (1652, p. 432).

While the effectivity of images in this schema resembles that implied by the doctrine of signatures, Giglioni (2000, p. 43) emphasises that, as in Ficino, Van Helmont's formative seeds are always implanted from outside matter, descending ultimately from the divine Ideas. It is precisely this divine origin that places constraints on which ideas can be materialised, and which cannot, in contrast to the more undisciplined (chaotic) resemblances at play in Paracelsus. In his early work, Van Helmont uses the idea that "all things are analogically in all things" to justify a Paracelsian understanding of "element" as an incorporeal seed. Such seeds take on the qualities of the conventional (Aristotelian) elements according to the series of "metamorphoses" of their development (so an earthy seed, in Helmont's example, is at one time earthy fire, at another earthy air, at another earthy water). But because the seed itself remains incorporeal and immutable, Van Helmont underlines that all things are, by contrast with the Paracelsian panspermia, only *analogically* in all things (1854, p. 47).[7] In Van Helmont, unlike in, say, Bacon, metamorphosis describes a natural process with no explicit connections to concrete doctrine derived from Ovid. The ambiguity about the role of metamorphosis in Cartesian philosophers could thus be referred to its earlier

[7]"If organic beings are in principle identical with the outside world, how can their specific differences, their specific "life", be explained? There does not seem to be room for specific forces, but only the general cosmic forces such as heat, which created life and determined its rhythm in ancient, notably Aristotelian, philosophy. Van Helmont, for this reason, broke away from the analogies between macrocosm and microcosm. Instead he built up the conception of the "Archeus" as the material vector of specificity" (Pagel 1982, p. 104). For the influence of Van Helmont on Boyle, see Newman (2006, p. 16).

ambiguity in Van Helmont and similar figures. That is to say, one could interpret the use of "metamorphosis" in a form deprived of any reference to Ovid as the symptom of Van Helmont's emphasis on the rationalism of his revision of Paracelsianism, related to his promotion of quantitative methods in chemistry and his rejection of the analogy of microcosm and macrocosm; the intervention of "metamorphosis" in this form could be taken as the marker of an awareness of the point at which hypothesis is becoming heuristic fiction. On the other hand, it might be read as a symptom of an ongoing confusion of fact and fiction.

Indeed, in some cases it is clear that the use of "metamorphosis" apparently without reference to Ovid has been directly motivated by the erasure of a mythological understanding of a transformation. The experiment involving the precipitation of copper upon an iron rod placed in a solution of copper sulphate was for a long time one of the most wondrous examples of transmutation and bore a particularly neat parallel in mythology in the affair of Mars and Venus:

> What Ovid records in the fourth book of the Metamorphoses about the adultery of Venus [copper] and Mars [iron], and about the Sun [gold?], who first observed this, with the sign of Vulcan [fire], Venus' husband, and that afterwards with the adulterer trapped it was shown to the gods – those experienced in metallurgy and marvellous conjunctions and the nature of transmutations explain that these are about the familiarity and kinship of iron and copper.
>
> (Libavius 1611a, p. 201)

Libavius recommended that this particular experiment be repeated *ad nauseam* until those who denied the transmutation of metals were purged of their poison (1599–1601, vol. 1, p. 107), yet the very same experiment was cited by those who denied transmutation: the ease with which the copper could be put back into solution and the original quantity of iron extracted argued clearly for a corpuscular analysis of the material substrate (Moran 2007a, pp. 73, 91). The same mythology, referred to Ovid, finds its way into the *Chymische Medicin*

(1638) of the Bavarian doctor Johann Agricola (1590–1668; Agricola 2000, p. 813) and, via the iatrochemist William Davison (1593–1669), into the correspondence of that notorious alchemist, Isaac Newton (1642–1726):

> That metals are transmutable is shown by the conversion of iron into copper, which may be observed when one adds iron filings to a solution of vitriol of Venus [copper sulphate]. Some believe that this operation was one of the secrets of Pythagoras of which Ovid speaks in his Metamorphoses, and that the conversion has been recorded hieroglyphically in the amours of Mars, Venus and Vulcan.
>
> (Newton 1959, p. 13, citing Davison 1640, p. 268)

The Hamburg professor Joachim Jungius (1587–1657), who explicitly rejected Paracelsus in favour of a mechanistic corpuscularian chemistry, proved through quantitative experiments that this reaction was, as he put it, a "permutation" not a "transmutation". Jungius does not attribute knowledge of the reaction to Ovid. Yet in light of its widespread mythical interpretation it can hardly be a coincidence that this is the sole chemical reaction referred to in his chemical curriculum, the *Praelectiones Physicae* (1630), as a "metamorphosis" (1982, p. 234). This was also the reaction singled out by Leibniz in support of his doctrine of metamorphosis (GP v, p. 214).

One must also bear in mind that when a mechanical philosopher used the word metamorphosis, the connection of the term to the doctrine of signatures is not yet history: Paracelsianism persists well into the era of mechanical philosophy. This tradition still retains some explicit, although limited, dependencies on Ovid in its overtly naturalistic aspects as well as, in some cases, a systematic rationalisation of mythological allegory. One of the most important representatives of the Paracelsian tradition in England was the Rosicrucian physician Robert Fludd (1574–1637). Libavius' criticism of Croll is mirrored by similar complaints levelled by the celebrated astronomer Johannes Kepler (1571–1630) against the comprehensive system of cosmic analogies that Fludd outlined in the *Utriusque Cosmi* (1617–19). In Fludd's own words: "Kepler holds my Harmony, on account of its symbolisms, to be poetical

rather than philosophical, because he observed that its basis, Chaos, is commissioned from Ovid, that the Waters, Light and shadows are decanted from Homer and Hesiod, and, indeed, as many times, from Vergil." (1623, pp. 291-2). Although it is certainly the case that the doctrine of signatures is associated with poetry in general (Vergil and Homer, for example), it is the Ovidian chaos that is the "basis" of the system. A symptom of the fundamental place of Ovid is that Fludd actually calls the transformations based on the application of similitudes to a sort of chaos (or "universal air") metamorphosis:

> I have explained in the preceding that all lower things are in their operations the types and similitudes of lofty things, and that God animates the Angels and the Angels give form to the stars, and the demons or stellar or Olympic Intelligences send their influences into the winds, and the winds animate the Universal Element of air in four ways, which fourfold formation gives or assigns the names to the four elements.[8] And although in the Universal air there is nothing but a single substance in its essence, this is varied in its nature following its fourfold condition according to the desire and property of that one spirit which is the only actor or sufficient acting principle in the metamorphosis or Proteotic [*Proteotica*] transformation from one nature or form into another.
>
> (1638, p. 106v)

Fludd compares the generation of imperfect life by the stars, in the period before the birth of the sun, to Ovid's Python (1617-19, p. 138), just as Apollo's slaying of Python is related to the healing power of the sun (1617-19, p. 27). But little else of Ovid remains.

On the continent, the Paracelsian tradition was represented in later times by, among others, the Jesuit polymath Athanasius Kircher (1602–1680), in whose work "metamorphosis"

[8]Fludd's treatment of the "Universal air" is reminiscent of Stoic descriptions of the division of the pneuma into winds (SVF 2.697). It is worth recording, in light of the place of the winds in this schema, that in a discussion elsewhere of the qualities of the winds, Fludd cites Ovid for a description of the masculinity (and hence dryness, in his schema) of Boreas (1631, p. 122, citing *Met.* 6.693-696). The mythical personification of the wind involves ambiguities similar to those of Stoic personification analysed in Chapter 1, since the universal air is an undifferentiated chaos.

can be found more frequently than in any similar contemporary. The frequency of Kircher's use of the word "metamorphosis" is certainly related to his Paracelsian cosmogony and matter theory. Kircher expresses some of the standard objections to Ovid. For example, his account of the origin of idolatry in *Oedipus Egyptiacus* (1652–4) begins with a long quotation of Ovid's creation story. Man's upward gaze is what leads him towards idolatry, as he mistakes the planets created for his delight for his creators (1652-4, vol. 1, pp. 164-66). In his discussion of the Brahmins in *China Illustrata* (1667), Kircher attacked Ovid on the understanding that his metamorphosis was a form of metempsychosis:

> Others follow the laws of Pythagorean Metamorphosis more strictly...They adduce these metamorphoses in such number and woven into fables so ridiculous and unharmonious that in the Ovidian Metamorphosis there is nothing so outlandish, stupid and insane, which these do not attribute to their metempsychosing heroes; and as wave beating on wave, and so on, innumerably, at last spills the eddies of the flood, so the metempsychotic superstition dragged after itself such a great multitude of old-wives' absurdities that not knowing how to be contained among the animals, quadrupeds, winged animals, beasts of the waters, and the insects, it invaded even the kingdom of vegetable nature, whence that shameful *dendrometempsychosis* was born, by which they are said to be transmuted not only into animals but even into plants, on the example of the Ovidian Daphne."
> (1667, p. 153)

Kircher finds these fables particularly disturbing, and expressive of the devil's cunning (he attributes them to demonic deception), because they represent a perversion of Christianity: "the Incarnation of the Divine Word traduced in filthy fables and mixed with the absurd fictions of Metempsychosis" (1667, p. 156). Within this perversion, however, lies the explanation for the persistence of naturalistic metamorphosis.

Although Kircher does not allude to Ovid in his explanation of creation, his chaos has a distinctly Ovidian cast, derived from its dependence on the Paracelsians. According to

Kircher in the *Arca Noe* (1675), just as God "first produced a chaotic mass, in which [all things] were contained as if in a kind of potential abyss and seminal virtue of nature, so also no vegetable, or animal, except the soul of man, did he create immediately from nothing; rather he should be deemed to have created them second, from the presupposed matter of the chaotic mass." (1675, p. 94). One function of this chaos (which Kircher calls panspermia) is to enable a natural explanation for the origin of species without supposing any special divine intervention. But the natural explanations provided are typically reliant on the regime of resemblances. The organisms so composed then underwent "the metamorphoses that we marvel at" exposed to different aspects of skies and stars with regards to the earth. One such "metamorphosis" was the monstrous beak of the Pica, which Kircher says could only have been formed through the influence of the stars (1675, p. 89). There is in the vegetable kingdom an "immense variety of metamorphosis" (1675, p. 95). But since animals have particularly beastly imaginations, their *vis phantastica* should have been particularly prone to the production of monsters: hence "it is clear that the effects of metamorphosis emanate from the natural congress of quadrupeds or the incubation of oviparous animals" (1675, p. 96). So, for example, a bird incubating the egg of another species would effect a transformation in the chick – another "metamorphosis" (1675, p. 89).[9]

As if in recognition that such a natural explanation exceeds the bounds of what is strictly naturalistic – metamorphoses run riot simply reproduce chaos – Kircher suggests that one act of divine intervention was necessary to purify the races of animals: this was the function of the flood. And yet, the flood was itself a topic uniquely suited to exposition through Ovid. Kircher does indeed quote him for a long description of the disaster (1675, p. 125) and for the story of the regeneration of mankind. The metamorphosis of the stones of Deucalion and Pyrrha is allegorised in Jesuit fashion as the humanising impact of religious education

[9]Rowland (2004) notes that in the *Itinerarium exstaticum coeleste* (an account of a journey through the solar system published in 1656), Kircher locates the origin of panspermia in the Sun, and suggests the influence of Giordano Bruno. Panspermia in this work is described in distinctly more spiritual terms than is implied by its association with chaos: "I do not want you to take panspermia in the sense in which the seeds of earthly things really contain [them] in actuality; but rather in a virtual sense of emanation."

(1675, p. 125). Discussing the change in the appearance of the earth after the flood, Kircher quotes Ovid (*Met.* 15.262-268), describing these changes, a little later, as *metamorphoses* (p. 188, 190; Ovid quoted again at p. 191). These metamorphoses are ongoing and part of the earth's animal life ("diseases and alterations") and not purely the result of the flood. Thus, although it somehow regulates natural production, the flood is far from eradicating metamorphosis.

Kircher's description of the earth after the flood in the *Arca Noe* makes extensive use of his earlier and most celebrated work, the *Mundus Subterraneus* (1678, vol. 1, pp. 76-7). This work takes up metamorphosis at much greater length, in the first volume, primarily on the topic of water. The water cycle is an "amazing metamorphosis" through all four elements exemplifying the everlasting conservation of fire within the earth (1678, vol. 1, p. 113). This fire also effects metamorphoses in rivers (1678, vol. 1, p. 248). In 1660 an earthquake in the Pyrenees converted hot springs "by a sudden Metamorphosis" into freezing waters. But a more "prodigious metamorphosis" is afforded by the waters of Clermont in the Auvergne, which turn whatever they touch to stone (1678, vol. 1, p. 283). Ovid furnishes a quotation to describe the hot springs at Palica in Sicily (*Met.* 405-6; p. 289). Water is the most marvellous of all the elements, explains Kircher, able to "convert all things into rock, iron, or copper, through a certain metamorphotic force, accelerate ageing, swell with divinatory power" (1678, vol. 1, p. 296). Ovid describes the Lyncestis tasting like wine (1678, vol. 1, p. 296). All these metamorphoses have naturalistic explanations: the metamorphic force of water is provided by a *succus lapidificus*, which is "nothing other than a humour of insensible corpuscles from the veins of rocks, formed from a mixture of abrasions from areas of natron and salt." Kircher even devises an experiment to prove this (1678, vol. 1, p. 302). In a section on the "various metamorphosis of lakes, rivers, founts and mutations of parts of the earth" Kircher reminds us that "there is nothing so solid, nothing so robust and strong that *tempus edax rerum* at last, if it does not destroy it completely, will not so mutate and alter it that at another time it will scarcely be recognised" (1678, vol. 1, p. 311). Subterranean fires

are responsible for half of these "marvellous metamorphoses of the Terrene Globe" ("internal mutation"); the rest is wrought by flood ("external mutation"; 1678, vol. 1, p. 312).

In the second volume of the *Mundus*, Kircher passes from the description of the structure of the earth to the fruits that it bears, starting with stones. Here, metamorphosis features primarily in Kircher's discussion of colours, upon whose astounding variety and difficulty of investigation he digresses at length (1678, vol. 2, p. 9). Nonetheless, Kircher not only posits a complicated chemical scheme to explain the variety of colours, but suggests a range of experiments to generate them artificially (again described as "metamorphoses"; 1678, vol. 2, pp. 12-13, 19). Returning to the subject of "lithometamorphosis, or things which are converted into stone", Kircher offers five canons to explain the variety of possible mechanisms (1678, vol. 2, p. 50), and relates further remarkable examples, such as the petrification of an entire village ("by a certain marvellous metamorphosis"), including men, animals, trees, furniture, and food (1678, vol. 2, p. 53). In a section on the birth of dragons, Kircher notes that monsters are produced by the "the confluence of different seeds": "this occurs most greatly and most often in insects, as their marvellous metamorphosis testifies enough and more than enough" (1678, vol. 2, p. 101). Eggs change their shape and undergo other "metamorphoses" when they are transported from the Americas to Europe (1678, vol. 2, p. 134). But the "ineffable wisdom, the power and the glory of GOD the best and greatest shines out" in no properties so much as those of Mercury; its "marvellous spirit" can be "transmuted into a stone, as if it had seen the Gorgon" purer and more powerful than any other crystal (1678, vol. 2, p. 171). On the following page this ability to vaporise and solidify is described as a "sudden metamorphosis" (1678, vol. 2, p. 172); there is equally a "metamorphosis of the other minerals" (1678, vol. 2, p. 176) – the metamorphosis of bronze into silver (1678, vol. 2, p. 235), of iron into bronze (1678, vol. 2, p. 242). Metamorphosis is described as the ultimate aim of the chrysopoetes (1678, vol. 2, p. 274).

The discussion of metals afforded Kircher an opportunity to formulate his relationship to Paracelsus explicitly. Kircher explains that metals all share the same matter and hence can

take on different forms under the influence of different seeds; lithometamorphosis is cited as an outstanding example of this, but so is the "metamorphosis" of plants into one another, as well as from and into compost (1678, vol. 2, p. 275). While he affirmed the possibility of transmutation in this sense, Kircher disagreed strongly with what he understood to be Paracelsus' claim that the mechanism of such transmutations was a form of magnetism (i.e. invisibly acting sympathy). "It is clear that Paracelsus was of such a mindset that if he heard anything strange and admirable in the Nature of things, whether true or false, he straight away translated it into his nonsense, in case he should seem ignorant of any inner mysteries of Nature, or rather fables." (1678, vol. 2, p. 277) Of course this is a description that we might well wish to assign to Kircher himself. All but plagiarising Libavius, Kircher goes on to criticise opponents of Paracelsus who hid their ignorance under allegorical interpretations of Ovid's *Metamorphoses*, Aesop's Fables, the Golden Fleece and the Song of Solomon, and "call[s] the process of the whole art of transmutation back to the anvil" so as to elucidate it clearly and logically (1678, vol. 2, p. 278).

Despite this distancing from both Paracelsus and Ovidian allegory, Kircher makes frequent use of the doctrine of signatures in explaining spontaneous generations associated with Ovid. He cites Ovid's description of the birth of creatures in the mud of the Nile (Met. 1.426-429) in order to prove that "mice are found with the work of the genital earth and water half-done [*inchoato*]" (a reference to Pliny), or, as Ovid puts it "one part lives; the other part is crude earth." Similarly, Kircher describes a species of "xylophyte" that is born from the branches of Laburnum, and whose "stupendous metamorphosis" he has often exhibited, when partly moving and partly still composed of wood, they can be seen to separate gradually from the branch – "a rare and monstrous birth" (1678, vol. 2, p. 372). Particularly interesting is Kircher's discussion of "marvels concerning the signatures of Orchids" (1678, vol. 2, p. 368). Kircher notes that there are Orchids containing the signatures of all sorts of animals, but particularly insects. These signatures, he suggests, are formed by the sperm of larger animals that spills onto the ground during mating season.

But in order to get us from these larger animals to orchids, there must be an intermediate layer of similitude: thus, Kircher observes that bees, for example, share a resemblance with cows, so that the bee-shaped Orchid (*apiformis*) is explained as originating from bull sperm. In turn, the power of the resemblance between bees and cows is proved by another famous case of spontaneous generation – the generation of bees from dead cattle (1678, vol. 2, p. 369; *Met.* 15.364-367). Similarly, the generation of scorpions from basil is explained by the mutual *amicitia* between the plant and the animal suggested by the scorpion-shape of its root; that this similitude is the operative cause is again proven by the fact – supported with *Met.* 15.369-71 – that scorpions are generated from buried crab claws (1678, vol. 2, pp. 373, 388). The "wonderful metamorphosis" of the silkworm, born from the mulberry in the manner of zoophytes, is proved by the resemblance (when viewed beneath a microscope) of the leaves of the mulberry to silk (1678, vol. 2, p. 381). Such explanations demonstrate a particular freedom in the interpretation of similitudes, extending those found in Ovid to account for a much wider variety of phenomena, similar only in the second-degree.

6.3 Galilean metamorphosis

As we might expect, Galileo participates fully in the discourse which reinforces philosophical truth by the exclusion of the *Metamorphoses*. Famously, Galileo rejects philosophy derived from books in general, comparing those who weave their philosophy out of quotations of Aristotle to painters like Arcimboldo (1526–1593), who compose images out of other images. In asserting that a painting should be composed of colours that bear no resemblance to the images they compose, Galileo recapitulates, though at one remove, his distinction between primary and secondary qualities in the *Assayer*.[10] In turn he compares "Arcimboldesque" philosophies of nature to alchemical allegories of the *Metamorphoses*, perhaps in part be-

[10]Biagioli observes that "Sagredo/Galileo's attempt to move from alphabetical to pictorial representation is only partly tenable. The relationship between colors and things depicted is not as arbitrary as between letters and concepts or things" (2007, p. 237, n. 58). The representation of the relation of primary to secondary qualities "at one remove" – i.e. through an analogy – is a persistent feature of Galileo's discussion of them, exemplified most famously in his retention of the metaphor of the "book" of nature, and closely

cause of Arcimboldo's own interest in alchemy and the association of his *Four Seasons* with Ovid in a eulogy written to accompany their dedication (Kaufmann 1976, p. 285).[11] The relevant passage occurs in the first dramatic "day" of the *Dialogue Concerning the Two Chief World Systems* (*Dialogo sopra i due massimi sistemi del mondo*, 1636), Galileo's *summa* of arguments for the Copernican hypothesis:

> Since you believe that by the collection and the combination of various particles you can draw out the juice, then what you and the other redoubtable philosophers do with the texts of Aristotle, I will do with the verses of Vergil or Ovid, making centos to explain with them all the affairs of men and the secrets of nature. But why do I say Vergil or any other poet? I have a little book shorter than Aristotle and Ovid, in which are contained all of the sciences, and with a tiny amount of study others can form a perfect idea of it: and that is the alphabet; and there is no doubt that whoever knows well how to pair and order this vowel with this consonant, or that other one, will dig out the truest replies to every doubt, will draw from it the teachings of all the sciences and all the arts, in just the same way that a painter, from diverse simple colours, placed separately on his palette, by mixing a little bit of this with a little bit of that, and that other one, will figure men, plants, buildings, birds, fishes, and in sum, will imitate all visible objects, without there being any eyes or feathers or scales or leaves or stones on his palette. In fact, *it is necessary that none of the things to be imitated, or any part of them, be actually among the colours*, if with them you wish to be able to represent everything; if there were, for instance, feathers, they would not serve to depict anything but birds and feather-dusters.

related to his retention of the term "metamorphosis". Lambert (2002, p. 57) argues that Galileo's description of the arcimboldesques evokes his own use of images in the *Sidereus Nuncius*.

[11] The eulogy, by Giovanni Battista Fontana (1525–1587) went unpublished, but Gregorio Comanini (1550–1608), who also produced a dedicatory poem with vaguely Ovidian content, remarked in his art-theoretical treatise of 1591 that Arcimboldo had surpassed the achievement of Ovid's *Phantasos* (Comanini et al. 2001, p. 28). The recent response of Maiorino (2003, p. 89) echoes that of Galileo: "such ensembles in fact parody metamorphosis by confusing a functional organism with a mechanical assemblage."

(OG vii, pp. 134-135; my emphasis)

In the exchange that follows, Galileo compares the Aristotelians to alchemists who obsessively extract the same meaning from the ancient myths – Endymion, Actaeon, Danae, Semele, Mercury, Proserpina, the Golden Bough – myths largely, though not exclusively, drawn from the *Metamorphoses* (OG vii, p. 136).

In line with such criticisms of Ovid, whenever "metamorphosis" appears in a positive light in Galileo's writings it carries no explicit reference to the *Metamorphoses.* However, the contexts in which the term appears nonetheless suggest a reception of the *Metamorphoses* in the abstract, or at least the mode of science which had formerly made such explicit use of it, insofar as they are moments at which Galileo invests in the truth of resemblances, illusions or fiction. The first of these moments follows Galileo's discovery of a "most extravagant marvel" in the heavens in July 1610. He had observed for the first time "that the star of Saturn is not one only, but composed of three, which are almost touching, and never move or mutate amongst themselves" (OG x, p. 410). It would be decades before astronomers understood that what Galileo had observed were rings. Although they did not move like planets, Saturn's "children", as Galileo called them, were, unbeknownst to him, slowly changing their aspect. At some point before December 1612 he looked at them again to find that they had completely disappeared. This realisation was the motivation for Galileo's first published use of the term metamorphosis, in his *Letters on Sunspots*, a polemical exchange with the Jesuit astronomer Christoph Scheiner in which Galileo argued, against the Aristotelians, that sunspots demonstrated the mutability of heavenly substance:

> Now, what can be said about such a strange metamorphosis [*metamorfosi*]? Perhaps the two lesser stars were consumed like sunspots? Perhaps they vanished and suddenly fled? Perhaps Saturn has devoured his own children? Or was it an illusion and a fraud, the appearance with which the lenses have deceived me for so much time, along with so many others who observed them on several occasions?
>
> (OG v, p. 237)

In this case, the truth lay in the surface appearance more than the depths. Whereas Scheiner had refused to take such mutations at face value, Galileo's letters are an attempt to validate the truth of such (non-)illusions, insofar as they directly indicated the mutability of heavenly substance (see the commentary in Galilei and Scheiner 2010). Galileo emphasises repeatedly that one can only speculate about the true nature of the sunspots and compare them to similar phenomena on earth (OG v, pp. 105-6): the body, if it is not a shadow, a reflection, and a surface, is unknowable.[12] Scheiner, by contrast, dismissed the notion of the mutability of the sun by arguing that the sunspots were "mere" appearances, shadows of invisible solar moons. His claims rested in part on the unprecedented lengths he had gone to to eliminate the possibility of being mislead by the visual artefacts generated by the telescope itself. All optical instruments generate such artefacts, which today are called "narcissus effects": Scheiner called them "monsters" (*monstra*, OG v, p. 57) and he was the first to systematically catalogue them (Figure 7). Like a new Perseus, Scheiner promised to "rip the masks off these monsters" (*larvas demamus primum portentis istis*, OG v, p. 61). This attempt to remove the false shadows from the telescopic images was paralleled by his attitude to the supposedly real shadows (in fact, not shadows) that the images revealed, which he explained by positing the solid but invisible solar moons: "whatever shadows appear, they will not be shadows, but true circumsolar bodies" (*non umbras, sed vera corpora*, OG v, p. 61).

By way of allusion to Dante's play on the possibility of falling into an error that is opposite to that of Narcissus (*Par.* iii, 10-18), Galileo does tinge his promotion of the veridicality of illusion with a hint of Ovidianism, implying a positive reception of the poet (see Reeves 2009 for a full explanation of this complicated device). Indeed, Ovid himself could have given Scheiner the lesson in the value of the surface that Galileo provides, for Ovid's Perseus had

[12]"And in the same way I do not understand more of the true essence of earth or fire than of the Moon or the Sun: this knowledge is that which is reserved for our understanding in the state of beatitude, and not before. But if we wish to stop at the apprehension of certain affections, there does not appear to me to be any need to despair of being able to trace them, also in the bodies most distant from us, no less than in those that are close by" (OG v, pp. 178-179).



Figure 7: Scheiner's "monsters" (OG v, p. 57).

survived his encounter with Medusa only by looking at her in the mirror of his shield.[13] But the most explicit allusions are, at least on the surface, still purely negative, and reminiscent of the old alchemical trope of the metamorphosis of the scientist. Scheiner seems to say that, by ripping off the mask, he looks at the face of Medusa directly. Similarly, in desiring *non umbras, sed vera corpora*, Scheiner had unwittingly precisely replicated Narcissus' mistake as Ovid describes it.[14] Perhaps picking up on these echoes, Galileo suggests that Scheiner's desire to look into the depths is really an inability to see beyond himself ("misura nostra"), and subjects him to exactly the metamorphosis he would like to avoid:

> And if her small mutations do not threaten the Earth with her total destruction, and they are not so much imperfections as her greatest ornament, why do you deprive the other bodies of the world of them and fear the dissolution of the sky through alterations no more inimical to the conservation of nature than these? I suspect that our desire to measure everything with our own limited measure makes us run into strange fantasies and that our particular hatred of death makes fragility hateful: yet, on the other hand, I am not sure how dearly we would wish, in order to become less mutable, to encounter the head of the Medusa, which would convert us into a marble or a diamond statue, depriving us of our senses and other movements, which would not be able to subsist in us without corporeal alterations.[15]
>
> (OG v, p. 235)

[13] "but he looked at the form of the horrendous Medusa in the air that rebounded from his shield" (*Met.* 4.782-3).

[14] Cf. Ovid's *corpus putat esse quod umbra est* (*Met.* 3.417). Not only did Scheiner mistake the sunspots for planets, but he mistakenly thought that he had observed a fifth planet orbiting Jupiter, which was similar to them.

[15] This reference to Medusa should be read alongside a fragment in which Galileo mocks Lodovico delle Colombe and Vincenzo di Grazia for their disbelief in the solar origin of sunspots by comparing them to Midas: "They do not recognise their simplicity when they reckon the perfection of a body to be greatest when it has a perfectly spherical form; that would be an extreme misery, similar to the request of Midas" (OG iv, p. 446). Reeves (1999b) discusses this fragment in the context of an analysis of the implications of Copernicanism for theories of economics.

Galileo would repeat this image of the petrified astronomer in the first day of the *Dialogo* (OG vii, p. 84), which contains the next occurrence of "metamorphosis", and goes over much of the material from the letters on sunspots. But there is something new: the connection between the mutability of celestial substance and the new doctrine of inertial motion that Galileo also briefly announced in those letters now receives much fuller discussion. After explicating the Aristotelian theory of matter, in which the elements each have a different "simple motion", defining its essence (e.g. earth moves naturally down, heavenly substance moves naturally in circles), Galileo goes on to critique the notion of "substantial change", that is the transformation of one essence or simple motion into another. In contradistinction to transmutation, Galileo's spokesman in the dialogue, Salviati, adopts the term metamorphosis to describe the changes resulting from purely mechanical local motions of parts, which themselves remain unchanged:

> Moreover, I never was very comprehending of this 'transmutation of substance' [*trasmutazione sustanziale*] (speaking always in purely natural terms), by which a material is so transformed that one must necessarily say that it is completely destroyed, so that nothing of its prior essence remains, and that another body, utterly different from the first has been produced from it; and imagining for myself a body under one aspect and a little later under a different aspect, I do not regard it as impossible that the transformation occurs by a simple transposition of parts [*una semplice trasposizione di parti*], without corrupting or generating anything new, because we see similar metamorphoses [*metamorfosi*] happening all day long.
>
> (OG vii, pp. 64-65)

Galileo is explicitly addressing biological transmutations (he mentions the generation of flies from wine must) that would commonly have been described as metamorphoses, maybe even illustrated with a quotation from Pythagoras. So it is that, a little later, the simple-minded Aristotelian Simplicio insists that "in sum this face of the earth is in a perpetual

metamorphosis [*perpetua metamorfosi*]; none of these sorts of mutations is visible in celestial bodies" (OG vii, p. 72). Yet there is a catachresis in Galileo's use of the term, since he is not speaking about biological transformations at all, but mechanical interactions of parts. Salviati's metamorphosis describes a change of something that both does and does not change; strictly speaking, it only moves. It would seem inappropriate to speak of such a change as "mere" illusion; on the other hand, it is only a change of aspect.

When, the Jesuit Antonio Rocco (1586–1653) responded to Galileo's *Dialogo* in a defence of traditional astronomy, Salviati's description of the "metamorphoses we see all day long" as mere exchanges of parts struck him as particularly absurd: "If you do not speak of the masquerades or fabulous mutations of Proteus – in a dream, however – of the costume-changes of Mercury, of layers of encrustation ["inorpellamenti incrostature"], I for my part never see [these metamorphoses], have never seen them, nor do I think I shall ever see them" (OG vii, p. 612). The concept of metamorphosis is naturally vulnerable to this kind of attack – similar to the attack that Galileo levels against the astronomers whom he compares to Medusan statues – since it preserves the suggestion that a change involves something deceptive or miraculous. But that is why Galileo had good reason to retain it. If not by some mysterious metamorphosis, how do "simple transposition of parts" produce the complex and corruptible bodies with which we are surrounded? More particularly, how do such simple motions produce the grand organism that is the focus of the dialogue: the solar system?

The reasons for the retention of "metamorphosis" are best illumined by turning to the exchange that may have motivated Galileo's dismissive remarks about the book of Ovid in the *Dialogo*: the controversy over the three comets which appeared in 1618, and its climax with Galileo's *Assayer* (*Il Saggiatore*, 1623). The controversy, beginning with a *Disputatio* published by the Jesuit Orazio Grassi in order to explain the significance of the comets' failure to exhibit parallax (a shift relative to a fixed background when observation is made from a different position, which decreases with the distance of the object), has several

instalments. Galileo launched a vicious critique of this *Disputatio*, publishing a *Discorso delle Comete* in the name of his student Mario Guiducci (1619). Grassi, incensed, responded to this *Discorso* point by point in a tract entitled *Libra Astronomica et Philosophica*, writing under the pseudonym Lothario Sarsi. Galileo's reply to this work was *Il Saggiatore*. Some further exchanges which followed can be ignored for our purposes. In this series of cuts and thrusts, specific debates about technical issues, such as parallax measurements, the nature of telescopic magnification, the mechanisms of heat-generation, and the directions of celestial motions, are blended into a broader debate about scientific method. At a key point in the controversy, Grassi invoked the authority of Ovid – "Ovid, an expert [*peritus*] not only in poetics, but also in mathematics and philosophy" (OG vi, p. 163). It was in response to this solecism that Galileo introduced the distinction between primary and secondary qualities, and made what is frequently considered to be the first programmatic statement of the epistemology of the new mechanical science. However, arguing tenaciously in favour of the erroneous opinion that the comets were not real bodies, but mere tricks of the light, this was an exchange in which Galileo took the critique of false resemblances, and false books, to such an extreme that it began to auto-destruct, making more apparent than ever the importance of retaining something of the *Metamorphoses* within scientific discourse, if only the value of fiction in the abstract.

6.4 Galileo's *Assayer*: the suicide of suspicion

An initially surprising aspect of the controversy on the comets is that the theory Grassi first announces in the *Disputatio*, and to which Galileo responds with the utmost hostility, is markedly anti-Aristotelian. Whereas Aristotle argued that comets were sublunary gases whose motion had set them alight, Grassi followed Tycho in placing comets in a superlunary sphere.[16] He argued that the way in which the comet's tail pointed away from the sun,

[16]Tycho's cometary theory implied the impossibility of crystalline spheres and sometimes led to the rejection of quintessence. Barker and Goldstein suggest that Tychonic cometary theory could therefore be

combined with the regular motion of its light, precluded any kind of chemical processes (OG vi, p. 36). Above all, the absence of parallax was geometrical proof of their very great distance. Galileo did not support Aristotle either, arguing that air would not provide enough friction to ignite a comet. Instead, according to him, the comet was a reflection of the sun on a gaseous exhalation of unknown size and substance. The linchpin of Galileo's argument was that the absence of parallax implies that objects are very distant only if it has first been shown that those objects are not mere reflections. An image of the sun reflected in a mirror shows the same – immeasurably small – parallax as the sun, although the mirror may be very close. Galileo gives some examples of atmospheric reflections that obey this rule – rainbows, parhelia, haloes – claiming that Grassi is unable to rule out the possibility that the comet is an image of this sort.

Grassi felt, however, that the simple appearance of the comet was enough to show that it was no reflection. Above all, its image was sharply defined, like a star. As Galileo was suggesting that the mirror producing the comet could be a gaseous exhalation of some kind, Sarsi countered that clouds do not offer sharply defined images like mirrors: when clouds are exposed to the sun, no image is seen, but the cloud itself is diffusely illuminated. If the comet were a reflection in a cloud, it would look like a cloud, not a sharply drawn circle of light. In response, Galileo needed to show that Grassi's distinction between the illumination of clouds and the reflections that we see in mirrors was spurious. What he assumes in order to do this, is a scepticism that verges on the hyperbolic. He begins by condemning Grassi's

considered a more significant marker of the Scientific Revolution than the Copernican world-system, although they dismiss the idea of a revolution (Barker and Goldstein 1988). Drake explains the apparently unwarranted savagery of Galileo's response by suggesting that since he was at this point banned from discussing the details of Copernican cosmology, he was searching for a "pretext" to launch a more abstract programme of methodological reform (Drake 1960, p. xiv). Copernicanism is hardly absent from the *Discorso*, however, since it was a vital if unspoken component of Galileo's explanation of the comet's motion. Shea suggests that Galileo viewed the failure of comets to show the ordinary stations and retrogressions of the planets as the strongest evidence for a Tychonic as opposed to a Copernican cosmos, and therefore went to great lengths to prove the comets illusory (1972, p. 86). Chen and Gal (2013) suggest that Galileo's ire is provoked by Grassi's argument that because the comet is not magnified in the telescope, it must be a distant object, like the stars. If true, Grassi's assumption that magnification decreases with distance would have negated Galileo's claim that the telescope showed stars more accurately by stripping away an illusion of the eyes.

confidence in his ability to distinguish true and false images as a form of narcissism, picking up on the literalistic twist Ovid had given to the elegiac trope of comparing stars to eyes. Narcissus "looks at his eyes, twin stars" (*Met.* 3.419-20) but the appearance of (false) real stars in puddles is an illusion noted by Lucretius (4.414-419: see Hardie 2002):

> I confess to not have such a perfect discriminatory faculty, but to be like that monkey which firmly believes he sees another monkey in the mirror, nor does he recognise his error before running round behind the mirror to grasp it four or six times, if that living and true simulacrum represents him so well. And supposing that those which Sarsi sees in the mirror are no true and real men, but vain simulacra, like those which we others see, I would be very curious to know what are those visual differences by which he so readily distinguishes the true from the fictive ...Merely spitting on the ground, without anything else, Sarsi will see, from the place where the reflection of the solar ray originates, the appearance of a most natural star...Sarsi must concede that the Suns and Moons and stars seen in calm water or in a mirror are true suns, true Moons and true stars.
>
> (OG vi, pp. 277-278)

Galileo goes on to explain that Grassi has no way of knowing when he sees a brightly illuminated cloud whether it is true that the entirety of the cloud is illuminated, especially if clouds are thought to be transparent under normal circumstances. If, in fact, the cloud is very large, with only the part that reflects the image of the sun being made visible, then this visible spot will behave like a reflection in a mirror, shifting across the surface of the cloud with every movement of the observer. The conditional is an exceedingly remote one, however, since illuminated clouds exhibit a very large degree of parallax. Indeed, the parallax of the cloud is just what allows Grassi to claim that the entire cloud is illuminated. Galileo is cognisant of this difficulty. He confronts it as follows:

> Furthermore, there is no reason the whole [cloud] could not appear illuminated and nonetheless be an illusion, which would happen if it were not greater than

> the space which was occupied by the image of the Sun. This would occur in the way that if, for example, seeing the image of the sun occupy as much space in a mirror as a fingernail, we cut away all that remained, there would be no doubt that this small mirror could appear entirely bright. Yet further, when the little mirror was smaller than the image, then not only would it appear entirely illuminated, but the image in it would no longer appear to be moved with every movement of the eye, as it is in a large mirror; thus being incapable of reflecting the whole image of the Sun it would follow that on the movement of the eye, the reflection would be seen now from one part, now from another part of the solar disc; and thus the image would appear immobile...fixed, although in reality it would be mobile.
>
> (OG vi, pp. 284-285)

Thus, Galileo argues that objects seen because they are illuminated and reflections seen in objects that themselves remain invisible are in principle indistinguishable. He does not make the more limited claim that they are indistinguishable in comets because so little is known of their nature, although that would have been enough to show that parallax is inconclusive for judging the distance of the comet. Instead, he makes a larger claim, that everything is, in this way, like a comet. All objects that show us their own shapes rather than the image of the light that illuminates them potentially do so through "illusion." By the reasoning advanced in this paragraph, the appearances of the planets, the moon, and any terrestrial object that is not itself a source of light, is an illusion, the reflection of an image that moves with the observer. In every case, all we are truly looking at is a reflection of the sun.

This paradoxical conclusion is reinforced by the long digression which follows, in which Galileo tries to show that objects that appear to lack the reflectivity of mirrors are in fact just "a multitude of mirrors" whose reflections are not accurately distinguished by the eye (OG vi, p. 285).[17] By analysing what happens to a reflection on a progressively ruffled sea, a

[17]Cf. "moltitudine di piccoli specchietti locati in varie inclinazioni, in mille e mille modi esposte all' occhio" (OG vi, p. 287). The conclusion, that although a cloud appears to be stable "one cannot be sure on that

continuous line is drawn between simple reflection, which shows an image of the light source, and scattered reflection, which shows the body of the reflector. The substance is irrelevant, claims Galileo; absolutely every surface is, in the end, just an assemblage of simple reflections and every appearance suggesting otherwise is as deceptive as a rainbow.[18] "Are not the same illusions of different colours seen in the plumage of many birds when the Sun strikes them in various ways?" Galileo asks, appealing to a standard trope employed by the sceptics. "But what else? I would say to Sarsi something perhaps new, if something new could be said to him. Let him take whatever material he likes, whether stone or wood or metal, and holding it up to the Sun, examine it most attentively: he will see there all the colours divided into most minute particles" (OG vi, p. 290). The entire phenomenal world, looked at in enough detail, turns out to be nothing but a hall of simple mirrors. For the Galileo of *Il Saggiatore*, nature "produces its effects in a manner unknowable by us...far from all our imagining" (OG vi, p. 281). But reflections all depend entirely on the position of the observer.[19]

The hardline division between truth and reflection corresponds to an equally hardline approach to the metaphor of the "book" of nature in this essay. Galileo makes an absolute distinction between rhetoric and geometry. *Tertium non datur*:

> If as to the fact there is no medium between the true and the false, thus in necessary demonstrations one either concludes without doubt or paralogises inexcusably. No space is left to keep one's footing with limitations, distinctions,

basis, that its illumination is something more real than a halo, a parhelion, a rainbow, or the reflection on the surface of the sea" is subsequently repeated (OG vi, p. 287).

[18]Coincidentally, Ovid's expression for the rainbow – *spectantia lumina falli* – was used in George Buchanan's 1555 poem *De Sphaera* to describe the insensible slipping of the earth alleged by Copernicans (Buchanan 1715, vol. 2, p. 120). Buchanan may also have been thinking of Palingenius' description of how the distance of the planets makes them appear smaller (*Quippe aliquid, quanto est longinquius, esse videtur / Tanto etiam minus, et spectantum lumina fallit*, Z. V. xi, 454-5).

[19]Visible objects are of two kinds: some, true, real, individual and immobile; others are only appearances, reflections of light, images and wandering simulacra, which have in their being such and so great a dependence on the sight of the observer that not only do they change position when he does, but I believe that if you took away sight, these also would completely vanish" (OG vi, pp. 65-66). These simulacra are so slippery that with the movement of the observer they "change, and not only their place, but even their essence" (OG vi, p. 71).

> distortions of words or other pinwheels, but one must in a few words and at the first assault be Caesar or nothing.
>
> (OG vi, p. 296)

Not only is the book of learning that is now up for rejection – uniquely, in Galileo's rejections of books – that of Galileo's favourite poet, Ariosto, but the book of nature that replaces it is – again, uniquely in Galileo's repeated use of the trope of the book of nature – utterly geometrised:

> And perhaps he thinks that philosophy is a book and a fantasy of a man, like the Iliad or Orlando Furioso, books in which the least important thing is whether what is written is true. Signor Sarsi, the thing is not thus. Philosophy is written in the greatest book, which stands continually open to our eyes (I mean the universe), but it cannot be understood without first learning the language, and recognising the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures; without these means it is humanly impossible to understand its meaning; without these there is vain wandering through an obscure labyrinth.
>
> (OG vi, p. 232)

Galileo's several remarks about poetry in the controversy reflect the mathematical abstraction to which he would like to limit nature's book. In the *Disputatio,* Grassi had declared that the comet was a god, recognisable by her footstep (as Venus at *Aen.* 1.405; OG vi, p. 33). In return, Galileo accuses the Tychonic description of comets of poeticising vacuously: but "nature takes no delight in poetry" (OG vi, p. 88).[20] Sarsi objected strongly: "I considered nature poetical always to this day" (OG vi, p. 117). But Galileo insists

[20]Tycho calls the comets "mimes [*mimi*] of planets" (Brahe 1913–29, vol. 4.2, p. 163). But Tycho's attitude to poetry was in fact very similar to that of Galileo in the *Il Saggiatore.* Tycho chided Cornelius Frangipanius for cited Ovid's *Fasti* in defence of an astronomical theory, reminding him that "painters and poets always had an equal right of making things up [*fingendi*], but not astronomers and mathematicians" (Brahe 1913–29, vol. 3, p. 257).

> that fables and fictions are in a manner necessary for poetry, that it cannot exist without them; but these lies are so abhorrent to nature that it is no less impossible a thing to find one of them there as it is to find shadows in the light. (OG vi, p. 234)

The analogy with light is particularly telling, since on other occasions Galileo underlines that the proper representation of nature depends on *sfumatura*, the blendedness of light and shade, the depiction of the earth-like surface of the moon being the prime example (see OG ix, p. 63, with Reeves 1999a, pp. 23-56 and Piccolino and Wade 2013, pp. 1-38, 64-83). In the black and white world of *Il Saggiatore*, however, there is, strictly speaking, no such thing as shade. Primary reflections do not coalesce into anything that is not "illusion". Thus, the nullity of the appearance of the comet is implicitly compared to the nullity of poetic fiction.[21]

It is on the issue not of reflection, but that of heat, however, that the parallel between the absolutist rejection of poetry and Galileo's peculiarly reductive attitude to the appearance of the comet comes through most forcefully. Here the scepticism extended to reflections is stretched to its limit, even to the extent of self-destruction. Aristotle's theory of comets supposed that fast-moving air would ignite. Grassi had argued that comets were of a different nature, but had not questioned this supposition. Galileo took it upon himself to refute the supposition as such. Again, he stepped well beyond the bounds of the dispute in doing so. It would have been enough to say that air does not offer sufficient friction, but Galileo goes further, using the principle of inertia to draw an absolute distinction between motion and heat: "I would venture almost to say that motion, *as simple motion*, cannot produce any alteration in the mobile body except a mutation of place, any more than if the whole were to remain at rest: because [according to the principle of inertia] a motion that belongs to the whole with all of its parts, with regards to the former and the latter, is as if nothing" (OG vi, pp. 55-56; my emphasis). In turn, Grassi put aside his disagreement with Aristotle's

[21] Drake warns us not to "ignore the linguistic consideration that was the source and whole point of Galileo's metaphor...We cannot gaze at partless points or breadthless lines" (1973, p. 17). This aspect of the metaphor remains important to the extent that – as I will show is indeed the case – Galileo fails to entirely banish poetry from nature.

cometary theory in order to defend the principle that rapid motion could cause combustion.[22] After noting that Seneca supports the claim that fast moving objects catch fire in the air (*N. Q.* ii, 56-7; OG vi, p. 165), he cites the additional testimony of several poets. Ovid is the first of these:

> But truly Ovid, an expert not only in poetry, but also in mathematics and philosophy, testifies that not just arrows, but lead bullets hurled from Balearic slings often catch fire in flight:
>
> > Not otherwise did he catch alight, than when a Balearic sling
> > Hurls a bullet: this flies and is inflamed as it goes,
> > And under the clouds it finds fires it did not have.
> >
> > (OG vi, p. 163; *Met.* 2.727-29)

Grassi goes on to quote similar evidence in Vergil, Lucan, Statius, and their common source, Lucretius. Galileo's response to this onslaught was of course to declare that the experience was a fiction: bullets do not really heat up in motion. But, as in the *Discorso*, he went further, arguing not only that heat is always an artefact of human perception, but denying entirely the reality of any of the so-called secondary qualities of matter. Among these he numbers, apart from heat, texture, colour, taste, sound and smell. Picking up what he had earlier said of the appearance of the comet, Galileo tells us that "on the part of the subject, in which it appears they reside, they are nothing other than pure names...so that if the animal were removed, all these qualities would be wiped away and annihilated" (OG vi, p. 248). The only realities are purely geometrical: "sizes, shapes, numbers, and slow or fast movements" (OG vi, p. 350).

As we have seen, the notion of metamorphosis arises in the *Dialogo* precisely in connection with the passage from "simple motion" to perceptible transformation. Its retention marks what remains in a painting over and above its constituent "simple colours". Here, it is

[22] "I desire nothing less than to fight on behalf of the opinions of Aristotle: whether the sayings of the great man are true or false does not delay me at present" (OG vi, p. 151).

claimed that there are no simple colours – or rather, simple colours are themselves fictions. Anything other than "simple motions" – by which is meant Galilean, relative, motions – is illusion. What then remains of metamorphosis?

At the same time as *Il Saggiatore* pursues a rigidly sceptical agenda by separating fiction from geometry, it is of course the most splendidly rhetorical of all Galileo's works, including a long fable allegorising scientific investigation, the famous "fable of the sounds".[23] Nor does Galileo himself shy away from poetic quotation, although the function of this quotation is never the provision of evidence. Grassi's appeal to poetry, especially Ovid, surely came as something of a gift in this regard. While the 'fact' that projectiles heat up was presented by Lucretius as empirical evidence for the materialistic explanation of lightning, in Vergil's hands it had already been 'remythologised' as a divine "portent" (*Aen.* 5.525-6). This was a dichotomy that Ovid, according to his standard practice, had intensified. In the passage quoted by Grassi, Ovid makes the flaming bullet the *comparans* of a simile in which the *comparandum*, the 'real' fact to be described, is the fantastical and purely metaphorical ignition of Mercury that occurs when he falls in love with the mortal Herse. While at one level the flight of the bullet resembles the flight of Mercury as he shoots down to the girl, at another level the trope deliberately recalls the distance between the worlds of fiction and of fact. Even as this distance is underlined, however, the simile itself, *qua* simile, is intended to figure the crossing of just this distance. That is, the passage from *comparandum* to *comparans* itself figures the materialisation of Mercury as he descends from the world of the gods to the world of mortals, as he breaks into reality from myth (Glinski 2012, p. 50). As Mercury becomes human, the human fact is correspondingly raised to the level of the fantastical and metaphorical. The result is, in part, to remind us that of all possible purely

[23]The rhetorical polish of *Il Saggiatore* is highlighted by Moss (1993, pp. 215-256) and Battistini (2000, pp. 125-181). Hall's more detailed analysis (2013) shows that Galileo repeatedly casts his clash with Grassi in epic terms; and that he draws a contrast between himself and Grassi in terms of the quality of their use of language. Hall points out, for example, that Galileo compares Grassi's writing to *intarsia* (OG vi, p. 261) and promotes the "simplicity" of his own style (OG vi, p. 330).

natural processes, a burning projectile is not only particularly literary, it is particularly unbelievable.

Although making no appeal to Ovid, Galileo reflected something of this superposition of fictionality and fact in the abstract in his own response to the trope. He initially agrees that the kind of phenomenon Grassi describes might not be impossible, pretending to disagree only about its cause. For, he claims, the "true cause" of the phenomenon can be found recorded in a different poet. He refers to Ariosto's description of the fracture of Ruggiero's lance in a dual:

> The splinters ascended to the sky:
> Turpin writes, truthful in this instance,
> That two or three fell back down in flames
> Which had risen to the sphere of fire
>
> (OG vi, p. 338; *Orlando Furioso* iii, 49)

The irony of this quotation is based, at one level, simply on the fact that its absurdity demonstrates why Galileo earlier opposed the book of Ariosto to the book of nature. At another level, however, the point is that Ariosto already marks his description as a fiction by citing from the famously unreliable chronicler, Bishop Turpin. In other words, Ariosto cites Turpin in just the manner that Galileo now cites Ariosto – "truthful in this instance". If Ariosto's appeal to Turpin is, as Looney (1996, p. 120) and Zatti (2006, p. 246, n. 42) argue, an imitation of Ovidian poetic practices, then perhaps we ought even to regard Galileo's appeal to Ariosto as likewise a kind of implicit Ovidianism.[24]

[24]There is a distinction to be made between the argument that Galileo means to compare Grassi's citation of unreliable sources to Ariosto's (e.g. Hall 2013, p. 95), and the argument I am making, that Galileo is comparing his own citation to Ariosto's. As Zatti has emphasised, Ariosto achieves a new level of irony in his use of Turpin, who had been a stock unreliable witness for earlier poets in the tradition. In particular his use of the trope moves beyond "the attitude of of limiting the marvellous" by employing an implicitly unreliable witness, towards that of "limiting the credibility of the real" (2006, p. 74), by simultaneously making explicit that the witness is unreliable, and insisting that his most unlikely claim is nonetheless true ("Turpin writes, truthful in this instance..."). This extra level of irony is, as Zatti suggests, something derived from Ovid. Compare, for example, the parenthetical remark inserted in the description of the birth of humans from the stones of Deucalion and Pyrrha: "who would believe this, unless its antiquity served as witness?" (*Met.* 1.400). Looney (1996, p. 120) points to an instance where Ariosto's use of Turpin can be shown to respond to a particular moment of unreliable narration in Ovid.

The main argument for regarding the citation in this way is that the philosophical problem it addresses is just the same problem that elicits a positive reference to metamorphosis in other contexts – in the letters on sunspots, in the *Dialogo* and in the second great dialogue, the *Discorsi e dimostrazioni matematiche, intorno à due nuove scienze* (1638), which we shall discuss in a moment. The problem is that of how it is possible for objects that are purely mathematical to produce the diverse phenomena that we perceive. Where do the secondary qualities come from? Motion that is purely relative – "simple motion" – can give rise only to a change of place. And yet, perversely, Galileo goes on to argue that despite the falsity of the projectile fact, "it was not said otherwise than very reasonably that motion is the cause of heat" (OG vi, p. 351). Grassi's Ovidian quotation turns out to have an unexpected relevance – not because projectiles actually catch fire, but because the way in which motion does produce heat involves something of the impossible transition from the divine to the human that Ovid's simile expresses. In his explanation of how secondary qualities are perceived, Galileo makes use of certain fictions, fictions which he at the same time denies. The quotation of Ariosto prepares us for this move, insofar as the twist in the Ovidian criticism of Turpin lies in the elaborate double-feint of the reality effect: it is not simply that the wonder is supported by the famous authority, Turpin, but it is highlighted as "truthful in this instance" against the background of a general scepticism towards that authority.

There is also the merest hint, in one of the examples that Galileo invents to demonstrate the subjective nature of sense experience, of the return of the earlier imagery of narcissism and petrifaction. Galileo asks us to compare moving a feather across a marble statue to moving it across a person: the one movement produces nothing, the other the sensation we call "tickling" (*sollecito*, OG vi, p. 348). Clearly, he argues, since the statue feels nothing, there is nothing in the motion itself that is inherently ticklish. But Galileo has chosen a very curious example, because it is a well known fact about tickling that not only is it impossible to tickle a statue, it is impossible to tickle oneself. It is, as it were, impossible to

reflect the sensation back to oneself without suffering a numbness, similar to the petrifaction induced by Medusa, or the metaphorical petrifaction attributed to Narcissus.[25] The example thus perhaps contains a tacit warning about mistaking Galileo's extremist mechanisation of nature for a form of solipsism. There is a way for Narcissus to see only his image, without that image being purely his own.

The explanation that Galileo gives of just how the senses perceive has in fact been taken to betray a lingering adherence to Aristotelianism and thus, implicitly, the regime of resemblances (Brown 1976, p. 350, n. 44).[26] Galileo seems to suggest that the shapes of particles divide them into at least three or four basic types corresponding to the traditional elements: those suitable for detection by the senses of touch, taste and smell correspond to earth, water and air. Hearing depends on the suitability of air for vibration. Heat is the sensation produced when the very smallest bodies, which Galileo calls "fire-particles" (*ignicoli*, OG vi, p. 351), penetrate the body. But at the same time as he defines different elements, Galileo strives to differentiate the sense in which these particles have an essence on his principles from the sense in which they might be thought to have an essence in an Aristotelian framework. The operation of *ignicoli*, for example, still depends entirely on motion: "when these were at rest, their operation would remain nothing...to excite heat, the presence of fire-particles is not sufficient, but one needs also their movement" (OG vi, p. 351). What makes these particles "fiery" is in fact only the readiness and speed with which they move, and that is provided by a geometrical quality: their "maximum subtlety" (*somma sottilità*, OG vi, p. 350), which gives them "penetration". This maximally fine material is what "we *label* [*chiamiamo*] with the general name of fire" (my emphasis), but we must not mistake the name for the essence (OG vi, p. 350). Similarly, the experiences of all the other senses are explained only by the shapes and motions of the relevant particles.

[25] On the flip-side, precise tickling can induce a statuesque repose in lobsters and certain other species.

[26] This view, however, contrasts with the dominant one, which takes Galileo's denial of the existence of secondary qualities at face value (e.g. Piccolino and Wade 2013, pp. 164-186): in my view this denial should not be taken too literally.

The imputation of a kind of Aristotelianism may perhaps stand to the extent that it remains mysterious how merely geometrical differences produce distinct physical behaviours. Galileo does not introduce any forces to explain how particles interact with each other. We feel this absence when he passes from the claim that fire particles are particularly mobile to the claim that they therefore have "penetration". At this point, Galileo goes so far as to absorb "penetration" as well as "touch" among the primary qualities ("figura, moltitudine, moto, penetrazione e toccamento", OG vi, p. 351). But particles conceived of discretely in their simple motion are incapable of "penetrating" anything, since all they do is move past other particles. Likewise, they cannot experience their contact with other particles as "touch" when their only activity is movement. In any case, it is clear that Galileo wishes to do two contradictory things: both show that sensations derive deterministically from the actions of primary bodies, and maintain an uncrossable gap between particles in their simple motions and the qualities of objects we interact with. That his aim is double and contradictory in this manner becomes particularly clear when he comes to discuss the sense of sight. For between light and the sensory organs there is apparently no geometrical proportion at all:

> And as the four elements have relations to the four senses considered, just so, I think, does light have a relation through the sight, the most eminent sense of all, but with that proportion of excellence which lies between the finite and the infinite, between the temporal and the instantaneous, between the quantum and the indivisible, between light and shadow.
>
> (OG vi, p. 350)

Galileo clearly does not wish to suggest that the relation between the finite and infinite is nothing, for there is the possibility of a physical transition from the one to the other. Indeed, this transition must occur constantly, not only in our sense organs, but in matter itself. For Galileo says that it may be possible for particles of heat to be broken down even further:

> And perhaps while the thinning and attrition is limited by the minimal particles, their motion is temporal and their operation calorific only; and then arriving at the ultimate and highest resolution into really indivisible atoms, light is created, with a motion, or I would say, an expansion or diffusion that is instantaneous, and capable of this by its – I do not know whether to say subtlety, rarity, immateriality, or some other condition different from all these, and nameless
>
> (OG vi, p. 352)

It turns out that even the minimal particles whose "penetration" we sense as heat are superstructures that bear, to the elements out of which they are constructed, the same relation as subsists between the finite and the infinite. What is truly substantial is perhaps not mechanically acting matter at all, but something immaterial. In addition, Galileo's description of the relation between sight with light in terms of a series of incommensurables is fraught with ambiguities. Let us look at them again in the Italian, since the translation I have provided above differs in a crucial respect from Drake's (see Figure 8):

> E come a i quattro sensi considerati anno relazione i quattro elementi, così credo che per la vista, senso sopra tutti gli altri eminentissimo, abbia relazione la luce, ma con quella proporzione d'eccellenza qual è tra 'l finito e l'infinito, tra 'l temporaneo e l'instantaneo, tra 'l quanto e l'indivisibile, tra la luce e le tenebre.
>
> (OG vi, p. 350)

First, it is unclear whether or not the superiority of sight enables it to apprehend directly the lowest level of indivisible and possibly "immaterial" substance. While Galileo says the elements relate "to" (Italian: "a") the other senses, he says that light has a relation "through" ("per") the sense of sight. We could read "per" as equivalent to "a", in which case the implication would be that sight relates to light as finitude to infinitude. But we could also interpret the incommensurable relation in question as one between light and the other senses, where "per" does not consign sight to the finitude of the other senses, but preserves it in a mediating role. Perhaps sight is a purely rational instrument – like the telescope as Galileo

portrays it in this work – that itself apprehends reality as it really is, but translates its apprehensions to the other senses only in an obscure form. There is also a question about precisely what is up for comparison in the relation between light and the sense to which it is related, and the other relations listed by Galileo:

	light	**sense**
	infinite	finite
	instantaneous	temporal
	indivisible	extended
a) text *ad litteram*:	shadow	light
b) Drake's reading:	light	shadow

Figure 8: Galileo's (dis-)analogies between light and sight.

It would be fair to assume that the *tertium comparationis* in the analogy is solely incommensurability, and that it does not matter in which columns we place the terms in Figure 8. If we wish to read more deeply, we have two options: either we parse the list of oppositions exactly as Galileo gives them (a) and understand that, for the sense, light is in its infinity equivalent to darkness; or, if that seems like nonsense, we can, with Drake (b), understand the co-ordination of the final "light and shadow" to be implicitly reversed, so that in fact it is sense which is like darkness.[27] It does not matter which of these readings we choose insofar as the mysteriousness of the transition from light to sense is concerned. In either case, we should closely connect the transition from light to darkness both with the earlier claim that all objects are really simple mirrors, and with the simile in which Galileo stated that nature admits of as much poetry as light does darkness. Insofar as there is a transition between light and matter, or between matter and the senses, there is a transition from primary to secondary reflection, from light to shadow, a transition which can only be poetical – a metamorphosis. The summing up of a multitude of mirrors to body forth an object involves the

[27]Drake translates: "between the finite and the infinite, the temporal and the instantaneous, the quantity and the indivisible; between darkness and light" (Galilei and Grassi 1960, p.131).

same transition. Even if sight is an exception to this rule, and can somehow perceive nature entirely stripped of its costume, poetry is unavoidable as soon as we begin to think about how sight communicates with the other senses.

It is useful to think about the difference between (a) and (b), however, since it neatly recapitulates the doubleness in the danger of narcissism which it is the function of metamorphosis to negotiate. On the reading *ad litteram* (a), sense illuminates a darkness (in fact an infinite light) that is outside of it. The light by which it sees is a light entirely its own, entirely other than the dark light that it illuminates. On Drake's reading (b), sense perceives light coming in from the outside, but it dims this light with its own darkness. These are the two poles across which Galilean metamorphosis, and the reception of Ovid in general, is stretched: the Pygmalion effect and the Narcissus delusion. In fearing the confusion of the shadows of sense with the light of reality, Galileo dismisses Ovid from natural philosophy; but in casting a light on nature through the sense, though in itself nature is completely dark and inscrutable, he finds it useful to retain "metamorphosis". In promoting his interpretation of sunspots, Galileo was at his most "Ovidian", but also his most empirically correct. In attacking Grassi, Galileo was at his most anti-Ovidian, but also at his most deceived with regards to the true nature of the phenomena.

Galileo emphasises on many occasions that the difference between human knowledge and divine knowledge has to do with the ability to grasp infinity (e.g. OG vii, p. 129). The birth of modernity has been associated with the realisation that infinity could be known through number. Whereas in antiquity and through most of the middle ages arithmetic and geometry were separate sciences, the former dealing with multitudes (aggregates of units or numbers), the latter with magnitudes (continuous quantities), at some pivotal moment this division is said to have collapsed, so that numbers became applicable to the analysis of continuous quantities as well. In the new mathematics, numbers are no longer identifiable with any real beings, but act as ciphers; they stand only for the relations that beings have among themselves. Now, "the numbers themselves", as it was put by the English mathematician

John Wallis (1616–1703), are "the indices [*indicia*] of all possible ratios whose common consequent is 1, Unity" (Wallis 1695, p. 183).[28] Galileo's thinking on the infinite, as it is elaborated in the *Discourses and Mathematical Demonstrations Relating to Two New Sciences* (*Discorsi e dimostrazioni matematiche intorno à due nuove scienze*, 1638), fits fairly neatly into the modern paradigm. Here, he confronts the problem of the composition of sensed bodies out of infinitely small parts raised in the *Assayer* by appealing explicitly to what he calls an "artifice" (*artifizio*). He explains that the old problem of the composition of the continuum is really no problem at all, since the very lack of proportion between the finite and the infinite means a continuum can be arbitrarily divided and marked as a unity. Unity itself, in other words, is identified with the continuum:

> Here I want to tell you something that will make you amazed, in the question of desiring or being able to resolve the line into its infinites [*suoi infiniti*] by applying the method someone uses in dividing it into forty, fifty, or one hundred parts...one is so far from being able to reach the sought after goal of indivisibles by such a method that rather one departs from it...going back to the beginning (because such a progression always distances itself from the sought for goal), if any number can be called infinite, that is unity...there is no infinite number other than unity. And these are some of the marvels that surpass the power of our imagination and that must make us realise how gravely they err who desire to discourse about the infinities with those same attributes that we use for finites [*a i finiti*]: these two natures have no harmony [*convenienza*] at all between themselves.
>
> (OG viii, pp. 82-83)

This claim comes in the midst of a discussion on the coherence of bodies, in which Salviati sets out to prove that a continuum is actually composed of an infinity of indivisibles (*compongono il continuo d'indivisibili*; OG viii, p. 77). In order to do so he must meet the

[28]The sentence first appeared in Wallis (1657, p. 71). The classical version of this narrative is that of Jacob Klein (1992). Heller-Roazen (2011) has recently re-articulated and elaborated Klein's ideas.

Aristotelian objection that because not all continuums are the same size, they cannot be actually infinitely divisible; and that they are so, therefore, only potentially. Galileo argues that the Aristotelians make the mistake of assuming that the infinite is the same as the series of countable numbers, or of finite divisions of a line, carried on forever. In fact, the countable numbers, which correspond to successive divisions of a line are something *between* the finite and the infinite:

> And speaking of discrete quantities, it seems to me that between the finite and the infinite there is a third median term, which is the correspondence with every assigned number [*rispondere ad ogni segnato numero*]; so that if asked, as in the present question, if the finite parts of the continuum are finite or infinite [in number], the most fitting response would be to say that they are neither finite nor infinite, but such that they correspond to every assigned number.
>
> (OG viii, p. 81)

The infinite itself is something radically heterogeneous from the countable series: unity itself, not countable because it is only one. Galileo produces many demonstrations to this effect; perhaps the most striking considers the continuous enlargements of a circle. Successive enlargements produce successively larger circles, but an infinite circle is not a circle at all. It is a straight line. Grasping the special nature of the infinite – its radical disharmony with the finite – is essential for understanding how bodies cohere and rarify. Particularly important is the claim that the same continuum can correspond to different finite assignments. Thus, a ball of gold could be enlarged to the size of a planet (Galileo's version of the alchemical quintessence!) without acquiring any more indivisibles than it already had. Thanks to the device of marking off some infinity by unity, it becomes possible to compare and measure such infinities. But nonetheless, the infinite being radically other from the finite, one should never confuse the mark of unity with a real quantity. It is nothing more than a useful artifice:

> The final and highest [division] would be that which resolves [the continuum] into an infinity of indivisibles, which I concede that one cannot reach by dividing

> successively into a greater and greater multitude of parts; but by employing the way that I propose of distinguishing and resolving the whole infinity with a single *tratto* [trait/brushstroke] (an artifice [*artifizio*] that should not be denied me), I would trust that they would have to keep quiet and admit this composition of the continuum from absolutely indivisible atoms, this especially being the road perhaps more than any other current of extricating oneself from many intricate labyrinths, such as, beyond those already touched on, the coherence of the parts of a solids, and understanding how the business of rarifaction and condensation takes place...
>
> (OG viii, pp. 92-93)

Such a concept of number, according to which ratios between real objects (continua of indivisibles) are determined through artifice, raises a dilemma: if numbers are merely indices of relations between continua, what, in the end, is the object they describe?[29] And if those objects are not directly knowable, lacking all harmony with the finite, how are we to know which of the relations they enter into are most significant? How are we to prefer one mathematical description over another? On the one hand, the lifting of natural philosophical knowledge directly from "the book of Ovid" seemed to offer an example of mistaking higher orders of transcription for the continuous processes that underwrite them; of, say, mistaking heat to be a primary quality. On the other hand, since the continuum itself is not transcribable directly, some artifice is required for the explanation of change, and the grounds upon which such an artifice is constructed and defended are as open to criticism as is the 'illusion' of a comet. Shortly after our passage on the artifice of the *tratto*, Galileo redresses what he seemed to assert about light in *Il Saggiatore*: now he says that it travels incredibly fast, but probably not infinitely fast; it too, can be refined – for the infinite itself could not be named. Thus, *metamorfosi* remained important long after the dismissal of "the book of Ovid" because this book itself traced the variability of variation, opened

[29]Hence Kepler's rejection of algebra: "I am bid to pass over by a single act or motion what is potentially of infinite divisibility" (KGW vi, p. 60).

up spaces for negotiating between the unknowable but real infinite and the knowable but artificial finite. At one moment light, at another moment water, or mercury, might function as the *tratto* that represents the continuum.

Apart from the two instances in the *Dialogo* and the one instance in the essay on sunspots that we have recorded, Galileo uses the term *metamorfosi* only once more in his entire oeuvre. Its final appearance is in the midst of the mathematical discussion of infinity from the *Discorsi*, which in its mention of "melting stones" perhaps alludes discreetly to the discussion of the melting bullet in *Il Saggiatore*. If there is a radical disharmony between the infinite and the finite, how is it possible to pass from one to the other? What exactly happens when we mark off the infinite by unity and set it in comparison with other infinities?

> Think now what a difference there is between a finite circle and an infinite one, since the latter changes its essence in such a way that it totally loses that essence and its ability to be...What shall say we say of this metamorphosis [*metamorfosi*] in the passage from the finite to the infinite? And why should we feel greater repugnance while, seeking the infinite in numbers, we go to enclose it in one. And while we break a solid into many parts and continue to reduce it to a most minute powder, so that it were resolved into its infinite atoms not further divisible, why could we not say that it were returned into one single continuum, but perhaps a fluid like water or mercury, or the liquefied metal itself? And do we not see stones melt into glass, and the same glass itself, with much fire, make itself more fluid than water?
>
> (OG viii, p. 85)

In this context *metamorfosi* is clearly chosen because it designates something more than simply change from some particular perspective, some relative determination of change; for example, change like the movement of the sun as witnessed from the earth. Rather, this shift of perspective generates a change that is absolute, and "real", though artificial, like the movement of the earth as witnessed from the sun.

6.5 Back to Ovid: three variations

The intercession of metamorphosis at key moments in the mechanical philosophy does not need to be reduced to either the pure recognition or the pure obscuration of the limit that it marks. Instead I am arguing that the concept of metamorphosis is employed precisely because it has a history of sustaining this ambiguity, an ambiguity which is rooted ultimately in the tensions between Epicureanism, Stoicism and Platonism in Ovid's own text. The consequences of this ambiguity were played out in the different valences acquired by "metamorphosis" in the abstract, but also by the way in which the abstract rationalised form of "metamorphosis without Ovid" repeatedly came so close to speaking its name as "Ovidian" (witness the extremely subtle and largely negative references to Ovid running through Galileo). In this section we shall demonstrate that even as this effort to separate metamorphosis from Ovid continued apace, various heirs of the mechanical philosophy did not hesitate to reconnect the more abstract form of "metamorphosis" to the *Metamorphoses* itself. We shall examine three philosophers who undertake explicit analyses of Ovid's cosmogony: the Cartesian-inspired Cambridge Platonist, Ralph Cudworth (1617–1688), the Rotterdam-based antiphilosopher and harbinger of the Enlightenment, Pierre Bayle (1647–1706), and Bayle's distinguished reader and critic, Voltaire (1694–1778). These three philosophers provide fitting material with which to draw our investigation to a (provisional) conclusion, since they represent three archetypal responses to the play of opposing viewpoints that Ovid's poem sets in motion: that is, the alternate adoption of different perspectives on his fictions according to circumstance and expediency, the attempt to present the different perspectives these fictions make available as complementing each other and so forming a harmonic unity, and the assertion that in making these different perspectives available, Ovid presents philosophy as hopelessly contradictory. To introduce these three variations in more detail, we shall see that:

1. Voltaire adopts contrasting attitudes to the value of heuristic fiction on different occasions, and interprets the incorporation of Ovid into natural science sometimes as a means

of promoting purely heuristic fictions (itself capable of a positive or negative construal) and sometimes as a symptom of mistaking fictions for truths (obviously negative, but also capable of a positive construal insofar as Voltaire himself sometimes argues for fictions, believing them to be empirical "truths" rather than heuristic fictions). Since Ovid is alternately adopted and defended, depending on perspective, the pattern here is alternation: thesis, antithesis and synthesis indefinitely repeated.

2. Cudworth's *True Intellectual System of the Universe* (1678) is an attempt to demonstrate the harmony between Cartesianism, Paracelsian vitalism, and Platonism. Finding the tendencies of all these systems in Ovid, the *Metamorphoses* served him as an instrument for asserting their compatibility, as well as the compatibility, therefore, of ancient learning and modern science. The pattern here is absolute synthesis.

3. Finally, Pierre Bayle also argues that the *Metamorphoses* contains rival philosophy perspectives, but for him the poem is a demonstration that any perspective leads to contradiction. The poem contains both mechanical and Platonic perspectives, not only so that each conflicts with the other, but so that each is shown to be internally inconsistent by itself. A central principle of the mechanical philosophy is that nature produces all things by itself, yet this same philosophy can only explain goodness and beauty if it assumes nature was divinely designed. The Platonic perspective explains the goodness of creation, but nature's inability to be good without divine design argues that created nature is, as a (non-)self-sufficient principle, defective. In Bayle, the pattern is absolute contradiction.

Voltaire

It is helpful to examine Voltaire first, since by conflating Cartesianism and Spinozism, Voltaire provides a particularly clear indication of why it was necessary for Cartesianism to retain the association of metamorphosis with fiction. That is, Voltaire considered that the Cartesians in general failed to maintain enough distance from their hypotheses and accepted what were truly fables as facts: Descartes had simply believed what he wrote in *Le Monde*. Instead, Voltaire repeatedly emphasised the importance of the Newtonian empiricist adage

hypotheses non fingo: "I do not feign hypotheses" (with the implication: instead, I formulate merely descriptive empirical laws). In the article *Anneau de Saturne* (1770) in the *Questions sur l'Encylopedie*, for example, Voltaire mocks the opinion of the mathematical physicist Maupertuis (1698–1759) according to which Saturn's rings would have been formed by an ocean evaporated from the planet by solar heat and then solidified under its own gravity.

> How you go on, my dreamer! How you metamorphose water into stone! Ovid was nothing compared to you. What marvellous power you have over nature! This imagination does not contradict your other ideas, o itch to say new things! O fury of systems! O madnesses of the human spirit!...Huyghens discovered Saturn's ring: he calculated its appearances. Hooke and Flamstead calculated them like him. A Frenchman has discovered that this solid body had been a circular ocean, and this Frenchman is not Cyrano de Bergerac.
>
> (OCV xxxviii, p. 398-399)

Another point on which Voltaire frequently attacked the new philosophers as having simply replicated Ovid was on their belief in the comprehensive geological transformations sustained by the globe and the accompanying transmutation of species. For example, in the article *Des Coquilles et des systèmes batis sur des coquilles* (1771) he attacked the "transformists" (Diderot, Maillet, La Mettrie, Buffon, Maupertuis, Leibniz, Robinet, etc.) on the grounds that in their philosophy "The *Metamorphoses* of Ovid would become the best book of physics ever written" (OCV xl, p. 274). These were prophetic words: from Hooke to Lyell, the imagination of the transformists, though far closer to the truth than Voltaire's unwarranted scepticism about the magnitude of geological changes, functioned as the last bastion of explicitly "panspermatic" and Ovidian theories of chaos, still standing in the nineteenth century. Here it appears that Voltaire's resistance to wild hypothesising, characterised as a resistance to Ovid, drew him into believing too much in the purely empirical character of his own observations, leading him into error. On the other hand, with regards to Voltaire's critique of Descartes' astronomical doctrines, and his promotion of the English empiricists,

it led him to truth. But, we shall see, this was not necessarily because it had eliminated Ovid from natural philosophy: the matter was quite the reverse.

Voltaire's claim that the Cartesians mistake fables for facts most truly applies to the ultimate systematiser, Spinoza. Spinoza presented his system as Cartesianism – the primacy of reason – taken to its logical conclusions.[30] He may be regarded as having desired to eliminate the necessity of metamorphosis *qua* fiction or fabulation from Descartes' philosophy. One reason that *Le Monde* is a fable for Descartes is because the correspondence between the mental and physical worlds is ultimately to be explained by creation *ex nihilo*, in which there is no place for chaos. Descartes explicitly denied the possibility that God could create a chaos (AT viii.a, p. 500; ix.b, p. 125). Supposing that there was a chaos removes the guarantee that the corporeal and mental realms will correspond, unless, *per fabulam*, that correspondence could be taken simply as a premise. This assumption *per fabulam* is precisely the move that Spinoza would make, not in fable, but in fact, denying creation *ex nihilo* and identifying matter and thought as attributes or aspects of the same underlying eternal substance, *Deus sive natura*. The consequence, however, was that from another perspective, Spinoza produced the most fabulous system of all. The lived world, both thought and extension, became but a combination of the modal variations of a single substantial and unchanging reality. As Bayle saw it, there was no room for individual identities in such a system. Hence, "the most infamous things the pagan poets have dared to sing against Venus and Jupiter do not approach the horrible idea that Spinoza gives us of God...the fable of Saturn devouring his own children is infinitely less unreasonable than what Spinoza asserts." (DHC, s.v. *Spinoza*, Rem. N).

Nonetheless, it could not be denied that Spinoza's system had brought physics into remarkably close correspondence with pure reason. By contrast, Newtonianism involved one particular postulate that Cartesian mechanical philosophers regarded as absurd – the operation of an "occult force", gravity, which could in no way be explained by the pre-existing

[30]In particular, Spinoza develops his concept of substance from that given at *Principia* i.51. The notion that Spinoza had simply taken Cartesianism to its logical conclusions was endorsed by Hegel, among others.

notion of matter as defined solely by size, shape and motion. To make matters worse, Newton's system predicted that the sum of motion in the universe should be continually decreasing; the solution, impossible for the Cartesians to stomach, was that from time to time God would step in to wind up the cosmic clock. Voltaire explicitly supported the conclusion of Newton, inspired in part by the Cambridge Platonists, that gravity must have been superadded to matter miraculously by God at creation. He did so by returning to what he saw as the dominant Cartesian reading of Ovid's creation story and pointing out that Ovid's chaos does not evolve autonomously but depends on the action of the demiurge. In the extract that follows, from the article *D'Ovide*, first published with Voltaire's complete works in the *Suite des mélanges de littérature* in 1756, Voltaire attacks Bayle's discussion of Ovid's cosmogony which he interpreted (quite reductively, as we shall see) as a simple exposition of the Cartesian fable of *Le Monde*:

> I tell him [Bayle] that Ovid and the philosophers understood by heavy and light things [in chaos], things that would become heavy and light when a God had put his hand to them. I tell him, you suppose that nature could have arranged itself by itself, given weight to itself. You would have to begin by proving that gravity is a quality essentially inherent in matter, and that is what we have never been able to prove. Descartes in his romance pretended that bodies did not become heavy but for when his vortices of subtle matter had begun to push them to the centre. Newton in his true philosophy does not say that gravitation, attraction, is a quality essential to matter. If Ovid could have guessed the book of the *Principles of Mathematics* of Newton he would tell you: 'Matter was neither heavy nor in movement in my chaos; it was necessary that God imprinted these two qualities: my chaos did not enclose the force that you suppose it did: *nec quidquam nisi pondus iners*, it was nothing but an impotent mass; *pondus* does not mean weight here; it means mass.'...Thus Ovid would find himself not only a good philosopher, but a passable theologian too.

(OCV, p. 367-8)

So far, this is a fairly orthodox interpretation of Newtonianism. As Voltaire continues, however, the decision to re-animate Ovid as a Cartesian philosopher takes on a certain colouring which detaches Voltaire from his allegiance to a pure empiricism, and suggests a certain commitment to the hypothesis as heuristic fiction. It emerges that Voltaire is not at all against philosophical romances. Newton's is the "true" philosophy not because it is literally true, he says, but because, like Ovid, it presents its fictions as fictions. Furthermore, not just gravity, but secondary qualities in general can only be explained by God. According to Voltaire, Ovid could reply to Bayle (and thus Descartes):

> You are wrong to suppose that my elements had all the qualities they have today; they had none of them; the subject existed naked, unformed, impotent; and when I said that the warm was mixed in my chaos with the cold, the dry with the moist, I had no other expressions to employ, which mean that there was neither cold nor warm nor dry nor moist. These are qualities that God has placed in our sensations and that are in no way in matter. I have not made the mistakes of which you accuse me. These are your Cartesians, your Gassendists, who make mistakes with their atoms, and their cubic parts; and their imaginations are no more true than my metamorphoses. I prefer Daphne changed into a laurel and Narcissus into a flower to subtle matter changed into suns and branching [*rameuse*] matter become earth and water. I have given you fables for fables; and you philosophers give fables for truths.[31]
>
> (OCV, p. 369-70)

[31] The expression "fables for fables" is recalled in Voltaire's discussion of mystical tropology in the *Questions sur l'Encyclopedie*. In the article *Figure* (1771) he claims that "there are no examples [of mystical tropology] among the Romans and Greeks, not even in the poets. One finds only in the *Metamorphoses* of Ovid ingenious inductions drawn from fables that are given for fables". Voltaire gives the example of the origin of humans from stones and of love in the arrows of lead and gold: "all these figures are ingenious and fool no one" (OCV xli, p. 421). It is also worth noting Voltaire's defence of the fictions of metamorphosis (against the Abbé Pluche who had argued for the exorcism of mythology from *belles lettres*) in the poem *Apologie de la fable*, which closes the article *Fable* (1771). Here, Voltaire addresses antiquity as a whole, "wise antiquity, beauty always new", but focusses on myths of metamorphosis: "You know how to animate the air, the earth and the seas / You beautify the universe...these mountains, these woods that border the horizon / are

The notion that the intervention of God is a "truth" of Newtonian philosophy thus appears to be interchangeable with the notion that it is a fable given as a fable. In this sense, Voltaire resists a literal reading of the divine intervention in the cosmogony and clings to the essentially fictional status of the *Metamorphoses,* perhaps no longer a source of scientific knowledge, but still a model. As for the question of "substance" – it is simply suspended. There are of course many problems with such a position, perhaps most pressingly its apparent incompatibility with the moral rationalism so dear to Voltaire and other representatives of the Enlightenment. The two paths – Spinozan rationalism which attempts to eliminate fabulation completely, and Newtonian empiricism which, as Voltaire constructs it here, eliminates anything that is not fabulation – both end up, at least as Voltaire reads them, with rather similar affirmations of the truth of the fables of the *Metamorphoses*.

Cudworth

Ralph Cudworth published one work – by chance in the same year as Newton's *Principia* (1678) – the *True Intellectual System of the Universe*, which was widely read and discussed, in part thanks to its promotion by Cudworth's daughter, Damaris Masham. According to Cudworth the work was composed primarily as a refutation of the naturalistic fatalism that some mistakenly believed was implied by the mechanical philosophy. For Cudworth, as, in a sense, for Voltaire, the emerging atomic physics was no threat to Platonism (that is, a transcendent deity), but rather its strongest confirmation: "the intrinsic constitution of this Atomic physiology also is such, as that whosoever admits it, and rightly understands it, must needs acknowledge incorporeal substance; which is the absolute overthrow of Atheism" (1829, vol. 1, p. 54). Where Voltaire hints at the possibility of regarding the suggestion of God's intervention upon matter as a fable given for a fable, Cudworth affirms it entirely as rationally proven. But Cudworth does not seek to oppose this commitment to a transcendent deity to Cartesianism. Rather, he attempts to demonstrate how both positions are simultaneously

covered with metamorphoses". The poem ends with a manifesto for the separation of the domains of faith and fiction: "We will always cherish the errors of Greece. / Ovid will always charm. If our new peoples are Christians at mass, they are pagans at the Opera" (OCV xli, p. 322-324).

necessary and thus harmonise with each other. Pierre Bayle was of a much darker turn of mind. He took this dialectic to its limit, demonstrating at once the mutual necessity and absolute disharmony of the Lucretian and Platonic alternatives.

Cudworth's argument for the value of atomism has two aspects, one logical, one philological. He aims to demonstrate both that the most ancient form of atomism was theistic ("atomic atheism being nothing else but a Rape committed upon the Atomick Physiology"), and that this theism arose logically from atomist principles (1829, vol. 1, p. 54). These two aims are in fact closely intertwined because the incorporeality of mind demands *ipso facto* that theistic truths pre-exist as ideas: the originality of theistic atomism would thus be evidence of its truth. According to the logical argument, the fundamental atomist principle is that nothing comes from nothing and that nothing descends into nothing. This principle demands, on the one hand, that secondary qualities which constantly pass in and out of existence must be dismissed as unreal. Only the primary qualities – magnitude, shape, arrangement, and motion – describe bodies as they are in themselves. On the other hand, the origin of secondary qualities must then be placed in a soul, which, unless it too shall descend into nothing, must be immortal. So far as the philological argument goes, Cudworth attempts to show that a theistic atomism was invented by Moses and transmitted to the West by Pythagoras.[32] To do so he cites a number of sometimes dubiously 'Pythagorean' ancient philosophers who espoused either atomist or immaterialist doctrines. But the primary evidence that "Pythagoras himself" held such notions "both as to inanimate as to animate things" (i.e. both as to atoms and souls) comes from his famous lines in Ovid (1829, vol. 1, p. 149, citing *Met.* 15.165-9 and 15.254-261). The 'inconsistency' with which Ovid combines Lucretian and Platonic teachings (some of the lines quoted by Cudworth directly echo Lucretius) thus emerges as a crucial philosophical insight.

Cudworth returns to Ovid at greater length in his attempt to prove that the pagans were not ignorant of the unity of God; Ovid "may well be presumed to represent the then generally

[32]For the history of Mosaic atomism, see Sailor (1964) and, on Mosaic physics more generally, Blair (2000).

received doctrine of the Pagans" (1829, vol. 1, p. 503). His cosmogony shows that the pagans embraced three key points. First, that the world is not eternal but had a "generation and novity" and a "first production out of chaos"; next, that "this cosmogonia, or generation of the world, was also a theogonia or generation of gods"; and, finally, that "all this was effected, and this orderly mundane system produced out of a disorderly confused chaos, not by a fortuitous motion of matter, or the jumbling of atoms, but by the providence and command of one unmade Deity" (1829, vol. 1, pp. 503-4). The first point is tantamount to the confession of atomism: the world was formed from inert matter (chaos).[33] The last point is tantamount to the confession of the theism that must accompany such atomism. The significance of the second point emerges upon further consideration of where Cudworth's conflation of Lucretius and Plato was leading him: namely, towards the Stoics. For Cudworth, the fact that the multiplicity of pagan gods was generated along with the world showed that:

> The ancient Pagans did physiologize in their theology...whether looking upon the whole world animated, as the supreme God, and consequently the several parts of it as his living members; or else, apprehending it at least to be a mirror, or visible image of the invisible Deity, and consequently all its several parts, and things of nature, but so many several manifestations of the Divine power and providence.
>
> (1829, vol. 1, p. 469)

The principle support for this claim is of course the Stoic allegories, as well as those aspects of the *Timaeus* that the Stoics had appropriated (though Cudworth marshals every conceivable source). While the pagan theogony was highly dangerous, inasmuch as it could be mistaken for the damnable variety of Stoic corporealism, it was not in itself absurd. In

[33]Cudworth earlier claimed that Anaxagoras postulated a "confused chaos of omnifarous atoms" organised by an immaterial mind (1829, vol. 1, p. 119). Later he speaks of the atheistical atomists as postulating the origin of all from a "material chaos" (1829, vol. 1, pp. 503-4). But in his discussion of the *Timaeus* he conflates the "antecedent non-existence" of the world with "antecedent chaos"; hence it is difficult to equate chaos *tout court* with an atomic jumble, since the latter would presumably exist in some way (1829, vol. 1, pp. 493).

fact, Cudworth regarded the recognition of an intrinsic divine force in nature, what he called a "plastic nature or spermatic principle", as an essential amendment to the theistic atomism as Descartes in particular had formulated it (1829, vol. 1, pp. 375-6). For,

> If there be no plastic artificial nature to admit too, then it must be concluded, that either all things come to pass by fortuitous mechanism, and material necessity (the motion of matter unguided) or else that God doth αὐτουργεῖν ἅπαντα, do all things himself immediately and miraculously
>
> (1829, vol. 1, p. 382)

Such a "plastic artificial nature", which Cudworth likens but does not equate to the Paracelsian Archeus (1829, vol. 1, p. 328), would serve as the instrument of God within nature, "vitally and magically" (1829, vol. 1, p. 334) directing atomic motion according to divine ideas, but itself lacking consciousness and freedom. While Cudworth could not support pagan theology outright, a certain sympathy for it is evinced by his care to separate from the purely corporealist, and hence atheistical form of Stoicism an original "right Heraclitic and Zenonian cabala", that is, a form of Stoicism in which plastic nature does not replace, but rather complements, a transcendent deity (1829, vol. 1, p. 289).[34] It would seem that for Cudworth the conflicting Lucretian, Stoic and Platonic aspects of Ovid's cosmogony come together into a coherent vision uniting modern Cartesian physics with vitalism and Platonism.

Bayle

Pierre Bayle contrasts sharply with Cudworth: for Bayle, the overriding characteristic of the universe is not harmony, but discord. Billed by Voltaire the "greatest master of the art of reasoning that ever wrote" (Voltaire 1877–1885, vol. 9, p. 476), Bayle founded his pessimism in part on his perception of the destructive power of reason itself. In his *Dictionnaire*

[34]For the importance of Stoicism in Cudworth's philosophy, and the ambiguity that it introduced, see Giglioni (2008) and Sellars (2011).

Historique et Critique in particular, one of the most popular books of the eighteenth century, he examined almost every conceivable philosophical opinion and found irrational elements in them all. There are conflicting views as to what exactly Bayle's own philosophy amounts to: a demonstration of the necessity of an irrational fideism (Popkin 1960), an argument for universal tolerance on a religious basis (Labrousse 1964),[35] or on the basis of moral rationalism (McKenna 2012), a surreptitious insinuation that reason leads ineluctably to atheism (Mori 1999), a demonstration that Cartesian dualism is the least inconsistent metaphysical system (Ryan 2009), or an exercise in the construction of unresolvable dialogues (Lennon 1999). There are certainly elements of all these positions to be found. Questioned as to his religion by the Cardinal de Polignac, Bayle is reported to have replied, "I protest against everything that is said, and everything that is done" (De Polignac 1749, p. 13). Infinite care must thus be taken in interpreting any apparently dogmatic remarks in Bayle's arguments.

Bayle pursued an investigation of the philosophical implications of materialism (often conflating Descartes with the atomists) across a number of the articles in his *Dictionnaire*: those on *Anaxagoras*, *Dicéarque*, *Epicure*, *Gassendi*, *Hobbes*, *Leucippe*, *Lucrèce, Spinoza*, *Zenon d'Elée*, to name but a few, and most interestingly for us, the article on *Ovide*.[36] Fulfilling an earlier promise to discuss the doctrine of chaos, the bulk of the article on Ovid is comprised of an analysis of his cosmogony, which Bayle describes as "clear and intelligible" as to its "phrases", but "badly connected and contradictory" as to its "dogmas" (DHC iii, p. 556). Bayle reduces Ovid's descriptions to six propositions: 1) nature was at first homogenous (*unus...vultus*); 2) it was a heavy mass (*pondus iners*) of seeds and principles in no order or symmetry; 3) opposed qualities (hot and cold, etc.) warred in the same body; 4) God resolved the war by separation; 5) he gave different qualities different abodes; 6) and

[35]Labrousse tends to see piety as central to Bayle's thought, and the doctrine of tolerance as mistaken by the Enlightenment *philosophes* for atheism, though Labrousse herself postulates a crisis in 1685 after which the materialistic strains in Bayle's reasoning become impossible to counter. The *Objections to Pierre Poiret* (1679) only recently securely attributed to Bayle show that this tendency began much earlier.

[36]My discussion of the *Ovide* article is indebted to Selcer's excellent analysis (2010, pp. 89-121). Selcer argues that the material structure of the encyclopedia itself "simultaneously models, activates and resists" (2010, p. 121) the tensions exposed in the article between a factious, aleatory materialism and divine design. Note that Wheeler makes a similar point about the structure of the *Metamorphoses.*

formed a stable alliance between them. Based on these six propositions, Bayle enumerates six objections: 1) a mass composed of different seeds cannot be homogenous unless it is ordered; 2) opposed qualities of lightness and weight should not combine to form a heavy mass; 3) such a mass could not be passive (*iners*) because its principles are in combat; 4) elementary qualities are sufficient to resolve a chaos without the intervention of God; 5) the combat of qualities has not ceased since the production of the world; 6) therefore the alliance is not stable (DHC iii, p. 556, rem. G).

The key to Bayle's interest in Ovid and the central node of his objections is his claim that "everything that we call the general laws of nature, laws of movement, mechanical principles, is the same thing as what Ovid and the Peripatetics call heat, cold, humidity, dryness, weight, lightness...When they admitted these to chaos, therefore, they necessarily recognised entirely the same force that produces in the World generations and corruptions, winds, rains, etc.". Thus, "Ovid, and those whose sentiments he paraphrased, had recourse to the administration of God without need" (DHC iii, p. 557, rem. G.). More than that, if God needed to act externally upon matter then it could only have been to alter its natural behaviour, hence "God could not have moved it without introducing disorder into the Nature of things, there being nothing more suitable to order than following the eternal and necessary institution of nature" (DHC iii, p. 557, rem. G.). Thus, Bayle emphasises the superfluity and even harmfulness of divine intervention in creation, explicitly defending the "fiction" of the formation of the world on mechanical principles, as elaborated by Descartes in *Le Monde* (DHC iii, p. 558, rem. G).

A similar argument about the self-sufficiency of pre-existing matter had been elaborated by Bayle in the article *Epicure.* There, Bayle set out to redeem Epicurus from the charge of irrationality by showing that, given the pre-existence of matter, the most rational course is to eliminate God entirely. There, as here, however, he denies that this step should actually be taken. His support for the mechanical philosophy "does not go so far as the crazy and extravagant Hypothesis of the Epicureans" (p. 558): while Bayle admits that undirected

atoms might form *a* world, he denies that sheer chance could produce "so many things that persist so long in their regularity, and so many animal machines a thousand times more industrious than those of human art" (p. 558). Hence, what the Epicurean or Cartesian reasoning really shows is the necessity of the creation of matter *ex nihilo*: "if one cannot rise to the notion of creation properly speaking, one cannot avoid all of the obstacles" (DHC iii, p. 557). "Nothing is so well fitted to give a high idea of the infinite wisdom of God" than the notion that he created matter in such a way that it was able to order itself autonomously (DHC iii, p. 558).

It might appear, then, that Bayle practices a rather standard critique of Ovid's chaos, similar to that of, say, William of Conches, albeit in the garb of the new philosophy. It is, however, on Bayle's own terms, impossible to take this apparent argument for creation *ex nihilo* as rational. As Bayle claimed in his article on *Spinoza*, creation *ex nihilo* violates that fundamental principle of logic associated with atomism: "a matter created from nothing is inconceivable, whatever efforts we make to form an idea of an act of will that might convert into a real substance that which was formerly nothing. That principle of the Ancients, *nihil ex nihilo fit*, nothing is made from nothing, presents itself incessantly to our imagination and shines there in a manner so dazzling that, in the event that we had begun to conceive something of the creation, it makes us lose our grip" (DHC iv, p. 271, rem. O). Bayle thus develops an implicit dilemma: either creation *ex nihilo*, which is inconceivable, or atomism, which is nonsensical. Scholars differ as to which branch of this dilemma Bayle prefers: while Mori (1999, p. 136), for example, claims Bayle leads us down the atomistic path, for Ryan (2009, p.140) he draws us towards creation *ex nihilo.* Even if we accept creation *ex nihilo* as Bayle's true view, we shall wish to dispute about the extent to which Bayle holds this view on the basis of pure fideism (Popkin 1960) as opposed to founding it upon a rationally considered "probabilism" (Ryan 2009, pp. 25, 143). And most importantly, we shall not be quit of a further and perhaps graver objection to the doctrine than the one raised in the article on Spinoza. This is the objection that occupies Bayle for the second half of his

discussion of chaos. It concerns, implicitly, the question of whether the world truly is ordered enough to justify the supposition of design.

Bayle is famous for his insistence on the intractability of the problem of evil, and the article on Ovid is one of his most eloquent forays into the topic.[37] The article is also typical inasmuch as it permits us to conclude nothing definite about Bayle's judgement of the problem: Bayle simply argues that according to rational and Cartesian principles (all interaction is by collision; no generation is without destruction) matter is always in the warring state ascribed to chaos. He never draws any conclusions from this argument about the nature of God, or relates it to his earlier argument from design for the necessity of creation *ex nihilo*. But it is precisely in this gesture of unexpressed self-contradiction that the force of Bayle's reception of Ovid becomes clear. For Bayle ascribes a very similar contradiction to Ovid, drawing on the *Metamorphoses* itself, particularly the speech of Pythagoras, as evidence for the continual war and destruction in the material realm. Although Bayle suggests the "contradiction" he has exposed between the ordering of the demiurge and the ceaseless flux described by Pythagoras is the result of Ovid's lapse of memory ("he does not remember what he said [about the order imparted to matter] in the Chapter on Chaos"), an attentive reader may gather from Bayle's own quotations that Ovid constructed this contradiction with some artistry, deliberately echoing his description of chaos in the speech of Pythagoras: *nulli sua forma manebat* (*Met.* 1.17) became *nec species sua cuique manet* (*Met.* 15.252). It is difficult not to attribute a similar artistry to Bayle's own implicit contradiction of his argument from design.

If there were any doubts as to the greater ambiguity of Bayle's discussion, they are dispelled when Bayle passes from a discussion of the persistence of chaos in the material realm to a discussion of the chaos within man. Here, reason itself comes up for explicit criticism: "what war is there not between his Soul and Body, between his Reason and Sense, between his sensitive soul and rational soul? Reason should calm this disorder and pacify

[37]See also the articles *Pauliciens* (iii, p. 624), *Manichéens* (iii, p. 302), and *Marcionites* (iii, p. 314).

these civil strifes; but she is judge and plaintiff, and her decisions are not executed, and do nothing but increase the evil" (DHC iii, p. 560, rem. H). And again, Bayle attributes a recognition of this chaos to Ovid, reciting the, by then, famous quotation of Medea (*video meliora*, etc., often cited by Spinoza) in order to demonstrate "the inability of Reason to make us do what it makes us approve" (DHC iii, p. 561, rem. H).[38] Ovid thus exemplifies at least three kinds of contradiction. Bayle twice compares Ovid's cosmogony to chaos itself, "inconsistent and self-contradictory and amounting to a rather greater chaos than the one he describes".[39] The cosmogony taken as a whole conflicts with the Pythagorean doctrine of elemental strife. And the subscription to any kind of dogma conflicts with Ovid's insistence on the poverty of reason. It is because it exhibits all these contradictions, however, that the *Metamorphoses* continues to make itself felt as a vehicle of authentic natural philosophy, surviving its repeated digestions in the manner of chaos itself.

[38]The citation of this line in the context of the dispute about the relation of the rational and irrational parts of the soul goes back at least to Chrysippus, whom Galen attacks for wrongly interpreting the Euripidean line on which the Ovidian line is based (*Plac. Hipp. Plat.* iv, 6.19 citing Eur. *Med.* 1078-1079).

[39]A similar remark appears in the article *Anaxagoras*: "In general, the ideas of the Ancients who have spoken of chaos were no less confused than chaos itself" (DHC i, p. 213).

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