
Aristoteles chemicus. Il IV libro dei 'Meteorologica' nella tradizione antica e medievale edited by Cristina Viano

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We know from the opening remarks of Alexander of Aphrodisias' *Commentary on Meteorology 4* that debates over the authenticity of *Meteor.* 4 and its place in the Aristotelian corpus are likely as ancient as the corpus itself. 'The book entitled "the fourth" of Aristotle's *Meteorology*', Alexander [Hayduck 1899, 179.3-5] maintains, 'does belong to Aristotle, but not to the treatise on meteorology, for the matters discussed in it are not proper to meteorology.' As Ingemar Düring notices, Galen, writing at about the same time as Alexander, quotes from it as the fourth book of the *Meteorology*. But to this day, debates both about its authenticity and its placement continue [see, e.g., Gottschalk 1961, Pepe 1978, Furley 1983, Lewis 1996].

Since the papers of Lucio Pepe and David Furley just referenced, it has generally been recognized that *Meteor.* 4 is a critical text for understanding a number of important issues such as Aristotle's attitude toward a scientific investigation of matter, the matter/form relationship, the nature of unqualified generation, teleology, and the proper way to investigate the uniform parts of animals. That is, far from being an early, misguided step in the history of chemistry, *Meteor.* 4 is an important text for understanding key aspects of Aristotle's natural philosophy.

The current volume is a welcome and important addition to the growing literature on *Meteor.* 4. It contains nine papers originally presented at a seminar held in Venice in December of 1999, co-organized by the Department of Philosophy and Philosophy of Science, University of Venice, and the Center for Research on Ancient Thought (Bibliothèque Léon Robin) of the CNRS. Two of the papers, including that of the editor, are in French; the rest are in Italian. The

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volume begins with a most useful summative introduction by Prof. Viano, which is followed by a valuable critical overview of *Meteor. 4* by its most recent translator, Lucio Pepe of the University of Naples.

The remainder of the papers conform to the volume's subtitle, 'Il IV libro dei "Meteorologica" nella tradizione antica e medievale'. The chapters by Carlo Natali and Cristina Viano discuss the commentaries of Alexander and Olympiodorus respectively; those of Paola Carusi, Pinella Travaglia, and Carmela Baffioni discuss its relevance to the Arabic hermetic and alchemical tradition; and those of Ahmad Hasnawi, Michela Pereira, and Chiara Crisciani focus on the period when these traditions begin to interact with medieval natural philosophy in the Aristotelian tradition. The 'medieval' traditions that are primarily in focus bear in one way or another on the transmission of the ideas in *Meteor. 4* through Arabo-Islamic interpreters. One of the important lessons of this volume is that it is from the Islamic tradition of interpretation, which relies heavily on the commentary of Olympiodorus, that *Meteor. 4* becomes inextricably bound up with the alchemical and hermetic traditions out of which chemistry in the early modern period springs.

Professor Pepe [1978] was among the first to mount an all out challenge to the then predominant view that a number of ideas in *Meteor. 4* reveal it to be post-Aristotelian.¹ In the present volume, he argues that there are no basic conflicts between *Meteor. 4* and the rest of the Aristotelian corpus and, thus, no doctrinal grounds for denying its authenticity. The general framework of the four contrary powers (hot, cold, moist, and dry) underlying the four elemental bodies (earth, water, air, and fire) is that of *Gen. et corr. 2*. The apparent differences, Pepe wants to argue, are derived from Aristotle's analysis of the processes that produce and transform the various uniform materials of our experience—processes such as solidification by drying or liquefaction due to condensation and melting; and uniform materials ranging from bone and blood through earthenware and wood to bronze, iron, silver, and soda. The occasional references to *poroi* do not indicate an atomic theory of matter but are parts of local, concrete explanations of phenomena such as evaporation and condensation. But the essay is not primarily devoted to this battle already won; it also lays out a clear and comprehensive picture of

¹ Pepe's paper was brought to the attention of English readers in Furley 1983.

the structure and purpose of *Meteor.* 4. The central thrust of this essay is that *Meteor.* 4 must be understood within the framework of Aristotle's natural philosophy and, thus, that our reference points for understanding it must be *Generatione et corruptione*, *De caelo* 3–4, *De partibus animalium*, and *De generatione animalium*—to which I would add the later parts of *Parva naturalia*. Besides being a clear and useful overview of the explanatory machinery at work, this essay also collects and discusses all the texts that self-consciously remind us that the explanations in this work are importantly incomplete, at least when it comes to accounting for biological or artificial products where the agencies of hot and cold are clearly guided by a formally imposed plan or *logos*. The negative message, extremely important for this collection in particular, is quite clear: we should not read this text through the lens of modern developments in chemistry, but as an integral part of Aristotle's philosophy of nature.

There are two issues that I had hoped to see Pepe discuss which he did not: one is how *Meteor.* 4 fits with *Meteor.* 1–3, the other is the apparent disconnection between the theory of concoction and 'in-concoction' in 4.2–3 and the actual explanations of 4.4–11. On the first question, Pepe seems to accept the verdict of Alexander that the work belongs with *Gen. et corr.* in some way. But it should be recalled that *Meteor.* 1 opens with an outline of Aristotle's project of natural investigation in which meteorology is a bridge from a general discussion of coming-to-be and passing away to the specific case of animals and plants. Were this work to end at the close of book 3, the investigation would not serve this transitional function. But book 4, with its gradual move to increasing discussion of living uniform bodies and its last chapter focusing on the transition to the study of living things and their parts, is just what we have been led to expect by the opening of book 1.

On the second question, Aristotle spends two chapters developing an elaborate classification of the actions of heating and cooling—three forms of *pepsis* and *apepsia*—that readers have every reason to believe will serve as the explanatory machinery for the rest of the work. Yet the classification is virtually absent from 4.4–11. Pepe discusses both the theory of concoction in 4.2–3 and the detailed explanations *via* heating, cooling, drying and moistening, solidification, and evaporation in 4.4–11; but he does not attempt to explain the absence of 'concoction theory' in the later discussion.

Carlo Natali considers the earliest of the commentaries on the *Meteorology*, that of Alexander. His contribution serves as an introduction not merely to this commentary, but to the role of the commentary in the Peripatetic school generally and to the special character of Alexander's commentaries. We are reminded that, in virtue of the temporal proximity of these commentators to the creation of the Andronican corpus, the ordering of the works found in that edition could be viewed as suggestive rather than definitive. At this moment in history, discussion of the placement of a particular text would have been perfectly natural. Natali also reminds us that this is very much a philosophical commentary—Alexander is less interested in the details of the science than he is in the work's theoretical coherence with Aristotle's metaphysical and physical principles.

Perhaps the most interesting feature of Natali's essay, however, derives from his detailed analyses of some key passages in the commentary, and especially that at Hayduck 1899, 222.16–22. For here we see that the peculiar form of Alexander's commentary leads directly to innovative developments in Aristotelianism. This is very much the commentary of a scholar of the Peripatos. Its creativity derives partly from its author's willingness to restate in his own terms what he takes Aristotle's arguments to be and partly from the desire (mentioned previously) to display connections between the doctrines and concepts of *Meteor.* 4 and other works such as the *De anima* or *Generatione et corruptione*—connections not emphasized by Aristotle himself. The discussion is easy to follow thanks to Natali's providing both the texts of *Meteor.* 389b7–18 and Alexander's commentary on it (with annotations).

The volume's editor, Cristina Viano, mounts a vigorous defense of Olympiodorus, a late sixth-century Platonist writing in Alexandria, against dismissive remarks such as:

Olympiodoros is rich in words, but poor in thoughts; if he says something new and original, it is seldom of any value for the interpretation of Aristotle; if he says anything of value, it is generally taken over from Alexander. [Düring 1980, 22]

Viano makes a case for the importance of Olympiodorus' commentary, especially for the underlying theme of the volume currently under re-

view. It is this commentary, written around 565,² that most strongly influenced the Islamic tradition in which it was regularly translated, commented on, and paraphrased. This commentary thereby became more influential in the Middle Ages than the commentary by Alexander. Thus, on purely historical grounds, it deserves far more attention than it has received: indeed, one regrets that it has not been translated into a modern language and has been virtually ignored in modern times. But Viano's defense goes much farther—seen from a historical perspective, Düring's comment that anything of value in Olympiodorus is derived from Alexander is profoundly mistaken.

As Natali does for Alexander, Viano provides a general introduction to Olympiodorus' style of commentary, one that became standard for the scholastics. The treatise in question is divided into *Praxeis* (Lessons, Exercises), and within each *Praxis* the text is divided into *Theoriai* and *Lexeis*. The former begin by quoting the text of Aristotle to be discussed, and then explicate that text in the commentator's own words. The *Lexeis* focus on individual words and phrases. The influence of this format can be readily observed in the commentaries on Aristotle by W. D. Ross.

Meteor. 4 is divided into 10 *praxeis*—as always it is important to remember that our chapters are a Renaissance invention. Olympiodorus' way of dividing up our text has little to do with modern chapter divisions. The commentary ends with notes on a text in our chapter 10; thus, the discussion of the transition to biology in chapter 12 is not commented on. The commentary aims at both systematization and clarification. As examples of how this leads to much originality, Viano points to the association of two forms of concoction with the inorganic world and one, *pepansis*, with the organic realm. Olympiodorus argues that *sepsis* has both a developmental stage and a 'corruption' stage. And he comments extensively on the methodology of 4.4–9, seeing two ways of 'diagnosing' the nature of the uniform bodies, namely, by reference to their matter using a form of 'tekmeriodic proof' and by reference to their form focusing on their different capacities. He explicitly criticizes Alexander's views about its place in the corpus, arguing that book 4 follows naturally on 3, being a generic level discussion of uniform materials—precisely what

² We are in the unusual position of being able to date Olympiodorus' commentary to around 565, thanks to its mention of a comet observed in that year.

is needed for the transition to the study of organic uniform parts. And unlike Alexander—and herein lies this commentary’s value to the alchemical tradition—he attends seriously to the details of the processes and mechanisms under discussion. He probably created the system for the classification of rocks, earths, and minerals that dominated chemistry and metallurgy until the 18th century—it is very similar to the classification found in Marcianus 299 (usually taken to be the founding document for Greek alchemy) and to that used by Proclus in his commentary on the *Timaeus*. All of which leads Viano to leave open the question of ‘the two Olympiodoruses’—for there is a commentary on the Alexandrian alchemical text *Κατ’ ἐνέργειαν* attributed to an Olympiodorus which is sometimes claimed to be inauthentic. Whether the Neoplatonic commentator and the alchemist are one and the same or not, Viano argues that the systematic similarities between our commentary and Marcianus 299 shows that at the very least there were mutual influences.

As I mentioned earlier, the remainder of the book is an exploration by a number of scholars of the influence of *Meteor.* 4 and its Greek commentators, first on various aspects of Islamic thought in the period stretching from the mid-8th century to mid-10th century, and then on such writings as the *Magister testamenti* attributed to Raymond Lull and the *Pretiosa margarita novella* of Pietro Bono in the twilight of the Middle Ages. I will conclude with a brief survey of the high points in these later chapters.

All of these authors have been set a difficult task; the body of literature they must survey is vast, and they are expected to do so in essays of 15–20 pages in length. They have each taken the sensible course of narrowing their focus, either thematically or textually. Paola Carusi, while basing her argument on a wide variety of texts from the mid-8th to mid-10th century, nevertheless concentrates on two comparisons: that of the opening lines of Aristotle’s *Meteor.* 4.1 and 4.4 with a purported ‘translation’ into Arabic by Ibn al-Bitrīq, and of Olympiodorus’ commentary on *Meteor.* 4.1 with Ibn Ishāq’s translation of pseudo-Olympiodorus’ commentary on the same text. It is clear, Carusi notes, that the Arabic texts by Ibn al-Bitrīq and Ibn Ishāq derive from a non-Aristotelian source, likely a Hellenistic neo-Pythagorean text that reinterprets doctrines deriving in turn from the *Meteorology*. Carusi then traces the influence of these ‘contaminations’ on some Arabic alchemical texts, arguing that these

contaminations make it all but inevitable that the core philosophical influences are non-Aristotelian in that they derive from a Hellenistic Pythagoreanism that looks back to Empedocles and Pythagoras for inspiration. Carusi reminds us, however, that these alchemical works with their concepts of qualitative hierarchy, microcosm and macrocosm, and of the creativity of nature with its powers of transformation, are also contemporaneous with the flowering of Islamic science and philosophy; and that we should be attentive to influences from contemporary context as well as ancient tradition.

Pinella Travaglia focuses on one text in the Arabian Hermetic tradition, *The Book of the Secret of the Creation*, commonly attributed to Appollonius. In broad outlines she reaches the same conclusions as Carusi: that Aristotle's *Meteorology*, especially its account of the constitution of metals by means of dry and moist exhalations, is a clear source of inspiration; and that the elaboration of this source material within the 'Hermetic' context produced a product far from its classical Greek origins. It is, as Travaglia says, 'an interesting example of the original interpretation of a classical source' [100]. This paper sits slightly uneasily in this volume, however, since the primary 'inspirational' sources are in *Meteor.* 1–3 rather than in book 4. The doctrine of dry and moist exhalations is deployed regularly in *Meteor.* 1–3, but is virtually absent in book 4 (as noted explicitly by Carmela Baffioni in her contribution [122]). Moreover, the key uniform bodies in the Hermetic tradition, sulfur and mercury, are each mentioned but once in the *Meteorology*—and again, the only mention of sulfur is outside book 4. Regarding the puzzle of why the elaborate theory of concoction developed in *Meteor.* 4.2–3 is absent in the rest of book 4, one must also wonder why the elaborate theory of exhalations used extensively in *Meteor.* 1–3 is likewise absent in book 4. In fairness, however, we should note that the author of *The Book of the Secret of Creation* was relying on 'translations' and 'commentaries' which were extremely distant from the original; and that these works freely interpolated ideas from the earlier books into the processes and materials discussed in book 4.

Perhaps the most apt description of the relationship between the texts in these traditions and the Aristotelian original is the metaphorical one embedded in the title of Carmela Buffioni's contribution, 'Echi di Meteorologica IV nell' Enciclopedia dei Fratelli della Purità'. Echoes, after all, become fainter the farther they are from their source

and are extremely prone to distortion due to environmental influences. The aptness of the metaphor may explain its reappearance in the subtitle of Michela Pereira's contribution concerning Aristotelian and Avicennian echoes in the *Magister testamenti*. In comparing texts in Aristotle and these texts, Buffioni and Pereira are forced to the conclusion that the layers of mediation between the original and the *Encyclopedia* and *Magister* make such comparisons very difficult. Again, the difficulty is that the primary source texts were not Aristotle's *Meteorology* and its commentaries, but a Hellenistic reworking of ideas in the *Meteorology* and the Arabic commentaries on this Hellenistic contribution.

Pereira provides us with a rich exploration of the interplay in the 13th century among doctors, alchemists, and natural philosophers working within the Aristotelian/Avicennian tradition, giving special attention to the *Magister testamenti*. But there is a second dimension to this discussion, namely, that of the interplay between philosophical theory and 'laboratory' practice, which concerns how the relationship between the practical arts and natural philosophy was understood by the author of this treatise. The *Magister* is a work that presents a creative reworking of the concept of prime matter and discusses diverse procedures for the transformation of metals. The echoes of *Meteor. 4* in it are very faint indeed.

Ahmad Hasnawi also considers Avicenna by comparing his treatise *On Actions and Passions* with *Meteor. 4* for a quite specific reason: its introduction bears a striking similarity to the introduction of *Meteor. 1* that is hard to imagine as accidental. Avicenna outlines his course of natural investigation in ways that are both strikingly similar to the outline that opens Aristotle's *Meteorology* and interestingly different. The treatise *On Actions and Passions* is to be studied after generation and corruption, but before 'meteors and minerals'. Avicenna also inserts a general study of soul prior to that of plants and animals, again a step importantly absent in Aristotle's outline. An appendix to Hasnawi's essay outlines the chapters of this work, and one can see immediately a number of parallels with *Meteor. 4* and at least as many differences. As with other works in the Arabic tradition, we see again the pattern of creatively blending ideas of *Meteor. 1–3* with ideas only found in book 4 (in this case, *antiparestasis*); but we also see a philosopher with an Aristotelian sensibility reacting strongly to the anti-Aristotelian elements in the alchemical tradition.

Through his own writings and his influence on Albertus Magnus and Thomas Aquinas, Avicenna had a far-reaching influence on the Middle Ages and Renaissance. The final essay in this collection, by Chiara Crisciani, considers these and other influences—alchemical, philosophical, and medical—on Pietro Bono's *Pretiosa margarita novella*, written in the 14th century and still influential two centuries later. It must be said that Crisciani's emphasis is on broadly Aristotelian influences as much as on the influence of the *Meteorology*. Alchemy is re-conceived after the model of an Aristotelian subordinate science under the science of minerals and, thus, broadly under *Meteorology*. And the theory of the formation of metals is conceptualized in terms of the Aristotelian metaphysical framework of potency and act, matter and form, and final causality. However, because the metals develop through a 'hierarchy of forms' reflecting degrees of perfection, there is a decidedly Neoplatonic element here as well. At the same time, the role of the alchemist has a decidedly 'modern' feel too. He cannot artificially transform anything; he can, however, through understanding this natural development, help the natural transitions along. Such understanding must arise from experience, including experiment.

This is an extraordinarily rich volume by a talented group of scholars. For those like myself who are familiar with Aristotle's *Meteorology* and its Greek commentators but not with the alchemical and hermetic traditions, this volume is full of revelations and historical surprises. At times one senses that the actual fourth book of the actual *Meteorology* by the actual Aristotle is playing no actual role at all. But this is to ignore the nature of history. For even when there are only the faintest of echoes of *Meteor.* 4 in the texts being discussed, the skilful historian can trace that echo back to its source. Intellectual history is a study of the creative interpretation and reinterpretation of tradition, and in this collection of essays we see how even the attempt to represent a text faithfully leads over and over again to innovation. The history told in these essays is also, of course, a small thread in the fabric of that amazing tale of the creative transmission of the texts and ideas of classical and Hellenistic Greece through Islamic culture to the Latin west, and their creative encounters with Greek manuscripts tracing back to the same sources.

It is, therefore, a reminder of a time when scientific and philosophical creativity emerged from the cultural interactions of East and West—at this moment in history, a valuable reminder.

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