

Book Reviews



Malcolm Wilson

Structure and Method in Aristotle's Meteorologica: A More Disorderly Nature
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In this remarkable book, Malcolm Wilson returns *Meteorologica* I–III to its important place in Aristotle's account of the natural world. Long a subject of medieval and Renaissance commentaries, recent scholarship has neglected the first three books of the *Meteorologica*. As Wilson points out, this neglect at times is startling. Numerous studies have recently discussed whether Aristotle thought winter rains have final causes based on a few lines in *Physics* 2.8 without considering what Aristotle wrote about rain and related phenomena in the *Meteorologica*.

Wilson's book is divided into two parts. The first is a series of studies that explain Aristotle's method for this book and what he calls the "architectonic" structure of meteorology. The second part then applies the conclusions of the studies to the individual phenomena Aristotle tried to explain. The second part works nearly like a commentary, following along the order of the chapters of *Meteorologica* I–III. It also serves to fortify and expand the arguments made in the first part.

Wilson explains the emergence of *Meteorologica* I–III in the context of the decline of the subject among later Presocratics, who were more occupied by the problem of change. According to Wilson, this decline resulted from their reducing meteorology to general physics. To correct their failing Aristotle devised material principles, the dual exhalations, for meteorological phenomena that were irreducible, yet related, to the four elements that were the basis of the general physics as presented in the *Physics*, *De generatione et corruptione*, and *De caelo*. These dual exhalations as material causes, are accompanied by two other causal principles: place and the efficient cause primarily arising from the power of the sun's motion. In Wilson's view, location hierarchically

orders meteorology. This order, however, is not teleological. Wilson judges final causes to be absent in this work, as “*meteora* are merely the mechanical responses of the heavenly desire” and without their own goals and purposes (p. 110). The mechanical processes that depend on the sun’s motion and rays (ἀκτίνες) include: combination, separation, combustion, ejection, condensation, and congelation.

While the multiplicity of processes might render *Meteorologica* I–III incoherent – and at times he admits Aristotle’s arguments are unconvincing – Wilson finds the unifying principle of the work in its establishment of a hierarchy of *meteora* that results from their matters, efficient causes, and places. Following the scholarship of Balme, Gotthelf, Lennox, and Pellegrin on Aristotle’s biological works, Wilson understands the *Meteorologica* to follow the rules established in natural history by sorting *meteora* into ten “greatest groups” that parallel the categorizing of animals into birds, fish, mammals, insects, testaceans, and so on. For meteorology, the matter, efficient cause, and place define the genera, which can be furthered broken down into differentiae based on quantity, altitude, size, shape, duration, and degree.

Just as in the case of animals, some *meteora* are superior to others. The dry exhalation is causally prior to wet vapor; and, masses of exhalation closer to sun are privileged over their lower relatives. The Milky Way, stable and moving in circles, situated near the interstitial region next to the heavens, and composed entirely of the dry exhalation, is the highest genus. The low-lying sea, composed primarily of vapor and acting in a way analogous to digestion, is its inferior counterpart. Similarly the motions of meteorological phenomena indicate their position in the hierarchy by their “posture” just as animals do, according to Wilson. The combustible dry exhalation typically rises straight up from the earth, while the vapors of the rain-cycle become part of laterally-moving rivers. Below the earth’s surface, largely unaffected by the power of the sun, the dry exhalation moves chaotically, provoking earthquakes.

Wilson’s use of the zoological writings to inform his reading of the *Meteorologica* is original, and is found nowhere in any of the Renaissance commentaries on this work, perhaps because the links between logic and biology, which are now widely accepted, were not known, or, perhaps because Aristotle never explicitly described this structure or these hierarchies among *meteora*. Furthermore, the order of subjects in the text do not follow Wilson’s proposed structure, forcing him to interpret five chapters (1.13–2.3) as a long digression. Yet, the second half of this volume demonstrates the usefulness of Wilson’s account. The hierarchical structure is not a cause in itself, but rather an effect (p. 87), allowing us not only to see meteorological phenomena as a homeostatic inter-related unity, but also unveiling Aristotle’s motivations for specific explanations. Wilson sees Aristotle as having “pre-selected” empirical evidence

that would fit his general hierarchical theory (p. 6). Similarly, Aristotle coaxed explanations of specific phenomenon into fitting the broader structure. Thus, Wilson can provide the motivations for what might seem ~~like~~ poor or strange arguments that are subordinate to the more general theory. In his words, he “prefer[s] to diagnose rather than to remedy his specific arguments,” (p. 8) which are apparently ill.

A good example is Wilson’s reading of Aristotle’s theory of the wind. Why did Aristotle strangely insist that wind is not air in motion? Wilson gives a structural answer. If it were simply moving air, then winds would create a global system always in motion. Rather, Aristotle wanted the winds to be parallel to rivers because of their proximity to the earth’s surface. For Aristotle, rivers have specific sources and form a radial hemispheric system that flows into the Mediterranean. If winds are to have a similar action and geography, then they must arise from fixed geographic locations, have specific flows that move toward a center near Greece, and therefore be made of something other than air, namely the dry exhalation. Another example is Aristotle’s endorsement of the sublunary nature of the Milky Way, something that few, even in antiquity, accepted. Wilson argues that the purpose is to show that the Milky Way, as the most superior and orderly of the *meteora*, demonstrates that the sublunary realm copies the motion of the heavens.

As a whole, this book does not result in a particularly positive assessment of Aristotle’s practice as a naturalist. While some have described his methodology in this work as abduction or inference to the best possible explanation, Wilson paints Aristotle in a slightly different light. Having chosen the principles, Aristotle sought out evidence that supported them. Yet at the same time, Aristotle was successful in demonstrating that meteorology as a field might possess its own distinct principles and still bridge the science of the heavens to that of biology.

In addition to placing *Meteorologica* I–III in the larger context of Aristotle’s natural philosophy, Wilson expertly discusses the many theories and conundrums this work presents. He admirably explains the exhalations, their actions, causes, and differences as well as specific *meteora*. Many of the issues cannot be resolved with certainty. What exactly are chasms (χάσματα)? By what means do the sun’s ἀκτίνες heat the earth? If the dry exhalation does not circle back to the earth, how has it not been exhausted? Regardless, Wilson gives many insights into these puzzles through formidable scholarship and by employing the three causes that define the genera and species of *meteora*.

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