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Aemulatio and Epicurean Semiosis at *Georgics* 1.415-23

As a didactic poem, Vergil's *Georgics* is intimately tied up with questions of knowledge, both about ourselves as humans and the world,¹ as well as of poetic succession. As many commentators have noted,² these issues often collide where Lucretius, the Epicurean *didaskalos*-poet, filters through the poem. One such collision occurs as Vergil attempts to describe why birds in particular are able to act as signs of weather changes:³

*haud equidem credo, quia sit divinitus illis
ingenium aut rerum fato prudentia maior;
verum ubi tempestas et caeli mobilis umor
mutavere vias et Iuppiter uvidus Austris
denset erant quae rara modo, et quae densa relaxat,
vertuntur species animorum, et pectora motus
nunc alios, alios dum nubila ventus agebat,
concipiunt: hinc ille avium concentus in agris
et laetae pecudes et ovantes gutture corvi.*

Geo. 1.415-23

I certainly do not think that this is due to some innate ability granted to them by divine agency or an extraordinary knowledge of natural affairs granted by fate. Rather, when a storm and the sky's fickle moisture have changed their courses and Jupiter, wet with the south wind, condenses what was rarified or rarifies what was condensed, the material of the birds' minds is altered and their chests now sense motions different from

¹ For eminent examples of such studies, see Farrell 1991, Perkell 1989, and Gale 2007.

² The two standard scholarly commentaries are Mynors 1990 and Thomas 1988.

³ See Gale 1991, 414-426 for a study of Vergil's response to Lucretius's ideas on humans and animals.

when the wind drove the clouds. Hence derives that birdsong in the fields and the joyful herds and the ravens rejoicing in their squawk.

This excursus into causal explanation allows Vergil to engage in a particularly high degree of poetic and philosophic *aemulatio*. In short, Vergil provides an Epicurean answer to an Epicurean problem in order to outstrip the chief Epicurean poet and indeed Epicurus himself.

In this paper, I offer a studied reading of this short passage in an attempt to elucidate Vergil's nuanced epistemic method, specifically his use of Epicurean semiosis. In order to illuminate this epistemology, I first tease out this passage's complex intertextual web and then its philosophic lineage. Interweaving allusions to Epicurus, Aratus, and Lucretius, Vergil utilizes the *topos* of animal signs to demonstrate his unique addition to the didactic genre more generally, but to Epicurean philosophy specifically. I contend that Vergil turns to contemporary Epicurean theories of semiosis, or inference from signs, to ground his explanation. As a result, Vergil offers a markedly Epicurean explanation for a phenomenon mocked by Epicurus and side-stepped by Lucretius. The focus of the intertexts and method suggests that these lines represent a salient example of Vergilian *aemulatio*. I suggest that this passage thus offers some insight into the nature of Vergil's emulative attitude toward Lucretius; that is, Vergil neither simply accepts and praises Lucretius, nor does he simply reject Lucretian ideas and methods. Instead, he builds on his Epicurean predecessor, both poetically and philosophically.

This paper tackles the issue of Vergil's relationship to Lucretius indirectly, however, treating instead Vergil's epistemology in this passage. Although a didactic poem, explicitly epistemic studies of the *Georgics* are relatively few. Recently though scholars such as Christine Perkell, Alessandro Schiessaro, and William Batstone have examined the epistemology of Vergilian didactic. Towards one end of the spectrum, Batstone suggests that one of Vergil's goals is to undermine "epistemological authority."⁴ This passage, however, establishes the surety of forecast knowledge via birds as weather signs. More towards the other side of the spectrum, Schiessaro sees Vergil fixing knowledge in the form of *praecepta*, "a predetermined set of fixed indicators."⁵ This epistemology is explicitly contrasted with Lucretian epistemology, which "used *signa as opsis tōn adelōn*, 'image of hidden things,' as a means to understand non-evident causes."⁶ Once again, however, this passage appears to buck the trend, as Vergil offers an explanation of the non-evident cause of birds' ability to act as weather signs. More centrally located, Perkell focuses on the simultaneous existence but instability of georgic knowledge: "The poem privileges mystery, not solution; complexity and ambiguity, not certainty."⁷ Finally, Christopher Nappa imagines an

⁴ Batstone 1997, 135.

⁵ Schiessaro 1997, 80.

⁶ *ibid.*, 83.

⁷ Perkell 1989, 190.

epistemology wherein knowledge of causes and of precepts are both necessary.⁸ Of course, the epistemology of the *Georgics* qua epistemology is too large a topic to be dealt with here, but I will suggest that no simple account of georgic epistemology may be given, yet the depth and philosophic rigor of Vergil's epistemic methods are occasionally passed over too hastily.

Before we consider the philosophical import of Vergil's explanation, however, we must first traverse Vergil's complex intertextual web. After a discussion of Ceres worship (1.335-350), the georgic narrator turns to consider weather signs (1.351-464).⁹ Vergil here systematically reworks the so-called *Diosemyia* of Aratus (*Ph.* 733-1154). Just as Aratus displays one section on celestial signs (*Ph.* 778-908) and one on non-celestial signs (*Ph.* 909-1141), Vergil offers sections on terrestrial signs (1.351-423) and astronomical signs (1.424-60). As Joseph Farrell points out, Vergil transposes the major structural elements: "Vergil treats of these topics in reverse order and drastically reduces their bulk."¹⁰ Yet the reference goes deeper. Within the portion considering terrestrial signs, the reader finds two sub-sections: signs of foul weather (1.351-92) and signs of fair weather (1.393-423). Once again, Farrell alerts us to the complex structural reference: "the expository structure [of] *Georgics* 1.351-423 imitates that of *Phaenomena*

⁸ Nappa 2003, 39-56, esp. 40 n.3.

⁹ For overview and general analysis, see Farrell 1991, 79-83 and Cole 1979. For commentary, see Thomas 1988, 127-44 and Conington and Nettleship 1858, 208-18.

¹⁰ Farrell 1991, 80.

909-998, dealing first with signs of wind, then signs of rain, and finally signs of fair weather.”¹¹ One could reconstruct the structural ties from Farrell’s data thus:

Signs of Foul Weather	<i>Geo.</i> 1.351-392	<i>Ph.</i> 909-987
Signs of Fair Weather	<i>Geo.</i> 1.393-423	<i>Ph.</i> 988-998
Celestial Signs	<i>Geo.</i> 1.424-514	<i>Ph.</i> 778-891

Amid the signs of fair weather (1.393-423), however, the reference extends to include *Phaenomena* 999-1012—Aratus’ account of how birds act when foretelling good weather to come.¹²

Beyond mere structural links, the *Georgics* passage on birds as weather signs offers linguistic references to Aratus’ corresponding section. When describing the shift from tempest to fair weather, Aratus looks to birds as his primary signs:

καὶ κόρακες μούνοι μὲν ἔρημαῖοι βοῶντες
 δισάκις, αὐτὰρ ἔπειτα μετ’ ἄθροα κεκλήγοντες:
 πλειότεροι δ’ ἀγελιδόν, ἐπὴν κοίτοιο μέδωνται,
 φωνῆς ἔμπλειοι: χαίρειν κέ τις οἴσσαιτο,
 οἷα τὰ μὲν βοῶσι λιγαινομένοισιν ὁμοῖα,

Ph. 1003-7

Let the ravens that cry twice and then squawk in unison be your only signs. In groups they frequently fill the sky with song, once they’ve regained their nests. One would think that they were rejoicing, so much do they cry like those who cry with clear voices.

As a signal of the changing weather, the ravens in the *Phaenomena* first “cry out twice, and then croak in unison” (*Ph.* 1003-4). Similarly, the georgic ravens “cry out three or

¹¹ *ibid.*, 81

¹² See Thomas 1988, 137-8.

four times" (*ter ... aut quater ingeminant*, 410-11).¹³ The forewarning cries of the ravens are first described in quantitative terms and then in qualitative terms. Aratus describes the caw of the raven that signals fair weather as resembling rejoicing: "one would think that they were rejoicing" (*Ph.* 1106). Vergil, in turn, describes his ravens as "joyous with some sort of exceedingly unusual delight" (*nescio qua praeter solitum dulcedine laeti*, 412).¹⁴ For both Vergil and Aratus, the numerous joyful cries of ravens signal forthcoming fair weather.

Having describing *what* signals the ravens provide, the georgic narrator turns to elucidate *how* ravens are able to act as weather signs. Here Vergil frequently echoes Lucretian language; indeed, Vergil mixes two passages from *De Rerum Natura* in these lines. First, the georgic narrator depicts weather phenomena (*tempestas et caeli mobilis umor*, 1.417) as "shifting their courses" (*mutavere vias*, 418). The phrase is unique and points to Lucretius' description of the movement of atoms:

*quod tales turbae motus quoque materiai
 significant clandestinos caecosque subesse.
 multa videbis enim plagis ibi percita caecis
 commutare viam retroque repulsa reverti
 nunc huc nunc illuc in cunctas undique partis.*

DRN 2.127-31

Such scattered motions provide signs that the motions of elementary matter also exist beneath them, though secretly and unseen. For you will

¹³ Thomas 1988, 137 suggests that Vergil's shift in the number of cries may be an oblique reference to Theophrastus' *Weather Signs* 52-3, where ravens caw three times.

¹⁴ Thomas *ibid.* notes that "the springtime activity of bees is described in the same way: *hinc nescio qua dulcedine laetae / progeniem nidosque fovent*, 4.55-6."

see many things here put in motion by invisible blows to shift their course and once they are beaten backwards to return again—now here, now there—in every sector all around.

Beyond the obvious verbal parallel, the *Georgics* passage resounds with echoes of this striking depiction of atomic motion. As the atoms are beaten back only to return again, so too, when the weather changes in Vergil's passage, the birds are described as having the material of their minds turned (*vertuntur species animorum*, 420). Motion (*motus*, *Geo.* 420 and *DRN* 2.127) and signification (*certis signis*, *Geo.* 1.394; *significant*, *DRN* 2.128) also play central roles in both passages. I shall return to the significance of this reference later.

The more direct referent for Vergil's explanation, however, comes from book five of *DRN*. Here Lucretius discusses the origins of language with reference to birds changing their songs as a result of different stimuli:

*postremo genus alituum variaequae volucres,
accipitres atque ossifragae mergique marinis
fluctibus in salso victum vitamque petentes,
longe alias alio iaciunt in tempore voces,
et quom de victu certant praedaque repugnant.
et partim mutant cum tempestatibus una
raucisonos cantus, cornicum ut saecla vetusta
corvorumque gregis ubi aquam dicuntur et imbris
poscere et inter dum ventos aurasque vocare.*

DRN 5.1078-86

Lastly, consider the race of winged creatures and various birds—hawks, ospreys, and sea-gulls that seeks their nourishment and livelihood in the salt-water amid the waves of the sea. They produce at different times vastly different voices than when they fight for food or struggle with their prey. And some, as a unit, change their raucous songs along with the

weather, as for example, the age-old breed of crows and the herd of ravens, when they are said to ask for water and rain and sometimes to call for winds and storms.

The opening to Vergil's discussion of birds as weather signs (*tum liquidas corvi pessa ter gutture voces / aut quater ingeminant*, *Geo.* 410-11) recalls Lucretius opening (*volucres... iaciunt voces*, *DRN* 5.1081). More explicitly, the description of weather altering its course (*ubi tempestas ... mutavere vias*, *Geo.* 1.417-8) recycles Lucretius' language when he describes the birds changing their song with the weather (*mutant cum tempestatibus*, *DRN* 5.1083). Furthermore, the repetition of *alios, alios* (*Geo.* 1.421) points directly to Lucretius' *alias alio* (*DRN* 5.1081). Finally, Vergil reworks Lucretius' description of the rumored prognosticative and causative abilities of ravens (*dum ventos aurasque vocare*, *DRN* 1086) when he imagines how ravens feel differently then "when the wind drove the clouds" (*dum nubila ventus agebat*, *Geo.* 1.421). One may note, however, that what is rumor in Lucretius (*dicuntur*, *DRN* 1085) is treated as common knowledge and fact in the *Georgics*.¹⁵

This small section on birds as signs of fair weather stands within a complex intertextual nexus. Standing at the heart of an extensive structural reference to the *Phaenomena*, these lines incorporate the language of both Aratus and Lucretius. Aside from the oblique reference to atomic motion, Vergil draws inspiration from both of his predecessors' accounts of birds acting as weather signs. Similarity in language,

¹⁵ Birds were well-known in the ancient world as prophets of weather. See, Aratus *Ph.* 949-53, Lucan *BC* 5.555-6, Horace *Carm.* 3.17.12-13 (TLL 4.961.35ff.), and Pliny *NH* 18.362-3 for discussions of this phenomenon.

however, belies Vergil's departure from both Aratus and Lucretius. Vergil offers an explanation of *how* birds can provide signs of weather changes. Aratus, like Vergil, treats the phenomenon as common knowledge and fact, but offers no indication that he is interested in or can provide an explanation. As noted above, Lucretius discusses this common belief from afar, only going so far as to state that birds "are said" to have this power. Lucretius does suggest a superficial explanation, however, when he declares that birds alter their song along with the weather (*mutant cum tempestatibus*, DRN 5.1083). This simplistic explanation stands within a philosophical heritage. I contend that Vergil is very much aware of this philosophical pedigree; as such, a fuller understanding of Vergil's deft poetic and philosophic maneuver requires closer attention to the philosophical, and specifically Epicurean, tradition in which it is situated.

Although short and perhaps lacking philosophic and poetic pizzazz, the Lucretian passage from book five proves important for Lucretius' relation to his philosophic forebear, Epicurus. It is universally, and rightfully, held that Lucretius was a rigidly doctrinaire Epicurean.¹⁶ He appears not to have trifled with contemporary Epicurean developments,¹⁷ and, as David Sedley has persuasively argued, structured his entire poem to reflect Epicurus' magnum opus—*On Nature*.¹⁸ These nine lines on birds prove, however, that Lucretius was not beyond possibly modifying the positions of his

¹⁶ Sedley 1998, 62-91 offers a studied account of Lucretius' philosophical fundamentalism.

¹⁷ Warren 2007, 19-32 offers a solid start for Lucretius' philosophical influences.

¹⁸ Sedley 1998.

master.¹⁹ Following Sedley's structural analysis, book five of the *DRN* would rework the meteorological sections of Epicurus' *On Nature*.²⁰ Unfortunately, none of *On Nature* is extant, so direct comparative study is impossible. Luckily, however, Epicurus' extant *Letter to Pythocles* (*Ep.Pyth.*) covers the gambit of Epicurean meteorology and allows the historian of philosophy indirect access to the general scope and sequence of what would likely be found in *On Nature*.²¹

The topic of birds as weather signs appears twice in Epicurus' letter, at sections 98 and 115.²² In the first instance, Epicurus offers two possible explanations for why particular signs can foretell weather changes:

ἐπισημασίαι δύνανται γίνεσθαι καὶ κατὰ συγκυρήσεις καιρῶν, καθὰ περ ἐν τοῖς ἐμφανέσι παρ' ἡμῖν ζώοις, καὶ παρ' ἑτεροιώσει ἀέρος καὶ μεταβολάς. ἀμφοτέρω γὰρ ταῦτα οὐ μάχεται τοῖς φαινομένοις. ἐπὶ δὲ ποίοις παρὰ τοῦτο ἢ τοῦτο τὸ αἴτιον γίνεται, οὐκ ἔστι συνιδεῖν.

Ep.Pyth. 98

There are weather signs either due to a coincidence of the seasons, as is the case with animals seen by us, or due to changes and alterations in the air. Neither explanation conflicts with visible facts. It is not possible to understand in which cases it occurs due to this or that cause.

One may note that either explanation is more properly an example of correlation, not causation. Either the changing season affects both the weather and the sign, or air changes affect both weather and sign. In both cases, weather phenomena and their so-

¹⁹ Clay 1983.

²⁰ Sedley 1998, 152-55.

²¹ I use the text of Usener 1887, 35-55.

²² Usener 1887, pp. 43 and 54 respectively.

called signs are correlated by the same cause. One may also note that Epicurus here, like Lucretius, tacitly grants that animals can act as signs of weather to some degree. The example of animals as weather signs under the explanation of temporal coincidence is repeated near the end of the letter, when Epicurus paints a witty picture of an alternative explanation:

αἱ δ' ἐπισημασίαι αἱ γινόμεναι ἐπὶ τισὶ ζώοις κατὰ σθγκύρημα γίνονται τοῦ καιροῦ. οὐ γὰρ τὰ ζῶα ἀνάγκην τινὰ προσφέρεται τοῦ ἀποτελεσθῆναι χειμῶνα, οὐδὲ κάθηται τις θεία φύσις παρατηροῦσα τὰς τῶν ζῶων τούτων ἐξόδους κᾶπειτα τὰς ἐπισημασίας ταύτας ἐπιτελεῖ. οὐδὲ γὰρ εἰς τὸ τυχὸν ζῶον κᾶν <εἰ> μικρὸν χαριέστερον εἴη, τοιαύτη μωρία ἐμπέσοι, μὴ ὅτι εἰς παντελεῖ εὐδαιμονίαν κεκτημένον.

Ep.Pyth. 115-16

That some animals act as signs of weather is due to a coincidence of time. For the animals do not provide some necessary reason for a storm being produced, nor does some divine being sit observing the comings and goings of these animals and then accomplish these “signs.” For such folly would not befall an ordinary being, even if somewhat enlightened, much less one who possesses perfect blessedness.

The image of a god sitting on Olympus waiting for a bird to caw a certain way before he whips up a storm is exceedingly comical. It demonstrates how ludicrous it is to think that birds are true causes of weather phenomena. It does not, however, prove that birds can act as weather signs *only* because of temporal coincidence. As Epicurus himself states, there are two possible explanations of weather signs that depend on correlation—temporal coincidence or barometric changes.²³ While he clearly places the specific

²³ For a detailed study of ancient meteorology in general, see Mourelatos 2005, 279-91.

example of animal signs in the former category, he does not demonstrate why this is the only possible explanation.

Lucretius appears to have sensed this gap. Although he distances himself from statements of fact concerning the prognostications of birds (*dicuntur*, DRN 5.1085), Lucretius does offer a pseudo-explanation with reference to weather changes (*mutant cum tempestatibus*, DRN 5.1083). I call this a pseudo-explanation because Lucretius tiptoes around the issue and merely states explicitly that the birds' cries and the weather phenomena are correlated. On the face of it, both a seasonal coincidence and changes in the air could be the cause of this correlation. Lucretius' language, however, does suggest that he situates his pseudo-explanation in a different camp than Epicurus. While the phrase "change along with the weather" elides the causal explanation, *mutant* (DRN 5.1083) echoes Epicurus' ἑτεροίωσις ἀέρος καὶ μεταβολάς (Pyth 98.14). Insofar as Lucretius intimates a difference of opinion with Epicurus, he signals his own philosophical independence, although choosing one of two possible Epicurean explanations would not tarnish Lucretius' doctrinaire relation to Epicurus. Of course, these issues remain in the background here, as Lucretius does not give an explicit causal explanation of birds as weather signs.²⁴ The role that the verb *mutant* plays in this delicate philosophical history nevertheless illuminates Vergil's particular contribution

²⁴ For a study of Lucretius semiotic distinction between animal and human vocalization, see Stevens 2008, 529-57. Although it does not focus explicitly on animals as weather signs, it places these lines in their larger context while simultaneously reading semiosis as central to the larger passage.

to this discussion. In Lucretius, weather and birds both simultaneously change; in Vergil, weather changes the birds.

Where Lucretius side-steps an explanation, Vergil takes an explicit stand. The verb *mutavere* (*Geo.* 1.418) demonstrates Vergil's break from both of his poetic and philosophic predecessors. The shift in the subject from Lucretius' *corvorum gregis* to Vergil's *tempestas* illustrates that Vergil offers a true causal explanation where Lucretius can only hint. Moreover, the verb echoes Epicurus' second possible explanation—*ἑτεροίωσις ἀέρος καὶ μεταβολάς* (*Pyth* 98.14). Like Epicurus, Vergil is interested in *how* birds can act as signs of weather phenomena. Unlike Epicurus, however, Vergil turns to barometric alterations for a causal explanation. Vergil deepens Epicurus' explanation by specifying the particular "change in the air" that allows birds to act as weather signs. Vergil's explanation thus engages in *aemulatio* with both Epicurus and Lucretius.²⁵ On the one hand, he challenges Epicurus' causal explanation; on the other hand, he states explicitly what Lucretius only offers implicitly. This small section of lines thus lies within both a dense intertextual web and a deep Epicurean tradition.

In establishing his own place in this literary and philosophic complex, Vergil offers his readers a scientifically nuanced account of how birds are able to signal changes in weather patterns. His explanation is condensed, however, and requires some unpacking. The heart of the explanation comes in one line: "[When Jupiter] condenses

²⁵ For a brief study of Lucretius' reception in Latin literature, see Hardie 2006, 111–127. In the section on Belief and Authority, Hardie discusses Vergil's relationship to Epicureanism and its chief Latin evangelist, commenting on the oft-debated lines at the center of the *Georgics* (2.490-4).

what was rarified, and rarifies what was condensed" (*denset, erant quae rara modo, et, quae densa, relaxat, Geo.1.419*). As the georgic narrator goes on to explain, the birds sense these barometric changes and correspondingly alter their behavior. The text itself offers no indication why birds are able to sense these barometric changes, when, for instance, humans cannot. That is to say, while the explanation is significantly more nuanced than either that of Epicurus or Lucretius, Vergil offers no "proof," no reason to believe his account.

One can, however, reconstruct the basics of Vergil's reasoning via an intertext with another passage from Lucretius' *DRN* (6.99-107). Early in book six, Lucretius discusses the nature of clouds, including their appropriate density. In short, clouds cannot be so dense as not to fly, or so rarified as not to hold their shape:

*nec fit enim sonitus caeli de parte serena,
verum ubi cumque magis denso sunt agmine nubes,
tam magis hinc magno fremitus fit murmure saepe.
praeterea neque tam condense corpore nubes
esse queunt quam sunt lapides ac ligna, neque autem
tam tenues quam sunt nebulae fumique volantes;
nam cadere aut bruto deberent pondere pressae
ut lapides, aut ut fumus constare nequirent
nec cohibere nives gelidas et grandinis imbris.*

DRN 6.99-107

For sound does not arise in the clear portions of the sky, but wherever clouds are in a denser pack, thence does a great rumbling roar arise so much more frequently. Then clouds are not able to have a body as condensed as stones or wood, yet neither so rarified as mists or swirling smoke. For either they ought to sink, impelled by their own inert weight like stones, or like smoke they would be unable to hold a shape and contain icy snow and hail storms.

The *Georgics* passage offers a number of verbal parallels, alongside the conceptual common ground. First, the opening of Vergil's explanation, *verum ubi tempestas* (*Geo.* 1.417), echoes Lucretius' transition—*verum ubi cumque* (*DRN* 6.100). Secondly, Lucretius' binary, *condensus* versus *tenuis*, maps nicely onto Vergil's *densus* versus *rarus*. Both authors also deal with the concept of density and its relation to physical phenomena. More importantly, however, Lucretius' account of the appropriate density for clouds—between that of a stone and mist—elucidates why Vergil believes his barometric explanation resolves the issue. Like clouds, birds are relatively rarified, as both can “fly.” Similarly, like clouds, birds are of sufficient density to retain a shape. Clearly, however, birds are more dense and thus less rarified than clouds. Moreover, they are also more rarified and less dense than human beings. It is their physiological status as “barometric intermediaries” that allows birds to act as signs of weather changes.

Let us quickly return to Vergil's text. His explanatory account occurs in two stages. First, there is an alteration in the weather (*uerum ubi tempestas et caeli mobilis umor / mutauere uias et Iuppiter uuidus Austris / denset erant quae rara modo, et quae densa relaxat*, *Geo.* 1.417-19). This leads to an alteration in the birds (*uertuntur species animorum, et pectora motus / nunc alios, alios dum nubila uentus agebat, / concipiunt*, *Geo.* 1.420-22). As the Lucretian intertext makes clear, the birds are able to sense the changing weather as they are physiologically similar to the elements of the weather. Humans, dense as we are, remain oblivious to these barometric alterations. Due to their crude ability to

communicate (Lucretius' chief interest at 5.1081-90), however, the birds are able to signal these changes to humans. If itself condensed, Vergil's materialistic explanation nonetheless offers a scientifically nuanced account of aviary prognostication, an account contrary to Epicurus. Moreover, this explanation is saturated in Lucretian language and methodology.²⁶ Vergil engages in philosophical *aemulatio* by providing a contrary and more nuanced explanation than Epicurus and in poetic *aemulatio* by reworking Lucretian language and ideas in that explanation. As entangled in the Epicurean literary tradition as these lines have already proven to be, however, more remains.

In the final portion of this paper, I wish to argue that the nature of Vergil's reasoning in this passage most closely accords with that of contemporary Epicurean theories on semiosis. Vergil thus offers an explanation to a problem discussed by both Epicurus and Lucretius in a manner that exceeds both authors by utilizing the theoretical apparatus of contemporary Epicureans. In short, this passage is an Epicurean *tour de force*—Vergil turns to Epicurean logic to offer an Epicurean scientific account using Epicurean poetic language. But what is this Epicurean logic and how does it find its way into the *Georgics*?

²⁶ Gale 2000, 83 n.85 notes the argumentative similarities between the *Georgics* passage and *DRN*: "The pattern of argument is also very Lucretian: for rejection of a competing view followed by resumption with *verum* ("but rather"), compare e.g. *DRN* 4.741 and 6.100; with *haud equidem credo* ("I certainly do not believe"), compare Lucretius' frequent first person interjections (e.g. *Ut opinor*, "I believe", 1.854, 2.201, 551, 1153 etc.) and warnings to the reader not to be misled by rival theories (e.g. *Procul est ut credere possis*, "it is far from credible", 4.856)."

The best witness for first century Epicurean philosophy is Philodemus of Gadara, a philosopher and teacher housed at Herculaneum, where he led an Epicurean community and school.²⁷ His library at Herculaneum, the so-called *Villa dei Papiri*, which was partially preserved by the eruption of Vesuvius in AD 79,²⁸ offers scholars a wide range of texts on Epicurean philosophy, including *De signis*.²⁹ This fragmentary treatise recounts various debates between the Epicureans and unnamed opponents on the methods and limits of semiosis, or inference by signs.³⁰ While there are various side debates and issues, the heart of the treatise concerns what counts as a legitimate sign inference. The opponents argue that only the “method of elimination” (ὁ κατὰ τὴν ἀνασκευὴν τρόπος) provides stable ground for logical inference from sign (evident phenomenon) to signified (non-evident phenomenon). Under this method, the only legitimate inferential propositions (if, then statements) are those that can produce a valid modus tollens syllogism (an anachronistic, yet helpful term). The opponents offer the example of smoke as a sign of fire (___). The inference “if there is smoke, then there is fire” is legitimate because the contrary inference, “if there is no fire, there is no

²⁷ A former pupil of Zeno of Sidon, the scholar of Athens’ Epicurean school, Philodemus was known for the breadth of his learning; e.g. Cicero’s *Fin.* 2.119; *Cic. Fam.* 15.16.1; 15.19.2; *Acad.* 1.5; *Tusc.* 4.7.

²⁸ For a survey of the history of the villa and its papyri, see Sider 2005.

²⁹ For a thorough discussion of the condition of Herculaneum papyri and the difficulties they present scholars, see Janko 1991, 271-308

³⁰ The first edited text was that of Gomperz 1865, but I use the more recent edition of de Lacy and de Lacy 1978; Asmis 1995 for opponents as Academics, Allen 2001 for Stoics.

smoke,” is necessarily true. Thus, the proposition “if there is smoke, then there is fire” is a legitimate inference because it can produce the valid modus tollens syllogism:

- [1] if there is smoke, then there is fire.
- [2] There is no fire.
- [3] Thus, there is no smoke.

The Epicureans, on the other hand, believe that in addition to the method of elimination, the “method of similarity” (ὁ καθ’ ὁμοιότητα τρόπος) allows for legitimate inferences. This logical method allows an inferential proposition to be legitimate if the two terms are sufficiently similar. James Allen describes this method as prescribing “how to project features that items of a certain type have been observed to have in our experience on to items of the same or similar type lying outside our experience.”³¹ This method thus allows for both inductive and analogical inferences.

While many of the examples in Philodemus’ text concern inductive inferences, the standard analogical example concerns inferences from visible bodies to the motion and nature of atoms. Here Vergil’s oblique reference to Lucretius’ account of atomic motion comes into clearer light. To recall, Lucretius draws an analogy from the motion of dust particles to that of atoms, performing a quintessentially Epicurean logical inference in the process. Lucretius’ reasoning can be analytically reconstructed thus:

- [1] Dust particles move sporadically.
- [2] Atoms are similarly small to dust particles.
- [3] So, atoms move similarly to dust particles.
- [4] Thus, atoms move sporadically.

³¹ Allen 2001, 320.

Unlike the method of elimination, the Epicurean method of similarity allows for logical inferences even in cases where there is no direct causal dependence between the two terms.³² This method requires only that the evident and the non-evident things share a known similarity, which then provides the foundation for inferring another similarity.

Like Lucretius, Vergil reasons analogically in the *Georgics* passage. As stated above, birds and clouds are similarly rarified, as both can “fly.” This known similarity provides the rational foundation for the inference that the barometric changes that affect clouds also affect birds. One can reconstruct Vergil’s reasoning in this manner:

- [1] Clouds and birds are similarly rarified.
- [2] Clouds are altered by barometric changes.
- [3] So, birds are altered by barometric changes.
- [4] So, when clouds are altered, birds are altered.
- [5] When birds are altered by a pressure change that produces foul weather, they squawk one way.
- [6] When birds are altered by a pressure change that produces fair weather, they squawk another way.
- [7] So, experience allows a human to determine which squawks correspond to which types of weather changes.
- [8] Thus, birds can act as signs of weather.

By referencing the paradigmatic example of Epicurean analogical reasoning, Vergil tips his methodological hand. In offering a new example of such reasoning in action, however, Vergil suggests his dependence on Philodemus. For although analogical reasoning is found through Epicurus’ texts (*Ep.Pyth.* passim), it is not until *De signis* that a consistent methodology appears to have been laid out. Epicurus’ fourfold division of

³² For fuller discussion of the differences between the two methods, see Asmis 1995, 155-85.

attestation/ non-attestation (ἐπιμαρτύρησις and οὐκ ἐπιμαρτύρησις) and contestation/ non-contestation (ἀντιμαρτύρησις and οὐκ ἀντιμαρτύρησις) merely allows one to determine which opinions concerning visible and invisible matters can and cannot be believed.³³ It offers little to no aid in forming positive explanatory accounts. Thus, insofar as Vergil offers a new explanation of birds acting as weather signs, he would appear to rely on Philodemus more than Epicurus.

Indeed, Vergil was well acquainted with Philodemus. Vergil was known to have been a member of a well-attested Roman Epicurean community linked to Philodemus whose other members were Quintilius Varus, L. Varius Rufus, and Plotius Tucca. Philip Thibodeau details the sources that attest their foursome:

The Donatan Life of Vergil, which famously makes Varius and Tucca Vergil's heirs and literary executors (*vita Verg.* 37-41); Servius' commentary on *ecl.* 6.13, which has Vergil and Quintilius studying together under the Epicurean Siro (the Proban Life of Vergil, 10-12, adds Varius and Tucca as fellow students); and Horace *Satires* 1.5.40-43, in which the group minus Quintilius appears within the entourage of Maecenas. Recently, a set of papyrus fragments from Herculaneum has yielded the names of all four, in a collection of works by Philodemus bearing the title *On Characters and Ways of Life*. In two fragments the set of names is incomplete, but one from the treatise *On Flattery* clearly lists all four as dedicatees: 'Vergilius... Quintilius, Plotius, and Varius'.³⁴

With the discovery of Philodemus' library, scholars have recently begun to sense the depth of influence Philodemus had upon Vergil. These studies to date have tended to

³³ Discussed most clearly by Epicurus at *Ep. Hdt.* 51.

³⁴ Thibodeau 2003: 248. For further discussion of a Roman Epicurean quartet, see Armstrong 2003: 2-3; for Philodemus' papyri (*P.Herc.* Paris. 2, *P.Herc.* 1082, and *P.Herc.* 253) that name the foursome as addressees, see Sider 1997: 19-21; for discussion of the papyri, see Gigante and Capasso 1989: 3-6.

focus on issues of ethical philosophy.³⁵ There is no reason, however, to think that Vergil only worked with Epicurean ethical philosophy, when *De signis* proves that the Philodeman school was deeply engaged in epistemological debates as well.

Regardless of the degree to which Philodemus specifically influenced Vergil in this passage, however, Vergil's reasoning conforms to a uniquely Epicurean form of inference—analogue inference from similarity. In discussing inferences from signs (inferences of weather patterns from birds), Vergil thus engages in semiosis himself. He infers from the visible sign that birds can fly to the invisible fact that they are affected by barometric pressure changes. This inference is made via an assumed similarity between clouds and birds, the two terms of the original inference. Vergil situates this moment of Epicurean semiosis amid a proverbial sea of Epicurean intertexts, most notably Lucretius, although Epicurus filters through as well. The Lucretian referents themselves are carefully selected. One (*DRN* 5.1081-90) concerns the issue at hand in the *Georgics* passage. The second (*DRN* 6.99-107) illuminates Vergil's implicit reasoning concerning the relation of clouds and birds. The third (*DRN* 2.125-31) hints at Vergil's own epistemic method. All of this is then situated within a larger structural reference to Aratus' *Phaenomena*.

In the end, Vergil appears to have been plugged into the epistemological debates of his times. Utilizing Epicurean methods of semiosis, Vergil is able to offer a

³⁵ For various examples of such studies, see Armstrong et al. 2004.

scientifically, philosophically, and poetically nuanced account of aviary prognostication. In a swift nine lines he simultaneously engages multiple poetic and philosophic predecessors only to outstrip them all. The deftness of his *aemulatio*, using and connecting various referents, comes to the fore when one carefully studies both the poetic intertextuality and the philosophical methodology.

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