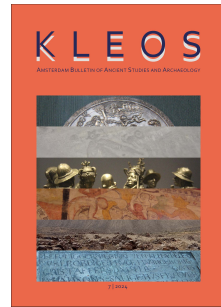




# KLEOS

AMSTERDAM BULLETIN OF ANCIENT STUDIES AND ARCHAEOLOGY



Issue 7, 2024

## CONTACT

bulletin.kleos@gmail.com

[www.kleos-bulletin.nl](http://www.kleos-bulletin.nl)

---

---

## INFORMATION ON PUBLICATION

Full Title: Suspend your disbelief: spontaneous generation in Antigonus's paradoxography

Author: Ariella Goldberg

Published: Kleos - Amsterdam Bulletin of Ancient Studies and Archaeology/Issue 7/October 2024

Pages: 27-41

ISSN: 2468-1555

**Link to these articles:** [www.Kleos-bulletin.nl](http://www.Kleos-bulletin.nl)

## RECOMMENDED CITATION:

Goldberg, A., 2024: Suspend your disbelief: spontaneous generation in Antigonus's paradoxography, *Kleos - Amsterdam Bulletin of Ancient Studies and Archaeology* 7, 27-41.

---

---

## KLEOS - AMSTERDAM BULLETIN OF ANCIENT STUDIES AND ARCHAEOLOGY

is a peer-reviewed, open access academic online journal, launched in 2014, which publishes current research and review articles by graduate and PhD students, as well as starting independent researchers, from the fields of archaeology and ancient studies (i.e. classics and ancient History). Kleos also provides reviews of recent books, conferences and exhibitions. The journal mainly aspires to serve as a platform for starting academic careers, and help students and starting researchers to share their research, gain experience in publishing, and improve their scientific skills. At the same time the journal aims to provide an overview of the research being conducted within the fields of archaeology, ancient history and classics, and support the interdisciplinary dialogue between these adjacent academic disciplines.

## SUBMISSIONS

The editors invite submissions of original research on any topic related to ancient history, classics and archaeology. Information on the editorial policy, the submission process, as well as guidelines for authors and other matters that concern potential contributors, is to be found on our website. For further information, authors and readers are referred to:

[www.kleos-bulletin.nl](http://www.kleos-bulletin.nl)

[vu-nl.academia.edu/KLEOSBulletin](http://vu-nl.academia.edu/KLEOSBulletin)

## DISCLAIMER

The editors cannot be held responsible for errors or any consequences arising from the use of information contained in this publication. The opinions expressed in the articles and reviews published in Kleos are those of the authors and not of the editors, nor of the Amsterdam Centre for Ancient Studies and Archaeology (ACASA). The publication of advertisements in Kleos or on the website does not constitute any endorsement by the editors of the products or institutions advertised.

## COPYRIGHT AND PHOTOCOPYING

Authorisation to photocopy items for academic, educational and personal use is granted. Check for information about the terms and conditions of use: [www.kleos-bulletin.nl](http://www.kleos-bulletin.nl)

# Suspend Your Disbelief: Spontaneous Generation in Antigonus's Paradoxography

Ariella Goldberg

## ABSTRACT

The term 'paradoxography' ('marvel-writing') refers to compilations of excerpted historical, ethnographical, natural scientific, and biological phenomena, which emerged in 4th century BC Alexandria with the purpose of presenting extraordinary phenomena.<sup>1</sup> Twentieth-century scholarship has depicted paradoxography as a misuse of legitimate historical and scientific works for the purpose of entertainment, while recent scholarship casts a more generous view of the relationship between paradoxographical compilations and their source texts. Nonetheless, the nature of paradoxography's engagement with science remains a desideratum of research. The present article focuses on Antigonus (fl. c. 240 BC) and his *Collection of Marvellous Investigations* (Συναγωγή ιστοριῶν παραδόξων), demonstrating how he invokes wonder in spontaneous generation—a biological process thought in antiquity to explain the appearance of organisms without being generated by another of their kind, such as insects in rotting matter.<sup>2</sup> Antigonus assumes his readers' familiarity with spontaneous generation, unlike other topics he discusses. This article demonstrates that, by positioning spontaneous generation as an object of wonder, Antigonus engages with contemporary discourse and encourages inquiry into this generative process. I introduce the history and critical reception of paradoxography, its stylistic features, and analyse Antigonus's references to spontaneous generation to emphasise his work's participation in scientific inquiry.

Ariella Goldberg

is an rMA candidate in Religious Studies at the University of Amsterdam with a BA in Classics and Mathematics from Amherst College. Her research focuses on how ancient Mediterranean science and technology influenced conceptions of nature, the body, automatism, and cosmology. Her cum laude thesis examined the religious and cultural significance of Hero of Alexandria's (1st century CE) automatic and pneumatic designs.

► [Profile page](#)

<sup>1</sup> On paradoxographical methods, see Jacob 1983, 132-133.

<sup>2</sup> The titular adjective παράδοξος is broadly construed. I use the translation of this title in Lightfoot 2021. S. White 2015 provides three alternatives: *Collection of Amazing Stories*, *Collection of Marvellous Tales*, and *Collection of Puzzling Reports*. These translations tend to prioritise the purpose of the compilation, which is to evoke wonder.

## INTRODUCTION TO 'PARADOXOGRAPHY'

The conception of paradoxography as a literary genre is modern, designating compilations of extracted phenomena presented as marvels that emerged around 4th century BC Alexandria. The rise of paradoxography was facilitated by access to libraries in urban centres such as Alexandria, Pergamum, and Athens.<sup>3</sup> Alexandria was particularly central to the development of paradoxography, due in part to support from the Ptolemies, whose court provided a social setting for the presentation of wonders; paradoxography also furthered Ptolemaic political objectives by symbolising their control over the earth's natural marvels.<sup>4</sup> The earliest author associated with paradoxography is Callimachus of Cyrene (4th-3rd century BC), the poet and librarian of the Museum of Alexandria.<sup>5</sup> Although Callimachus is most famous for his poetry and the Πίνακες, a complete catalogue of the books contained in the Museum, he also wrote the *Collection of Wonders over the Whole Earth according to Locations* (Συναγωγή θαυμάτων τῶν εἰς ἅπασαν τὴν γῆν κατὰ τόπους). Callimachus is partially preserved in the *Collection of Marvellous Investigations* by Antigonos, perhaps of Carystus (fl. c. 240 BC).<sup>6</sup> Antigonos calls Callimachus's work "[...] a collection of strange phenomena from which we will write down as many as seems to us to be worth hearing [... ἐκλογὴν τῶν παραδόξων, ἧς ἀναγράφομεν ὅσα ποτὲ ἡμῖν ἐφαίνετο εἶναι ἀκοῆς ἄξια]."<sup>7</sup> Antigonos then paraphrases Callimachus's work and arranges the entries by topic, rather than geographic location.<sup>8</sup>

Early authors who would later be recognised as paradoxographers include Agatharchides, Lysimachus, and

---

<sup>3</sup> Yu 2016, 2.

<sup>4</sup> Greene 2019, 34; Lightfoot 2021, 52-57.

<sup>5</sup> Pajón Leyra 2011, 19.

<sup>6</sup> The name 'Antigonos' appears at the beginning of the collection, potentially referring to Antigonos of Carystus, a 3rd-century BC biographer, art historian, and sculptor associated with the court at Pergamon. U. v. Wilamowitz proposed this attribution, merging several Hellenistic figures into one identity; see Wilamowitz-Moellendorff 1881, 169-177; cf. Schepens/Delcroix 1996, 377 note 1 and 401 note 89. O. Musso disputes Antigonos's authorship of the *Collection*, arguing for its compilation during the 10th-century AD reign of Constantine VII Porphyrogenitus; see Musso 1976, 1-10; id. 1977, 15-17. T. Dorandi supports Wilamowitz's identification of Antigonos of Carystus but suggests that a different Antigonos may have authored the *Collection*; see Dorandi 1999, xi-xxii; id. 2005, 121-4; cf. Köpke 1862. Nonetheless, as Lightfoot contends, the *Collection's* references date to a time before or during Antigonos of Carystus's *floruit*, supporting the work's 3rd-century BC dating and Wilamowitz's argument for its Antigonian authorship; see Lightfoot 2021, 42-43 note 1. While the authorship of the *Collection* cannot be established with certainty, the present study accepts the Hellenistic dating for its analysis. For further discussion, see Sassi 1993, 459-65; Scott Fitzgerald 2006, 378 note 11; Vergados 2007, 737 note 2.

<sup>7</sup> Antigonos, *Collection of Marvellous Investigations* 129.6-8. Greek text is adapted from Westermann 1839.

<sup>8</sup> Scott Fitzgerald 2006, 316-317.

Philostephanus of Cyrene, who was a student of Callimachus.<sup>9</sup> Paradoxographers consulted authoritative works by scientists, historiographers, and poets, including Aeschylus, Alcman, Aristotle, Ctesias, Herodotus, Theophrastus, and Xenophanes, extracting “[...] ‘wonders’ (thaumata [θαύματα]), ‘singular’ things (idia [ἴδια]), and those events that occur against expectation (paradoxa [παράδοξα]).”<sup>10</sup> The designation of thaumata, idia, and paradoxa as such is based on the author’s perception of his own work and the subjective response that he expects to evoke. In the case of Antigonus, this intentionality provides a lens into what would have been considered worthy of wonder in 3rd-century BC Hellenistic culture.

Authors associated with paradoxography did not necessarily consider themselves paradoxographers or attribute their work to a specific genre.<sup>11</sup> As C. Delattre argues, “paradoxographic texts develop through imitation of previous writers and reformulation, not through adaptation of an ideal model.”<sup>12</sup> In fact, the term ‘paradoxographer’ (ὁ παραδοξογράφος) is not attested until the Byzantine age in the work of 12th-century scholar Johannes Tzetzes (1110-1180 AD).<sup>13</sup> In his *Thousands* (Χιλιάδες), also known as the *Book of Histories*, (βιβλος ιστορική), Tzetzes uses the term for the first time to characterise Anthemius of Tralles, a 6th-century architect and mathematician. In the relevant passage (*Book of Histories* 2 35, 154), Tzetzes lists “Ἄνθεμιος... ὁ παραδοξογράφος” alongside other authorial sources for the fabled account of Archimedes utilising solar reflection to set fire to the Roman fleet during the siege of Syracuse.<sup>14</sup> Anthemius, however, is not a writer of paradoxography according to the modern definition; other sources primarily identify Anthemius as an engineer, having been the architect for the reconstruction of the church of Hagia Sophia in Constantinople after it was destroyed by an earthquake in 557 AD.<sup>15</sup> Moreover, according to I. Pajón Leyra, Tzetzes avoids using the term ‘paradoxographer’ when discussing literature related to the marvellous, indicating that he does not use it with its modern connotation.<sup>16</sup>

K. Yu points out the problems with classifying paradoxography

---

9 Yu 2016, 2.

10 Geus/King 2018, 431.

11 For the view that literary genre was not systemically defined in antiquity, see Rosenmeyer 2006, 426-437.

12 Delattre 2018, 206 note 7.

13 Lightfoot 2021, 46. All translations throughout this article are the present author's own unless stated otherwise.

14 Kiessling 1826, 46.

15 Pajón Leyra 2011, 92-93 note 217.

16 *Ibid.*, 92-93.

as a distinct genre due to its intersections with historiography, zoology, medicine, and aretology, noting that paradoxographers are often better known for their work in other fields.<sup>17</sup> When ancient sources discuss marvellous tales, they name a variety of authors, not all of whom are considered to be associated with paradoxography by modern scholarship. For instance, in his *Attic Nights (Noctes Atticae)*, Aulus Gellius (c. 123-170 AD) lists Aristeas Proconnesius, Isigonus of Nicaea, Ctesias, Onesicritus, Philostephanus, and Hegesias among the authors of “[...] Greek books full of wonders and stories, unheard of and unbelievable [*libri Graeci miraculorum fabularumque pleni, res inauditae, incredulae*] [...]”<sup>18</sup> Of these, only Isigonus of Nicaea is today considered a writer of paradoxography, although he is foremost known as a historian.<sup>19</sup> Thus, in antiquity and the Byzantine period paradoxography appears intermixed with other literature in which interest in the marvellous is commonplace.<sup>20</sup> Pajón Leyra summarises that while it is uncertain whether paradoxographical authors considered their work as a distinct genre, ancient and Byzantine non-paradoxographical authors made no distinction between paradoxography and other texts featuring similar content.<sup>21</sup>

Instead, ‘paradoxography’ is an etic term that developed through the modern publication of texts. In 1568, Xylander published the earliest edition of the works of paradoxographers, including Antigonus, Apollonius (fl. 2nd century BC), and Phlegon of Tralles (fl. 2nd century AD). Scholars credit Anton Westermann with introducing paradoxography as a genre to the modern world with his 1839 publication of *Παραδοξογράφοι, Scriptores Rerum Mirabilium Graeci*.<sup>22</sup> It is with this acknowledgement that the present study examines paradoxography, following Delattre, as “[...] a discursive practice embedded in an extensive corpus” rather than as a genre.<sup>23</sup>

## CRITICAL RECEPTION OF PARADOXOGRAPHY

Although paradoxographers often selected accounts that their source authors designated as inconsistencies or exceptions to rules, they also intentionally excised their topic of interest from its

---

<sup>17</sup> Yu 2016, 1.

<sup>18</sup> Aulus Gellius, *Attic Nights* 9.4.3.

<sup>19</sup> Pajón Leyra 2011, 90.

<sup>20</sup> *Ibid.*, 92-93 note 217.

<sup>21</sup> *Ibid.*, 89. On the lack of an independent literary genre of paradoxography in antiquity, see Dorandi 1999, xiii-xvi.

<sup>22</sup> Pajón Leyra 2011, 96; Lightfoot 2021, 46 note 4. For bibliography and editions, see Pajón Leyra 2022, 406.

<sup>23</sup> Delattre 2018, 206.

surrounding explanation, thus portraying the topic as more exceptional than originally described. As J. Lightfoot notes, the paradoxographer cherry-picked his thaumata, distorting their original meaning.<sup>24</sup> This selective presentation made topics that were reasonable in their original explanatory context seem more surprising or unusual in the paradoxographical work.

It is this tendency toward manipulation which has long led to the negative critical reception of paradoxography. Ancient authors such as Polybius, Diodorus of Sicily, and Lucian disparage wondrous tales and, by extension, paradoxography, suggesting that the use of wonder for entertainment conflicts with the pursuit of truth.<sup>25</sup>

20th-century scholars such as G. Schepens, K. Delcroix, W. Schmid, O. Stählin, A. Giannini, and J. Romm collectively characterise paradoxography as a trivial repurposing of 'true' science, condemning it as derivative, consumer-oriented literature lacking in originality and critical engagement with its subject matter, thereby marginalising paradoxography to the realm of 'pseudo-science'.<sup>26</sup> Lightfoot offers a compelling counterargument, contending that "these assumptions about the supposed lack of intellectual interest or value in this material have [...] led to the allegation that these collections must have been aimed at a popular audience, which is also supposedly an automatically credulous audience."<sup>27</sup>

The paradoxographer's omission of explanatory material does not reflect a lack of interest in scientific explanation, but rather serves to achieve the desired impact on the reader. Recently, scholars have suggested that paradoxography may arise from Hellenistic sympotic contexts in which wonder-telling was common as a form of entertainment and intellectual stimulation; R. Greene asserts that paradoxography unintentionally recreates sympotic discourse, adapting it into a textual form and allowing solitary readers to privately enjoy the pleasures once experienced primarily in social settings.<sup>28</sup> According to Greene, an appetite for wonder was "[...] shared by the masses and the intelligentsia alike."<sup>29</sup> Paradoxography's stylistic and rhetorical features facilitate stimulating wonder and scientific inquiry.

---

24 Lightfoot 2021, 74.

25 Greene 2019, 30 note 9.

26 Schepens/Delcroix 1996, 409; Schmid/Stählin 1920, 237; Giannini 1963, 248, 432; Romm 1992, 92. For further discussion of scholarly reception of paradoxography, see Lightfoot 2021, 52.

27 Lightfoot 2021, 52.

28 Greene 2019, 39-40. See also Pajón Leyra 2011, 77-80.

29 Greene 2019, 40.

## STYLISTIC FEATURES OF PARADOXOGRAPHY

Stylistic choices in paradoxography appear to be designed with the subjective experience of the reader in mind. The paradoxographer curates a sense of wonder by excluding details that would reveal the cause behind certain observations. This is evident in entry 3 of Antigonus's *Collection of Marvellous Investigations*, which states that, in Cephallenia, cicadas are found, seemingly inexplicably, only on one side of a river that divides the land.<sup>30</sup> The source of Antigonus's information is Aristotle's *History of Animals* (Τῶν περὶ τὰ ζῷα ἱστοριῶν), where it appears in a longer section about local varieties of animals.<sup>31</sup> Preceding the example about cicadas, Aristotle explains that certain species of animals occur only in certain places due to their need for particular environmental conditions to thrive.<sup>32</sup> Aristotle then describes the tendency for environmental characteristics to vary over short geographical distances, such as neighbouring regions.<sup>33</sup> This additional information justifies the fact that cicadas live on one side of the river but not the other side; presumably, only one side of the river offers them suitable conditions to thrive.

With Aristotle's explanation, a seemingly unlikely scenario—the presence of cicadas on one side of a river but not the other—is provided theoretical basis. In contrast, Antigonus excludes the information about variable environmental conditions. After several more entries, Antigonus remarks that to determine “[...] whether these things are so according to purpose or chance, much attention is needed [εἴτε κατὰ προαίρεσιν εἴτε κατὰ τύχην οὕτως ἔχει, πολλῆς ἐστὶν ἐπιστάσεως δεόμενα].”<sup>34</sup> Schepens and Delcroix interpret this statement as “[...] typical of the pseudo-scientific spirit in which the author compiled his digest of natural wonders” and an indication that the paradoxographer was not interested in Aristotle's rationalisation.<sup>35</sup> This reading, however, ascribes a sense of frivolity that is not actually present. Instead, Antigonus's statement should be read as an invitation to the reader to engage in the necessary inquiry to determine the purposeful or coincidental nature of the observations.<sup>36</sup> Given Antigonus's relatively transparent citation style, it is possible that readers may have searched for elucidation in the source text;

---

<sup>30</sup> Antigonus, *Collection of Marvellous Investigations* 3.

<sup>31</sup> Aristotle, *History of Animals* 7.28.

<sup>32</sup> *Ibid.*, 7.28.24-25.

<sup>33</sup> *Ibid.*, 7.28.25-27.

<sup>34</sup> Antigonus, *Collection of Marvellous Investigations* 20.12-14.

<sup>35</sup> Schepens/Delcroix 1996, 391-392.

<sup>36</sup> The present author's interpretation of Antigonus' statement agrees with D. Eleftheriou's translation: "Mais on aurait besoin d'un examen attentif pour déterminer si ces comportements sont intentionnels ou s'ils sont dus au hasard". See Eleftheriou 2018, 137.

although, for this particular entry, he gives no details on his source. Alternatively, if read aloud in a social setting, this text may have stimulated discussion as to why such a statement could be true. This possibility would suggest a manner of engagement with the text resembling that of the *paignia* of Late Antiquity—the tricks, games or playful poetry over erudite dinner conversations.<sup>37</sup>

Besides decontextualisation, paradoxography displays a technical, paratactic style in which entries are arranged with little authorial commentary and an ambiguous (or non-existent) overarching narrative. However, entries are often grouped according to thematic or locational concurrence.<sup>38</sup> Themes might include water marvels, zoological wonders, and persons of impressive longevity.

There is also an expressed interest in the location of wonders. Entries often concern “[...] contemporary wonders in local topographies rather than those from myth [...].”<sup>39</sup> The association of the paradoxa with their respective locations indicates an appeal to credibility. A prerequisite for an entry to be a thauma (θαῦμα) is its belonging to the real world; the entry will only evoke an appropriate sense of wonder if the reader believes that the phenomenon is real—in other words, a confirmed empirical observation.<sup>40</sup> The choice of sources confirms this interest in demonstrating the credibility of the thaumata. It was custom to draw from a wide variety of sources to give the impression of comprehensiveness. The citation standards are, however, inconsistent. Antigonus adheres to the language of his original source and often cites sources by name, while authors of later paradoxographical collections tend to be less concerned with citation.

The deliberate elimination of explanation heightens the sense of paradox associated with the topic at hand but, as Lightfoot argues, it does not indicate a lack of interest in the potential explanation.<sup>41</sup> The following sections support this argument by focusing on Antigonus’s entries concerning spontaneous generation, a widespread notion by the time he wrote about it.

## THEORETICAL ACCOUNTS OF SPONTANEOUS GENERATION

Scholars observe that spontaneous generation was widely

---

<sup>37</sup> Dufault 2019, 51-69.

<sup>38</sup> For examples and references, see Lightfoot 2021, 65-68.

<sup>39</sup> Yu 2016, 3.

<sup>40</sup> See Schepens/Delcroix 1996, 382-9 on the credibility of the marvels contained in paradoxographical collections.

<sup>41</sup> Lightfoot 2021, 78.

recognised during classical antiquity and beyond.<sup>42</sup> However, it was always worthy of scientific inquiry. J. Farley objects to the portrayal of spontaneous generation in the history of science as an intuitive phenomenon that was gradually and expediently disproven by rigorous experimentation, with the final blow delivered in 1858 by Louis Pasteur.<sup>43</sup> Similarly, K. Zwier encourages scholars to take seriously Aristotle's evidence-based defence of spontaneous generation, rather than to view it as a result obtained by intuition, popular folklore, or previous thought.<sup>44</sup>

Spontaneous generation is theorised by Aristotle to account for the appearance of whole species of animals, such as certain insects, hermit crabs, fish, eels, and oysters.<sup>45</sup> Aristotle articulates his theory of spontaneous generation multiple times, forming the philosophical basis for this phenomenon.<sup>46</sup> Often referenced is Aristotle's *Generation of Animals* 762a18-29, which claims that animals and plants are formed in the earth when liquid containing πνεῦμα ('air') and θερμότης ψυχική ('soul-heat') within the earth become enclosed, interacting and forming a structure akin to a frothy bubble. Aristotle integrates spontaneous generation into the framework of sexual generation, in which the female parent supplies the material principle through menstrual fluid and the male parent the formative principle (semen). Analogously, in cases of spontaneous generation, earthy material provides the female component and environmental heat provides the male component. Aristotle argues for the regularity of this nonetheless extraordinary generative process.

Zwier significantly concludes that Aristotle does not invent the term 'spontaneous generation' but rather acquires it from common usage.<sup>47</sup> By comparing Aristotle's use of terms such as 'to occur spontaneously' in *Physics* 2.4-6 with similar phrasing regarding the spontaneous generation of plants and animals, Zwier determines that "[...] there is no obvious indication that

42 Dudley 1997, 144; Kruk 1990, 268; McCartney 1920, 102. This phenomenon also appears in didactic poetry, flourishing through the Roman period (e.g., Oppian, *Cynegetica* 2.561-69; *Halieutica* 1.762; see Osorio 2020 for discussion of examples from Virgil's *Georgics*).

43 Farley 1977, 2.

44 Zwier 2018, 2. See note 1 for further details. Older scholarship, Zwier contends, tends to dismiss Aristotle's handling of spontaneous generation as an acceptance of popular opinion, or a contradiction with his own theories. For these views, see McCartney 1920, 102 and Vartanian 1973, 307, respectively.

45 On insects, see Aristotle, *History of Animals* 538a1-3; 552a16, a21, a29-30; 557b1, b8. On hermit crabs, see *History of Animals* 548a15. On fish, see *History of Animals* 569a10-27. On eels, see *History of Animals* 570a16-23. On oysters, see *Generation of Animals* 763a26-34. See other examples in McCartney 1920, 104-108 and Vartanian, 1973, 307.

46 See Aristotle, *Generation of Animals* 715a20, b25; 713b10; 732b10; 743a35; 757a30, b20; 758a5; 761a15, b20f; 762a5-63a30; *History of Animals* 539a15-25.

47 Zwier 2018, 19.

Aristotle is coining the term, or even applying it in a non-standard way.”<sup>48</sup> Further, Zwier analyses an instance in Plato’s *Sophist* in which the stranger calls it common knowledge that nature produces living things spontaneously, without deliberate intent.<sup>49</sup> Zwier argues that this statement provides evidence for the pre-Aristotelian familiarity with routine spontaneous generation.

Before Antigonus’s *floruit*, other non-paradoxographical works also document the spontaneous generation of plants and animals. G. L. Campbell catalogues references in Pre-Socratic philosophy, citing figures such as Pythagoras, Anaximander, Anaxagoras, Empedocles, and Democritus.<sup>50</sup> Additionally, Theophrastus, Aristotle’s student and successor as head of the Lyceum, acknowledges the notion that both plants and animals arise from matter, despite being hesitant about spontaneity in general.<sup>51</sup> Theophrastus describes worms appearing in ripe fruit on trees, in the moist space under the bark of certain trees, and in pot-herbs; he attributes their presence to specific environmental conditions, such as dampness and the direction of the wind.<sup>52</sup>

The fact that spontaneous generation is expressed in Aristotle’s work as an already-existing concept suggests that this idea was somewhat ubiquitous some 100 years prior to Antigonus’s Hellenistic dating. Antigonus acknowledges this cultural familiarity by noting its transmission through hearsay (ἀκοή), a claim unique to this entry.<sup>53</sup> As such, Antigonus’s work engages with a contemporary interest in spontaneous generation.

## SPONTANEOUS GENERATION IN ANTIGONUS

By alluding to his readers’ knowledge of spontaneous generation, Antigonus interacts with, as Delattre puts it, “[...] a community of expectations between author and reader.”<sup>54</sup> This interaction is significant because it shows how Antigonus deliberately challenges conventional ideas about the natural world. As Delattre explains, “[...] even if *phusis* [φύσις], ‘what nature offers to us’, and *doxa* [δόξα], ‘what we know of nature’, define common expectations, the two notions differ precisely in the paradoxographic text: the paradoxographer points out elements of the world that belong to *phusis*, but are contrary to *doxa*.”<sup>55</sup> Antigonus invites readers to suspend their disbelief and view

---

48 Ibid., 18-19.

49 Plato, *Sophist* 265c7-9 in Zwier 2018, 19 note 36.

50 Campbell 2003, 330-33. See also Osorio 2020, 31-32, 35; Totelin 2018, 62; Dudley 1997, 144.

51 For discussion of spontaneous generation in Theophrastus, see Balme 1962, 102-4.

52 Theophrastus, *Enquiry into Plants* 4.14.11.

53 Antigonus, *Collection of Marvellous Investigations* 89.15-16.

54 Delattre 2018, 208.

55 Ibid.

spontaneous generation as a reality, presenting nature as a realm of marvels. Unlike Aristotle, who appeals to generalisability to demonstrate the routine nature of spontaneous generation, Antigonus emphasises its singularity. Interestingly, while Antigonus inverts Aristotle's method of proof, he nonetheless engages in a form of generalisation by grouping diverse, local references under the theme of spontaneous generation. This reflects a similar scientific approach, one that recognises a shared cultural interest, gathers data, and organises it around a broad concept.

Antigonus distinguishes his task from Aristotle's, noting that while Aristotle's extensive body of work comprises almost 70 books, his own entries serve to summarise, not explain, the curiosities found in Aristotle's writings.<sup>56</sup> Antigonus's entries on spontaneous generation showcase techniques to prompt a sense of awe among his readers. Entries 19, 88, 89, and 90 are discussed here in detail.<sup>57</sup>

Entry 19 contains multiple examples of the spontaneous generation of animals, which Antigonus calls 'singularities' (ἴδια), beginning with *bugonia*, the generation of bees from ox corpses.<sup>58</sup> Throughout the entry, Antigonus references Archelaus the Egyptian, thought to be part of the Alexandrian court of either Ptolemy II Philadelphus (309–246 BC) or Ptolemy III Evergetes (c. 284–222 BC).<sup>59</sup> Antigonus claims that, in Egypt, burying a bull in specific locations with the horns protruding above the ground and uncovering it later results in the emergence of bees due to the animal's decomposition.<sup>60</sup> Antigonus supposes that this phenomenon inspires a certain Philitas to address bees as "ox-born" (βουγενεῖς).<sup>61</sup> Following this, Antigonus claims that scorpions are generated from crocodile carcasses and wasps from horse carcasses.<sup>62</sup> He corroborates these respective claims with

---

<sup>56</sup> Antigonus, *Collection of Marvellous Investigations* 60.16-20.

<sup>57</sup> See also *Ibid.*, 84, 85.

<sup>58</sup> *Ibid.*, 19.8-9. See Olck 1897, 434-435 for examples of this phenomenon. For discussion of *bugonia* in Vergil, see Osorio 2020. On uncertainty about whether *bugonia* should be seen as a form of spontaneous generation, see Totelin 63-64; for the purposes of this study, the fact that *bugonia* entails non-parental generation is sufficient.

<sup>59</sup> Archelaus the Egyptian is also known as Archelaus of Chersonesus, which presumably refers to Chersonesus Mikra, an Egyptian settlement near Alexandria. Archelaus supposedly wrote a prose paradoxography, making him a reputable source for Antigonus. Numbers of Archelaus's epigrams are from Lloyd-Jones/Parsons 1983. For further discussion, see Westermann 1839, xxii-xxiv; Lightfoot 2021, 55 note 29; Smith 1867, 264; Schepens 1996, 404-5; Greene 2019, 34.

<sup>60</sup> Antigonus, *Collection of Marvellous Investigations* 19.9-13. For a more thorough discussion of this passage and its source, see Lightfoot 2021, 55.

<sup>61</sup> Antigonus, *Collection of Marvellous Investigations* 19.15. Antigonus seemingly alludes to Philitas of Cos, the scholar, elegiac poet, and teacher of Ptolemy Philadelphus during his reign. For information on the life and work of Philitas, see Spanoudakis 2002, 19-74.

<sup>62</sup> Antigonus, *Collection of Marvellous Investigations* 19.17-18.

Archelaus's epigrams 125 and 126.<sup>63</sup> Concluding the entry, Antigonus credits Aristotle with the notion that scorpions originate from decaying bergamot mint.<sup>64</sup>

The entry aligns with Lightfoot's observation that paradoxographical collections often group marvels into loose thematic clusters, allowing readers to contemplate potential connections between each wonder.<sup>65</sup> Antigonus ensures that spontaneous generation is attested, and thus appreciated as a marvel, by citing diverse authors such as Philitas, Archelaus, and Aristotle, positioning them as equally credible and relevant to each other. According to Lightfoot, texts engaging in unexpected dialogue evoke the wonder central to paradoxographical collections.<sup>66</sup> These citations also provide readers with the option to investigate further. While Aristotle attempts to justify the routine nature of spontaneous generation by aligning it with his theory of sexual generation and assigning it to multiple species, Antigonus emphasises its singularity, attempting to use this feature as a marker of legitimacy.<sup>67</sup> He does so by focusing on the substance from which the spontaneously generated animals appear. Aristotle's theory of spontaneous generation places importance on environmental conditions, but Antigonus takes this further, implying that there may be specific qualities inherent to the dead animal from which living animals are generated. A similar strategy is seen in entry 90, where Antigonus cites Aristotle's observation of another spontaneously generated animal: a type of mite called 'akari' that is generated in wax.<sup>68</sup> Beginning another thematic section on spontaneous generation, entry 88 states that lice emerge from small bumps on the body resembling hair follicles and, if moistened, cause a disease which afflicted Alcmaeon of Croton, the naturalist philosopher, and Pherecydes of Syros.<sup>69</sup> In entry 89, Antigonus states that snakes are generated from decaying human corpses if the deceased had inhaled the odour of snakes before death; the singularity of spontaneous generation is demonstrated by the specificity of this condition and the specific body part from which the snake emerges.<sup>70</sup> He quotes epigram 129 by Archelaus:

---

63 Ibid., 19.21-22, 19.24-25.

64 Ibid., 19.26-27. See Aristotle, *History of Animals* 577b6-8.

65 Lightfoot 2021, 65.

66 Ibid., 68.

67 Antigonus, *Collection of Marvellous Investigations*, 19.8; 89.3.

68 Ibid., 90. See Aristotle, *History of Animals* 577b6-8.

69 Antigonus, *Collection of Marvellous Investigations*, 88.

70 Ibid., 89.2-6.

πάντα δι' ἀλλήλων ὁ πολὺς σφραγίζεται αἰὼν ·  
ἀνδρὸς γὰρ κοίλης ἐκ μυελοῦ ράχεως  
δεινὸς γίνετ' ὄφεις, νέκυος δειλοῖο σαπέντος,  
ὃς νέον ἐκ τούτου πνεῦμα λάβη τέρας,  
τεθνεότος ζωῆν ἔλκων φύσιν · εἰ δὲ τόδ' ἐστίν,  
οὐ θαῦμα βλαστεῖν τὸν διφυῆ Κέκροπα.

Long eternity puts a seal on all beings through each other  
For from the marrow of the spine of a man  
A terrible snake comes into being, from the wretched corpse  
after it has decomposed,  
Which by this marvel takes new breath,  
By wrestling living nature from the deceased. And if this is  
so,  
It is no wonder that the two-natured Cecrops was born.

Antigonus asserts that the epigram provides a stronger testimony to the phenomenon of spontaneous generation than mere hearsay.<sup>71</sup> He situates spontaneous generation as a wonder and a rarity while nonetheless affirming its prevalence through citation. By emphasising its status as an object of wonder, Antigonus instills value in the phenomenon, inviting reflection. Although Antigonus is familiar with the Aristotelian explanation of spontaneous generation, he uses singularity, rather than Aristotle's generalisable theory, as proof of the phenomenon. This choice does not indicate a failure to grapple with Aristotle's work, but rather a desire to stimulate wonder and scientific inquiry in this rumoured concept.

## CONCLUSION

Antigonus's *Collection of Marvellous Investigations* does not symbolise a decline in interest in 'serious' science, but rather a growing interest in nature's marvels that flourished through the Hellenistic and Roman periods. When considered in this light, Antigonus's Collection offers a valuable reminder that scientific engagement appears in a variety of different literary contexts and is not limited to explanatory modes. This study contributes to research on paradoxography by focusing on Antigonus's treatment of spontaneous generation—a topic that, according to Antigonus, has spread through hearsay. By simultaneously emphasising the validity and singularity of spontaneous generation, Antigonus portrays it as a phenomenon worthy of wonder. Antigonus's collection stimulates thought and potential conversation on similar topics as those in Aristotle's theoretical accounts.

---

<sup>71</sup> Ibid., 89.15-16.

## BIBLIOGRAPHY

- Balme, D. M., 1962: Development of Biology in Aristotle and Theophrastus: Theory of Spontaneous Generation, *Phronesis* 7 (1-2), 91-104.
- Campbell, G.L., 2003: *Lucretius on Creation and Evolution : A Commentary on De Rerum Natura, Book Five, Lines 772-1104*, Oxford (Oxford Classical Monographs Lucretius on Creation and Evolution).
- Delattre, C., 2018: Paradoxographic Discourse on Sources and Fountains: Deconstructing Paradoxes, in M. Gerolemou (ed.), *Recognizing Miracles in Antiquity and Beyond*, Berlin, 205-24.
- Dorandi, T., 1999: *Antigone de Caryste. Fragments*, Paris.
- Dorandi, T., 2005: Accessioni a Antigono di Caristo, *Studi Classici e Orientali* 51, 119-33.
- Dudley, J.A.J., 1997: The evolution of the concept of chance in the physics and ethics of Aristotle: a commentary on Phys. II, IV-VI, Dissertation, Nijmegen.
- Dufault, O., 2019: *Early Greek Alchemy, Patronage and Innovation in Late Antiquity*, Berkeley (California Classical Studies).
- Eleftheriou, D., 2018: Pseudo-Antigonos de Carystos: collection d'histoires curieuses, Thèse de doctorat, Université de Nanterre.
- Farley, J., 1977: *The Spontaneous Generation Controversy from Descartes to Oparin*, Baltimore/London.
- Feldman, L. H., 2007: Antigonos of Carystus, in M. Berenbaum/F. Skolnik (eds.), *Encyclopaedia Judaica* 2, Detroit, 198.
- Geus, K./C. G. King, 2018: Paradoxography, in P. T. Keyser/J. Scarborough (eds.), *Oxford Handbook of Science and Medicine in the Classical World*, New York, 431-44.
- Giannini, A., 1963: Studi Sulla Paradosografia Greca I: Da Omero a Callimaco: Motivi e Forme Del Meraviglioso, *Rendiconti Dell'Istituto Lombardo, Accademia Di Scienze e Lettere* 97, 247-66.
- Greene, R. 2019: A Most Amazing Conversation: The Social Contexts of Wonder-Telling and the Development of Paradoxography, *New England Classical Journal* 46(2), 28-45.
- Jacob, C., 1983: De l'art de compiler à la fabrication du merveilleux: Sur la paradoxographie grecque, *Lalies* 2, 121-140.
- Köpke, R., 1862: *De Antigono Carystio*, Dissertation, Berlin.
- Kruk, R., 1990: A Frothy Bubble: Spontaneous Generation in the Medieval Islamic Tradition, *Journal of Semitic Studies* 35, 265-82.
- Lightfoot, J., 2021: *Wonder and the Marvellous from Homer to the Hellenistic World*, New York (Cambridge Classical Studies).
- McCartney, E.S., 1920: Spontaneous Generation and Kindred Notions in Antiquity, *Transactions and Proceedings of the*

- American Philological Association* 51, 101-115.
- Musso, O., 1976: Sulla struttura del cod. Pal. Gr. 398 e deduzioni storico-letterarie, *Prometheus* 2, 1-10.
- Musso, O., 1977: *Michele Psello. Nozioni paradossali*, Naples 1977.
- Olck, F., 1897: Biene, in G. Wissowa (ed.), *Paulys Realencyclopädie der classischen Altertumswissenschaft* 3 (1), 431-450.
- Osorio, P., 2020: Vergil's Physics of Bugonia in Georgics 4, *Classical Philology* 115, 27-46.
- Pajón Leyra, I., 2011: *Entre Ciencia y Maravilla: El Género Literario de La Paradoxografía Griega*, 1st Edition, Zaragoza (Monografías de Filología Griega, 21).
- Pajón Leyra, I., 2022: Mythography and Paradoxography, in R. S. Smith/S. M. Trzaskoma (eds.), *The Oxford Handbook of Greek and Roman Mythography*, Oxford, 396-408.
- Romm, J. S., 1992: *The Edges of the Earth in Ancient Thought: Geography, Exploration, and Fiction*, Princeton NJ.
- Rosenmeyer, T. G., 2006: Ancient Literary Genres: A Mirage?, in A. Laird (ed.), *Ancient Literary Criticism*, Oxford, 426-437.
- Sassi, M. M., 1993: Mirabilia, in G. Campiano/L. Canfora/D. Lanza (eds.), *Lo spazio letterario nella Grecia antica* 1: La produzione e circolazione del testo, 2: L'ellenismo, Rome, p. 449-68.
- Schepens, G./K. Delcroix, 1996: Ancient Paradoxography: Origin, Evolution, Production and Reception, in O. Pecere/A. Stramaglia (eds.), *La Letteratura Di Consumo Nel Mondo Greco-Latino*, Cassino, 373-460.
- Schmid, W./ O. Stählin, 1920: *Geschichte Der Griechischen Literatur*, 2. Teil: Die Nachklassische Periode Der Griechischen Literatur. 1. Hälfte: Von 320 Vor Christus Bis 100 Nach Christus, 6th Edition, Munich.
- Scott Fitzgerald, J., 2006: *The Life and Miracles of Thekla: A Literary Study*, Washington DC (Hellenic Studies Series, 13).
- Smith, W., 1867: *Dictionary of Greek and Roman Biography and Mythology* (1). Boston.
- Spanoudakis, K., 2002: *Philitas of Cos*. Leiden.
- Totelin, L. M. V., 2018: Animal and Plant Generation in Classical Antiquity, in N. Hopwood/R.
- Flemming/L. Kassell (eds.), *Reproduction: Antiquity to the Present Day*, Cambridge, 53-66.
- Tzetzes, J./ T. Kiessling (tr.), 1826: *Historiarum Variarum Chiliades Graece. Textum Ad Fidem Duorum Codicum Monacensium Recognovit, Brevi Anotatione Et Indicibus*, Leipzig.
- Wilamowitz-Moellendorff, U. v., 1881: Antigonos von Karystos in U. v. Wilamowitz-Moellendorff/A. Kiessling, *Philologische Untersuchungen* (4), Berlin.
- Vartanian, A., 1973: Spontaneous Generation in P. P. Wiener (ed.), *Dictionary of the History of Ideas: Studies of Selected Pivotal*

- Ideas 4*, New York, 307-312.
- Vergados, A., 2007: The "Homeric Hymn to Hermes" 51 and Antigonus of Carystus. *The Classical Quarterly*, 57 (2), 737-742.
- White, S., 2015: Phaenias in the Mirabilia Tradition: From "Antigonus" to Callimachus, in O. Hellmann/D. Mirhady (eds.), *Phaenias of Eresus: Text, Translation, and Discussion*, New York, 171-199.
- Yu, K. W, 2016: Paradoxography, Oxford Classical Dictionary. <https://oxfordre.com/classics/view/10.1093/acrefore/9780199381135.001.0001/acrefore-9780199381135-e-4728>, accessed on 06/20/2023.
- Zwier, K. 2018: Methodology in Aristotle's Theory of Spontaneous Generation, *Journal of the History of Biology* 51 (2), 355-386.