

## ARISTOTLE ON CHANCE AND SPONTANEOUS GENERATION. A DISCUSSION NOTE

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In *Physics* II. 4-6 Aristotle deals with the technical concept of chance (τὸ αὐτόματον). Here a number of specific characteristics are ascribed to the chance happenings. At the same time, in his biological works Aristotle presents his notorious theory of 'spontaneous generation' (αὐτόματος γένεσις). Most scholars assume that this theory ought to be in line with the doctrine of chance, as this is presented in his *Physics*. It is clear, however, that spontaneous generation lacks (at least some of) the features a chance happening ought to have. For instance, spontaneity is not unusual. My purpose here is to address the exegetical problem at hand, in particular to sketch out an argument according to which the discrepancy between Aristotle's doctrine of chance and his theory of spontaneous generation is merely an apparent one.

**Keywords:** Aristotle – Chance (being) for the sake of something – Generation of animals – Incidental causation J. Lennox – Luck – *Per se* causation – *Physics*

### I

In *Physics* (*Phys.*) II. 4-6 Aristotle deals with the technical concepts of 'luck' (ἡτύχη) and 'chance' (τὸ αὐτόματον). In the opening paragraph of *Phys.* II. 4 (195b31-36) he states that the ensuing discussion, in the next couple of chapters, is intended to do three things: (a) determine what luck and chance are, (b) resolve how, if at all, these two fit into the scheme of the four causes and (c) specify how luck and chance are related to each other.<sup>1</sup> As is well known, in *Phys.* II. 5 Aristotle addresses (a) and (b). He presents an analysis of luck and chance, and he then argues that although these are not causal forces in their own right, there is none the less a sense in which some things do happen by luck or chance (197a32-35).<sup>2</sup> Finally, in *Phys.* II. 6 he goes on to clarify how these two concepts are connected to each other.

In *Phys.* II. 5-6 Aristotle makes a number of comments on the relation between luck and chance. First, he states that 'luck' is to be used only for events which are due to the causal agency of persons, i.e. subjects who are capable of 'thought' (διάνοια) and 'choice'

<sup>1</sup> See also *Phys.* II. 4. 196b5-9.

<sup>2</sup> For an analysis of this particular argument in *Phys.* II. 5, see Judson 1991, 73-75. See also Charlton 1970, 105-109.

(προαίρεσις) (*Phys.* 197a1-6, b1-2).<sup>3</sup> Second, he asserts that lucky events are a subset of chance events (*Phys.* 197a36-b1). Third, he assumes that chance encompasses every outcome of luck, and certain events within the realm of ‘nature’ (φύσις) (e.g. *Phys.* 196b21-33, 197b6-22, 198a1-6). Finally, although most of *Phys.* II. 5 is devoted to an analysis of luck, Aristotle clearly notes that any points made about lucky events apply more widely to every happening that is due to chance (e.g. *Phys.* 196b21-24, 29-31, 197a32-35).<sup>4</sup>

The reconstruction of the seminal doctrine of chance has caused a number of interpretative disputes.<sup>5</sup> Despite the disagreements, however, there seems to be a minimum consensus among interpreters. It is assumed that *Phys.* II. 4-6 suggests that a chance outcome has three key characteristics:<sup>6</sup>

1. It is a rare event. As Aristotle states in *Phys.* II. 5. 196b10-17, a chance event happens “neither always nor for the most part” (οὔτε ἀεὶ οὔτε ὡς ἐπὶ τὸ πολὺ).<sup>7</sup>

2. It is a random event. An outcome of chance is the ‘incidental’ (συμβεβηκός) effect of some end-directed causal chain (e.g. *Phys.* 196b23-24, 197a12-18). It is, so to speak, a by-product of a teleological process of causation.<sup>8</sup>

3. It is typically/normally brought about by purposeful action or by nature (e.g. *Phys.* 198a5-9).<sup>9</sup>

What vexes modern interpreters is the fact that this account of chance, i.e. (1)-(3), appears to be at complete variance with Aristotle’s theory of αὐτόματος γένεσις, as the latter is presented in the biological works.<sup>10</sup>

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<sup>3</sup> I use the term ‘event’ to cover the whole range of things that may be said to come to be; i.e. events, processes, states of affairs and activities.

<sup>4</sup> In the rest of this paper ‘chance’ is used in its wide sense, unless otherwise indicated.

<sup>5</sup> Scholars are in agreement that the notions of luck and chance play crucial roles in Aristotle’s philosophy of science as well as in his ethical theory. For further discussion of this point, see Lennox 1984, 52.

<sup>6</sup> For some of the various attempts to reconstruct Aristotle’s doctrine of chance, see e.g.: Balme 1962, 96-102; Charlton 1970, 105-11; Freeland 1991, 66-72; Johnson 2005, 95-104, 198-204; Judson 1991; Lennox 1982, 229-236; Lennox 1984; Ross 1936, 514-525; Sorabji 1980, 5-7; Torstrik 1875.

<sup>7</sup> See also *Posterior Analytics* I. 30. 87b19-27 and *On Generation and Corruption* II. 6. 333b4-7. As Judson (1991, 82-89) argues, where Aristotle states that an event *E* is rare or usual, what he has in mind is a form of “conditional frequency”; i.e. *E* is rare/usual relative to another event *E1*. Thus, an outcome of chance is said to be a rare event in the sense that it is rarely produced by the type of causal process that has brought it about.

<sup>8</sup> The concept of incidental causation forms an integral part of Aristotle’s theory of chance. For our present purposes, it suffices to note that in the context of *Phys.* II. 4-6 Aristotle takes it that an incidentally caused event, i.e. a chance event, is the unexpected or accidental outcome of a teleological chain of causation. See also the discussion in section II. It is also worth pointing out that, for Aristotle, a particular chance event may be brought about (incidentally) by any of a number of end-directed causal processes (*Phys.* II. 5. 197a14-18). Apparently, this is why many of his predecessors believed that chance is inscrutable to men (*Phys.* II. 5. 197a8-11). For two useful treatments of this point, see Judson 1991, 79, 91-91 and Charlton 1970, 108.

<sup>9</sup> In *Phys.* II. 8. 199b15-17 Aristotle clearly states that nature, like intentional action, gives rise to teleological processes.

<sup>10</sup> See e.g. Balme 1962; Lennox 1982; Hull 1967-68.

In *Generation of Animals (GA)* III. 11. 762a9 Aristotle tells us that the “coming-to-be” (γένεσις) of most species of testacea is αὐτόματος. Scholars take it that the very use of the term ‘αὐτόματος’ in this context indicates that the topic of discussion is chance coming-to-be.<sup>11</sup> Strangely enough, though, ‘αὐτόματος γένεσις’ in the biological works has come to be rendered as ‘spontaneous generation’ and not as ‘chance generation’. The exegetical puzzle that arises here is this. *Phys.* II. 4-6 warrants the claim that a chance outcome has the features outlined above. Interpreters suppose that in the biological works Aristotle develops a theory of spontaneous generation,<sup>12</sup> which is expected to be in line with his doctrine of chance.<sup>13</sup> Nevertheless, in his zoology Aristotle assumes that spontaneity is *not* unusual, is *not* random and *does not* bring about organisms which are normally due to natural generation.<sup>14</sup>

In this short discussion paper I propose to address the problem described above. To be more specific, I intend to sketch out an argument to the effect that there is no real inconsistency between the doctrine of chance presented in *Phys.* II. 4-6 and Aristotle’s theory of spontaneous generation. This argument will show that the alleged contradiction is a merely apparent one.

## II

J. Lennox (1982, esp. 234-236) has made a commendable effort to resolve the dilemma at hand. In particular, he argues that spontaneous generation may be shown to be roughly in line with the “essential ingredients” of chance specified in *Phys.* II. 5-6. Although his argument presents a number of problems, I do not intend to review it on this occasion. What I would like to do instead is to focus on what Lennox (1982, 237) himself calls a “fatal flaw” in Aristotle’s zoology.

As was mentioned above, in *GA*. III. 11 we are told that the members of most species of testacea come to be through spontaneous generation. These are regularly produced biological entities which are well adapted to their specific sort of life. If this so, then how can Aristotle credibly maintain that the animals in question come to be by chance or spontaneously? It seems that in his zoology Aristotle commits the same mistake he charges Empedocles with. Putatively, he contradicts his own position which has it that: there are developmental processes which result in well-adapted biological entities; these entities come to be as they do always or for the most part; nothing which is “the outcome of luck

<sup>11</sup> See e.g. Balme 1962; Lennox 1982; Johnson 2005, e.g. 199-201. As far as I am aware, there is only one exception to this interpretative ‘trend’; see Judson 1991, 73-74 fn. 2. The argument in this paper is motivated by Judson’s passing remarks on this issue.

<sup>12</sup> In *GA* III. 11. 762a18-27 Aristotle presents the general pattern of spontaneous generation. For an analysis of this stretch of text, see Lennox 1982, 224-225. Furthermore, at numerous places in the *History of Animals* Aristotle affirms that there are various species of animals which are spontaneously generated; see e.g. *History of Animals* V. 1. 539a21-25, 19. 550b32-551a13, VI. 15. 569a25-26.

<sup>13</sup> See the references in fn. 10.

<sup>14</sup> For further discussion of these points, see Balme 1962, 96-97. See also Lennox 1982, 220, 228-236.

or chance” (ἀπὸ τύχης καὶ τοῦ αὐτομάτου) happens with this kind of regularity; outcomes of luck and chance are simply rare events (*Phys.* II. 8. 198b16-199a8).<sup>15</sup>

There appears, then, to be a blatant disparity between Aristotle’s account of chance in *Phys.* II. 4-6 and his theory of spontaneous generation. Are we to admit that in the biological works Aristotle somehow forgets or deliberately circumvents (at least) one of the key premises of his painstakingly formulated doctrine of chance? Or, are we to perhaps assume that there is some construal of this doctrine that may allow us to align it with his theory of spontaneous generation? A glimmer of hope for such a solution to our exegetical puzzle is supported by the textual evidence in *Phys.* II. 5-6. In our text, as well as in a number of other places, Aristotle assumes that rarity is a necessary condition for chance.<sup>16</sup> Yet, rarity does not feature in any substantial way in his official account of what chance is.<sup>17</sup> Could this be an indication that the equation of chance with rarity is not, after all, a strict one?<sup>18</sup> I believe that we need not saddle Aristotle with a contradiction, or attempt a drastically revised reading of *Phys.* II. 4-6. I intend to show that the collective textual evidence suggests that there is no real discrepancy between Aristotle’s doctrine of chance and his theory of spontaneous generation.

In *Phys.* II. 5. 196b33-197a6, 12-18 Aristotle presents an analysis of luck by means of considering a relevant example. *Very briefly*, in these notoriously difficult passages he argues along the following lines.<sup>19</sup> A man wanted to attain a certain ‘end’ (τέλος), namely, to watch a play. Thus, he deliberated about the means of achieving the objective he wished for, and he made a relevant decision. He deliberately chose to come to the market place, which is where the theater is located. As a consequence, he did go the market place where he unexpectedly encountered his debtor. Thus, he managed to achieve a desired but unintended end. He got to collect on a debt. According to Aristotle, the man’s encounter with the debtor is an outcome of luck as it satisfies two conditions. It is an incidentally caused event. The man in the *Phys.* II. 5 example instigated a chain of causation which was aimed at a particular end: his getting to attend a play. This teleological process, however, brought about an event that it was not intended or suited to produce. The encounter with the debtor was only a fallout of this causal chain. To be more specific, it was an event that was generated in an incidental or a non-*per se* manner.<sup>20</sup> Furthermore, Aristotle takes it that the

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<sup>15</sup> As is well known, Aristotle supposes that the biological entities in question are ‘due to nature’ (τὰ φύσει) and not to luck or chance; see (e.g.) *Phys.* II. 8. 198b34-36.

<sup>16</sup> See fn. 7.

<sup>17</sup> This is convincingly argued by L. Judson (1991, esp. 77-82, 89-95). See also Barnes 1994, 192.

<sup>18</sup> For some cursory remarks towards such a reading of the connection between chance and rarity, see Judson 1991, 95-98.

<sup>19</sup> For two comprehensive discussions of these passages, see Judson 1991 and Lennox 1984. See also the references in fn. 6

<sup>20</sup> Two things ought to be noted here. First, Aristotle often contrasts *per se* with incidental causation. He takes them to be a pair of opposing modes of causation; see e.g. *Phys.* II. 5. 197a12ff and *Metaphysics* Δ. 30, E. 2. And second, in *Phys.* 197a12-18 he supposes that an outcome of luck has no proper or *per se* (ἀπλῶς) cause; it is an incidentally caused event.

man's encounter with his debtor, like every outcome of luck, is 'for the sake of something' (ἐνεκά του). That is to say, it is an event which is of a kind to bring about a certain end. It is the *per se* cause of the man's getting to recover the money owed to him.<sup>21</sup>

One last thing we ought to bear in mind, is Aristotle's claim that an outcome of chance is something for which "mind or nature might be responsible" (ἂν ἢ νοῦς γένοιτο αἴτιος ἢ φύσις) (198a5-6).<sup>22</sup> It is not hard to decipher how this thesis relates to the case of a lucky outcome. As we have just seen, the man's encounter with his debtor (at the market place) was the incidental effect of a particular end-directed chain of causation: the one instigated by the man's wish to attend a play. Evidently, the man's getting to meet his debtor was not the result of forethought and choice. This lucky outcome, however, could have been the product of thought and choice. It could have been brought about by a causal chain set off by the man's desire for the end actually achieved, namely, the collection of the debt.<sup>23</sup>

In *Phys.* II. 6 197a36-197b15 Aristotle plainly states that the term 'chance' does not cover only those events which are from luck. It is also used to refer to a particular class of happenings which involve non-rational agents, i.e. animals other than man and inanimate objects. What is important to acknowledge is that Aristotle does provide us with a couple of examples of such chance events, which, for the sake of clarity, we will label as '*chance outcomes\**'. In *Phys.* II. 6 he tells us that:

[197b15] ... we say that the horse came by chance, in that it was saved [16] because it came, but it did not come for the purpose of being saved (... ὁ ἵππος αὐτόματος, φαμέν, ἦλθεν, ὅτι ἐσώθη μὲν ἐλθὼν, οὐ τοῦ σωθῆναι δὲ ἐνεκα ἦλθε). And the tripod fell [17] by chance. It was set up for someone to sit on, but [18] it did not fall for someone to sit on.<sup>24</sup>

This passage is admittedly too terse to disclose the precise structure of the causal processes Aristotle has in mind. Nonetheless, the overall textual evidence supports a number of plausible claims. Let us consider the first of the examples in our text, the case of the horse. Aristotle tells us that the horse's coming to a certain location belongs to the category of *chance outcomes\** (197b15). He then goes on to add that this event may be thus classified since: (a) the horse was saved *because* it came to the particular place; it would not have been saved if it had failed to so (197b15-16) and (b) the animal did not come to this place for the purpose of being saved; presumably, it went there for an altogether different purpose (197b16). Shortly afterwards, in *Phys.* 197b19-22, Aristotle makes a couple of interesting statements. First, he tells us that "if something comes to be but not for the sake of what results", i.e. if its "cause is external" (ἔξω τὸ αἴτιον), then we say that this event is "due to chance" (ἀπὸ τοῦ αὐτομάτου) (197b19-20). And second, he

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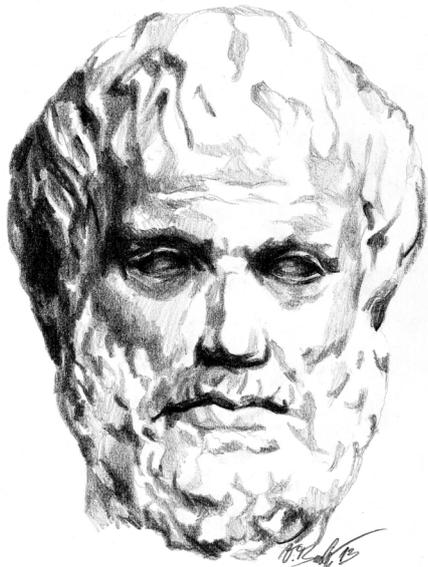
<sup>21</sup> For an argument in support of this last claim, see Judson 1991, 77-78. Contrast Judson's reading of the ἐνεκά του condition with the one in Lennox 1984, 56-58. For a more detailed treatment of the Aristotelian distinction between *per se* and incidental causation, see Kelsey 2004, esp. 119-124.

<sup>22</sup> See also *Phys.* II. 5. 196b21-22.

<sup>23</sup> Compare this analysis of *Phys.* 198a5-6 with the one in Lennox 1984, 52-58; 1982, 231-233.

<sup>24</sup> Charlton's (1970, 36) translation, slightly modified.

asserts that if the event under consideration is the result of a rational agent's action, then we may call it "an outcome of luck" (197b20-22).



*Aristoteles*

*Phys.* II. 6. 197b15-16 confirms that a *chance outcome\**, very much like an outcome of luck, is for the sake of something. The horse's coming to a certain location is of a kind to produce the end it actually brings about. That is to say, it is the *per se* cause of the animal's being saved. The key feature of all chance events, though, is the way they are brought about. As Aristotle points out in *Phys.* 197b20, they have external causes. It is clear enough that the intended claim here is that every chance event is incidentally caused. That is to say, external causation is nothing more than incidental causation.<sup>25</sup> If this much is accepted, then Aristotle's position concerning *chance outcomes\** turns out to be the following. There are events which involve the action of non-rational agents. If such an event serves as the *per se* cause of some end, but it has not come to be for the sake of it, i.e. if it is the incidental product of a causal chain aimed at an altogether differ-

ent end (197b16), then it may be said to be an *outcome of chance\**.<sup>26</sup>

To sum up, it seems that Aristotle's description of *chance outcomes\** parallels his account of what an outcome of luck is. A *chance outcome\** is an event with very specific traits. It is an event which involves the action of a non-rational agent. Furthermore, it is of a kind to promote a certain end. For instance, the horse's coming to a certain location is the *per se* cause of the animal's being saved. This type of event, however, does not come to be for the sake of its effect. To return to the *Phys.* 197b15-16 example, Aristotle *explicitly* states that the horse did not come to the particular location for the purpose of

<sup>25</sup> On this point, see also Judson 1991, 93-94.

<sup>26</sup> It is worth noting that contrary to what some interpreters claim, see e.g. Lennox 1984, 52-53 and Judson 1991, 77, Aristotle does not make seemingly contradictory claims about the nature of chance events. In particular, he never claims that a chance event is and is not for the sake of something. What he does assert is this: (a) a chance event *is* for the sake of something, but (b) it *does not come to be* for the sake of what it brings about. This much is readily confirmed by the textual evidence; see e.g. *Phys.* II. 5. 196b34, 197a16; 8. 199b21-22; *Posterior Analytics* II. 11. 95a8-9; *Rhetoric* I. 10. 1369a32-b5. Very briefly, the second of these statements, (b), is meant to indicate that a chance event is incidentally caused; it is the outcome of a causal chain the aim of which is an end other than the one actually brought about.

being saved; it came for a different reason – which the text does not specify. Hence, it follows that a *chance outcome\** comes to be incidentally; it is the incidental result of a causal chain aimed at an end other than the one actually realized.

We have to concede that Aristotle's views on *chance outcomes\** give rise to a number of questions. What kind of causal process does it take to (incidentally) produce such an event? Are we to assume that this ought to be a teleological process that is set off by a non-rational agent? And most importantly, how are we to understand Aristotle's claim that a *chance outcome\** might be done as an outcome of nature? We may plausibly assume that the horse in the *Phys.* II. 6 example could have come to a certain place for the purpose of being saved. This could have happened under conditions like the following: the horse was instinctively/naturally accustomed to using this place as a hideout; and, on the particular occasion it was pursued by a predator. On the other hand, it is not easy to see how something analogous may be said about an inanimate object such as the tripod in the *Phys.* 197b16-18 example.<sup>27</sup> The fact of the matter is that the available texts do not provide us with any useful hints as to how we may definitively settle any of these issues. For our present purposes, however, it suffices to note three points from Aristotle's sketchy account of what a *chance outcome\** is. An *outcome of chance\** is an event which, at least to some extent, is due to the action of a non-rational agent. Furthermore, it is, like an outcome of luck, the product of incidental causation. And finally, this is an event which, Aristotle insists, might be done due to nature.

In *Phys.* II. 6, where *chance outcomes\** are finally discussed, Aristotle has very little to say about animal generation. The only remarks related to this matter are found in *Phys.* II. 6. 197b32-37. In this stretch of text Aristotle states that:

We are furthest from an outcome of luck with things which come to be due to nature (μάλλιστα δ' ἐστὶ χωριζόμενον τοῦ ἀπὸ τύχης ἐν τοῖς φύσει γιγνομένοις). For if something comes to be contrary to nature (παρὰ φύσιν), we then say not that it is the outcome of luck but rather that it is an outcome of chance. Yet it is not quite that either (ἔστι δὲ καὶ τοῦτο ἕτερον): the source of a chance outcome is external, whilst here it is internal (τοῦ μὲν γὰρ ἔξω τὸ αἴτιον, τοῦ δ' ἐντός).<sup>28</sup>

Most commentators take it that in this passage Aristotle refers to generative processes which result in deformed biological entities, i.e. monsters.<sup>29</sup> He points out that these entities are often called '*chance outcomes\**'. He then immediately proceeds to state that

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<sup>27</sup> What makes things even more confusing is *Phys.* II. 6. 197b30-32, where Aristotle tells us that: a stone's falling down was a *chance outcome\**; it hit somebody on the head, although it did not fall for that purpose. He also states that this is a *chance outcome\** as the stone "could have fallen *through somebody's agency and for hitting*" (πέσοι ἄν ὑπὸ τινός καὶ τοῦ πατάξαι ἔνεκα) (197b31-32). Given this last point, it is very hard to see how Aristotle understands the claim that the stone's falling down, a *chance outcome\**, is an event that might be done due to nature. It would take a really complex analysis of this event in order to show that it could have come to be due to nature.

<sup>28</sup> Charlton's (1970, 37) translation, slightly modified.

<sup>29</sup> See e.g. Lennox 1982, 234 fn. 33 and Charlton 1970, 110-11. Compare with Ross 1936, 524.

this is not quite right. Strictly speaking, in these cases we cannot talk about a *chance outcome*\* as the cause of a deformity in nature is not external, that is to say, incidental; rather, its cause is an internal one.<sup>30</sup> In other words, in our text Aristotle considers the case of unusual or unexpected events in the domain of animal generation, the production of monsters, and he concludes that such events cannot be said to be *chance outcomes*\*. What is imperative to note here is that once more he reiterates his familiar thesis: if an event *E* is to be classified as a chance outcome, of either one of the two varieties identified in *Phys.* II. 5-6, then it ought to be incidentally caused. That is to say, it has to be an event which is the by-product or the fallout of an end-directed chain of causation. Although a deformed biological entity is an unexpected result, Aristotle notes, it cannot be classified as a *chance outcome*\* as it fails to meet the abovementioned criterion.

The next thing we need to consider is that the general pattern of spontaneous generation expounded in *GA.* III. 11 (762a18-27) does not leave any room for external or incidental causation, as this is understood in *Phys.* II. 5-6. To be more specific, Aristotle does not construe spontaneous generation as a process the first step of which is the by-product of another end-directed chain of causation. Even in *Meta. Z.* 7. 1032a28-32, where he again acknowledges the possibility of spontaneous generation, it is clear that this kind of process does not have its causal origin in an incidentally caused event. Aristotle simply claims that some organisms have the capacity to be produced “without seed”, i.e. spontaneously, “as well as from seed”.<sup>31</sup> It transpires, then, that in *Phys.* II. 4-6 Aristotle defends the view that if an event is to be a chance outcome, then it ought to be incidentally caused by some end-directed chain of causation. This requirement is clearly not satisfied by the processes he classifies as spontaneous generations.

How are we then to explain the discrepancy between the biological works and *Phys.* II. 4-6? Our discussion has shown that there are more differences than similarities between a chance event, as this is understood in the *Physics*, and spontaneous generation, as this kind of process is analyzed in (e.g.) *GA.* III. 11. An outcome of chance, as we have repeatedly noted, is the incidental result of a teleological process that is instigated either by a man or a non-rational agent. Spontaneous generation is not an incidentally caused process. Furthermore, a chance outcome is a rare event. On the other hand, according to Aristotle’s zoology, there are entire species of animals which are produced spontaneously.

What are we to make of all this? I believe that the answer to this interpretative puzzle is fairly straightforward. We do know that the Greeks used the term ‘αὐτόματον’ in at least two distinct senses. They used it to indicate ‘mere chance’, i.e. an accidental or unexpected event. They also used it to indicate the capacity of certain things for self-motion/spontaneous movement.<sup>32</sup> I would like to submit that here lies the explanation for the

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<sup>30</sup> Aristotle takes it that the source of the deformity is a defect in the seed itself.

<sup>31</sup> Apparently, Aristotle abandons this view in *GA* and the *History of Animals*. In the biological works he assumes that an animal species is produced either spontaneously or by nature. For further discussion of this point, see Balme 1962, 99-100.

<sup>32</sup> Liddell & Scott 1889, 134.

alleged discrepancy between the doctrine of chance in *Phys.* II. 4-6 and the theory of spontaneous generation in Aristotle's zoology. In the *Physics* Aristotle uses 'αὐτόματον' in its first sense. That is to say, he uses it to refer to events which are unexpected. This is precisely why he repeats time and again the claim that a chance event, whether this is an outcome of luck or a *chance outcome\**, is the incidental product of an end-directed chain of causation. On the other hand, in the biological works 'αὐτόματος γένεσις' is used to refer to processes instigated by matter which, without the contribution of 'seed' (σπέρμα), has the capacity for self-motion, i.e. motion towards a fully grown and well-adapted biological organism. In the first case, an outcome of chance is fairly characterized as a rare event. The justification for this claim is quite simple. As Aristotle himself points out, an outcome of chance is rare in the sense that it is not regularly produced by the causal chain which has brought it about. For instance, meeting one's debtor is not regularly produced by one's deliberate choice to go to the market place in order to attend a play.<sup>33</sup> In contrast, whenever a certain kind of matter, i.e. liquid and earth of a particular variety, is enclosed, it acquires the capacity to instigate a generative process; i.e. a causal process leading to the generation of a specific kind of biological organism.<sup>34</sup> Evidently, there is nothing to prevent this type of biological process from happening on a regular basis.

If the proposal made above is adopted, then we can readily explain away the inconsistency between Aristotle's doctrine of chance and his theory of spontaneous generation. At the same time, we need to acknowledge that Aristotle himself is to fault for the confusion created among his interpreters. As we have seen, in *Phys.* II. 5-6 he insists that some kinds of chance events, those we labeled as '*chance outcomes\**', might be done due to nature. It is still not entirely clear what the content of this claim is. This statement, as it stands, may be taken as a reference to the putative fact that in some way chance extends to the realm of animal generation.<sup>35</sup> Our analysis of the texts, however, indicates that all Aristotle intended to say was this. There are two types of chance events. Outcomes of luck are things which are due to rational agents. An event of this kind is said to be such that it might be done due to thought, as it could be the proper/non-incidental result of intentional action. On the other hand, *outcomes of chance\** are things which are due to non-rational agents. Aristotle, for reasons he does not quite spell out, insists that this type of event could be done due to nature, as it could be *per se* caused by a teleological process involving a non-rational agent.

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<sup>33</sup> In *Phys.* II. 5. 197a8-21 Aristotle states that the cause of a chance event is 'indeterminate' (ἀόριστον). That is to say, a chance event may be brought about (incidentally) by any of a number of events, none of which is causally connected to it with any kind of regularity.

<sup>34</sup> See *GA.* III. 11. 762a18-27, as well as Lennox's (1982, 224-225) analysis of the text.

<sup>35</sup> In *Phys.* II. 8. 199b15-17 Aristotle assumes that something is "due to nature" (φύσει) if it "... arrives, by a continuous process of change, starting from some principle in itself, at some end". It is clear enough that the entities which are primarily due to nature, in the sense just noted, are biological organisms. Hence, one may easily mistake Aristotle's claim that a *chance outcome\** might be done by nature, as a statement to the effect that chance (somehow) extends to the realm of biological generation.

### III

In this short discussion note I have outlined an argument whose aim is to resolve a particular puzzle in Aristotle's philosophy of science. As we have seen, it is commonly assumed that the Stagirite's theory of spontaneous generation is not in line with the doctrine of chance presented in the *Physics*. In this paper I have argued that the alleged inconsistency in Aristotle's work is only an apparent one. The collective textual evidence suggests that the term 'αὐτόματον' does not have the same sense in the *Physics* and the biological works. Having said this much, I have to also concede that the argument in this paper could benefit from: (a) a closer analysis of Aristotle's doctrine of chance and (b) a detailed account of the differences between Aristotle's conceptions of spontaneous and non-spontaneous/sexually initiated biogenesis. However, these are tasks which will have to be undertaken in the context of a longer project.

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