

Art, Nature, and *automaton* in the VII book of Aristotle's *Metaphysics*

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Abstract

Most scholars are used to quote passages from Aristotele's biological works, in particular from *Parts of Animals* I and *Generation of Animals* II, or, alternatively, from *Physics* II, to understand the need for employing the concept of final causality in the explanation of natural processes. In this paper, instead, I will focus on chapters 7-9 of the VII book of *Metaphysics*, where Aristotle provides an account for the generation of individual substances. These chapters offer an interesting perspective about the general issue of natural teleology.

ملخص

يستشهد عدد كبير من الباحثين بفقرات من أعمال أرسطو البيولوجية و خاصة أجزاء الحيوان ج 1 و نشوء الحيوان ج 2، و أيضا من السماع الطبيعي ج 2، لفهم الحاجة لاستعمال مفهوم السببية الغائية في تفسير السيرورات الطبيعية. سأحاول بالأحرى في هذا العمل التركيز على الفصول 7-9 من الكتاب السابع لما بعد الطبيعة أين يقدم أرسطو مبحثا في نشوء الجواهر الفردية. تمنح هذه الفصول تطورا مهما لمسألة الغائية الطبيعية بصورة عامة.

Résumé

La plupart des spécialistes ont eu l'habitude de citer des passages des œuvres biologiques d'Aristote, en particulier *Les parties des animaux* I et *Génération des animaux* II, ou, alternativement, de la *Physique* II, pour comprendre le besoin d'employer le concept de causalité finale dans l'explication des processus naturels. Je vais plutôt me focaliser dans ce papier sur les chapitres 7-9 du livre VII de la *Métaphysique*, où Aristote fournit une étude de la génération des substances individuelles. Ces chapitres offrent une perspective intéressante à propos de l'enjeu général de la téléologie naturelle.

Although the purposive structure of the world does not play the role of a universal "law of nature", understood in the sense of modern physics, the need for employing the concept of final causality in the explanation of natural processes is defended by Aristotle in many places in his corpus. According to this aim, most scholars are used to quote passages from the biological works, in particular from *Parts of Animals* I and *Generation of Animals* II, or, alternatively, from *Physics* II. In this paper, instead, I will focus on chapters 7-9 of the VII book of *Metaphysics*, where Aristotle provides an account for the generation of individual substances. These chapters offer an interesting perspective about the general issue of natural teleology.

In chapters 7-9 of the VII book of *Metaphysics* Aristotle provides an account of the becoming meant as a process of generation of the individual substances. According to the Stagirite three kinds of things exist: those which are generated by nature, those which

are generated as an effect of art, and those which are generated spontaneously, that is to say «απο ταυτοματου». Moreover, he points out three aspects in the generation process: what are the things generated from, to put it differently, the matter; what are the things generated of, the efficient cause; what is generated, that is to say, the individual being who belongs to a particular species since it is union of matter and form.¹

Starting from this scheme, it is possible to outline the distinction between nature and art :

1. In all the processes which occur according to natural causes, a substance of a specific species generates another one which belongs univocally to the same species; e.g. a man begets another man, the horse gives birth to a horse, etc. In the artificial generations, instead, the efficient cause does not belong to the same species of the generated thing, in this case is both extrinsic to the matter and form. E.g. the blacksmith has nothing in common with the bronze ball; and obviously, as Aristotle says in the II book of *Physics*: «man is born from man, but not bed from bed».²
2. In all the processes of artificial production, an efficient cause, a craftsman that first thinks of the thing to be generated and secondly produces it by acting on the matter with the right tools, exists; this doubling between thinking and making does not occur in natural processes.
3. In the end, in the artificial production a specific incorporeal form, which is present in the maker's soul, becomes the cause of a substance which belongs to the same species not univocally, but according to analogy; for example, the idea of a house which is present in the architect's project is what allows the building of the house itself to be made up with lime and bricks. Thus a house is not produced by a house, but by the “form of house” in the builder's mind.

Taking all these three elements into account the boundary between art and nature seems to be solved in a pacific way. However, in the VII book of *Metaphysics* Aristotle works out a more complex theory, since after opposing technical production with natural generation, the Stagirite points out their common characteristics.

First of all, matter and form pre-exist in every kind of process where both natural things and human artifacts come to be; matter and form are ontological conditions of the becoming process, but in turn they are not involved in the becoming process itself.³

Again, Aristotle claims: «Things which are formed by nature are in the same case as these products of art for the seed is productive in the same way as the things that work by art, for it has the form potentially [...]»⁴. By referring to the seed Aristotle takes an account of how natural living things of such kind come to reproduce themselves. If we consider the case of living beings the seed of the male parent holds the form according to which the new living body will be made up; to put it differently, the male parent produces the offspring out of the matter supplied by the female parent, by impressing the form on the matter. In both natural processes and artificial productions, a form which belongs to a

¹ Aristotle, *Metaphysics* VII 7, 1032a 12 – 20.

² Aristotle, *Physics* II, 1, 193a 14 – 193b 9: «if you planted a bed and the rotting wood acquired the power of sending up a shoot, it would not be a bed that would come up, but wood. [...] The form indeed is “nature” rather than matter; for a thing is more properly said to be what it is when it has attained to fulfillment than when it exists potentially. Again man is born from man, but not bed from bed». According to Aristotle's definition, all the things that exist by nature have within themselves a principle of motion or stationariness.

³ Aristotle, *Metaphysics* VII, 8, 1033a 23 – 1033b 19. See also Aristotle, *ibid*, XII 3, 1069a 35 – 1070a 9.

⁴ Aristotle, *ibid*, VII, 8, 1034a, 34 and followings.

specific kind reproduces itself in a different matter, since matter plays the role of the so-called «*principium individuationis*».¹

Let's now turn our attention to the third analogy: both natural generations and technical productions show a finality in their process of becoming. In chapter 5 of the second book of *Physics* Aristotle says: «events that are for the sake of something include whatever may be done as a result of thought or nature».² It doesn't matter whether the end is to reproduce a specific kind of living body or if the end consists in what is made by human activity for human needs. In the Aristotelian system of the so-called four causes – the material substratum, the form or *eidos*, the mover, and the end – the last one represents the highest form of rationality present in nature, according to a philosophical framework that will be one of the most important legacies that Aristotle leaves to the Middle Age. As a consequence of what has been said, it is not matter of a crucial opposition between natural generation and artificial production in Aristotle, but it is a kind of opposition between these two forms of production, meant in a teleological meaning, and the « ». If natural generation and artificial production are different in the species, the spontaneous production is different from both of them *toto genere*.

This further point becomes even clearer if we go to read some passages in chapters 7 and 9 of the VII book of *Metaphysics*. The medical art and the building art are the examples which Aristotle is referring to. Some things are produced spontaneously as well as by art, e.g. health; while other things are not, e.g. a house. The form of the house is in the soul of the architect exactly as the form of health is in the mind of the physician: if we accept this point «it follows that in a sense health comes from health and house from house, that with matter from that without matter».³ The starting point and the active principle is the same in both cases. What's the difference between a house and health? Aristotle provides an account by saying that «some matter is such as to be set in motion by itself»: lime and bricks cannot be set in motion by themselves in order to build a house according the rules of art, but it could happen that an ill man can recover health without any help of medical art, without the doctor's intervention. For example: if heating is needed to produce the healthy subject, the production of warmth can be the result either of the action of a physician, e.g. rubbing, or of a spontaneous process: again «*απο ταυτοματου*».⁴

We are able to offer a similar account if we consider the cases of natural processes. Aristotle discusses this point in the lines 1032a and followings. According to the Stagirite natural products sometimes are produced «without seed as well as from seed». If we recall what has been previously said – that the seed contains the form which is specifically the essence of all the things that come to be by nature – we can argue that when Aristotle, in the VII book of *Metaphysics*, uses the words «without seed as well as from seed» what he means is that specific biological process known as «spontaneous generation».⁵ A relevant consequence of this theory is the wide extension of cases where

¹ Cf. Allan Gotthelf (1987). "Aristotle's conception of final causality". In Allan Gotthelf and James G. Lennox (Eds.), *Philosophical Issues in Aristotle's Biology*. Cambridge: Cambridge University Press, p. 217: "The semen's 'motion' is analogous to the motion of artist's tools. As the motion of the tools have a definition corresponding to the art, i.e., to the form in the mind of the artist, so the semen's 'motion' must have a definition corresponding to the nature, i.e., to the form of the parent. That is to say, the semen's 'motion' must be identified by reference to the form it is transmitting".

² Aristotle, *Physics* II, 5, 196b 20-25. See also Aristotle, *Metaphysics* XI, 8, 1065a 26-30.

³ Aristotle, *Metaphysics* VII, 7, 1032b 11-13.

⁴ Aristotle, *ibid*, VII 9, 1034a 13 and followings.

⁵ According to Aristotle's view, wherever plants and animals are not generated from seed, they are generated spontaneously. For the equivalence between the expression 'without seed' and 'spontaneously',

an individual substance comes to be spontaneously: these cases range from both natural products and artificial objects. In other words, the range of processes which fall into the sphere of *αυτομάτων* transcends the boundary between art and nature. In both of them, the reason why a process of coming-to-be turns out to be spontaneous is always the same: in these marginal and scattered cases the matter can be set in motion by itself. Taking the concept of *αυτομάτων* within the context of his metaphysics Aristotle is compelled to accept the existence of cases where the matter can give to itself the movement that the seed imprints to it. In any sense this theory is a little concession to Democritus and to his «mechanistic» conception of nature.

It will be helpful to recall the pass of chapter 9 of the VII book of *Metaphysics* and to read it entirely: «Things which are formed by nature are in the same case as these products of art. For the seed is productive in the same way as the things that work by art; for it has the form potentially, and that from which the seed comes has in a sense the same name as the offspring; [...] the natural things which (like the artificial objects previously considered) can be produced spontaneously are those whose matter can be moved even by itself in the way in which the seed usually moves it; those things which have no such matter cannot be produced except from the parent animals themselves (1034b)».

So we have a set of four cases that we can sum up in the following scheme:

1. some artificial objects can be produced only by art without exception: a house;
2. some artificial objects can be produced either by art or spontaneously: health;
3. on the other side: some kind of living beings can be only produced from seed, and in no other way: horses;
4. but at the same time we have to consider the existence of certain animals that come to be spontaneously, «without seed»: some kinds of fish, eels, the testacea.

In *Generation of animals*, for example, Aristotle claims that creatures like testaceans are generated spontaneously: « Now all things formed in this way, whether in earth or water, manifestly come into being in connection with putrefaction and an admixture of rain-water. For as the sweet is separated off into the matter which is forming, the residue of the mixture takes such a form. Nothing comes into being by putrefying, but by concocting; putrefaction and the thing putrefied are only a residue of what which is concocted».¹ We can find similar examples in both Aristotle's biological works *History of animals* and *Generation of animals*, although the doctrine of spontaneous generation developed in the last book sounds quite different from the theory exposed in the VII book of *Metaphysics*. Karen R. Zwiener, in a paper emerged from a seminar given by Allan Gotthelf, proves that Aristotle, in *Generation of animals*, draws a strict analogy between

see Ross's commentary to this place. *Aristotle's Metaphysics*, (1997) a revised text with introduction and commentary by W. D. Ross. Oxford: Clarendon Press, vol. I, p. 183: "A specially important instance of this kind of spontaneity is 'spontaneous generation' of plants and animals from rotting earth, dew, mud, excrements, wood, &c. [...]: e.g. eels, H.A. 570 a 7; fishes (569 a 11), testaceans (547b 18, G.A. 761 b 23), insects (539 a 24, GA 732 b 12)". See also James G. Lennox, (2001). *Aristotle's Philosophy of Biology. Studies in the origins of life science*. Cambridge: Cambridge University Press.

¹ *Generation of Animals* III, 11, 762a 9. Cf. Monte R. Johnson (2005) *Aristotle on Teleology*. Oxford: Clarendon Press, p. 200: "Things are generated spontaneously when they result in an end (in this case, a living thing), but did not come to be naturally or deliberately for the sake of this. That is evidently the case with the testacea. Unlike natural plant and animal reproduction, in which the parts and the processes exist and come about for the sake of reproducing the form of an adult plant or animal, spontaneously generated organisms come about because certain materials are moved in certain ways that allow the concoction of the vital principle". See also James G. Lennox, (2001). *Aristotle's Philosophy of Biology. Studies in the origins of life science*. Cambridge: Cambridge University Press.

sexual and spontaneous generation: “In sexual generation, the principle of movement lies within the semen; the semen contains a movement by which the parts of the new animal are formed. In spontaneous generation, it is ‘that portion of the soul principle (*psychikes arches*) which gets enclosed or separated off within the *pneuma* [that] makes a fetation and implants movement (*kinesis*) in it’ (GA III 11 762b 16-18)”.¹

Finally we can outline three basic features of the concept of « αὐτομάτων » as opposed both to nature and art, according to the theory developed in chapters 7-9 of the VII of *Metaphysics*. By using the expression « αὐτομάτων » Aristotle is referring to every kind of process in which something comes to be either without a form in the soul of a craftsman, or without a seed which has a form in itself; in this case we have a spontaneous generation. Moreover, in every case in which a process of spontaneous generation is involved, the matter which begins the production is such as to be set in motion by itself; we are talking about scattered and limited cases. In the end, every time the matter is moved by itself the result of the process, that is to say, the actualisation of a single nature, is only caused by blind efficient causes: blind necessity means necessity without finality. In other words, wherever a living thing comes to be according to merely blind necessity, the process of coming-to-be occurs only by automatic interactions of his physical parts.

Conclusive Remarks

Aristotle had a conception of the world as a global system where finality represents the highest form of rationality. However, finality is neither what happens everywhere, nor what happens in each specific kind of natural process of coming-to-be: finality is not a universal law of nature, if we take the term «universal» in his strictly logical sense. For Aristotle the field of nature is not a homogeneous whole: by admitting the existence of scattered and marginal cases where nature works according to a blind «*ananche*» he admits the local validity of Democritean necessity. My claim is that in Aristotle’s view the difference between finality and blind necessity coincides with the difference between the whole and the parts, between nature meant in a global sense and nature meant in a local sense. The distinction between these two levels is the keystone by which Aristotle forestalls what should turn out to be a contradiction: the Stagirite views spontaneity, which is the negation of teleology, as the marginal exception that proves the general validity of the rule, where “spontaneity” is merely meant to indicate the absence, in certain cases, of finality. Spontaneously generated organisms are the evidence that material parts alone are capable of coming together to produce a living form: the presence of merely deterministic processes here on earth, in the sublunary sphere, confirms the imperfection of this world in comparison with the beauty and the perfection of heavens. Whenever the matter moves by itself and produces something spontaneously, without the light of a purpose and without the direction of a final cause the result will be an individual substance deriving only from blind efficient causes. According to Aristotle’s view there’s no kind of supremacy in the matter moving by itself in comparison with the matter receiving a form either by a seed or by a maker. We must consider the capability of being set in motion by itself not as a virtue of matter, rather as a defectiveness and a lack of real power. It is metaphysically puzzling how the matter,

¹ Cf. Karen R. Zwier (2006) *Aristotle on Spontaneous Generation*, p. 8. The paper is available at the following url: <http://www.sju.edu/academics/cas/resources/gppc/pdf/Karen%20R.%20Zwier.pdf>. For more details see, in particular, p. 15: “Convinced as he [Aristotle] was that simple material potentials could not give a full explanation of animal generation of any kind, he postulated a soul-heat, present in all *pneuma*, which acts on the material concocted by the environment and guides the process of spontaneous generation in a similar way to the action of the heat in the semen on material concocted by the female parent”.

that is to say, the passive principle, can be set in motion by itself. A full understanding of this problem is worthy of further investigations.

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