

ON THE CLASSIFICATION OF ANIMALS ACCORDING TO BIOLOGICAL FUNCTIONS, AFTER ARISTOTLE

Milana TASIĆ¹

ABSTRACT. *In the same terms in which he spoke about the nature in Physics, Aristotle wanted to speak about the flora and fauna in Meteorology, where the biology and physics would be part of the same science of nature. These terms are: matter, form, entelechy, cause, consequence et al. Then, for example, concepts such as eidos, potential, actual, etc., would apply as to certain things and beings, so to categories of living things, such as species, genera and the like.*

To classify living beings, Aristotle starts, just from the biological functions they perform, whereas each of them is purposeful, as it is the total activity of each individual too. They are otherwise performed in an optimal way, while nature on this path follows several principles, such as: “principle of economy” (if the animal has horns, it does not have claws), “principle of compensation” (brain, which is cold, is connected with the vertebral column, which is warm), “principle of specialization” (each organ performs only one function), and others.

Otherwise, indirectly, the similarity of organs and biological functions which they perform goes in favor of the answer to the question: “What is life”, although Aristotle does not see that species can cross into each other – which is the legacy of Darwinism – believing that as constant and permanent they are always eternal as such (“biological fixism”). Wasting no, of course, out of sight to be “in the same place” faces to the organs, which are in many ways perfected their forms and vital functions.

KEYWORDS: *function, organ, reproduction, classification, principle*

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¹ Faculty of Life Sciences, University of Strasbourg, FRANCE.

1. Functions of animals

At the beginning of his work *Meteorology*, Aristotle expressed the intention in the way he spoke in *Physics* about “the first causes of nature, and all natural motion, also the stars ordered in the motion of the heavens” and the like, to see “what account we can give, in accordance with the method we have followed of animal and plants, both generally and in detail” [Aristotle, 1994–2009, 338a]. In so much as the soul is for him a form of the body and exactly that which is capable to receive life, otherwise already contained in potential form in it. Then the science of natural life, biology would be part of one and the same science of nature, physics, when it would be talking about the living world in the (same) terms of the causes, consequences, space, time and the like. Insofar as, according to him, to animals belong a central place in the science of nature, since they are the most perfect of all creatures in it, like as the senses belonging to man make possible to have a complete cognition of the world etc.

What does Aristotle say about the biological function in animals? To what extent is their description in accordance with his ontological doctrine of being (hylomorphism), and can we recognize a number of biological functions, as basic ones and the same, in the abundance of life forms on earth, and what would ultimately go in favor of answering the question: “What is life?” First, the most general would be that it belongs to living being the “nutritive soul”, as a way in which it subsists, as well as different sensory ability, or that all living beings, as a rule, move and relatively change their form in life. We should also mention another power of the soul, namely the “reasonable” one. But when it is about the vital organs and functions, he finds that they basically have a common “order”, even that particular organs are called differently, while their purpose was the same. When he speaks, for example, about the liquid that nourishes the body, he will say that it is “blood” or “what it corresponds to it”, and about the organ from which it spreads, to be the “heart, or what is in this place”. And in addition to it, it would be the same arrangement of vital organs in animals, as they would be also in the central part of the body, around the heart, between the mouth and anus.

All animals, therefore, have the organ to bring food, “mouth”, although some species do not have lips, jaw, teeth ... like birds having in this place a beak. Behind this organ, Aristotle observes the esophagus, which leads to the stomach, and for which he will find again that it differs in form and size, going from species to species of living beings. As to the manner in which he interprets the digestion of food in the body, he will say that this happens only due to the internal heat, the heat of stomach, which is acting on the food to pass through it. He is doing it, by analogy with food cooked by a man on fire, because it gets so tasty and easily digestible. Additionally, if teeth by grinding food help its digestion, it is not the case with the esophagus, whose role is to transfer it from the mouth to the stomach. Otherwise, abdominal organs are enveloped by a sleeve (*omentum*); making these to keep internal heat they have, because they contain enough fat in them.

According to Aristotle, blood, milk and other organic “secretions” are due to a frequent process of digestion of food, particularly, as a result of a particular extraction from it. Blood is the final product of nutrients in the body; it easily finds its

way to all parts of the body, feeding the body to its growth, as well as body organs are composed of it. His observations about the diet of other species are scarce (except bees), so that, for example, he will say that the insects enter a minimum of food, what would be due not to the body size, but to the fact that their bodies are cold. Namely, the digestion would create heat, which would be detrimental to them. The curiosity in that would be cricket, whose life takes only a little of dew, or even moisture released by the body ... There is no doubt, however, that Aristotle properly connected digestion and the role of blood in the body, although the blood circulation will be described only in the XVII century (Galen, Harvey et al.).

About the blood he will tell that it is made by a “water” part, *serum* and a “thick” part, *fibrin*, able to clot, what is certainly true, but he doesn’t find that it is the same everywhere. According to him, the composition of the blood can be different from one animal to another or even from organ to organ, in the same animal. Namely, it is light or dark, thin or thick, cold or hot, so that on these properties of it underlay physical characteristics of the animals. In the sense that if its blood is thicker and warmer, it is stronger, and if it is thinner and colder, the animal is more sensitive and intelligent. And the same can be said about animals having another matter instead of blood. This is the case, say, with the bees, which are more intelligent than many species that have blood. There is a difference in the properties of blood, according to Aristotle, between higher and lower parts of the body too, between the left and right sides, as well as between men and women.

Then, unlike the philosopher-naturalists before him, who said that all vessels depart from the head, Aristotle finds that they all are catching up in the heart, as the center. What makes the difference between the two large blood vessels: the aorta and vena cava, that he calls the big vein. The last one is located at the front and on the right side of the body, and the aorta is behind and on the left. Hence capillaries branch reach all parts of the body except the brain which Aristotle finds to be “in all animals devoid of blood”. [Aristotle, 1965, 338a] He will say also that the heart is the only organ where the blood vessels do not pass, that it begets in the embryo and it is not subject to damage etc. According to him, the heart heat warms the blood, which by spreading – like liquid that boils – “shock” to heart valves, so to batter heart rates. In general, we can say at this point that Aristotle fails even closer to the knowledge about the circulation of blood in the body, what we have today.

But when it comes to breathing even though he notices that quadrupeds, whales, birds ... bring air into their body, he has not been on the trail of a true understanding of the biological function because it is based on knowledge of chemistry. Nevertheless, he recognizes the role of cover in the larynx, which allows the food to pass from the mouth to the esophagus, although he does not differ the pharynx from the larynx. Aristotle believes that water and food are introduced into the body in order to cool the inside of the body. Breathing is intended to balance the heat of the heart, and the brain serves for cooling too, which is cold itself, and which does not contain blood. In fishes that do not breathe, their blood is cooled by the water which passing through the gills, reaches the heart. As for the senses, he will say, that all species do not have all of them, and some of them touch their subject, while the other

“make” it indirectly. According to their form, however, they are most diverse, as they are developed differently. For example, elephant’s trunk is the organ of smell and it is extremely large, serving in the bringing of food and water to the mouth, while the same organ is very poorly developed in insects and fishes. Otherwise, all of the conclusions he brings out are based on observations and experiments Aristotle performs.

He encounters a certain problem when he should “bound” sense of touch to some organ of the body, but between the skin and flesh, and an “internal organ”, he does not decide for some of them. Neither, however, sees a connection between the sense organs and the heart as the center of sensuality, sensitivity. And when it comes to the motion of animals, he notices that these methods are very different, but that something they have all in common, can be nevertheless detected between them, namely, that some species walk, second creep, third fly, fourth swim etc. And what he observes is that in each case of the motion there is one point on the body that is fixed and serves as a point of support. He will say on the motion afterward that there are three groups of them, two in the group: up-down, front-back and left-right, or that any motion is either pushing, or pulling. And comparing blood and bloodless animals, he finds that the former have four points of support, while others – like crustaceans and insects – five. In the case of man, these are two legs and two arms, while in birds he finds two legs and two wings or in fishes four fins, etc. Even snakes that crawl rely on the four points of their body and so on, and Aristotle will say that if some animal species would not have maximum four points of support in the motion, it could not fall in bloodless animals.

Let us mention too some similar characteristics in the motion of which he speaks that in the animals moving by legs, the number of the latter is even, that every movement starts from the right leg, and that quadrupeds move legs “diagonally”. And if all movements should be “related” to an organ, as their seat, where they come all from – willingly and unwillingly – then this is precisely the heart, according to him.

2. Animal reproduction

There are two ways of forming a new being: the first is from parents that are similar, and the second – spontaneously. What he observes in this regard is that there are animals in which the gender does not differ, and such that are only female. Such animals without the “matching” secrete some sticky substance from which it would arise offspring afterward. No doubt, he is reasoning here by analogy with plants.

When, however, it is about the ways of fertilization in sexual way, Aristotle finds that there are four of them. Mammals, for example, are viviparous; they do not lay eggs, but born offspring, which are of the same form of birth, as well as their parents. The so-called oviparous animals are those that lay eggs like birds, or certain species of fish, from which, after a period of incubation, hatch their young. Then, he says, there are some animals whose females lay their eggs in them, and from which it will come then into the world hatchlings. This is the case with sharks, with jumps and others and, finally, insects and some other species form first the larvae, which then

pass through different intermediate steps before they become like their parents. And what would be the case with butterflies too.

Aristotle recognizes the essential role played by the conception in reproduction, noting that the advantage of males over females is in the fact that these give life to fruit and strength to develop on, even if the embryo is conceived in the female's background. He finds a confirmation of that in those birds that lay their eggs in female's uterus, but they cannot conceive life until fertilized by the males. According to Aristotle, the form of the embryo comes from the sperm of male and the matter of female, since all that exists is unity of matter and form. And it is by sperm "containing movements" which are imprinted into the matter of a female, by urging physical and chemical agents to form a being modeled on the male. Then the aforementioned motions can come from the ancestors and what insofar the cub will do more similar to them, and so on. In addition to the existing form of conception by sexual intercourse, by living beings themselves, Aristotle speaks of conception without parents, as the creation of species *ex nihilo*. Here the matter is, according to him, of the lower organisms and insects, such as aphids, ticks, horse flies, caterpillars and others. These parasites result from manure, from sludge ... Flies, for example, he says arise from garbage "from the red dots that appear in the trash, and that soon begin to move; thus creating small stationary larva; ... and then comes out a perfectly finished fly, which begins to move when the air is warm, or when there is the sun". [Aristotle, 1965, V 19, 552a] And this is the case with many species of fishes that live in the swamps and the like. Aristotle believes that the shells are formed "spontaneously" too, because it is the only way to explain they are in such a large numbers on the sides of ships, just of the rot deposited in that place.

Otherwise, he finds that in both cases – the one with sexual reproduction and the other, with spontaneous one – the matter basically is about the same principle of reproduction in nature, so that insofar they equally "share" the place in the coming to be. For a formal, active and a material, the passive element is observed both times, first as a substrate, and the second as the principle of motion. Such a substrate, in the case of a spontaneous motion, may be the most diverse. It comprises the mud, sludge, dump, foam on the water and the like. It can be the leaves of plants and skin of animals, etc. And as far as the active principle that animates the substrate and makes the embryo developing, for Aristotle that is a certain warm breath, acquiring the heat just from the sun. In the end, the question is whether the animals that spontaneously have become can reproduce themselves, or that way leads to the inevitable vanishing of species? The answer he gives is that in certain species the reproduction is possible, in a manner of sexual reproduction, and in the manner "of growing" as in plants. The first case we meet in bugs, which spontaneously arise from the soil, from plants or parts of animals and which have male and female individuals, produce offspring, but they are imperfect and do not resemble the parents. However, there are some species that "give" a perfect replica of themselves.

3. On the classification of animals in general

Speaking about the parts (organs) of animals, Aristotle, first of all, puts them into two groups: those that are similar to the whole to which they belong (*homeomeria*) and those who are different from it (*aneomeria*). For example, a part of the bone is (still) bone, but a part of the eye is not the eye itself. After, the second main division of all animals, according to him, would be in the blood and bloodless ones, but it's more important his attempt to classify living beings according to their body functions, having primarily in view four kinds of causes, that exist according to him. For instance, he says in the work *The parts of animals*: “the nature and the number of the parts of which animals are severally composed are matters which have already been set forth in detail in the book of *Researches about Animals*. We have now to inquire what are the causes that in each case have determined this composition, a subject quite distinct from that dealt with in the *Researches*.” [Aristotle *bis*, II 646a]

However, in his works, we do not find a completed classification of animal species. In any case, he certainly appreciates what essentially defines them, such as lifestyle, which recognizes to be “wild” or “tame” ones. Among them, however, some species are only wild: lion, tiger, etc., some only tame: donkeys, mule ... as there are those that are both: pig, cat, ox, horse etc., and even people. After, among wild animals there are those who live in isolation and others who live in a group, and of these, some have a leader, and others do not. Or some have their habitat: ants, bees, and some species of insects – do not. That is, there are animals living by day and those living by night, those living on the earth and another living underground. And besides mentioned ones, there are other differences essentially determining the species and which may equally be used in classification. One of them is the diet. In fact, some animals eat meat, other fruits, and there are animals – omnivorous. As there are those using only one type of food, such as bees, which are fed by honey, or spiders – by midges. Next, the environment in which they live may certainly serve as the principle of division: namely air, water, and earth, but not the kind of motion they use. Because there are animals, like birds, that can fly and walk.

Of further diversities as substantial ones let us say that land animals are more movable, which is not the case with aquatic animals. The others spend their whole life in the water, such as fish, while others live in water, but they breathe and reproduce outside of it. As they essentially differ in the mode of reproduction: some give birth to live young, while others lay their eggs, and the third are conceived spontaneously. Or, rather, by the way they move, since some walk, others fly, swim, etc.

But since differences in the characteristics of animals are the most diverse, Aristotle chooses as a principle of classification a particular problem to be discussed. In speaking, say, of the motion, he will distinguish genera and species according to the position of their limbs, as well as after the shape of the foot or the paw and the like. In all cases, the principle of the division he follows would be: do species possess some special property, or not, and this principle is qualified as dichotomic. It is about a simplified principle whose shortcomings are observed by Aristotle too, because it is

possible the same genus to belong to the two divisions, and *vice versa*. For example, if the principle of division is “bipedalism”, geese would belong to the same genus of animals as a man, although they differ from him. Or if one classifies animals in those with wings and those without wings, ants would belong in two different species, even though it is one and the same species. To avoid this issue, he rejects a single trait exclusively to serve in a division, but takes into account the characteristics of maximum number of organs, of the organism as a whole. In this regard, first, he chooses to put aside the peculiarities concerning the lifestyle as accidental ones (*Parts of animals*), and to keep those related to the anatomy of the body. Here he has in mind biological functions, the shape of the limbs, etc., and thus he collects all the common elements in all species, and then, gradually, he reaches higher genera, realizing greater and greater generalizations.

However, the difficulties encountered in this area are mostly from insufficient differentiation of terms *eidos* and *genos*, what was the case with Plato too, who also did not succeed to differentiate them clearly. When it is about the species, he precisely enough pinpoints this term, when he says that it consists of all individuals having characteristics different from individuals of other species. Namely already by their exterior differ oxen, horses, and sheep among them. But when it comes to gender, he notices the difficulty of attributing identical properties to different species, but he basically realizes that only the essential traits are of importance whether the species belongs to a genus, or not. The definition of the latter concept would be after him: “Groups that only differ in degree, and in the more or less of an identical element that they possess, are aggregated under a single class; groups whose attributes are not identical but analogous are separated”. [Aristotle *bis*, I, 644a] And that is the difference which exists between two species of birds with different size of wings, where they will belong to the same genus but to different species and the differences between, say, birds and fish where the fish scales “correspond” to fins in birds. In this way the birds, according to him, are one genus, within which there are more species, such as fishes are the same, that is, a genus with more species. In any case, the species cannot be divided to other species, while the definition of the genus contains that it must have more than one species.

The difficulty arises when we detect that there are more genera with some same characteristics it was necessary to find terms to serve in a more complete classification. As it is known, we use today, within the science of classifications of plants and animals, a number of “further”, as higher, concepts, behind the notions of genus and species we encounter in Aristotle. These are: family, order, class, phylum, and kingdom. Aristotle in some treatises in biology uses terms “large genus” and “varieties” to describe wider populations of genera, as crustaceans, or insects, but he lacks the appropriate terms on several occasions. He also does not find the words to designate species such as bumblebees and wasps to distinguish them from bees. And when he realizes that the species of animals having lungs lack a special term to denote this, he does not attempt to rebuild such a term. On such occasions, he would rather resort to descriptive words, so that on the animals reproducing as oviparous he will say that they are “those that give birth to a living being, but which lay eggs in

themselves”. He, therefore, does not attempt to find a new scientific term for a particular biological group, resorting to the words of ordinary language, and what later will be the merit of biologist Linnaeus, who will use for each individual, both in the case of flora, and the case of fauna, with the name for the species, the name for the genus too. Thus he will classify that individual, and determine its place in the vegetal or in the animal world.

But, despite it, the later biologists will find that Aristotle’s observations were accurate enough to carry out the various divisions and subdivisions, and that left not much space for a satisfactory classification. According to Cuvier “Aristotle established the zoological classification which left quite a few things to complete in the centuries after him. His major divisions and subdivisions in the animal kingdom are surprisingly accurate and they all resisted the later developments in sciences”. Indeed, the current division of animals on vertebrates and invertebrates, as primary – corresponds to the later division in zoology in the blood and bloodless animals. In the second case, he will say that these are the animals having a certain liquid that “corresponds” to the blood of animals since they both have the same role in the organism.

4. The classification according to mode of reproduction

If the property to “have” or “do not have” blood was the first principle of division of all animals, when it comes to blood animals, he divides all of them according to the way they reproduce. Such a first dichotomous division is in the class of viviparous and class of oviparous animals. In viviparous he notes that they all are mammals that breathe through lungs, and that their bodies are more or less covered with hair. Man belongs to this class. Behind it, there are mammals quadrupeds, which, in turn, are divided into three genera: in the first one are those animals that have more toes and the same number of teeth in the jaw. He differs among them herbivorous animals (elephant) and carnivorous animals (lion, tiger). The second genus of mammals are those animals whose feet are separated, and the number of teeth in the jaw different. All of them are ruminants and they have horns (except camels). And, finally, the third genus of mammals consists of ungulates. Each of them has a mane on the neck, etc. It should be said that to each of these genera belong a different number of species. Aristotle also has in mind that some species of this class of mammals live under water, such as whales, dolphins, sharks, which, in every case, he differs from the fish.

Another class of warm-blooded animals consists of oviparous, which include animals that breathe through lungs and other ones that breathe through gills. In the first class, there are animals whose body covers feathers – these are birds and animals that have scales – such as reptiles. After he divides birds, first, in four large groups, and reptiles – in two, depending on whether they have or do not have legs. The first group includes snakes, and the second group turtles, lizards, crocodiles, frogs and so on. Next, oviparous animals that breathe through gills are fish. Their bodies are almost all scaled, and they all have gills instead of lungs and dividing them into

species, he does it according to their way of reproduction and according to the main bone (cartilage).

When it comes to animals that do not have blood and invertebrates, their classification is far less complete than the one performed by Aristotle in the case of animals which have blood, or vertebrates. He's just trying to subsume them under the genera and species, but an abundance of life forms within this subclass of animals remains still to him unknown. Otherwise, he will discern six genera of these animals, namely: cephalopods, crustaceans, shellfish, insects, worms, and zoophyte. He will say about cephalopods that they contain mollusks, which are divided into three groups: octopus, squid, and cuttlefish, while the crab has more species, which we do not mention this time. In the case of shellfish, Aristotle distinguishes four species of them, while about the insects he will say to constitute a large genus which includes several smaller families. Two of them are beetles and cuttlefishes, the other two bees and wasps, which have two pairs of wings, and then come the flies, with one pair. There are species of the insect without wings, such as fleas and lice, as well as centipedes, etc., while he puts crickets aside, because of the peculiarities of their mouth. Finally, by the word "worm", Aristotle designate all those species he did not previously cover by some of these species.

Let us say also that Aristotle observes various external changes in animals, what is connected with the seasons and what concern, for example, the hair, the color of the body, the voice. Such a case is with the robin, which changes the color of the feathers from black to yellow, and changes the color of voice. He was, therefore, in the trail of conviction that biological species can pass into each other, noting that robin and redstart are one and the same species of birds, which change the color of the feathers in the winter.

He also noticed that it is possible crossing different species, citing numerous examples of this and that there are examples of species obtained in this way which are fertile, but also those remaining sterile. Examples of the first are wolfs and dogs or foxes and dogs, and for the other, horses and donkeys. According to him, the mixing of species is particularly widespread among birds, where golden eagles are the only pure species among them. In such cases come to the formation of interspecies, according to him, as evidenced for example apes, which manifest characteristics of animals and people. This is the case with seals too, which by certain characteristics are fishes, and by some others terrestrial animals. The first, because they have rear fins, and the second, because they have two front legs. Or: bats are mammals, but birds too, since they have wings that can fly. While at the same time the ostrich has wings but cannot fly. In addition there are species which are in the middle of animals and plants. This is the case with zoophytes, such as sponges. In fact, some of them move, but there are those who are constantly attached to rocks.

5. The principles in the world of living beings. On the final cause

Finally, let us ask whether Aristotle was on the trail of, say, the theory of transformism of Lamarck or Darwin's theory of evolution of species? Insofar as the degree of complexity of organisms appears in his works as some sequence that

“suggests” that species in the lower place in the hierarchy (as) “tend” to pass into those immediately above them. The answer is certainly negative. According to him, the species do not pass one into another, but they exist as eternal and constant in a place that belongs to them in nature, and such a view in biology is denoted as “absolute fixism”. However, he certainly recognizes that nature manifests the ingenuity in their creations, which is reflected in the similarity of anatomical organs and functions they perform, or in their adaptation to environmental conditions, etc., what leads him to realize a continuous formation in it, that is, nature, starting from inanimate matter, through various forms of flora and fauna, confirms the constant striving to be “perfect” in life forms. And insofar as (already) in the plant world are perceived different, larger or smaller, forms of “liveliness”. In this way, each species of flora and fauna would be a possible degree on the scale in nature, with the man on the top, as the most developed form of life. Of course, at the bottom would be forms of living beings – zoophytes, as a transition between plants and animals. Because they cease to live when separated from the ground, like plants, but they have a certain sensitivity that lacks in plants. One degree above them would be various crustaceans: ostrea, sea anemone et al., so that on the same line would be recognized after species of animals that are more mobile, warmer and more sensitive.

There are more principles that nature follows in the living world, acting completely and perfectly. The first is that it “does nothing in vain”, or that it “always create what is best”, etc., enduring so through eons, do not missing in anything, nor tempting excess of anything. In contrast to, say, Empedocles, who held that body organs combine arbitrarily, and then operate only automatically. The second would be “compensation principle”, which is in that when nature abridges something, on the one hand, it compensates it on the other. This is the case, say, with the brain, which, as cold, is connected to the spinal cord, which is warm. It is spoken after about “the principle of specialization”, which consists in the fact that only certain organs perform certain functions. Although there are exceptions, such as tongue, which is an organ to digest food and organ of speech etc. Aristotle explains also the “principle of economy” in nature, if it gave to some species certain means of defense: claws, horns, etc., it will not “multiply” them in the same species, as well as to leave some species without them and the like. Moreover, nature has given the optimal amount of earthy matter for them, so that he finds that all animals which have horns haven’t two rows of teeth. As it assigned the most appropriate place for them, so that the deer horns are ahead, on the front etc. It can be said that nature resorts to cunning on the indicated way when trying to achieve what is best with the very instruments that are at its disposal, etc.

Basically, it can be said that the aim of Aristotle is first to point out the importance of formal and final causes for the organ function, in contrast, say, to mechanists, who make it with the material, and efficient causes. For example, the latter will say that when the air stream goes down into an embryo, later in that place will be made out nostrils, while, according to Aristotle, it should explain for what purpose serve the breath, as a physiological process. Because, as we said, “nature does nothing in vain”, according to him, as it “always does what is best”.

Of course, the final cause would receive here a supreme importance, and hence Aristotle will say, for example, that the hand of a corpse, or an arm of stone, are only homonyms, and different by their function. He dedicates its work *Parts of animals* – although his conclusions are sometimes insufficiently correct, such as that of women, for which he finds that they do not need a big brain like a man does. In looking for the final causes of particular organs, he would follow the analogous functions of organs in different species of animals, finding for example that both lungs and gills serve to cool down the body of the individual to which they belong.

Equally, if we ask whether Aristotle had in mind a certain finalism of the system of all living beings as a whole, or just only of particular parts of the organism, the answer certainly would be that it is about the last one. As the finalism of the very species and organs will be further limited by the physical-chemical reasons, according to him. After the case of the eye that is red because it has more moisture in it, and not for the sake of something to what it serves, that is, a vision. But Aristotle will nevertheless accept the mechanistic reasons of Democritus and Empedocles, which he calls to be “hypothetically necessary”. Namely, each animal organ its own existence and function that performs owes to the organism as a whole, and could not exist independently of it.

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