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HOW MIGHT HAVE DEMOCRITUS REPLIED TO THEOPHRASTUS' OBJECTIONS CONCERNING VISION?

Abstract: In this paper, Democritus' account of vision is critically discussed taking into account primarily Theophrastus' *De sensibus*. I endeavor to demonstrate that Democritus used the other explanatory model of perception apart from the causal and materialistic. There is a testimony suggesting that Democritus employed the mathematical knowledge in order to elucidate some aspects of vision. Furthermore, the explanatory value of the wax analogy is discussed in detail. Despite Theophrastus' well thought out criticism, the author's intention is to demonstrate that Democritus created the sophisticated and advanced theory of vision, which can be successfully defended from Theophrastus' objections.

Keywords: Democritus' theory of vision, Theophrastus' objections, *εἶδωλα*, atoms, wax analogy

INTRODUCTION

Over the last 70 years, there has been a fruitful discussion among the scholars over the open-ended problems in Democritus' proto-theory of sense perception in general, and vision in particular. Theophrastus' treatise *De sensibus*² is the best source for accounting for Democritus' theory of vision. It is not accidental that Theophrastus dedicated the third of his treatise to Democritus' account of sense perception, not only due to its "peculiarity" or "uniqueness", as Theophrastus himself stated. What is indisputable is that Democritus created the most elaborated and detailed theory of vision among Pre-Socratics. In addition, it is very well-known that among them Democritus was the most respected by Aristotle.

In this paper, I will endeavor to interpret Democritus' theory of vision mostly based on Theophrastus' *De sensibus* (*DS*). In doing this, I will attempt

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² George M. Stratton claims that "the title *Περί αἰσθησεων* has the higher manuscript authority. But *Περί αἰσθησεως* also appears; and this with the addition of *καὶ περὶ αἰσθητῶν* better describes the whole composition, and has often been adopted." Cf. Stratton 1917, 15.

to demonstrate that Democritus did not only use the causal and materialistic explanatory models in accounting for sense perception. Nevertheless, there are some indications that Democritus might exploit mathematical knowledge concerning coins and perspective in order to explain some elements of vision. Moreover, I will particularly attempt to point out the explanatory value of the wax analogy and to defend Democritus from Theophrastus' objections concerning the incapability of the air imprints to explain the mechanism of vision. Despite Theophrastus' well thought out criticism, my intention is to demonstrate that Democritus created the refined and advanced theory of vision, which can be successfully defended from Theophrastus' objections.

HOW DOES VISION OCCUR?

Theophrastus' treatise is considered to be the most comprehensive source for accounting for Democritus theory of vision. He begins the critical "reconstruction" of Democritus' account of perception by setting up a dilemma in Aristotelian manner. Democritus is neither to be placed among the philosophers who held that perception occurs via similarity nor via dissimilarity. It seems to be the false dilemma, since it is at the end of paragraph 50 of the *De sensibus* explicitly claimed that for Democritus the visual perception is explainable in terms of similarity.

Theophrastus' discussion on Democritus' theory of seeing is divided into two sections. In the first one (49–51), according to Theophrastus, Democritus explains the visual perception in terms of effluences and air imprints. In the second section (51–55), Democritus' account of sight is sharply criticized. Theophrastus often mingles his own report with his criticism in such a manner that some significant details of Democritus' account, including the role of sun in vision, are revealed only implicitly through Theophrastus' critique. This kind of procedure does not contribute to the reliability of his own report, which might be an objection to Theophrastus' entire critical enterprise.

First, I will reconstruct Democritus' theory of vision, using not only Theophrastus' testimony, but also the other sources, attempting to provide his account as comprehensive and consistent as possible. Theophrastus grouped Democritus with the other philosophers who explain vision (*ὄραϊν*) in terms of *ἐμφάσεις*.

According to Theophrastus, Democritus envisaged the occurrence of the vision in the following way: "*ὄραϊν μὲν οὖν ποιεῖ τῇ ἐμφάσει.*"³ There are the two relevant English translations of this sentence, which I will discuss.

³ Cf. Stratton 2017, 108. G. M. Stratton's book contains both the original Greek text of the *De sensibus* and his English translation of it.

1) George M. Stratton translates it in the following way: “Vision he explains by the reflection [in the eye].”⁴

2) C. C. W. Taylor’s translation runs as follows: “He makes sight occur by means of the image [in the eye].”⁵

It might be plausible to claim that the vision is a kind of reflection in the observer’s eye caused by the object seen. What is, however, problematic in Stratton’s translation is that it does not specify what kind of reflection *ὄραϊν* is. Namely, the term “reflection” has a vast variety of different meanings, evidently being not sufficiently precise to explain the uniqueness of the activity of seeing. Moreover, a Latin term *reflexio* rather matches with another Greek term, *ἀνάκλασις*, often used by Aristotle, which literally means “bending back“, or, in a more contemporary English “beaming-back“.⁶ In addition, Taylor’s translation is more compatible with the atomistic concept of *εἶδωλα*, responsible for the beginning of the process of vision, as we will see in the course of this paper.

WHAT FACTORS ARE RESPONSIBLE FOR VISION?

The more-detailed explanation of how vision comes about is given in the next passage of Theophrastus’ *De sensibus* (50):

“He makes sight occur by means of the image [in the eye]; his account of this is original, for the image, he says, does not come into being (*γίγνεσθαι*) immediately in the eyeball (*ὀφθαλμόν*), but the air (*ἀέρα*) between the sight and the thing seen is compacted by the seer and the thing seen, and an imprint is made on it, as everything is always giving off an effluence (*ἀπορροήν*). This mass of air, which is solid and of a different color, is then imaged in the eyes, which are moist; a dense body does not take the image, but a moist one lets it pass through.”⁷

In the cited passage are mentioned only the following factors, responsible for vision: the effluences streaming from all perceptible objects, the air as the medium of “transfer“ of effluences, the air imprint and the observer’s eye. Here, there is no reference to the sunlight or the sun-light particulars,

⁴ Cf. Stratton 1917, 109.

⁵ Cf. Taylor 1999, 108.

⁶ Kelli Rudolph places the emphasis on the importance of distinguishing the two concepts: *ἔμφοσις* and *ἀνάκλασις*. He argues that *ἔμφοσις* does not connote “the garden-variety of reflection“, since the verb *ἐμφαίνεται* literally means “imaged in” the eye. See Rudolph 2011, 28.

⁷ This is C. C. Taylor translation. Cf. Taylor 1999, 108.

whose role will be discussed *in extenso* by Theophrastus in the passage 54. The εἶδωλα are not mentioned here, but at the end of the paragraph 51.

The presupposition of the entire process of vision is the principle: “everything is always giving off an effluence”, which seems to be “taken over from Empedocles, almost as a verbatim quotation.”⁸ Empedocles employed the term “effluences” to explain magnetism, sounds, and even seeing, and at the same time he considered them to be an indication of constant decay.⁹

In the first part of my paper, I will elucidate each of these factors and their unique role in Democritus’ account of vision. Let us begin with the effluences emitting from all objects, including all visible things. What Democritus meant by the effluences (ἀπορροαί)? This term seems to signify the process in which from the surfaces of all perceptible objects certain εἶδωλα are flowing off. And these εἶδωλα are the atomic aggregates, which can be characterized as the “three-dimensional copies” of objects around us. Their role is to transmit the information about the size, shape, and color of these things. They move at inconceivable high speeds, in order to enable the continuous vision.

Democritus utilizes the air to explain how the structure of matter impacts on forming the image in the viewer’s eye. The air is a medium (μεταξύ) through which εἶδωλα flow. It is a group of atoms, having no exact shape. The air atoms, however, have a certain limit in size, in the sense that they are smaller than the swarm of atoms which constitute water and earth.¹⁰ This makes air more flexible for imprinting than water or earth.

The next element in Democritus’ explanation of vision is the sun or, more precisely, sunlight particulars.¹¹ They are responsible for “bringing light to vision”, apparently by condensing the air-masses and pushing them toward the observer’s eye. Like fire, sunlight might be an atomic aggregate, consisted of the very fast and round atoms.¹² Likewise, in the *De caelo*,¹³ Aristotle claims that fire combines and connects rather than divides things.

⁸ Cf. Burkert 1977, 99.

⁹ Cf. *Ibid.*, 99.

¹⁰ Cf. Luria 1970, 275, Taylor 1999, 54b, 83-84. According to Simplicius, Leucippus and Democritus “do not, however, say what the shape is of air or water or earth or their elements; the only difference they cite is one of size between their elements, saying that air is composed of the smaller atoms of the same shapes, water of the larger, and earth of the larger still. They no longer differentiate them by shape, but say that each of them is composed of atoms of all shapes, the same in each case.” This is Taylor’s translation.

¹¹ They are discussed in the paragraph 54 of Theophrastus’ *De sensibus*.

¹² Cf. Rudolph 2011, 76.

¹³ Cf. Aristotle, *DC* 307a31–b5.

For Democritus, the light particles evidently play a certain role in the process of forming air imprints and vision, by increasing concurrently air density and brightness. Thus, the air, permeated with the light particles, is condensed and prepared for “molding by the *εἶδωλα*.”¹⁴ By denying that Democritus has adequately explained the function of the light particles in vision, Theophrastus shares very convincing, common-sense belief that the “sun disperses the air,”¹⁵ implying that the temperature rather deludes than condenses the air.

Because the air imprints are of the immense importance for Democritus’ account of vision, Theophrastus gives so much attention as to refute both the idea of an air imprint and its function in vision. How significant the concept of air imprints is for Democritus’ theory of vision is particularly noticeable in the light of the wax analogy. Unlike Plato and Aristotle, Democritus does not employ the wax analogy in order to describe the imprints in the soul, but in the air. This powerful and compelling metaphor was exploited by Democritus for more than one reason. Like the images of certain real things engraved on the stone and later on pressed in the wax, the emitted *εἶδωλα* from the perceptible object press the condensed air, thus producing impressions. The wax impressions are not only the copies of the images on the stone, but also the isomorphic, miniature and mimetic replications of the real, visible objects.

By this simile, Democritus seems to be showing that we do not directly perceive the *εἶδωλα*, streaming from the real objects. What we see are their miniature copies, molded by and imprinted in the air. In other words, he introduces this, in the history of epistemology, vastly influential comparison to explain the modification of the air as a medium of seeing things. The air imprints are, however, not any sort of the modifications of the air, but the modifications of a special kind. Like the wax impressions, they resemble the visual objects being their miniature replications. Although the air and the light particles modify *εἶδωλα*, they resemble to a great extent the things seen. Furthermore, since the wax imprints are imagined by Democritus to be a step removed from the viewer, he might also employ this analogy, as many commentators believe,¹⁶ in order to explain the epistemic uncertainty of the images we perceive.¹⁷

As the newly molded air imprint approaches the eye, “the air density grows due to the increased density of the eye effluences. This continues the

¹⁴ Cf. Rudolph 2011, 76.

¹⁵ Cf. *DS*, 54, 6-7. This is Stratton’s translation. Cf. Stratton 1917, 113.

¹⁶ Cf. Baldes 1975, 95-97, 100-105, Burkert 1977, 98-107, Rudolph 2011, 67, 69-70, 75-82.

¹⁷ Cf. Fritz 1953, 96-99, Burkert 1977, 103, Rudolph 2011, 80.

compressing process”,¹⁸ making the air imprint sufficiently small to be “imaged in” the viewer’s eye. As the air imprint enters the viewer’s eye, the soft and moist eye lets the image cross the channels. The process of vision occurs when the *εἰδωλα*, emitted from the objects, compressed and shaped by the air and light particulars, approach the eye. This sense organ also emits effluences of its unique kind, thus influencing the final product of seeing, which is an “image” in the eye.

Theophrastus is very detailed and eloquent in explaining the material structure of an eye, indicating that it was of a matter of great importance to Democritus. The eyes are moist, their “outer coating is as fine as possible, and the inside as porous as possible, without any dense, strong flesh or thick, greasy liquid”.¹⁹ Philosophically more appealing and controversial is the debate on the eye’s activity in the process of seeing. There are two opposing views in interpreting the function of eye in Democritus’ account of vision, whereby both of them seem to be based on Theophrastus’ testimony. Some scholars²⁰ held that for Democritus the viewer is no more active in the vision than in the other kinds of perception. According to them, Democritus ascribes to our eyes only reactive function.

The other group of scholars²¹ ascribes to Democritus rather an active than a purely receptive account of vision.²² I concur with the interpretation of the second group of scholars. The argument in favor of understanding Democritus’ account of eye as an active one runs as follows. If, according to him, “everything is always giving off an effluence”, then, also, the observer’s eye is “giving off the effluences”. Consequently, the effluences from the viewer’s eye are not merely to be regarded as the resistance of our eyes to the impact of the imprints.²³ Furthermore, Theophrastus explicitly asserts: “Between the sight [*ὄψις*] and the thing seen ‘as being’ compacted [*συστελλόμενον*] by the seer and the thing seen”. This implies that the formation of the air imprints is the outcome of the interaction between the observer and the perceived object. Additionally, in the fragment 148²⁴ it is claimed that owls see at night by “fiery warmth about its eyes”, which being “sharp and cutting”, “divides and mixes

¹⁸ Cf. Rudolph 2011, 77.

¹⁹ Cf. *DS* 50. I use Taylor’s translation. Cf. Taylor 1999, 108-9.

²⁰ Cf. Baldes 1975, 95 ff., Barnes 1982, 378.

²¹ Cf. Burkert 1977, 99-100, Fritz 1953, 94, Guthrie 1969, 442-3, Rudolph 2011, 70 ff.

²² This seems to be to some extent similar to what Plato claimed in the *Timaeus*. Cf. *Timaeus* 45a-b, 67c-d.

²³ Cf. Taylor 1999, 210.

²⁴ Cf. *Ibid.*, 48.

up its sight.” Due to the sharp and cutting “fire” in owls’ eyes, it seems they are very active in the process of bringing about the vision.²⁵

If it is proven that the observer’s eye plays an active role, then it remains to explain this activity. Unfortunately, there is no direct testimony concerning this issue. Taking into account that in the antiquity Democritus was considered as a mathematician and that among his works there were mathematical texts, dealing, among other things, with optics, one may drive the inference that his account of viewer’s activity is linked with mathematics in general and optics in particular.

Among modern contemporary commentators, Kurt von Fritz (1953), Walter Burkert (1977) and Kelli Rudolph (2009, 2011, 2012) advocate the thesis that the observer’s eye emanates the visual rays, being creative in forming the process of visual perception. Kelli Rudolph makes reference on Euclid’s treatise *Optics*, who accounted for the seeming reduction of distantly perceived objects. He wrote as well that planes and lines converge toward our eyes. Euclid is our earliest source for the account of “a visual cone with its apex at the eye and its base.”²⁶

If the said above is to be applied to Democritus, one might assume that the effluences streaming from the viewer’s eye are constantly emanated in a conical pattern, thus enabling perspective vision. Subsequently, the compressing force of the visual rays might be responsible for directing the images, flowing from the objects in high speed and great quantity,²⁷ to the observer’s eye. The elucidation of the observer’s active role in seeing, explained in terms of visual rays and cones, might be plausible, particularly having in mind that Democritus himself dealt with the optical issues. This is, indeed, only an interpretative assumption, but it does not contradict the general outlook of Democritus’ philosophy.

AN ATTEMPT TO REFUTE THEOPHRASTUS’S OBJECTIONS AGAINST DEMOCRITUS’S ACCOUNT OF VISION

The most comprehensive criticism of Democritus’ theory of vision is given by Theophrastus’ *De sensibus*. Taking into account Democritus’ philosophy in its entirety, I will further discuss each of Theophrastus’ objections and what Democritus might have replied to them.

²⁵ Cf. Taylor 1999, Testimonia 148. The *Etymologicum Genuinum* is a later testimony.

²⁶ Cf. Rudolph 2011, 74.

²⁷ Cf. *Ibid.*, 78.

Theophrastus' first three objections in the paragraph 51 are against the concept of an air imprint, which is characterized as ἄτοπος ("peculiar"). I classify them as follows:

1) The imprint in the air (ἀποτύπωσις) is ἄτοπος ("peculiar"), for the reason that the air is not material sufficiently consistent for imprinting. In addition, Theophrastus makes reference to Democritus' wax analogy, as if there were a sort of self-contradiction in Democritus' comparison between the air imprints and the wax impressions. This reading is suggested by H. Baltussen.²⁸

2) Water is a better material for imprinting, since it is denser. Baltussen rightly claims that Theophrastus' suggestion that Democritus should have taken water instead of air is in fact the pseudo-improvement of the opponent's position.²⁹ Apparently, Theophrastus considers the idea of material imprints to be absurd.

3) The concept of an air imprint (ἀποτύπωσις) is redundant, since "an effluence of the shape of the object" has been posited.³⁰

The second objection is very implausible. Democritus might have replied that the water particulars are not appropriate for seeing through, because they are too large and incorrectly shaped to be imprinted by the images. Moreover, water is not affected by the sunlight particulars in the same degree as the air is, since it is already a continuous body not adaptable for the rapid movement of imprints.

Regarding the objection of the redundancy, one may reply that the process of emitting εἴδωλα is not sufficient for explaining the complexity visual perception. As it is described by Theophrastus himself, the vision includes compression both from the observer and from the thing seen, certain modifications of the air, which could hardly be covered by the concept of ἀπορρόη.

If the concept of an air imprint is provisionally accepted in the light of the wax analogy, then Theophrastus points out to the problems involved by adopting it.

1) If air were impressed like wax, the imprint would be facing the thing seen.

2) As a result, the thing will be seen inverted.

²⁸ Cf. Baltussen 2000, 185.

²⁹ Cf. *Ibid.*, 185.

³⁰ Cf. Taylor 1999, 109.



Picture 1. On the left: the engraved image on the stone.

On the right: the wax impression.

I will make an effort to point out that these objections miss the point. The wax impressions are in fact the inverted copies of the images on the stone of the real objects (See Picture 1). They face just the surface of the engraved images on the stone; nevertheless, only the background of the wax would have images “exactly as” they “appeared on the stone.”³¹ The similar elucidation can be applied to vision. Like the wax impressions, the air imprints, will appear “forward-facing to us”, because what we are see, as Rudolph Kelly rightly suggested, is the “back of the air imprints.”³² Theophrastus seems not to take into account that the inverted copies (like wax impressions, photo negatives, or air imprints) of the copies (like the engraved figures on the stone or the *εἰδωλα* of the real objects) provide not the inverted, but frequently the more or less correct perceptual information of some aspects of visual world. In addition, one might suggest that the repulsive force among the air and light atoms can have a large impact on the movements and “paths” of air imprints to our eyes in a way that the air imprints cannot only be turned around, but also moved upside down, implying that turning around is not necessarily the only movement of the air imprints.

In the following four objections to Democritus’ account vision in the *De sensibus*, Theophrastus attempts to point out that his opponent’s account of air-imprints is not only inadequate, but also incapable to explain the mechanism of seeing. These objections run as follows:

1) When several things are seen in the same place, how will there be so many imprints in the same air?³³

2) How can we see each other without imprints clashing, since we would be face to face with our own source?³⁴

³¹ Cf. Rudolph 2011, 79.

³² Cf. *Ibid.* 79.

³³ Cf. *DS* 52.5–8.

³⁴ Cf. *DS* 52.8–10.

3) Why does each person not see oneself? “For the imprints would be imaged in one’s own eyes, just as much as in those of others, especially if people are face to face and the same thing happens as with the echo.”³⁵

4) All bodies produce imprints and a great number of them “crosses one another’s paths,”³⁶ which make vision impossible.³⁷

This set of objections against Democritus concerns the observer-object situation, and, indeed, causes the serious difficulties for the account of vision explained by the air imprints. The first objection refers to an observer and several objects. It aims not at the simultaneous occurrence of many imprints, as Baltussen in his reading suggested.³⁸ The multiplicity of imprints “in the same air” is what Theophrastus considers to be problematic.

Theophrastus’ reference on the “same air” seems to imply that he, in contrast to Democritus, held a static rather than a dynamic view of the visual perception. If by the phrase “in the same air” Theophrastus meant things “grouped together so that parts of them overlap”, then it might be that the effluence and imprint of the unseen part of one thing is blocked by the perceptible part of another.³⁹ If this reading, offered by Rudolph,⁴⁰ is accurate, then one may reply that the overlapping and blocking of effluences and air imprints precisely mirror the situation on the phenomenological level where both seen and unseen parts of things overlap.

Theophrastus evidently sees the problem between the one and same air and the plenty of imprints in it. If we, however, assume that the air is constantly being molded and compressed, then so many imprints are in a continuous and rapid motion through the air. The fast motion and the continuous fluctuation of the air imprints seem to be required by Democritus’ account of visual perception, and it might be the reply to Theophrastus’ objection.

The third objection, dealing with the reciprocal vision for one person, raises the question on the relationship between the seer and the object seen, when the object seen is the seer himself. We must see ourselves, argues Theophrastus, because the air imprints of ourselves would be imaged in our eye as much as in the eyes of others. Democritus might reply that seeing implies the compression from both sides, which is absent in the case of seeing oneself, since there is no external visual object emitting the effluences and compress-

³⁵ Cf. *DS* 53 1-5. I use Taylor’s translation. Cf. Taylor 1999, 109.

³⁶ Cf. Rudolph 2011, 80.

³⁷ Cf. *DS* 53 6-8.

³⁸ Cf. Baltussen 2000, 187.

³⁹ Cf. Rudolph 2011, 80.

⁴⁰ Cf. *Ibid.*

ing from its side. In other words, due to the reason that not all the conditions necessary for the occurrence of vision are satisfied, we cannot see ourselves.

The objections 2) and 4) seems to be similar, since both of them presuppose the impediment of the vision either due to the collision of air imprints in the case of reciprocal vision of two persons or because of their crossing each other's paths. The doxographical sources on the Democritus' account of visual perception did not preserve answers to the difficulties raised by Theophrastus. Guthrie and Rudolph explained what might be the answers to these two Theophrastus' objections. Guthrie suggested that for Democritus two persons can see each other without their imprints colliding, because he (or atomists in general) may have thought that "these are tenuous enough and with sufficient interstices of void."⁴¹

Even more plausible seems to be the interpretation given by Kelli Rudolph. According to him, effluences and air imprints pass through one another, "being arranged and contracted enough to preserve their configuration, but loose enough to let other images to pass through them."⁴² This elucidation is supported by a convincing example. When two projectors are directed at one another, the image produced from one projector will not be blocked by the image emitted from the other. By contrast, the entire image from the first projector passes through the beam of the second projector and is observable on the opposite wall.⁴³

It is not surprising that Theophrastus' further objection also deals with the air imprints, that is to say, with the endurance of air imprints. Theophrastus suggested that the air imprint should remain even if a) the objects are not visible or near, b) "if not at night, then at least by day" due to the fact that the visibility at night depends on the temperature of the air, i.e., the coolness of the weather perseveres air imprints. The air imprints are not presumably envisaged by Democritus as the static images, remaining same under all circumstances.

It is not entirely clear whether Democritus thought that the air imprints should always remain same or it is Theophrastus' own assumption. If we suppose that they really remain, one may suggest that they become so small, and finally dispel. Theophrastus' criticism challenges his opponent's account of perception with the serious difficulties, but it seems that it does not altogether refute it as an absurd and obscure pseudo-theory.

The most serious objection to Democritus' theory of vision is neither the concept of an air imprint nor its function in explaining the mechanism of see-

⁴¹ Cf. Guthrie 1969, 442.

⁴² Cf. Rudolph 2011, 81.

⁴³ Cf. *Ibid.*, 81.

ing, but the lack of the explanation of what happened after the objects had been seen.

INSTEAD OF CONCLUSION: PERCEIVING AND THINKING ARE THE SAME

It is not at all unexpected that Theophrastus ended his informative criticism of Democritus' account of vision with the reference to his opponent's view of thought, because the explanation of cognition seems to be required in the account of sense perception. According to Theophrastus, Democritus explained the occurrence of thought, when components of the soul are appropriately balanced, and are affected by excess of heat or cold. Theophrastus gives credit to this account as being a consistent one.⁴⁴ If, for Democritus, the soul is corporal, then the thought, as a result of the soul's activity, should be explained in terms of composition of human/animal body.

It is, however, hard to understand the link between the elucidation of vision in terms of images and air imprints and these few references on thought envisaged as an outcome of the properly balanced soul's components, which are affected by the excess of coldness and heat. In other words, this explanation of thinking hardly has something in common with the Theophrastus' interpretation of Democritus' account of vision. Nevertheless, apart from Aristotle, Theophrastus is the earliest source for the very important and influential interpretative claim that Democritus identified perceiving with thinking. Since antiquity, it has been a subject matter of the debate what Democritus meant by this identification, and what its further implications are. Without entering into that highly interesting debate and the various readings of Democritus' identification of τὸ αἰσθῆσθαι with τὸ φρονεῖν, I am inclined to interpret it taking into account the entire above-discussed Theophrastus' report and his criticism of Democritus' theory of vision.

The same mechanism seems to underlie both activities, implying that they are both produced by the impact of εἰδῶλα (images), which might be of a different kind, as suggested by Lucretius.⁴⁵ He distinguished the finer images, which "penetrate to the mind from the coarser which stimulate sense organs."⁴⁶ If the vision is a kind of picturing the things, in a way interpreted in this paper, then Democritus might envisage analogously the thinking, as a special kind of the visual representation of objects, directly or indirectly stimu-

⁴⁴ Cf. *DS*, 58 ff.

⁴⁵ Cf. Lucretius, 2001, IV.728-31.

⁴⁶ Cf. Taylor 1999, 204.

lated by the fine, swift sets of atoms streaming from the objects all around us. Like images, thoughts might be a replica of the shapes of objects, their size and distances from us, yet more precise and accurate than the perceptual images. My final conjectures are highly hypothetical. The fact is that Theophrastus did not convey any information concerning further processing of perceptual images, since, most probably, Democritus did not assert anything about that, which leaves this question open to the various often fruitful additions and enhancements in the millennial history of atomism.

REFERENCES

- Aristotle, *On the Heavens*, in: Barnes, J. (ed.), *The Complete Works of Aristotle*, Vol. 1, Princeton, Princeton University Press, 1984, 447-511.
- Avotins I., "Alexander of Aphrodisias on vision in the atomists", *Classical Quarterly*, Vol. 30 (1980), 429-454.
- Baldes, R. W., "Democritus on Visual Perception: Two Theories or One?", *Phronesis*, Vol. 20, No. 2, (1975), 93-105.
- Baldes, R. W., "Democritus on the Nature and Perception of 'Black' and 'White'", *Phronesis*, Vol. 23, No. 2 (1978), 87-100.
- Baltussen, H., *Theophrastus against the Presocratics and Plato*, Leiden, Boston, Brill, 2000.
- Barnes, J., *The Presocratic Philosophers*, London, Routledge, 1982.
- Brancacci, A., Morel P. M. (eds.), *Democritus: Science, The Arts, and the Care of the Soul*, Proceedings of the International Colloquium on Democritus (Paris, 18-20 September 2003), Leiden, Boston, Brill, 2007.
- Burkert, W., "Air-Imprints or Eidola: Democritus' Aetiology of Vision", *Illinois Classical Studies*, Vol. 2 (1977), 97-109.
- Diels, H. und Kranz, W. 1964. *Die Fragmente der Vorsokratiker*. Zürich/Berlin: Weidmann.
- English, R. B., "Democritus' Theory of Sense Perception", *Transactions and Proceedings of the American Philological Association*, Vol. 46 (1915), 217-227.
- Fritz, K. von, "Democritus' Theory of Vision", in: Underwood, E. A. (ed.), *Science, Medicine and History*, Oxford, Oxford University Press, 1953, 83-99.
- Guthrie, W. K. C., *A History of Greek Philosophy*, Vol. 2, *The Presocratic Tradition From Parmenides to Democritus*, Cambridge, Cambridge University Press, 1969.
- Luria, S. R., *Democritea*, Leningrad, 1970.
- Lucretius, *On the Nature of Things*, tr. by Martin Ferguson Smith, Indianapolis, Hackett Publishing Company, 2001.
- O'Brien, D., "Théories atomiste de la vision: Démocrit et le problème de la fourmi céleste", in: L. Benakis (ed.), *Proceedings of the First International Congress on Democritus (Xanthi)*, 1984, 27-57.

- Plato: *The Timaeus*, in: Cooper, J. M. and Hutchinson, D. S., *Plato: Complete Works*, Indianapolis, Hackett Publishing House, 1997, 1224-1292.
- Rudolph, K., *Reading Theophrastus: A Reconstruction of Democritus' Physics of Perception*, doctoral dissertation, Cambridge, University of Cambridge, 2009.
- Rudolph, K., "Democritus' Perspective Theory of Vision", *The Journal of Hellenic Studies*, Vol. 131 (2011), 67-83.
- Rudolph, K., "Democritus' Ophthalmology", *The Classical Quarterly*, Vol. 62, Iss. 2 (2012), 496-501.
- Stratton, G. M., *Theophrastus and the Greek Physiological Psychology before Aristotle*, Californian University, Semicentennial Publications, 1917.
- Taylor, C. C. W. (transl.), *The Atomists: Leucippus and Democritus*, Toronto, Buffalo, London, University of Toronto Press Incorporated, 1999.

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KAKO BI DEMOKRIT MOGAO DA ODGOVORI NA TEOFRASTOVE PRIGOVORE?

Sažetak: U ovom radu kritički preispitujem Demokritovu teoriju vizualnog opažanja i to pre svega na osnovu Teofrastovog spisa *De sensibus*, premda se u radu koriste i drugi izvori. Nastojim da pokažem kako je Abderanin, pored kauzalnog i materijalističkog, koristio i druge modele za objašnjenje vizualnog opažanja. Postoji svedočanstvo koje upućuje na to da je Demokrit upotrebljavao matematičko znanje ne bi li dublje objasnio perspektivu i druge elemente videnja. U radu se detaljno razmatra eksplanatorni smisao i značaj Demokritove analogije sa otiscima u vosku, što će postati čuvenom i opštim mestom u istoriji epistemologije. Uprkos tome što su Teofrastovi argumenti dobro osmišljeni i artikulisani, intencija ovog rada u celini jeste da se pokaže kako je Demokrit stvorio vrlo sofisticiranu i utemeljenu teoriju vizualnog opažanja koja može u znatnoj meri da uspešno odgovori na Teofrastove prigovore.

Ključne reči: Demokritova teorija videnja, Teofrastovi prigovori, *εἴδωλα*, atomi, analogija sa voštanom pločom

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