Aristotle’s Transparency: Comments on Katerina Ierodiakonou, “Aristotle and Alexander of Aphrodisias on Colour”

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1

Thankfully, Katerina Ierodiakonou's paper puts aside the question of how, according to Aristotle, we perceive colours, and addresses the prior question concerning the nature of colour in itself. This prior question is as interesting as it has been neglected, Aristotle's answer is intriguing, and Katerina's interpretation of Aristotle's answer is convincing.

Absolutely central to Aristotle's theory of colour is his concept of the transparent (τὸ διαφανές). However, as Katerina observes, Aristotle's two accounts of the transparent, one in *De anima* II.7 and the other in *De sensu* 3, appear rather discrepant. In *De anima* II.7, the transparent is a property of certain bodies, notably air and water, which allows them to function as the media of vision. In *De sensu* 3, however, the transparent is a property which belongs to *all* bodies in a greater or lesser degree and which allows them to have colour.

Katerina begins to address this apparent discrepancy by calling attention to the different contexts in which the two accounts of the transparent are set. While the focus of *De sensu* 3 is 'on the nature of colour in itself', she writes, '[i]n the *De anima* the focus is on how we perceive colours, and thus what is transparent here is the medium of vision, i.e. what makes something else visible.' I agree that the discrepancy is only apparent and best explained with reference to different focuses of the works in which the two accounts are set, but I would describe the focus of *De anima* differently.

There are two reasons I should like to propose a different description of the focus of *De anima*. One reason is more general, and has to do with my conviction that false expectations from *De anima* have generated an unduly large amount of scholarly disputes over the past thirty years or so. The more specific reason is that a different description of the focus of *De anima* will put me in position to say some things about Aristotle's concept of the transparent that perhaps fall outside of the scope of Katerina's paper, but also to propose a different view of the relationship between the transparent and colour.

2

The project of *De anima*, I take it, is to give an account of the principle of a science of living beings. Aristotle is aware of the challenges before such an account, as we learn from *De anima* I.1. One challenge is to find a proper way of dividing the subject matter. Although souls are not divisible entities, as Aristotle insists, an appropriate way of splitting up the subject matter has to be found if the project is to be brought to completion. The appropriate way of splitting up the subject matter would be into parts that are (i) conceptually independent from one another ('separable in account', as Aristotle would put it); explanatory of other capacities and phenomena of the soul; and (iii) exhaustive. Once the subject matter is divided into such parts, Aristotle can provide a detailed treatment of each part, allowing that some parts require further divisions and additional elaborations. With the last part receiving a

proper treatment, the bulk of the project of *De anima* is complete: a systematic account of the principle of living beings is set out and ready to be called into use in other tasks of Aristotelian biology.

Aristotle divides the soul into the nutritive, the perceptive and the thinking part.[1] Each part is a capacity, and a capacity can only be explained with reference to the corresponding activity. The activities, in turn, can only be explained with reference to their corresponding objects. So the first and foremost thing to be explained, if one wants to give a proper treatment of a part of the soul, is the object with which that part of the soul is concerned. What Aristotle needs to do here is to identify the object correctly and to explain which conditions have to be satisfied for the object to bring that capacity into actuality. If the identified object is present and the specified conditions are satisfied, the respective capacity will be actualized by the object. There are no further requirements for the activity to take place.

Of course, most capacities require bodily organs, but in *De anima* Aristotle satisfies himself with saying only very basic things about the organs and their properties. As far as *De anima* is concerned, with an adequate identification of the object with which a part of the soul is concerned, and with an explanation of the conditions that have to met for the object to actualize this part of the soul, Aristotle's work on that part of the soul is mostly done. To put this in more specific terms: if you understand what each type of object of perception is and which conditions have to be satisfied for it to actualize the corresponding perceptual capacity, you understand what the different types of perceptual activities are, you thus understand what the special senses are, and in the end you come to understand what the perceptual part of the soul is (or perhaps not just yet, since you also need to understand that the five senses, each exercised by a different type of sensible object, are in fact unified, as Aristotle argues in *De anima* III.1-2).

Much though you understand about perception by this point, you do *not* yet understand how an episode of perception comes about. To understand that, you also need to know what is the nature of colour or sound in itself, how they change the medium, how the medium changes the peripheral sense organs, how the peripheral sense organs convey these changes to the central sense organ, and why perception takes place there and there only. However, explaining these things is not the aim of *De anima*, at any rate not as I read it. The aim of *De anima* is, rather, to give an account of the soul, including an account of the perceptual part. Consequently, I do not think that the focus in *De anima* is on 'how we perceive colours'.[2]

I stress this because some scholars, assuming that Aristotle's aim in *De anima* is to explain how we perceive colours, have read certain passages of *De anima* as suggesting that tomatoes make our eye-jelly go red. Other scholars have argued that this could not be what the passages say. Proving that *De anima* contains no evidence for the view that perception involves physical changes, yet sharing the assumption that *De anima* contains Aristotle's explanation of how we perceive colours, the latter scholars concluded that perception

[1] The capacity to move the animal from one place to another turns out to belong essentially to the perceptual part of the soul, and thus does not merit the status of a part of the soul.

[2] See what Aristotle says about the division of labour between *De anima* and *De sensu* on the subject of perpception, in *De sensu* 3, 439a12-17.

involved no physical change whatsoever, thus making Aristotle's theory even less credible than it actually is.

Both parties, I think, are partly right and partly wrong. The literalists are right to claim that in Aristotle's theory episodes of perception involve physical changes, but wrong to seek evidence for that claim in *De anima*. The spiritualists are right to claim that *De anima* provides no evidence for the view that in Aristotle's theory episodes of perception involve physical changes, but wrong to think that, therefore, episodes of perception do not involve physical changes in Aristotle's theory. What is common to both parties, however, is the same false assumption that '[i]n the *De anima* the focus is on how we perceive colours'.

If that is a false assumption, then what is the true focus of *De anima*, due to which the definition of the transparent in *De anima* II.7 differs from the definition stated in *De sensu* 3? As I have indicated, the focus is the identification of the object with which a given part of the soul is concerned and of the conditions under which the object comes to actualize this part or of the soul. In particular, the focus of the chapters on perception is the identification of the five types of special sense objects and the conditions that have to be satisfied for them to produce seeing, hearing, etc. Here we are interested in the identification of the object of vision (τὸ ὁρατόν).

In the opening lines of *De anima* II.7, Aristotle says that there are two types of proper objects of vision (ὁρατὰ καθ᾽αὑτά): colour and a class that has no proper name (418a26-28). We learn that items in the nameless class 'are not seen in the light, but produce perception in the dark, e.g. fiery and shining appearances (…) such as fungus, horn, the heads, scales and eyes of fish' (419a2-5).[3] The fundamental difference between these two types of proper objects of vision is that colours require light to be visible, whereas phosphorescences – as I propose to call the nameless class of items – require darkness to be visible.

Both types of things visible in themselves require an account. To explain why colours require light to be visible and why phosphorescences require darkness to be visible, Aristotle clearly needs to explain what light and darkness are. And since both light and darkness are states of the transparent (τὸ διαφανές), it is hardly surprising that Aristotle makes an effort to explain the transparent in some detail—and not just any sort of the transparent, but specifically the sort that explains light and darkness as conditions of the visibility of colours and of phosphorescences, respectively.

True, Aristotle says disappointingly little about phosphorescence,[4] and he focuses mostly on colour. However, he says enough to disprove Katerina's claim on p. 2, that Aristotle 'seems to believe that there is no vision without colours'. Surely Aristotle believes that there is vision without colours—namely, vision of phosphorescences. But while vision of phosphorescences requires darkness, when no vision of colour is possible, vision of colours requires light, when no vision of phosphorescence is possible.

3

[3] I take it that the examples listed by Aristotle are not themselves members of the nameless class, but things which *exhibit* items of the nameless class. For instance, it is not the 'head of fish' that belongs to the nameless class, but the characteristic greenish phosphorencence exhibited in the dark by heads of a certain kind of fish.

[4] He leaves us with a promissory note at 419a6-7: δι᾽ ἣν μὴν οὖν αἰτίαν ταῦτα ὁρᾶται, ἄλλος λόγος.

The transparent that explains light and darkness is a property of bodies that serve as a medium of vision, typically air and water. In *De anima* II.7, 418b6-7, Aristotle attributes this property to 'many solid bodies' too, presumably all those bodies that let things show through them, e.g. glass, crystal, fibre and the like. In *De sensu* 3, however, Aristotle claims that this property inheres in *all* bodies in a greater or lesser degree (ὑπάρχει δὲ μᾶλλον καὶ ἧττον ἐν πᾶσι, 439b8-9; cf. 439a24-25). In bodies which do not have determinate boundaries, such as water and air, transparency is what accounts for light and darkness. Light is defined as the actualization of transparency in such bodies in the presence of fire or the sun. By implication, darkness is the potentiality of transparency in such bodies in the absence of fire or the sun.

In bodies which do have determinate boundaries, that is in solid objects such as rocks and cups, transparency is what accounts for their colour. Colour is defined as the limit of the transparent in determinate bodies (439b11-12), observing the *endoxon* that colours are or belong to the surface of objects. Aristotle adds that even indeterminate bodies exhibit colour at their limit, but their colour very much varies with factors such as distance of observation or the quantity of the body, e.g. the colour of the sea gets darker as the depth of the sea increases.[5]

To use modern jargon, we can say that transparency is a necessary macroscopic property of bodies which emerges from their elemental composition. It is a necessary property, because every body, regardless of its elemental composition, will inevitably be transparent to some degree. It is a macroscopic property, because it is a property above the threshold of visibility to the human eye, be it direct visibility of a colour or indirect visibility of a medium which allows things to show through it. And it is an emergent property, because no element is itself transparent, but any sufficiently large body made of elements will always be transparent to some degree.

Now the property of transparency accounts for several different phenomena. First of all, it accounts for the phenomenon of mediating proper objects of vision. This phenomenon occurs only in bodies with the highest degree of transparency. Presumably, the requisite degree of transparency is achieved by bodies composed predominantly of the airy or the watery element. Incidentally, bodies of such elemental composition will not have determinate boundaries of their own. Moreover, the phenomenon of mediating proper objects of vision occurs only when the transparency of the indeterminate bodies is in a certain state. To mediate colours, transparency has to be actualized, i.e. air or water has to be lit, which happens in the presence of fire or the sun. To mediate phosphorescences, transparency has to be in potentiality, i.e. air or water has to be dark, which happens in the absence of fire or the sun.

This brings us to the second phenomenon for which transparency accounts: light and darkness. These are two opposite states of transparency in indeterminate bodies, caused respectively by the presence and the absence of fire or the sun. Of course, there are many intermediate states between the two opposites, depending on the size of fire or the position of the sun in the sky. These intermediate states make things more or less visible, e.g. in the dusk colours get less visible while phosphorescences start to become visible.

Third, transparency accounts for the phenomenon of colour, both for varying colours of indeterminate bodies and for fixed colours of determinate solid bodies. Here the key

[5] See the passage from *De generatione animalium* V.1, 779b28-33, quoted by Katerina on p. 11.

question is how precisely transparency accounts for the phenomenon of colour. On p. 10 Katerina says that 'a body is white because it is transparent to a great degree, and black because it is not at all transparent', implying that it is simply the degree of transparency of determinate bodies that explains their colour. On this account, then, different colours just are different degrees of transparency of determinate bodies. I find this account problematic on at least two grounds.

Firstly, this account forces us to assume that a marble plate is white because it has a high degree of transparency, which is counterintuitive, given that even a very thin marble plate does not let other things be seen through it. If one insists that the white marble plate is transparent nonetheless, then I wonder what is the difference between the white marble plate and a white piece of fibre which does indeed have a high degree of transparency, as it lets other things be seen through it.

Secondly, and more fundamentally, this account is problematic because it blurs the distinction between colour and transparency as a neutral state with regard to colours. On Aristotle's theory, the sense is a mean in relation to a range of qualities that it discriminates, and for that purpose the sense organ has to be neutral in relation to these qualities. Now the suggestion is essentially to unpack the relevant qualities as different degrees of neutrality.

Perhaps it is more promising to dissociate the degree of transparency from colour, and explain colour differently, e.g. as an effect of one part of a determinate body's elemental composition upon its transparency, regardless of the degree of transparency that this particular elemental composition happens to produce. For example, a piece of rock has a certain elemental composition which gives it a certain (low) degree of transparency. Because the rock is composed of the fiery element in some significant proportion, the small degree of transparency that is present in the rock is actualized in such a way that the rock is white. A coal, by contrast, has composition with the fiery element in such low proportion that its transparency, in whatever degree it happens to be present in the coal, remains potential, which makes coal black.

A confirmation of this explanation of colour, I think, can be found in a passage from *De sensu* 3, quoted and interpreted differently by Katerina:

> Now, that which when present in air produces light may be present also in the transparent; or again, it may not be present, but there may be a privation of it. Accordingly, as in the case of air the one condition is light, the other darkness, in the same way the colours white and black are generated in bodies. (*De sensu* 3, 439b14-18; trans. J. I. Beare, rev. J. Barnes)

If 'that which when present in air produces light' is fire, this passage can be read as saying that the fiery element can be present or absent in the transparency of a determinate body; if the fiery element is present, or abundantly present, the body will be white, and if the fiery element is absent, or nearly absent, the body will be black.[6]

A similar story can be told about phosphorescence. It is reasonable to suppose that phosphorescence is an outcome of specific elemental composition, probably one in which the

[6] One obvious objection to this suggestion is that snow would need to have a lot of fiery element in it, but I suppose Aristotle has resources to defuse this objection.

fiery element predominates or enters a special mixture with the other elements. Phosphorescent bodies are transparent to some degree, of course, but their transparency enters an explanation of their colour, not of their phosphorescence. Aristotle insists that it is not the colour of phosphorescent bodies that is visible in the dark (ἀλλ' οὐδενὸς ὁρᾶται τούτων τὸ οἰκεῖον χρῶμα, 419a6). So, phosphorescence is not the fourth phenomenon that the property of transparency accounts for.

The suggestion that the fiery element accounts for phosphorescence is additionally attractive, I believe, because it assigns a role to the fiery element analogous (i) to the role fire plays in actualizing the transparency of determinate bodies, that is in producing their colour, but also (ii) tp the role fire plays in actualizing the transparency of indeterminate bodies that serve as the media of vision. Just as a mass of fire (or ether) is necessary to actualize the transparency of an indeterminate body so as to let other things become visible through them, i.e. to light up the medium, a certain amount of fiery element, mixed in the right proportion with the other elements, is likewise necessary for a determinate body to become visible when the transparency of an indeterminate body is not actualized, i.e. to make things glow in the dark.

If this is roughly correct, fire (or ether) seems to be at least as responsible for making bodies visible as the transparent, which seems to be fully in line with common experience.

4

Finally a word on Alexander to whom Katerina turns for help in distinguishing two senses of τὸ διαφανές. She summarizes Alexander's distinction on p. 6:

> According to Alexander, therefore, Aristotle uses the term 'διαφανές' in the *De anima* in a narrow sense that applies to the medium of vision, namely air or water, signifying both what admits light and what lets something else be seen through it, i.e. signifying that such bodies become visible by making other bodies visible through them. In the *De sensu*, on the other hand, he uses it in a wide sense that applies to all bodies, signifying that all bodies come to light, i.e. signifying that they all become visible. To put it briefly, transparency is understood in terms of the notion of visibility; the degree to which something becomes visible depends on the degree to which it is transparent, and *vice versa*.

Katerina's presentation of Alexander's interpretation, spelled out in his commentary on *De sensu* (45.11-16), seems to me correct. Alexander thinks that something is transparent in the narrow sense if it fulfils two conditions: if it (i) admits light and if it (ii) lets something else be seen through it. Something is transparent in a wider sense if it fulfils only the first condition, that of admitting light. So, common to the transparent in both senses is that of 'admitting light'. I see two problems with Alexander's distinction.

First, I am not sure that an indeterminate body, such as air or water serving as the medium of vision, admits light (φῶς δέχεται) in the same way in which a determinate body, such as the yellow cup on my table, admits light. Presumably, indeterminate bodies admit light in the sense that the property of transparency is actualized in them, and it is actualized in the presence of fire or ethereal body such as the sun (418b11-13). The more this property of transparency is actualized, depending on the size of fire or height of the sun in the sky, the more visible colours of objects become. Determinate bodies, on the other hand, admit light in

the sense of ‘what comes to light (φαινόμενον), i.e. to what becomes visible’ (p. 5). This sense of ‘admitting light’ clearly has little or nothing to do with the property of transparency in indeterminate bodies. The transparency of determinate bodies enters an explanation of their colour, and they have their colour even in the dark, before they come to light and become visible. To say that the transparent admits light in both indeterminate and determinate bodies, therefore, is to indulge in homonymy.

Second, we can accept that indeterminate bodies, such as air or water, admit light in the sense that the property of transparency in a medium is actualized. And the better this property is actualized, the more visible colours of objects located in the medium become. But, remember, at the same time the less visible phosphorescences become. With phosphorescences it is the other way round: the weaker the actualization of the property of transparency in the medium, the more visible phosphorescences become. They are most visible when the medium is not actualized at all, when it is only potential, that is in pitch darkness. Why is this important? Because when we see a phosphorescence — and we can see it only in the dark — we indirectly see also the medium, insofar as it lets the phosphorescence be visible through it. This means that it is wrong to connect transparency and visibility with light too tightly, as Alexander seems to be doing.