

LIGHT: ARISTOTLE & ST THOMAS

This is the first of two papers on light. We set out here the teaching of Aristotle in his treatise on the soul, *De Anima*, Book II, Chapter 7 (on *Sight and Its Object* and *How Colour is Seen*), followed by St Thomas Aquinas's *Commentary* on the text (*In II De Anima*, Book II, lecture XIV and part of lecture XV). The author has added his own notes to St Thomas's *Commentary* in an endeavour to reconcile with it the discoveries of modern empirical science.

One of the difficulties of the modern metaphysician is to place himself in the cosmological position of Aristotle and St Thomas. We take for granted so many discoveries about the earth and the universe that we have difficulty in reducing our perceptions to the limitations of their knowledge of the natural world. There is an inclination to reject their views because they lacked our scientific advantages. But from the little available they gathered much more about reality than our modern thinkers could have.

The annotations made here proceed on assumptions made in an earlier paper published on this web site, *Science and Aristotle's Aether*¹, in which the author commented on views expressed by American Thomistic philosopher, Christopher A Decaen, in a paper he published in *The Thomist* in 2003². The views expressed here are offered as a contribution to the natural philosophy of Aristotle and St Thomas for acceptance, amendment or correction by better minds.

Michael Baker

22nd January 2009 — *St Vincent*

Aristotle's text [*De Anima* Book II, Chapter 7]³

That of which there is sight is the visible; and the visible is colour, and also something which, though it has no name, we can state descriptively. It will be evident what we mean when we have gone further into the matter.

For the visible is colour, and it is this of which visibility is predicated essentially; not however, by definition, but because it has in itself the cause of being visible. For every colour is a motivating force upon the actually transparent: this is its very nature. Hence nothing is visible without light; but by light each and every colour can be seen. Wherefore, we must first decide what light is.

There is clearly something transparent. By transparent I mean that which is indeed visible yet not of itself, or absolutely, but by virtue of concomitant colour.

¹ http://www.superflumina.org/ether_science.html

² *Aristotle's Aether and Contemporary Science*, *The Thomist* 68 (2004): 375-429.

³ The translation is taken from the text in English reproduced in Kenelm Foster and Silvester Humphries, *Commentary on Aristotle's De Anima*, (Dumb Ox Books, Notre Dame, Indiana, 1994), a revised edition of a Yale University Press publication of 1951.

Air and water and many solids are such. But transparency does not depend on either air or water as such, but on the same quality being found in both, and in the eternal sphere above as well.

Light is the act of this transparency, as such: but in potency this [transparency] is also darkness. Now, light is a kind of colour of the transparent, in so far as this is actualized by fire or something similar to the celestial body; which contains indeed something of one and the same nature as fire.

We have then indicated what the transparent is, and what light is; that light is not fire or any bodily thing, nor any emanation from a body—[if it were this last,] it would be a sort of body, and so be fire or the presence of something similar in the transparent.

For it is impossible for two bodies to exist in the same place at the same time.

Light seems to be the contrary of darkness; and the latter is the privation of this quality in the transparent. So it is plain that the presence of this is light.

Empedocles (or anyone else who may have said the same) was wrong when he said that light was borne along and extended between the earth and its envelope, unperceived by us. This is in contradiction alike to sound reasoning and to appearances. Such a thing might happen unobserved over a small space: but that it should remain unnoticed from the east to the west is a very extravagant postulate.

Now that only can receive colour which has none, as only that which is soundless can receive sound. What is without colour is the transparent and the invisible, or what is barely seen, being dark. The transparent is precisely of this nature when it is not in act, but in potency. For the same substance is sometimes dark, sometimes light.

Not all visible things, however, are visible in light, but only the colour proper to each. There are certain things which are, indeed, not seen in light, but which produce a sensation in darkness, such as those which burn or are luminous. These are not called by any one term. Such are the fungi of certain trees, horn, fish-heads, scales and eyes. But the colour proper to each of these is not perceived. Why these things are thus seen is matter for another enquiry.

At present what is clear is that what is seen in light is colour; [and that] therefore it is not seen without light. For to be colour is to be able to move the transparent into act; and this act of the transparent is light. A plain proof whereof is that if one places on the sight itself a coloured object, it is not seen. But colour moves the transparent medium (e.g., air); and the sensitive organ is moved by this extended continuum.

Democritus put forward the erroneous opinion that if the medium were a vacuum, perception would be everywhere exact, even of an ant in the sky. This is, however, impossible; for only when the sensitive faculty is affected does vision occur. This cannot, however, be effected by the colour seen in itself. It must

therefore by due to the medium. If there were a vacuum, a thing, so far from being perceived clearly, would not be seen at all. We have stated then, why it is necessary that colour be seen in light.

But fire is seen in both darkness and light: necessarily, for the transparent is made light by it.

St Thomas's Commentary [In II *De Anima* Lectures XIV, XV]⁴

['n...' indicates the paragraph reference to the text in the original Latin: '§...' indicates the reference in the Pirotta edition of St Thomas's texts.]

The author's annotations have been made in Palotino Linotype, and inset.

Lecture XIV

n. 1 §399 Having distinguished the proper sense-objects from the common, and from those that are sensible incidentally, the Philosopher now treats of the proper object of each sense: first of the proper object of sight; then, at 'Now let us start', of that of hearing; then, at 'It is not so easy', of that of smell; then, at 'The tastable', of that of taste; and lastly, at 'The same reasoning holds', of that of touch.

As to sight, he discusses, first, its object, and then, at 'At present what is clear', how this object comes to be seen. Touching the object of sight, he does two things. First, he determines what is the visible, dividing it into two. Secondly, at 'For the visible is colour', he deals with each. He says then, first, that, the proper object of a sense being that which the sense perceives *of itself exclusively*, the object of sense of which the special recipient is sight is the visible. Now in the visible two things are included. For while colour is visible, there is also something else which can be described in speech, but has no proper name. This relates to those things which can be seen by night such as glow-worms, certain fungi on oak-trees and the like, concerning which the course of this treatise will inform us more clearly as we gain a deeper understanding of the visible. But we must start with colour which is the more obvious visible.

n. 2 §400. Then, at 'For the visible', he begins to define both objects of sight, first colour and then, at 'Not all visible things', that of which he says that it has no proper name. As to colour he does two things: first, he shows what colour has to do with visibility; secondly, at 'There is, accordingly, something transparent' he settles what is required for colour to be seen.

First of all, then, he says that, colour being visible, it is visible of itself (*secundum se*), for colour as such is *per se* visible.

n. 3 §401. *Per se* [essentially] is said in two ways. In one way, when the predicate of a proposition falls within the definition of the subject, e.g., 'man is an animal'; for animal enters into the definition of man. And since that which falls

⁴ The translation is based on that of Kenelm Foster and Silvester Humphries in their *Commentary on Aristotle's De Anima* cited above with amendments to expression in certain passages by the author.

within the definition of anything is in some way the cause of it, in such a case the predicate is said to be the cause of the subject. In the other way, on the contrary, it is said when the subject of the proposition falls within the definition of the predicate, as when it is said that a nose is snub, or a number is even—for snubness is nothing but a quality of a nose; and evenness of a number which can be halved—and in these cases the subject is a cause of the predicate.

n. 4 §402. Now colour is essentially visible not in the first, but in this second manner, for visibility is a quality, as being snub is a quality of a nose. And this is why he says that colour is visible according to itself (*secundum se*), but not by definition (*non ratione*); that is to say, not because visibility is placed in its definition, but because it possesses of itself the reason why it should be visible, as a subject possesses in itself the reason for a quality proper to it.

n. 5 §403. Which he proves from this, that all colour is able to move the diaphanous to act. For the diaphanous is the same as what is transparent—as air or water—and colour has this in its nature that it is able to move the diaphanous to act. And, on this, that it moves the diaphanous to act, the visible appears. Whence it follows that colour according to its nature is visible. And since the diaphanous it not brought to act save through light (*lumen*), it follows that colour is not visible without light. And, therefore, before it may be shown how colour may be seen, it is necessary to speak of light.

“The diaphanous is the same as what is transparent...” The diaphanous has in its nature something of the transparent and something of its contrary, the opaque. The transparent simpliciter (*aether*) is invisible and, likewise, the light it carries is invisible. Thus, the lights from the sun and the stars do not manifest themselves in lighted pathways outside earth’s atmosphere. [It is because *aether* is ungenerable and incorruptible that it is not lit by the light it carries, nor heated by the heat; cf. *Science and Aristotle’s Aether*⁵]. Their lights are only manifest on termination in the proper receptor, the eye (or its artificial equivalent, the photographic camera), or at the diaphanous (earth’s atmosphere), or at some *corporis terminatum* (bodily surface) whether outside earth’s atmosphere, such as a planet or satellite, or within it. In so far as the diaphanous is transparent it conveys light. It is in so far as it is a mix of the transparent and the opaque, it seems to me, that it makes colour manifest. It is the diaphanous, St Thomas says, that is receptive of colour. [Lectures XIV, n. 6; XV, n. 1]

n. 6 §404. Then, at ‘There is, accordingly’, he sets out those things without which colour cannot be seen, namely, the diaphanous and light (*lumen*); and this in three sections. First, he shows in what the diaphanous consists. Secondly, at ‘But light (*lumen*) is the act of this etc...’, he sets out concerning light (*de lumine*) what is its act. Thirdly, at ‘Now that only can receive colour’, he shows how the diaphanous is receptive of colour.

To begin with, therefore, he says that since colour moves the diaphanous by its very nature, the diaphanous must clearly be something. Since the diaphanous does not have colour of its own, it enables things to be seen by receiving colour from outside, and in this peculiar fashion (*aliquo modo*) it is visible. Examples of

⁵ http://www.superflumina.org/ether_science.html

the diaphanous are air and water and many solid bodies, certain jewels and glass. Now while other accidents pertain to the elements and the bodies of which they are constituted in accordance with the nature of those elements—such as heat and cold, weight and levity, and that sort of thing—the diaphanous does not befit the nature of air or water in this fashion (*tamen diaphanum non convenit praedictis*), but according to a common nature which is not confined to air and water—which are corruptible bodies—but to the heavenly body also which is perpetual and incorruptible. For at least some of the celestial bodies are manifestly diaphanous. We should not be able to see the fixed stars of the eighth sphere unless the lower spheres of the planets were transparent or diaphanous (*transparentes, vel diaphanae*). Hence it is evident that to be diaphanous (*diaphanitatis*) is not a property consequent on the nature of air or water, but of some more generic nature, in which the cause of diaphanousness is to be found, as we shall see later.

“In order that it may enable vision, the diaphanous does not have colour of its own...” In fact the diaphanous (e.g., air, water, glass, diamond etc.) does manifest colour, albeit faintly, or very faintly. Both philosophers allow (cf., here, and in Lecture XV n. 2 below) that the diaphanous can be called visible in some respect.

“[T]o be diaphanous is not a property consequent on the nature of air or water” but of some more generic nature. This is the issue. Aristotle uses one word to indicate the transparent, *phos*. St Thomas uses two, *transparentes* and *diaphanum*. What St Thomas is referring to here is not diaphanousness, but transparency, but he says *diaphanitatis* because he is unaware that the heavenly bodies—sun, stars, planets, etc.—are not part of the heavenly matter. Transparency, I argue, can properly only be said of *aether*.

Christopher A Decaen advised the author as follows: “Note... that St Thomas also brings in the words *lucens* and *lucidus* and even *illuminans*, all referring to the light source, in chapters 14 and 15. It also occurs to me that St Thomas (esp. in *De Sensu*) sometimes uses *perspicuum* as a synonym for *diaphanum*. See, esp. ch. 5 of *De Sensu*’s *Commentary*.”⁶

n. 7 §405. Next, at ‘Light (*lumen*) etc.’, he shows what light (*lumen*) is, first stating the truth, then dismissing an error. To begin with he says that light (*lumen*) is the act of the diaphanous as such. For it is evident that neither air nor water nor anything of that sort is actually transparent (*transparentes*) unless it is illuminated. Of itself the diaphanous is in potency to both light and darkness (the latter being a privation of light) as primary matter is in potency both to form and the privation of form. Now light (*lumen*) is to the diaphanous as colour is to a bodily surface (*ad corpus terminatum*): each is the act and form of that which receives it. And on this account he says that light (*lumen*) is the colour, as it were, of the diaphanous, in virtue of which the diaphanous is made actually so by some light-giving body (*ab aliquo corpore lucente*), such as fire, or anything else of that kind, or by a celestial body. For to be full of light and to communicate it (*lucens actu et illuminativum*) is common to fire and to the celestial body, just as to be diaphanous (*esse diaphanum*) is common to air and water and to the celestial body.

⁶ Personal communication to the author.

“[L]ight is to the diaphanous as colour is to a bodily surface... on [which] account [Aristotle] says that light is the colour, as it were, of the diaphanous...” Light is invisible in the transparent, as said above: it is visible only in the diaphanous.

“[T]o be full of light and to communicate it is common to fire and to the celestial body, just as to be diaphanous (*esse diaphanum*) is common to air and water and to the celestial body.” Here St Thomas elaborates his distinction of the diaphanous from the transparent. He speaks of the ‘celestial body’ here in the two senses arising from the confusion with *aether*, the heavenly substance, of the celestial lights it seems to contain.⁷ In the former, he applies to it the Latin word *lux*, indicating a light source; in the latter he is speaking of *aether* and its faculty of transparency by which *lux* is communicated. He might better have said *esse transparens* in the latter.

n. 8 §406. Then, at ‘We have then indicated’ he rejects a false opinion on light (*de lumine*); and this in two stages. First, he shows that light (*lumen*) is not a body; then at ‘Empedocles was wrong’ he refutes an objection brought against the arguments which prove that light is not a body. As to the first point he does three things.

First, he states his own view, saying that, once it is clear what the diaphanous is, and what light (*lumen*) is, it is evident that light (*lumen*) is neither fire (as some have said, positing three kinds of fire, the combustible, and flame, and light); nor a body at all, nor anything flowing from a body, as Democritus supposed, asserting that light (*lumen*) consisted of atomic particles emanating from a light giving body (*a corporis lucidis*). If there were these emanations from bodies, they would themselves be bodies or something corporeal and light (*lumen*) would thus be nothing other than fire, or something material of that sort, present in the diaphanous; which is the same as to say that light (*lumen*) is a body or an emanation from a body.

n. 9 §407. Next, at ‘For it is impossible’, he proves his own hypothesis thus. It is impossible for two bodies to be in one place at one time. If therefore light (*lumen*) were a body, it could not co-exist with a diaphanous body; but this is false; therefore light (*lumen*) is not a body.

n. 10 §408. Thirdly, at ‘But it seems’ (i.e., ‘Light seems’) he shows that light (*lumen*) exists (*est*) together with the diaphanous. For contraries exist in one and the same subject. But light (*lumen*) and darkness are contraries in the manner in which privation and the possession (of a quality) is a species of contrariety, as is stated in the *Metaphysics*, Book X [cf., chap. 4, 1055a30ff]. Obviously, darkness is a privation of this quality, i.e., of light (*lumen*) in the diaphanous, and therefore the diaphanous is the subject of darkness. Hence too, the presence of the quality mentioned, i.e., *lux*, is *lumen*: and therefore *lumen* exists (*est*) together with the diaphanous.

This passage elaborates St Thomas’s understanding of light and the distinction he draws between *lux* and *lumen*, a distinction overlooked in standard translations which treat the two terms as synonymous. The subtlety of the Latin is not easy to

⁷ ‘Confusion’ is said here, not derogatively, but technically. Because of the limits of his experimental knowledge, St Thomas treats as one elements which are physically distinct.

render in English. We set it out here from 'But light and darkness...' to the end of the passage with the significant noun *habitus* (habit, power, quality or nature) highlighted. [L]umen autem et tenebra sunt contraria secundum modum quo privatio et **habitus** est quaedam contrarietas, ut dicitur in decimo metaphysicae. Manifestum est autem, quod tenebra est quaedam privatio huius **habitus**, scilicet luminis in diaphano; et sic subiectum tenebrae est diaphanum; ergo et praesentia dicti **habitus**, scilicet lucis, est lumen: ergo lumen est simul cum diaphano.

Where St Thomas first uses *habitus* he is referring to its usage in his Commentary on Chapter 4, Book X of Aristotle's *Metaphysics* [Book X, Lesson 6] There it means 'possession' (i.e., 'something had', its nominal meaning). 'Possession' is there contrasted with 'privation' (*habitus* and *privatio*). The second time he uses it he is referring to the quality in the diaphanous whose privation is darkness, namely, *lumen*. But the third, and most significant usage, of *habitus* refers to the quality of which *lumen* is the representative in the diaphanous, *lux*. He will say, at n. 23 below, "the participation or effect of *lux* in the diaphanous is called *lumen*." He says there also that *lux* has no contrary, a consequence of its proper substance, *aether* ('first altering body') having no contrary. Here he says that *lumen* does have a contrary but only in respect of privation which, as is remarked in the passage in the Commentary on the *Metaphysics*, is a sort of contradiction (non-being) rather than contrariety *strictu sensu*. Light (*lumen*) is visible in the diaphanous, but invisible (as *lux*) in *aether*, as said above.

n. 11 §409. Then at 'And not rightly...' [i.e., 'Empedocles... was wrong'], he refutes an answer to one argument which might be urged against those who hold that light (*lumen*) is a body. For it is possible to argue thus against them: if light (*lumen*) were a body, illumination ought to be a local motion of light passing through the transparent; but no local movement of any body can be sudden or instantaneous; therefore, illumination would be not instantaneous but successive according to this view.

n. 12 §410. Of which the contrary is a fact of experience; for in the very instant in which a luminous body becomes present, the transparent is illuminated all at once, not part after part. So Empedocles, and all others of the same opinion, erred in saying that light was borne along by local motion, as a body is; and that it spread out successively through space, which is the medium between the earth and its envelope, i.e. the sky; and that this successive motion escapes our observation, so that the whole of space seems to us to be illuminated simultaneously.

Modern science may smile at the insistence of Aristotle and St Thomas on this point of instantaneous illumination, and say that they erred in rejecting Empedocles' view of light's successive motion. For light does not illumine instantaneously, but successively and at a speed science can demonstrate, 299,792.458 kps 'in vacuo'. But they were right and Empedocles, and modern science, wrong. For light is not a body, not corpuscular, not comprised of atomic particles, but a quality of a particular substance, *aether*. Crucial to the understanding of light is the realisation that it is not something that exists *in itself* (a substance) but only *in something else*. What follows? Light does not have a speed: rather, the speed of its propagation, *C*, is a property of its proper substance, *aether*. Light does illumine instantaneously. If the speed at which *aether* permits its propagation is not infinite, this is because *aether* is material and suffers from the limitations of all things material, inertia.

n. 13 §411. For this assertion is against the truth which reason can easily perceive. For the illumination of the diaphanous requires nothing other than the opposition to the body to be illuminated of the one illuminating with no obstacle intervening.

n. 14 §412. Again, it contradicts appearances. One might indeed allow that successive local motion over a small space could escape our notice; but that a successive movement of light from the eastern to the western horizon should escape our notice is so great an improbability as to appear quite impossible.

n. 15 §413. But as the subject matter under discussion is threefold, i.e. the nature of light, and of the diaphanous, and of the necessity of light (*luminis*) for seeing, we must take these three questions one by one.

On the nature of light (*de natura luminis*) various opinions have been held. Some, as we have seen, held that light (*lumen*) was a body; being led to this by certain expressions used in speaking. For instance, we are accustomed to say that a ray 'passes through' the air, that it is 'thrown back', that rays 'intersect', and so forth; which all seem to imply something corporeal.

n. 16 §414. But this theory is groundless, as the arguments of Aristotle here adduced show, to which others might easily be added. Thus it is hard to see how a body could be suddenly multiplied over the whole hemisphere, or come into existence or vanish, as light does; nor how the mere intervention of an opaque body should extinguish light in any part of a transparent body if light itself were a body. To speak of the motion or rebounding of light is to use metaphors, as when we speak of heat 'proceeding into' things that are being heated or being 'thrown back' when it meets an obstacle.

n. 17 §415. Then there are those who maintain, on the contrary, that light (*lumen*) is spiritual in nature. Otherwise, they say, why should we use the term 'light' in speaking of intellectual things? For we say that intellectual things possess a certain intelligible 'light'. But this also is inadmissible.

n. 18 §416. For it is impossible that any spiritual or intelligible nature should fall within the apprehension of the senses; whose power, being essentially embodied, cannot acquire knowledge of any but bodily things. But if anyone should say that there is a spiritual 'light' other than the light that is sense-perceived, we need not quarrel with him; so long as he admits that the light which is perceived is not spiritual in nature. For there is no reason why quite different things should not have the same name.

n. 19 §417. The reason, in fact, why we employ 'light' and other words referring to vision in matters concerning the intellect is that the sense of sight has a special dignity; it is more spiritual and more subtle than any other sense. This is evident in two ways. First, from the object of sight. For objects fall under sight in virtue of properties which earthly bodies have in common with the heavenly bodies. On the other hand, touch is receptive of properties which are proper to the elements (such as heat and cold and the like); and taste and smell perceive properties that

pertain to compound bodies, according as these are variously compounded of heat and cold, moisture and dryness. Sound, again, is due to local movement which, indeed, is also common to earthly and heavenly bodies, but which, in the case of the cause of sound is a different kind of movement from that of the heavenly bodies, according to the opinion of Aristotle. Hence, from the very nature of the object it would appear that sight is the highest of the senses; with hearing nearest to it, and the others more remote from its dignity.

n. 20 §418. Next, one can see how the sense of sight is more immaterial (*spiritualior*) from its mode of affectation. For in every other sense what is immaterial in its operation is accompanied by some natural change. I mean by 'natural change' what happens when a quality is received by a subject according to the material mode of the subject's own existence, as e.g., when anything is cooled, or heated, or moved about in space. But immaterial change (*immutatio spiritualis*) refers to the manner of reception of the likeness of an object in the sense-organ, or in the medium between object and organ, as a form, causing knowledge, and not merely as a form in matter. For there is a difference between the mode of being which a sensible form has in the senses and that which it has in the thing sensed.

Now in the case of touching and tasting (which is a kind of touching) it is clear that material change occurs: the organ itself grows hot or cold by contact with a hot or cold object—there is not merely an immaterial change (*non fit immutatio spiritualis tantum*). So too the exercise of smell involves a sort of vaporous exhalation; and that of sound involves movement in space. But seeing involves only an immaterial change (*immutatio spiritualis*), and hence among all the senses sight is the more immaterial (*spiritualior*); with hearing as the next in order. These two senses are therefore the most immaterial (*maxime spirituales*), and are the only ones under our control. Hence the use we make of what refers to them—and especially of what refers to sight, in speaking of intellectual objects and operations.⁸

n. 21 §419. Then again some have simply identified light (*lumen*) with the manifestation of colour. But this is patently untrue in the case of things that shine by night, their colour, nevertheless, remaining obscure.

n. 22 §420. Others, on the other hand, have said that light (*lumen*) was the substantial form of the sun, and that the brightness proceeding therefrom (in the form of colours in the air) had the sort of being that belongs to objects causing knowledge as such. But both these propositions are false. The former, because no substantial form is in and of itself an object of sense perception; it can only be intellectually apprehended. And if it is said that what the sense sees in the sun is not light but its splendour (*non est lux, sed splendor*), we need not dispute about names, provided only it be granted that what sight apprehends is not a substantial form. And the latter proposition too is false; because whatever simply has the being of a thing causing knowledge does not, as such, cause material change; but

⁸ I have substituted 'immaterial' for St Thomas's 'spiritual' because in the 21st century we limit the use of the term 'spiritual' to matters which concern belief, or to the religious. In any event, 'immaterial' is just as effective in conveying his meaning.

the rays from the heavenly bodies do in fact materially affect all things on earth. Hence our own conclusion is that, just as the corporeal elements have certain active qualities through which they affect things materially, so light is the active quality of the heavenly body through which it acts; and is in the third species of quality, like heat.

Observe how St Thomas switches from *lumen* to *lux* as soon as mention is made of the sun.

n. 23 §421. But it differs from heat in this, that light (*lux*) is a quality of first altering body which has no contrary, whence it follows that light (*lux*) has no contrary: heat, on the other hand, has a contrary. And because light has no contrary there is no place for a contrary disposition in its recipient (*in suo susceptibili*). And, because of this, its matter (*suum passivum*), i.e., the diaphanous, is always as such immediately disposed to its form. That is why illumination occurs instantaneously, whereas what can become hot only becomes so by degrees. Now the participation, or effect, of light (*lux*) in the diaphanous is called *lumen*. If it appears in a direct line to the enlightened body it is called ‘a ray’. But if it is caused by a reflection of a ray upon a light receiving body, it is called ‘splendour’. But *lumen* is the universal [name] for every effect of light (*lux*) in the diaphanum.

“Now the participation, or effect, of light (*lux*) in the diaphanous is called *lumen*.” I argue from this that light in the diaphanous may be *lux* or *lumen*; but light in *aether* is always *lux*.

“If it appears in a direct line to the enlightened body it is called ‘a ray’. But if it is caused by a reflection of a ray upon a light receiving body, it is called ‘splendour’.” Neither a ray of light, nor the splendour of light (as St Thomas defines it here) can occur in *aether*—which is not to say that the lights of sun and stars seen from beyond earth’s atmosphere are not ‘splendid’. But St Thomas is referring to that particular quality of light which accompanies its dispersal in the diaphanous.

n. 24 §422. So much being admitted as to the nature of light (*luminis*), we can easily understand why certain bodies are always actually lucent, whilst others are diaphanous, and others opaque. Because light (*lux*) is a quality of the first altering body, the most perfect and least material of bodies, those among other bodies which are the least material and most mobile are always actually lucent. The next in this order are the diaphanous; whilst those that are most material, being neither luminous of themselves nor receptive of light (*luminis receptiva*), are the opaque. One may see this in the elements. For fire has light (*luce*) in its nature, though that light (*lux*) does not appear to us except in other natures on account of density. Air and water, being more material (*minus formalia*), are diaphanous; whilst earth, the most material of all, is opaque.

Here St Thomas expressly distinguishes *aether* from the celestial bodies it appears to contain, and from the diaphanous, and ascribes *lux* to *aether* as its proper quality. He also ascribes *lux* to earthly fire.

n. 25 §423. As to the third point [the necessity of light for seeing], it should be noted that some have said that light is necessary for seeing on account of the colour in the things seen. For they say that colour has not the power to move the diaphanous, except through light (*nisi per lumen*). And they say that the indicator of this is that when one is standing in shadow he can see what is in the light (*in lumine*), but not conversely [i.e., if he stands in the light he cannot see what is in shadow]. The cause of this fact, they said, lay in a correspondence between sight and its object: as seeing is a single act, so it must bear on an object formally single; which would not be the case if colour were visible of itself—not in virtue of light—and light also were visible of itself.

n. 26 §424. Now this view is clearly contrary to what Aristotle says here, ‘and which has in itself the cause of being visible’. Hence, according to Aristotle’s opinion, it must be said that light is necessary for seeing, not because of colour, (as, they say, making colours actual which are only in potency while in darkness), but on account of the diaphanous which light renders actual, as the text states.

n. 27 §425. And as evidence of this, note that every form is, as such, a principle of effects resembling itself. Colour, being a form, has therefore of itself the power to impress its likeness on the medium (*in medio*). But note also that there is this difference between the form with a complete, and the form with an incomplete, power to act that the former is able not merely to impress its likeness on matter, but even to dispose matter to fit it for this likeness; which is beyond the power of the latter. Now the active power of colour is of the latter sort; for it is, in fact, only a kind of light somehow dimmed by admixture of opaque matter. Hence it lacks the power to render the medium fully disposed to receive colour. But this pure light (*lux pura*) can do.

n. 28 §426. Whence it is also clear that, as light (*lux*) is, in a certain way, the very substance of colour, all visible objects as such share in the same nature; nor does colour require to be made visible by extrinsic light (*per lumen extrinsecum*). That colours in light are visible to one standing in the shade is due to the medium’s having been sufficiently illumined.

Lecture XV

n. 1 §427. After the Philosopher has shown (above) what is colour, what is the diaphanous and what *lumen*, he now proceeds to explain how the diaphanous is related to colour. It is clear, from the foregoing, that the diaphanous is receptive of colour; for colour acts upon it, as we have seen. Now what is receptive of colour must itself be colourless, as what receives sound must be soundless; for nothing receives what it already has. The diaphanous is therefore colourless.

n. 2 §428. But, as bodies are visible by their colours, the diaphanous must itself be invisible. Yet since one and the same power apprehends contrary qualities, it follows that sight, which apprehends light, also apprehends darkness. Hence, although the diaphanous of itself possesses neither light nor colour, being receptive of both, and is thus not of itself visible in the way that things bright or coloured are visible, it can, all the same, be called visible after the fashion of darkness which is hardly visible. The diaphanous, then, is of this sort, that is darkness, when it is not actually diaphanous, but only so in potency. For it is the

same nature which is the subject at different times of darkness and of light (lumen). Thus it belongs to the diaphanous whenever it lacks luminosity and is only potentially transparent, to be in state of darkness.

“[A]s bodies are visible by their colours, the diaphanous must itself be invisible...”
But relatively, not absolutely, so because the diaphanous is receptive of both light and colour. Both Philosophers agree that the diaphanous can be called visible after the fashion of darkness, and the scarcely visible. And this is borne out by experience, for each instance of the diaphanous, e.g., air, water, glass and (clear) precious stones, is coloured, albeit faintly. Similarly, considered as the media of sound, neither air nor the sea is utterly soundless as, e.g., when either is agitated violently.

n. 3 §429. Then at ‘Not all’, having decided about colour, which is made visible by light, he reaches a conclusion about that other visible object of which he said above that it had no proper name. He observes that not all things depend on light for being seen, but only the colour that is proper to each particular thing. Some things, e.g., certain animals that appear fiery and lucent in the dark, are not visible in the light, but only in darkness. There are many such things, including the fungi of oaks, the horn of certain beasts and heads of certain fish, and some animals’ scales and eyes. But while all these things are visible in the dark, the colour proper to each is not seen in the dark. The things are seen both in light and in darkness; in light as coloured objects, but in darkness only as bright objects.

n. 4 §430. The reason why they are seen shining in the darkness is another matter. Aristotle only mentions the fact incidentally, in order to show the relation of the visible to luminosity. This, however, seems to be the reason for their being visible in the dark, that such things have in their constitution something of light (*aliquid lucis*), inasmuch as the brightness of fire and the transparency of air and water is not entirely smothered in them by the opacity of earth. But having only a small amount of light (*modicum... de luce*), their brightness (*lux*) is obscured in the presence of a greater light (*maioris luminis*). Hence in the light they appear not as bright, but only as coloured. But their light is so weak that it is unable perfectly to actualise the diaphanous so as to reduce it perfectly to act so that it can bring forth colour. Hence, by their light (*sub eorum luce*) neither their colour, nor that of other things, is able to be seen: only their brightness (*lux*). For light (*lux*), being a more effective agent upon the diaphanous than colour, and more visible, can be seen with less alteration of the diaphanous.

n. 5 §431. Next, at ‘But now’ (i.e., at ‘At present what is clear...’), he explains how colour actually affects sight, first pointing out what this necessarily presupposes; and then, at ‘The same holds’, he shows that something similar necessarily applies in respect of the other senses. Concerning the first he makes two points. First he establishes the truth. Then at ‘This is, however, impossible’ he excludes an error. First, then, he says, what is clear as mentioned above, that what is seen in light (*in lumine*) and cannot be seen without it, is colour, for as said above, it is of the nature of colour (*de ratione colore*) to move the diaphanous; and it does this through light (*lumen*) which is the act of the diaphanous. Therefore without light (*lumen*) colour cannot be seen.

“[W]ithout *lumen* colour cannot be seen.” St Thomas’s careful distinction of *lumen* from *lux* here is crucial to the understanding of how the diaphanous differs from *aether*. Colour cannot appear unless there is *lumen*—not *lux*, be it noted, but *lumen*—which can only appear in the diaphanous. The applications of modern science bear this out: photographs of objects which have no surrounding atmosphere show them to be practically devoid of colour. Photographs of objects in the presence of an atmosphere, as e.g., the surface of Mars, do manifest colour.

n. 6 §432. The sign of which is this: if a coloured body is placed upon the organ of sight it cannot be seen, for there is no diaphanous medium to be affected by the colour. For though the pupil is [itself] a sort of diaphanum, yet it is not diaphanous in act if the coloured body is placed upon it. For there has to be air or something of that sort for colour to move the diaphanous to act, by which the [operative] sense, that is, the organ of sight, is moved as by a body continuous with itself. For bodies only affect one another through contact.

n. 7 §433. Then, when he says ‘For this (is impossible)’ he sets aside an error, saying Democritus did not speak well in opining that if the medium between the eye and the thing seen were a vacuum, any object, however small, would be visible at any distance, e.g. an ant on the vault of heaven. This is impossible. For if anything is to be seen it must actually affect the organ of sight. Now it has been shown that this organ as such is not affected by an immediate object—such as an object placed upon the eye. So there must be a medium between organ and object. But a vacuum is not a medium; it cannot receive or transmit effects from the object. Hence through a vacuum nothing would be seen at all.

n. 8 §434. Democritus erred because he thought that the reason why distance diminishes visibility was that the medium is an impediment to the action of the visible object upon sight. But this is false. The diaphanous is not in the least incompatible with luminosity or colour; on the contrary, it is precisely proportioned to their reception; a sign of which is that it is illuminated or coloured instantaneously. The reason why distance diminishes visibility, is that everything seen is seen within the angle of a triangle, or rather pyramid, whose base is the object seen and apex in the eye that sees.

n. 9 §435. It makes no difference whether seeing takes place by a movement from the eye outwards, so that the lines enclosing the triangle or pyramid run from the eye to the object, or the opposite, so long as seeing does involve this triangular or pyramidal figure; which is necessary because, since the object is larger than the pupil of the eye, its effect upon the medium has to be scaled down gradually until it reaches the eye. And, obviously, the longer are the sides of a triangle or pyramid the smaller is the angle at the apex, provided that the base remains the same. The further away, then, is the object, the less does it appear—until at a certain distance it cannot be seen at all.

n. 10 §436. Next, at ‘But fire (is seen)’, he explains how fire and bright bodies are seen—which are visible not only, like coloured objects, in the light, but even in the dark. There is a necessary reason for this, namely that fire contains enough light to actualise perfectly the diaphanous, so that both itself and other things

become visible. Nor does its light fade in the presence of a greater light, as does that of the objects mentioned above.