

DEMOCRITUS' BASIC COLOURS

TEXT 1: Theophrastus, *On the Senses* 79; trans. C. C. W. Taylor (*The Atomists, Leucippus and Democritus. Fragments: A Text and Translation with a Commentary, Toronto 1999*)

Πρῶτον μὲν οὖν τὸ πλείους ἀποδοῦναι τὰς ἀρχὰς ἔχει τινὰ ἀπορίαν· οἱ γὰρ ἄλλοι τὸ λευκὸν καὶ τὸ μέλαν ὡς τούτων ἀπλῶν ὄντων μόνων.

First of all, there is a problem in positing several principles; the others posit only white and black, as the only simple ones.

TEXT 2: Theophrastus, *On the Senses* 73-76

τῶν δὲ χρωμάτων ἀπλᾶ μὲν λέγει τέτταρα. λευκὸν μὲν οὖν εἶναι τὸ λεῖον. ὃ γὰρ ἂν μὴ τραχὺ μηδ' ἐπισκιάζῃ μηδὲ δυσδίωδον ἦ, τοιοῦτον πᾶν λαμπρὸν εἶναι. δεῖ δὲ καὶ εὐθύτροπα καὶ διαυγῆ τὰ λαμπρὰ εἶναι. τὰ μὲν οὖν σκληρὰ τῶν λευκῶν ἐκ τοιούτων σχημάτων συγκεῖσθαι οἷον ἢ ἐντὸς πλάξ τῶν κογχυλίων· οὕτω γὰρ ἂν ἄσκια καὶ εὐαγῆ καὶ εὐθύπορα εἶναι. τὰ <δὲ> ψαθυρὰ καὶ εὐθρυπτα ἐκ περιφερῶν μὲν λοξῶν δὲ τῆ θέσει πρὸς ἄλληλα καὶ κατὰ δύο συζεύξει, τὴν δ' ὅλην τάξιν ἔχειν ὅτι μάλιστα ὁμοίαν. τοιούτων δ' ὄντων ψαθυρὰ μὲν εἶναι, διότι κατὰ μικρὸν ἢ σύναψις· εὐθρυπτα δ', ὅτι ὁμοίως κεῖνται· ἄσκια δέ, διότι λεῖα καὶ πλατέα· λευκότερα δ' ἀλλήλων τῷ τὰ σχήματα τὰ εἰρημένα καὶ ἀκριβέστερα καὶ ἀμιγέστερα εἶναι καὶ τὴν τάξιν καὶ τὴν θέσιν ἔχειν μᾶλλον τὴν εἰρημένην. τὸ μὲν οὖν λευκὸν ἐκ τοιούτων εἶναι σχημάτων. τὸ δὲ μέλαν ἐκ τῶν ἐναντίων, ἐκ τραχέων καὶ σκαληνῶν καὶ ἀνομοίων· οὕτω γὰρ ἂν σκιάζειν καὶ οὐκ εὐθεῖς εἶναι τοὺς πόρους οὐδ' εὐδιόδους. ἔτι δὲ τὰς ἀπορροίας νωθεῖς καὶ ταραχώδεις· διαφέρειν γάρ τι καὶ τὴν ἀπορροὴν τῷ ποιᾶν εἶναι πρὸς τὴν φαντασίαν, ἣν γίνεσθαι διὰ τὴν ἐναπόληψιν τοῦ ἀέρος ἀλλοίαν. ἐρυθρὸν δ' ἐξ οἴωνπερ καὶ τὸ θερμὸν, πλὴν ἐκ μειζόνων. ἐὰν γὰρ αἱ συγκρίσεις ὥσι μείζους ὁμοίων ὄντων τῶν σχημάτων μᾶλλον ἐρυθρὸν εἶναι. σημεῖον δ' ὅτι ἐκ τοιούτων τὸ ἐρυθρὸν· ἡμᾶς τε γὰρ θερμαινομένους ἐρυθραίνεσθαι καὶ τὰ ἄλλα τὰ πυρούμενα, μέχρις ἂν οὐ ἔχη τὸ τοῦ πυροειδοῦς. ἐρυθρότερα δὲ τὰ ἐκ μεγάλων ὄντα σχημάτων οἷον τὴν φλόγα καὶ τὸν ἄνθρακα τῶν χλωρῶν ξύλων ἢ τῶν αὔων, καὶ τὸν σίδηρον δὲ καὶ τὰ ἄλλα τὰ πυρούμενα· λαμπρότατα μὲν γὰρ εἶναι τὰ πλεῖστον ἔχοντα καὶ λεπτότατον πῦρ, ἐρυθρότερα δὲ τὰ παχύτερον καὶ ἔλαττον. διὸ καὶ ἦττον εἶναι θερμὰ τὰ ἐρυθρότερα· θερμὸν [μὲν] γὰρ τὸ λεπτόν. τὸ δὲ χλωρὸν ἐκ τοῦ στερεοῦ καὶ τοῦ κενοῦ συνεστάναι † μεγάλων ἐξ ἀμφοῖν, τῆ θέσει δὲ καὶ τάξει αὐτῶν τὴν χροάν. τὰ μὲν οὖν ἀπλᾶ χρώματα τούτοις κεχρῆσθαι τοῖς σχήμασιν· ἕκαστον δὲ καθαρώτερον, ὅσῳ ἂν ἐξ ἀμιγυστέρων ἦ. τὰ δὲ ἄλλα κατὰ τὴν τούτων μίξιν·

On colours, he says that there are four simple ones. White is what is smooth. For whatever is not rough or shadowy or difficult to penetrate, anything like that is bright. Bright things must also have straight pores to let the light pass through. Hard, white things are composed of shapes like the inner surface of shells, so they are shadowless and shining, with straight pores. Those which are friable and brittle are composed of spherical atoms positioned obliquely in pairs, in an arrangement which is practically uniform overall. They are friable because the connections hold between small groups of atoms, brittle because they are uniformly positioned, and shadowless because they are smooth and flat. The more exclusively things are composed of these shapes, unmixed with others, and the more they display that position and arrangement, the whiter they are. White consists of shapes of those kinds and black of the opposite, rough, uneven, and dissimilar, for they cast shadows and their pores are not straight or easily penetrable. Further their effluences are dull and confused; effluences differ relative to appearances, which are produced by the reception of impressions of different kinds made on the air. Red consists of the same sort of hot, only bigger; for the bigger the combinations of similar atoms are, the redder the thing is. The evidence that red consists of that sort of atoms is that we go red when we get hot, and so do other things that are burning, until they catch fire. And things composed of large atoms, such as flame and coal, are redder than green or dry wood. And so are iron and other things when they are burning; the brightest are those which have the most and the finest fire, while those which have less, thicker in texture, are redder, as the fine-textured is hot. Greenish-yellow consists of a mixture of solid and void, the colour varying according to their position and arrangement. The simple colours use these shapes; the less each is mixed, the purer it is. The other colours are produced by mixture of these.

TEXT 3: Stobaeus I.16.1 [= Aëtius I.15.8]

Δημόκριτος φύσει μὲν μηδὲν εἶναι χρώμα, τὰ μὲν γὰρ στοιχεῖα ἄποια, τὰ τε ναστὰ καὶ τὸ κενόν· τὰ δ' ἐξ αὐτῶν συγκρίματα κεχρώσθαι διαταγῇ τε καὶ ῥυθμῷ καὶ προτροπῇ, ὧν ἡ μὲν ἐστὶ τάξις ὁ δὲ σχῆμα ἢ δὲ θέσις· παρὰ ταῦτα γὰρ αἱ φαντασίαι. τούτων δὲ τῶν πρὸς τὴν φαντασίαν χρωμάτων τέτταρες αἱ διαφοραί, λευκοῦ μέλανος ἐρυθροῦ *ὠχροῦ.*

Democritus says that by nature there is no such thing as colour, for the elements, the solid things and the void are propertyless. The compounds made from them are coloured by 'contact,' 'rhythm,' and 'tuning,' i.e., arrangement, shape, and position; for the appearances arise from these. There are four varieties of these apparent colours, white, black, red, and yellow.

TEXT 4: Theophrastus, *On the Senses* 63-64

περὶ μὲν <οὔν> βαρέος καὶ κούφου καὶ σκληροῦ καὶ μαλακοῦ ἐν τούτοις ἀφορίζει. τῶν δὲ ἄλλων αἰσθητῶν οὐδενὸς εἶναι φύσιν, ἀλλὰ πάντα πάθη τῆς αἰσθήσεως ἀλλοιουμένης, ἐξ ἧς γίνεσθαι τὴν φαντασίαν. οὐδὲ γὰρ τοῦ ψυχροῦ καὶ τοῦ θερμοῦ φύσιν ὑπάρχειν, ἀλλὰ τὸ σχῆμα 'μεταπίπτον' ἐργάζεσθαι καὶ τὴν ἡμετέραν ἀλλοίωσιν... σημεῖον δ' ὡς οὐκ εἰσὶ φύσει τὸ μὴ ταῦτὰ πᾶσι φαίνεσθαι τοῖς ζώοις, ἀλλ' ὁ ἡμῖν γλυκύ, τοῦτ' ἄλλοις πικρὸν καὶ ἑτέροις ὄξυν καὶ ἄλλοις δριμύ τοῖς δὲ στρυφνόν καὶ τὰ ἄλλα δ' ὠσαύτως. ἐτι δ' αὐτοὺς μεταβάλλειν τῇ κράσει κατὰ τὰ πάθη καὶ τὰς ἡλικίας· ἧ καὶ φανερόν, ὡς ἡ διάθεσις αἰτία τῆς φαντασίας. ἀπλῶς μὲν οὔν περὶ τῶν αἰσθητῶν οὕτω δεῖν ὑπολαμβάνειν. οὐ μὴν ἀλλ' ὥσπερ καὶ τὰ ἄλλα καὶ ταῦτα ἀνατίθησι τοῖς σχήμασι· πλὴν οὐχ ἀπάντων ἀποδίδωσι τὰς μορφάς, ἀλλὰ μᾶλλον τῶν χυλῶν καὶ τῶν χρωμάτων καὶ τούτων ἀκριβέστερον διορίζει τὰ περὶ τοὺς χυλοὺς ἀναφέρων τὴν φαντασίαν πρὸς ἄνθρωπον.

That is his account of heavy and light and hard and soft. None of the other sensible qualities has any nature of its own, but all are states of the sense when it is altered so as to give rise to an appearance. For there is no nature belonging to hot or cold, but change in shape [sc. of the thing perceived] brings about alteration in us... The evidence for this is that things do not naturally seem the same to all creatures, but what is sweet to us is bitter to other creatures, sharp-tasting to others, pungent to others, sour to others again, and the same for other cases. Further, they [i.e., observers] vary in their judgments according to their different states and to their ages; which makes it clear that their disposition is the cause of how things seems to them. Of course, these too [i.e., states of observers] are, like everything else, ascribed to the shapes [sc. of the atoms]. Though he does not set out the shapes underlying them all, but rather those underlying flavours and colours, and of these flavor is given the more precise account, in which the appearance is referred to [the state of] the individual.

TEXT 5: Theophrastus, *On the Senses* 69

ὄλως δὲ μέγιστον ἐναντίωμα καὶ κοινὸν ἐπὶ πάντων, ἅμα μὲν πάθη ποιεῖν τῆς αἰσθήσεως, ἅμα δὲ τοῖς σχήμασι διορίζει, καὶ τὸ αὐτὸ φαίνεσθαι τοῖς μὲν πικρὸν, τοῖς δὲ γλυκύ, τοῖς δ' ἄλλως. οὔτε γὰρ οἷον <τε> τὸ σχῆμα πάθος εἶναι οὔτε ταῦτὸν τοῖς μὲν σφαιροειδές, τοῖς δ' ἄλλως. ἀνάγκη δ' [εἴπερ] ἴσως, εἴπερ τοῖς μὲν γλυκύ, τοῖς δὲ πικρὸν, οὐδὲ κατὰ τὰς ἡμετέρας ἕξεις μεταβάλλειν τὰς μορφάς. ἀπλῶς δὲ τὸ μὲν σχῆμα καθ' αὐτὸ ἐστὶ, τὸ δὲ γλυκύ καὶ ὄλως τὸ αἰσθητὸν πρὸς ἄλλο καὶ ἐν ἄλλοις, ὡς φησιν. ἄτοπον δὲ καὶ τὸ πᾶσιν ἀξιοῦν ταῦτὸ φαίνεσθαι τῶν αὐτῶν αἰσθανομένοις καὶ τούτων τὴν ἀλήθειαν ἐλέγχειν, καὶ ταῦτα εἰρηκότα πρότερον τὸ τοῖς ἀνομοίως διακεκμηνοῖς ἀνόμοια καὶ πάλιν τὸ μηθὲν μᾶλλον ἕτερον ἑτέρου τυγχάνειν τῆς ἀληθείας.

But in general the greatest contradiction, which pervades the whole theory, is his both making them states of perception and at the same time distinguishing them by their shapes, and saying that the same thing appears bitter to some, sweet to others, and different to yet others. For it is impossible for the shape to be a state, or for the same thing to be spherical to some and differently shaped to others (yet perhaps that is how it has to be, if it is sweet to some and bitter to others), or for the shapes to change according to our dispositions. It is simply the case that shape is intrinsic, but sweet and sensible qualities in general are relative and dependent on other things, as he says. And it is absurd to require that the same appearance should be presented to everyone who perceives the same thing, and should be the test of their truth, when he has previously said that things appear differently to those who have different dispositions, and again that none has more truth than any other.