

Timaeus by Plato (excerpt)

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Genesis 27 C – 37 A

Timaeus: All men, Socrates, who have any degree of right feeling, at the beginning of every enterprise, whether small or great, always call upon God. And we, too, who are going to discourse of the nature of the universe, how created or how existing without creation, if we be not altogether out of our wits, must invoke the aid of Gods and Goddesses and pray that our words may be acceptable to them and consistent with themselves. Let this, then, be our invocation of the Gods, to which I add an exhortation of myself to speak in such manner as will be most intelligible to you, and will most accord with my own intent.

First then, in my judgment, we must make a distinction and ask, What is that which always is and has no becoming; and what is that which is always becoming and never is? That which is apprehended by intelligence and reason is always in the same state; but that which is conceived by opinion with the help of sensation and without reason, is always in a process of becoming and perishing and never really is. Now everything that becomes or is created must of necessity be created by some cause, for without a cause nothing can be created. The work of the creator, whenever he looks to the unchangeable and fashions the form and nature of his work after an unchangeable pattern, must necessarily be made fair and perfect; but when he looks to the created only, and uses a created pattern, it is not fair or perfect. Was the heaven then or the world, whether called by this or by any other more appropriate name-assuming the name, I am asking a question which has to be asked at the beginning of an enquiry about anything-was the world, I say, always in existence and without beginning? or created, and had it a beginning? Created, I reply, being visible and tangible and having a body, and therefore sensible; and all sensible things are apprehended by opinion and sense and are in a process of creation and created. Now that which is created must, as we affirm, of necessity be created by a cause. But the father and

maker of all this universe is past finding out; and even if we found him, to tell of him to all men would be impossible.

And there is still a question to be asked about him: Which of the patterns had the artificer in view when he made the world-the pattern of the unchangeable, or of that which is created? If the world be indeed fair and the artificer good, it is manifest that he must have looked to that which is eternal; but if what cannot be said without blasphemy is true, then to the created pattern. Every one will see that he must have looked to, the eternal; for the world is the fairest of creations and he is the best of causes. And having been created in this way, the world has been framed in the likeness of that which is apprehended by reason and mind and is unchangeable, and must therefore of necessity, if this is admitted, be a copy of something. Now it is all-important that the beginning of everything should be according to nature. And in speaking of the copy and the original we may assume that words are akin to the matter which they describe; when they relate to the lasting and permanent and intelligible, they ought to be lasting and unalterable, and, as far as their nature allows, irrefutable and immovable-nothing less. But when they express only the copy or likeness and not the eternal things themselves, they need only be likely and analogous to the real words. As being is to becoming, so is truth to belief. If then, Socrates, amid the many opinions about the gods and the generation of the universe, we are not able to give notions which are altogether and in every respect exact and consistent with one another, do not be surprised. Enough, if we adduce probabilities as likely as any others; for we must remember that I who am the speaker, and you who are the judges, are only mortal men, and we ought to accept the tale which is probable and enquire no further.

Socrates. Excellent, Timaeus; and we will do precisely as you bid us. The prelude is charming, and is already accepted by us-may we beg of you to proceed to the strain?

Timaeus: Let me tell you then why the creator made this world of generation. He was good, and the good can never have any jealousy of anything. And being free from jealousy, he desired that all things should be as like himself as they could be. This is in the truest sense the origin of creation and of the world, as we shall do well in believing on the testimony of wise men: God desired that all things should be good and nothing bad, so far as this was attainable. Wherefore also finding the whole visible sphere not at rest, but moving in an irregular and disorderly fashion, out of disorder he brought order, considering that this was in every way better than the other. Now the deeds of the best could never be or have been other than the fairest; and the creator, reflecting on the things which are by nature visible, found that no unintelligent creature taken as a whole was fairer than the intelligent taken as a whole; and that intelligence could not be present in anything which was devoid of soul. For which reason, when he was framing the universe, he put intelligence in soul, and soul in body, that he might be the creator of a work which was by nature fairest and best. Wherefore, using the language of probability, we may say that the world became a living creature truly endowed with soul and intelligence by the providence of God.

This being supposed, let us proceed to the next stage: In the likeness of what animal did the Creator make the world? It would be an unworthy thing to liken it to any nature which exists as a part only; for nothing can be beautiful which is like any imperfect thing; but let

us suppose the world to be the very image of that whole of which all other animals both individually and in their tribes are portions. For the original of the universe contains in itself all intelligible beings, just as this world comprehends us and all other visible creatures. For the Deity, intending to make this world like the fairest and most perfect of intelligible beings, framed one visible animal comprehending within itself all other animals of a kindred nature. Are we right in saying that there is one world, or that they are many and infinite? There must be one only, if the created copy is to accord with the original. For that which includes all other intelligible creatures cannot have a second or companion; in that case there would be need of another living being which would include both, and of which they would be parts, and the likeness would be more truly said to resemble not them, but that other which included them. In order then that the world might be solitary, like the perfect animal, the creator made not two worlds or an infinite number of them; but there is and ever will be one only-begotten and created heaven.

Now that which is created is of necessity corporeal, and also visible and tangible. And nothing is visible where there is no fire, or tangible which has no solidity, and nothing is solid without earth. Wherefore also God in the beginning of creation made the body of the universe to consist of fire and earth. But two things cannot be rightly put together without a third; there must be some bond of union between them. And the fairest bond is that which makes the most complete fusion of itself and the things which it combines; and proportion is best adapted to effect such a union. For whenever in any three numbers, whether cube or square, there is a mean, which is to the last term what the first term is to it; and again, when the mean is to the first term as the last term is to the mean-then the mean becoming first and last, and the first and last both becoming means, they will all of them of necessity come to be the same, and having become the same with one another will be all one. If the universal frame had been created a surface only and having no depth, a single mean would have sufficed to bind together itself and the other terms; but now, as the world must be solid, and solid bodies are always compacted not by one mean but by two, God placed water and air in the mean between fire and earth, and made them to have the same proportion so far as was possible (as fire is to air so is air to water, and as air is to water so is water to earth); and thus he bound and put together a visible and tangible heaven. And for these reasons, and out of such elements which are in number four, the body of the world was created, and it was harmonized by proportion, and therefore has the spirit of friendship; and having been reconciled to itself, it was indissoluble by the hand of any other than the framer.

Space 48 E – 53 C

Timaeus: This new beginning of our discussion of the universe requires a fuller division than the former; for then we made two classes, now a third must be revealed. The two sufficed for the former discussion: one, which we assumed, was a pattern intelligible and always the same; and the second was only the imitation of the pattern, generated and visible. There is also a third kind which we did not distinguish at the time, conceiving that the two would be enough. But now the argument seems to require that we should set forth in words another kind, which is difficult of explanation and dimly seen. What nature are we to attribute to this new kind of being? We reply, that it is the receptacle, and in a manner

the nurse, of all generation. I have spoken the truth; but I must express myself in clearer language, and this will be an arduous task for many reasons, and in particular because I must first raise questions concerning fire and the other elements, and determine what each of them is; for to say, with any probability or certitude, which of them should be called water rather than fire, and which should be called any of them rather than all or some one of them, is a difficult matter. How, then, shall we settle this point, and what questions about the elements may be fairly raised?

In the first place, we see that what we just now called water, by condensation, I suppose, becomes stone and earth; and this same element, when melted and dispersed, passes into vapour and air. Air, again, when inflamed, becomes fire; and again fire, when condensed and extinguished, passes once more into the form of air; and once more, air, when collected and condensed, produces cloud and mist; and from these, when still more compressed, comes flowing water, and from water comes earth and stones once more; and thus generation appears to be transmitted from one to the other in a circle. Thus, then, as the several elements never present themselves in the same form, how can any one have the assurance to assert positively that any of them, whatever it may be, is one thing rather than another? No one can. But much the safest plan is to speak of them as follows:-Anything which we see to be continually changing, as, for example, fire, we must not call "this" or "that," but rather say that it is "of such a nature"; nor let us speak of water as "this"; but always as "such"; nor must we imply that there is any stability in any of those things which we indicate by the use of the words "this" and "that," supposing ourselves to signify something thereby; for they are too volatile to be detained in any such expressions as "this," or "that," or "relative to this," or any other mode of speaking which represents them as permanent. We ought not to apply "this" to any of them, but rather the word "such"; which expresses the similar principle circulating in each and all of them; for example, that should be called "fire" which is of such a nature always, and so of everything that has generation. That in which the elements severally grow up, and appear, and decay, is alone to be called by the name "this" or "that"; but that which is of a certain nature, hot or white, or anything which admits of opposite equalities, and all things that are compounded of them, ought not to be so denominated. Let me make another attempt to explain my meaning more clearly.

Suppose a person to make all kinds of figures of gold and to be always transmuting one form into all the rest-somebody points to one of them and asks what it is. By far the safest and truest answer is, That is gold; and not to call the triangle or any other figures which are formed in the gold "these," as though they had existence, since they are in process of change while he is making the assertion; but if the questioner be willing to take the safe and indefinite expression, "such," we should be satisfied. And the same argument applies to the universal nature which receives all bodies-that must be always called the same; for, while receiving all things, she never departs at all from her own nature, and never in any way, or at any time, assumes a form like that of any of the things which enter into her; she is the natural recipient of all impressions, and is stirred and informed by them, and appears different from time to time by reason of them. But the forms which enter into and go out of her are the likenesses of real existences modelled after their patterns in wonderful and inexplicable manner, which we will hereafter investigate. For the present we

have only to conceive of three natures: first, that which is in process of generation; secondly, that in which the generation takes place; and thirdly, that of which the thing generated is a resemblance. And we may liken the receiving principle to a mother, and the source or spring to a father, and the intermediate nature to a child; and may remark further, that if the model is to take every variety of form, then the matter in which the model is fashioned will not be duly prepared, unless it is formless, and free from the impress of any of these shapes which it is hereafter to receive from without. For if the matter were like any of the supervening forms, then whenever any opposite or entirely different nature was stamped upon its surface, it would take the impression badly, because it would intrude its own shape. Wherefore, that which is to receive all forms should have no form; as in making perfumes they first contrive that the liquid substance which is to receive the scent shall be as inodorous as possible; or as those who wish to impress figures on soft substances do not allow any previous impression to remain, but begin by making the surface as even and smooth as possible. In the same way that which is to receive perpetually and through its whole extent the resemblances of all eternal beings ought to be devoid of any particular form. Wherefore, the mother and receptacle of all created and visible and in any way sensible things, is not to be termed earth, or air, or fire, or water, or any of their compounds or any of the elements from which these are derived, but is an invisible and formless being which receives all things and in some mysterious way partakes of the intelligible, and is most incomprehensible. In saying this we shall not be far wrong; as far, however, as we can attain to a knowledge of her from the previous considerations, we may truly say that fire is that part of her nature which from time to time is inflamed, and water that which is moistened, and that the mother substance becomes earth and air, in so far as she receives the impressions of them.

Let us consider this question more precisely. Is there any self-existent fire? and do all those things which we call self-existent exist? or are only those things which we see, or in some way perceive through the bodily organs, truly existent, and nothing whatever besides them? And is all that which, we call an intelligible essence nothing at all, and only a name? Here is a question which we must not leave unexamined or undetermined, nor must we affirm too confidently that there can be no decision; neither must we interpolate in our present long discourse a digression equally long, but if it is possible to set forth a great principle in a few words, that is just what we want.

Thus I state my view:-If mind and true opinion are two distinct classes, then I say that there certainly are these self-existent ideas unperceived by sense, and apprehended only by the mind; if, however, as some say, true opinion differs in no respect from mind, then everything that we perceive through the body is to be regarded as most real and certain. But we must affirm that to be distinct, for they have a distinct origin and are of a different nature; the one is implanted in us by instruction, the other by persuasion; the one is always accompanied by true reason, the other is without reason; the one cannot be overcome by persuasion, but the other can: and lastly, every man may be said to share in true opinion, but mind is the attribute of the gods and of very few men. Wherefore also we must acknowledge that there is one kind of being which is always the same, uncreated and indestructible, never receiving anything into itself from without, nor itself going out to any other, but invisible and imperceptible by any sense, and of which the contemplation is

granted to intelligence only. And there is another nature of the same name with it, and like to it, perceived by sense, created, always in motion, becoming in place and again vanishing out of place, which is apprehended by opinion and sense. And there is a third nature, which is space, and is eternal, and admits not of destruction and provides a home for all created things, and is apprehended without the help of sense, by a kind of spurious reason, and is hardly real; which we beholding as in a dream, say of all existence that it must of necessity be in some place and occupy a space, but that what is neither in heaven nor in earth has no existence. Of these and other things of the same kind, relating to the true and waking reality of nature, we have only this dreamlike sense, and we are unable to cast off sleep and determine the truth about them. For an image, since the reality, after which it is modelled, does not belong to it, and it exists ever as the fleeting shadow of some other, must be inferred to be in another [i.e. in space], grasping existence in some way or other, or it could not be at all. But true and exact reason, vindicating the nature of true being, maintains that while two things [i.e. the image and space] are different they cannot exist one of them in the other and so be one and also two at the same time.

Thus have I concisely given the result of my thoughts; and my verdict is that being and space and generation, these three, existed in their three ways before the heaven; and that the nurse of generation, moistened by water and inflamed by fire, and receiving the forms of earth and air, and experiencing all the affections which accompany these, presented a strange variety of appearances; and being full of powers which were neither similar nor equally balanced, was never in any part in a state of equipoise, but swaying unevenly hither and thither, was shaken by them, and by its motion again shook them; and the elements when moved were separated and carried continually, some one way, some another; as, when rain is shaken and winnowed by fans and other instruments used in the threshing of corn, the close and heavy particles are borne away and settle in one direction, and the loose and light particles in another. In this manner, the four kinds or elements were then shaken by the receiving vessel, which, moving like a winnowing machine, scattered far away from one another the elements most unlike, and forced the most similar elements into close contact. Wherefore also the various elements had different places before they were arranged so as to form the universe. At first, they were all without reason and measure. But when the world began to get into order, fire and water and earth and air had only certain faint traces of themselves, and were altogether such as everything might be expected to be in the absence of God; this, I say, was their nature at that time, and God fashioned them by form and number. Let it be consistently maintained by us in all that we say that God made them as far as possible the fairest and best, out of things which were not fair and good. And now I will endeavour to show you the disposition and generation of them by an unaccustomed argument, which am compelled to use; but I believe that you will be able to follow me, for your education has made you familiar with the methods of science.

The triangles 53 C – 55 D

Timaeus: IN the first place, then, as is evident to all, fire and earth and water and air are bodies. And every sort of body possesses solidity, and every solid must necessarily be contained in planes; and every plane rectilinear figure is composed of triangles; and all

triangles are originally of two kinds, both of which are made up of one right and two acute angles; one of them has at either end of the base the half of a divided right angle, having equal sides, while in the other the right angle is divided into unequal parts, having unequal sides. These, then, proceeding by a combination of probability with demonstration, we assume to be the original elements of fire and the other bodies; but the principles which are prior to these God only knows, and he of men who is the friend God. And next we have to determine what are the four most beautiful bodies which are unlike one another, and of which some are capable of resolution into one another; for having discovered thus much, we shall know the true origin of earth and fire and of the proportionate and intermediate elements. And then we shall not be willing to allow that there are any distinct kinds of visible bodies fairer than these. Wherefore we must endeavour to construct the four forms of bodies which excel in beauty, and then we shall be able to say that we have sufficiently apprehended their nature. Now of the two triangles, the isosceles has one form only; the scalene or unequal-sided has an infinite number. Of the infinite forms we must select the most beautiful, if we are to proceed in due order, and any one who can point out a more beautiful form than ours for the construction of these bodies, shall carry off the palm, not as an enemy, but as a friend. Now, the one which we maintain to be the most beautiful of all the many triangles (and we need not speak of the others) is that of which the double forms a third triangle which is equilateral; the reason of this would be long to tell; he who disproves what we are saying, and shows that we are mistaken, may claim a friendly victory.

Then let us choose two triangles, out of which fire and the other elements have been constructed, one isosceles, the other having the square of the longer side equal to three times the square of the lesser side.

Now is the time to explain what was before obscurely said: there was an error in imagining that all the four elements might be generated by and into one another; this, I say, was an erroneous supposition, for there are generated from the triangles which we have selected four kinds—three from the one which has the sides unequal; the fourth alone is framed out of the isosceles triangle. Hence they cannot all be resolved into one another, a great number of small bodies being combined into a few large ones, or the converse. But three of them can be thus resolved and compounded, for they all spring from one, and when the greater bodies are broken up, many small bodies will spring up out of them and take their own proper figures; or, again, when many small bodies are dissolved into their triangles, if they become one, they will form one large mass of another kind. So much for their passage into one another. I have now to speak of their several kinds, and show out of what combinations of numbers each of them was formed. The first will be the simplest and smallest construction, and its element is that triangle which has its hypotenuse twice the lesser side. When two such triangles are joined at the diagonal, and this is repeated three times, and the triangles rest their diagonals and shorter sides on the same point as a centre, a single equilateral triangle is formed out of six triangles; and four equilateral triangles, if put together, make out of every three plane angles one solid angle, being that which is nearest to the most obtuse of plane angles; and out of the combination of these four angles arises the first solid form which distributes into equal and similar parts the whole circle in which it is inscribed.

The second species of solid is formed out of the same triangles, which unite as eight equilateral triangles and form one solid angle out of four plane angles, and out of six such angles the second body is completed. And the third body is made up of 120 triangular elements, forming twelve solid angles, each of them included in five plane equilateral triangles, having altogether twenty bases, each of which is an equilateral triangle. The one element [that is, the triangle which has its hypotenuse twice the lesser side] having generated these figures, generated no more; but the isosceles triangle produced the fourth elementary figure, which is compounded of four such triangles, joining their right angles in a centre, and forming one equilateral quadrangle. Six of these united form eight solid angles, each of which is made by the combination of three plane right angles; the figure of the body thus composed is a cube, having six plane quadrangular equilateral bases. There was yet a fifth combination which God used in the delineation of the universe.

Now, he who, duly reflecting on all this, enquires whether the worlds are to be regarded as indefinite or definite in number, will be of opinion that the notion of their indefiniteness is characteristic of a sadly indefinite and ignorant mind. He, however, who raises the question whether they are to be truly regarded as one or five, takes up a more reasonable position. Arguing from probabilities, I am of opinion that they are one; another, regarding the question from another point of view, will be of another mind.

The four elements 55 D – 57 D

But, leaving this enquiry, let us proceed to distribute the elementary forms, which have now been created in idea, among the four elements. To earth, then, let us assign the cubical form; for earth is the most immoveable of the four and the most plastic of all bodies, and that which has the most stable bases must of necessity be of such a nature. Now, of the triangles which we assumed at first, that which has two equal sides is by nature more firmly based than that which has unequal sides; and of the compound figures which are formed out of either, the plane equilateral quadrangle has necessarily, a more stable basis than the equilateral triangle, both in the whole and in the parts. Wherefore, in assigning this figure to earth, we adhere to probability; and to water we assign that one of the remaining forms which is the least moveable; and the most moveable of them to fire; and to air that which is intermediate. Also we assign the smallest body to fire, and the greatest to water, and the intermediate in size to air; and, again, the acutest body to fire, and the next in acuteness to, air, and the third to water. Of all these elements, that which has the fewest bases must necessarily be the most moveable, for it must be the acutest and most penetrating in every way, and also the lightest as being composed of the smallest number of similar particles: and the second body has similar properties in a second degree, and the third body in the third degree. Let it be agreed, then, both according to strict reason and according to probability, that the pyramid is the solid which is the original element and seed of fire; and let us assign the element which was next in the order of generation to air, and the third to water.

We must imagine all these to be so small that no single particle of any of the four kinds is seen by us on account of their smallness: but when many of them are collected together their aggregates are seen. And the ratios of their numbers, motions, and other

properties, everywhere God, as far as necessity allowed or gave consent, has exactly perfected, and harmonised in due proportion.

From all that we have just been saying about the elements or kinds, the most probable conclusion is as follows:-earth, when meeting with fire and dissolved by its sharpness, whether the dissolution take place in the fire itself or perhaps in some mass of air or water, is borne hither and thither, until its parts, meeting together and mutually harmonising, again become earth; for they can never take any other form. But water, when divided by fire or by air, on reforming, may become one part fire and two parts air; and a single volume of air divided becomes two of fire. Again, when a small body of fire is contained in a larger body of air or water or earth, and both are moving, and the fire struggling is overcome and broken up, then two volumes of fire form one volume of air; and when air is overcome and cut up into small pieces, two and a half parts of air are condensed into one part of water. Let us consider the matter in another way. When one of the other elements is fastened upon by fire, and is cut by the sharpness of its angles and sides, it coalesces with the fire, and then ceases to be cut by them any longer. For no element which is one and the same with itself can be changed by or change another of the same kind and in the same state. But so long as in the process of transition the weaker is fighting against the stronger, the dissolution continues.

Again, when a few small particles, enclosed in many larger ones, are in process of decomposition and extinction, they only cease from their tendency to extinction when they consent to pass into the conquering nature, and fire becomes air and air water. But if bodies of another kind go and attack them [i.e. the small particles], the latter continue to be dissolved until, being completely forced back and dispersed, they make their escape to their own kindred, or else, being overcome and assimilated to the conquering power, they remain where they are and dwell with their victors, and from being many become one. And owing to these affections, all things are changing their place, for by the motion of the receiving vessel the bulk of each class is distributed into its proper place; but those things which become unlike themselves and like other things, are hurried by the shaking into the place of the things to which they grow like.

Now all unmixed and primary bodies are produced by such causes as these. As to the subordinate species which are included in the greater kinds, they are to be attributed to the varieties in the structure of the two original triangles. For either structure did not originally produce the triangle of one size only, but some larger and some smaller, and there are as many sizes as there are species of the four elements. Hence when they are mingled with themselves and with one another there is an endless variety of them, which those who would arrive at the probable truth of nature ought duly to consider.

Motion and rest 57 D – 58 C

Unless a person comes to an understanding about the nature and conditions of rest and motion, he will meet with many difficulties in the discussion which follows. Something has been said of this matter already, and something more remains to be said, which is, that motion never exists in what is uniform. For to conceive that anything can be moved without a mover is hard or indeed impossible, and equally impossible to conceive that there can be a mover unless there be something which can be moved-motion cannot

exist where either of these are wanting, and for these to be uniform is impossible; wherefore we must assign rest to uniformity and motion to the want of uniformity. Now inequality is the cause of the nature which is wanting in uniformity; and of this we have already described the origin. But there still remains the further point-why things when divided after their kinds do not cease to pass through one another and to change their place-which we will now proceed to explain. In the revolution of the universe are comprehended all the four elements, and this being circular and having a tendency to come together, compresses everything and will not allow any place to be left void. Wherefore, also, fire above all things penetrates everywhere, and air next, as being next in rarity of the elements; and the two other elements in like manner penetrate according to their degrees of rarity. For those things which are composed of the largest particles have the largest void left in their compositions, and those which are composed of the smallest particles have the least. And the contraction caused by the compression thrusts the smaller particles into the interstices of the larger. And thus, when the small parts are placed side by side with the larger, and the lesser divide the greater and the greater unite the lesser, all the elements are borne up and down and hither and thither towards their own places; for the change in the size of each changes its position in space. And these causes generate an inequality which is always maintained, and is continually creating a perpetual motion of the elements in all time.

Kinds of the elements 58 C – 60 B

In the next place we have to consider that there are divers kinds of fire. There are, for example, first, flame; and secondly, those emanations of flame which do not burn but only give light to the eyes; thirdly, the remains of fire, which are seen in red-hot embers after the flame has been extinguished. There are similar differences in the air; of which the brightest part is called the aether, and the most turbid sort mist and darkness; and there are various other nameless kinds which arise from the inequality of the triangles. Water, again, admits in the first place of a division into two kinds; the one liquid and the other fusile. The liquid kind is composed of the small and unequal particles of water; and moves itself and is moved by other bodies owing to the want of uniformity and the shape of its particles; whereas the fusile kind, being formed of large and uniform particles, is more stable than the other, and is heavy and compact by reason of its uniformity. But when fire gets in and dissolves the particles and destroys the uniformity, it has greater mobility, and becoming fluid is thrust forth by the neighbouring air and spreads upon the earth; and this dissolution of the solid masses is called melting, and their spreading out upon the earth flowing. Again, when the fire goes out of the fusile substance, it does not pass into vacuum, but into the neighbouring air; and the air which is displaced forces together the liquid and still moveable mass into the place which was occupied by the fire, and unites it with itself. Thus compressed the mass resumes its equability, and is again at unity with itself, because the fire which was the author of the inequality has retreated; and this departure of the fire is called cooling, and the coming together which follows upon it is termed congealment.

Of all the kinds termed fusile, that which is the densest and is formed out of the finest and most uniform parts is that most precious possession called gold, which is hardened by filtration through rock; this is unique in kind, and has both a glittering and a yellow colour.

A shoot of gold, which is so dense as to be very hard, and takes a black colour, is termed adamant. There is also another kind which has parts nearly like gold, and of which there are several species; it is denser than gold, and it contains a small and fine portion of earth, and is therefore harder, yet also lighter because of the great interstices which it has within itself; and this substance, which is one of the bright and denser kinds of water, when solidified is called copper. There is an alloy of earth mingled with it, which, when the two parts grow old and are disunited, shows itself separately and is called rust. The remaining phenomena of the same kind there will be no difficulty in reasoning out by the method of probabilities. A man may sometimes set aside meditations about eternal things, and for recreation turn to consider the truths of generation which are probable only; he will thus gain a pleasure not to be repented of, and secure for himself while he lives a wise and moderate pastime. Let us grant ourselves this indulgence, and go through the probabilities relating to the same subjects which follow next in order.

Water which is mingled with fire, so much as is fine and liquid (being so called by reason of its motion and the way in which it rolls along the ground), and soft, because its bases give way are less stable than those of earth, when separated from fire and air and isolated, becomes more uniform, and by their retirement is compressed into itself; and if the condensation be very great, the water above the earth becomes hail, but on the earth, ice; and that which is congealed in a less degree and is only half solid, when above the earth is called snow, and when upon the earth, and condensed from dew, hoarfrost. Then, again, there are the numerous kinds of water which have been mingled with one another, and are distilled through plants which grow in the earth; and this whole class is called by the name of juices or saps. The unequal admixture of these fluids creates a variety of species; most of them are nameless, but four which are of a fiery nature are clearly distinguished and have names. First there is wine, which warms the soul as well as the body: secondly, there is the oily nature, which is smooth and divides the visual ray, and for this reason is bright and shining and of a glistening appearance, including pitch, the juice of the castor berry, oil itself, and other things of a like kind: thirdly, there is the class of substances which expand the contracted parts of the mouth, until they return to their natural state, and by reason of this property create sweetness;-these are included under the general name of honey: and, lastly, there is a frothy nature, which differs from all juices, having a burning quality which dissolves the flesh; it is called opos (a vegetable acid).

Kinds of the earth 60 B – 61 C

As to the kinds of earth, that which is filtered through water passes into stone in the following manner:-The water which mixes with the earth and is broken up in the process changes into air, and taking this form mounts into its own place. But as there is no surrounding vacuum it thrusts away the neighbouring air, and this being rendered heavy, and, when it is displaced, having been poured around the mass of earth, forcibly compresses it and drives it into the vacant space whence the new air had come up; and the earth when compressed by the air into an indissoluble union with water becomes rock. The fairer sort is that which is made up of equal and similar parts and is transparent; that which has the opposite qualities is inferior. But when all the watery part is suddenly drawn out by fire, a more brittle substance is formed, to which we give the name of pottery. Sometimes

also moisture may remain, and the earth which has been fused by fire becomes, when cool, a certain stone of a black colour. A like separation of the water which had been copiously mingled with them may occur in two substances composed of finer particles of earth and of a briny nature; out of either of them a half solid body is then formed, soluble in water-the one, soda, which is used for purging away oil and earth, and other, salt, which harmonizes so well in combinations pleasing to the palate, and is, as the law testifies, a substance dear to the gods. The compounds of earth and water are not soluble by water, but by fire only, and for this reason:-Neither fire nor air melt masses of earth; for their particles, being smaller than the interstices in its structure, have plenty of room to move without forcing their way, and so they leave the earth unmelted and undissolved; but particles of water, which are larger, force a passage, and dissolve and melt the earth. Wherefore earth when not consolidated by force is dissolved by water only; when consolidated, by nothing but fire; for this is the only body which can find an entrance. The cohesion of water again, when very strong, is dissolved by fire only-when weaker, then either by air or fire-the former entering the interstices, and the latter penetrating even the triangles. But nothing can dissolve air, when strongly condensed, which does not reach the elements or triangles; or if not strongly condensed, then only fire can dissolve it. As to bodies composed of earth and water, while the water occupies the vacant interstices of the earth in them which are compressed by force, the particles of water which approach them from without, finding no entrance, flow around the entire mass and leave it undissolved; but the particles of fire, entering into the interstices of the water, do to the water what water does to earth and fire to air, and are the sole causes of the compound body of earth and water liquefying and becoming fluid. Now these bodies are of two kinds; some of them, such as glass and the fusible sort of stones, have less water than they have earth; on the other hand, substances of the nature of wax and incense have more of water entering into their composition.

Senses 61C – 63 E

I have thus shown the various classes of bodies as they are diversified by their forms and combinations and changes into one another, and now I must endeavour to set forth their affections and the causes of them. In the first place, the bodies which I have been describing are necessarily objects of sense. But we have not yet considered the origin of flesh, or what belongs to flesh, or of that part of the soul which is mortal. And these things cannot be adequately explained without also explaining the affections which are concerned with sensation, nor the latter without the former: and yet to explain them together is hardly possible; for which reason we must assume first one or the other and afterwards examine the nature of our hypothesis. In order, then, that the affections may follow regularly after the elements, let us presuppose the existence of body and soul.

First, let us enquire what we mean by saying that fire is hot; and about this we may reason from the dividing or cutting power which it exercises on our bodies. We all of us feel that fire is sharp; and we may further consider the fineness of the sides, and the sharpness of the angles, and the smallness of the particles, and the swiftness of the motion-all this makes the action of fire violent and sharp, so that it cuts whatever it meets. And we must not forget that the original figure of fire [i.e. the pyramid], more than any other form, has a

dividing power which cuts our bodies into small pieces (Kepmatizei), and thus naturally produces that affection which we call heat; and hence the origin of the name (thepmos, Kepma). Now, the opposite of this is sufficiently manifest; nevertheless we will not fail to describe it. For the larger particles of moisture which surround the body, entering in and driving out the lesser, but not being able to take their places, compress the moist principle in us; and this from being unequal and disturbed, is forced by them into a state of rest, which is due to equability and compression.

But things which are contracted contrary to nature are by nature at war, and force themselves apart; and to this war and convulsion the name of shivering and trembling is given; and the whole affection and the cause of the affection are both termed cold. That is called hard to which our flesh yields, and soft which yields to our flesh; and things are also termed hard and soft relatively to one another. That which yields has a small base; but that which rests on quadrangular bases is firmly posed and belongs to the class which offers the greatest resistance; so too does that which is the most compact and therefore most repellent. The nature of the light and the heavy will be best understood when examined in connexion with our notions of above and below; for it is quite a mistake to suppose that the universe is parted into two regions, separate from and opposite to each other, the one a lower to which all things tend which have any bulk, and an upper to which things only ascend against their will. For as the universe is in the form of a sphere, all the extremities, being equidistant from the centre, are equally extremities, and the centre, which is equidistant from them, is equally to be regarded as the opposite of them all. Such being the nature of the world, when a person says that any of these points is above or below, may he not be justly charged with using an improper expression? For the centre of the world cannot be rightly called either above or below, but is the centre and nothing else; and the circumference is not the centre, and has in no one part of itself a different relation to the centre from what it has in any of the opposite parts. Indeed, when it is in every direction similar, how can one rightly give to it names which imply opposition? For if there were any solid body in equipoise at the centre of the universe, there would be nothing to draw it to this extreme rather than to that, for they are all perfectly similar; and if a person were to go round the world in a circle, he would often, when standing at the antipodes of his former position, speak of the same point as above and below; for, as I was saying just now, to speak of the whole which is in the form of a globe as having one part above and another below is not like a sensible man.

The reason why these names are used, and the circumstances under which they are ordinarily applied by us to the division of the heavens, may be elucidated by the following supposition:-if a person were to stand in that part of the universe which is the appointed place of fire, and where there is the great mass of fire to which fiery bodies gather-if, I say, he were to ascend thither, and, having the power to do this, were to abstract particles of fire and put them in scales and weigh them, and then, raising the balance, were to draw the fire by force towards the uncongenial element of the air, it would be very evident that he could compel the smaller mass more readily than the larger; for when two things are simultaneously raised by one and the same power, the smaller body must necessarily yield to the superior power with less reluctance than the larger; and the larger body is called heavy and said to tend downwards, and the smaller body is called light and said to tend

upwards. And we may detect ourselves who are upon the earth doing precisely the same thing. For we of separate earthy natures, and sometimes earth itself, and draw them into the uncongenial element of air by force and contrary to nature, both clinging to their kindred elements. But that which is smaller yields to the impulse given by us towards the dissimilar element more easily than the larger; and so we call the former light, and the place towards which it is impelled we call above, and the contrary state and place we call heavy and below respectively. Now the relations of these must necessarily vary, because the principal masses of the different elements hold opposite positions; for that which is light, heavy, below or above in one place will be found to be and become contrary and transverse and every way diverse in relation to that which is light, heavy, below or above in an opposite place. And about all of them this has to be considered:-that the tendency of each towards its kindred element makes the body which is moved heavy, and the place towards which the motion tends below, but things which have an opposite tendency we call by an opposite name. Such are the causes which we assign to these phenomena. As to the smooth and the rough, any one who sees them can explain the reason of them to another. For roughness is hardness mingled with irregularity, and smoothness is produced by the joint effect of uniformity and density.