

(e.g. mass, force, energy, and so forth). If *nothing* were stable, then there would be no such laws and no such universals. (More on these points in later chapters.)

The theory of actuality and potentiality, then, is for the Aristotelian absolutely crucial to understanding what any empirical and material world would have to be like for scientific knowledge of it to be possible. Since it deals with the necessary metaphysical preconditions of any possible natural science, it is deeper than any finding of natural science – whether physics, chemistry, biology, or whatever – and thus cannot be overturned by any such finding. It is a theory of the philosophy of nature rather than of natural science, and indeed the foundation of Aristotelian philosophy of nature.

There is much more to the theory when worked out systematically. Particularly relevant to the philosophy of nature is the distinction within the domain of potency or potentiality between an *active potency* and a *passive potency*. An active potency is a capacity to bring about an effect of some sort. It is what in contemporary philosophy is typically referred to as a *causal power*. A passive potency is a capacity to be affected in some way. In contemporary philosophy it is sometimes called a *liability*. The debate in contemporary analytic metaphysics over categorical and dispositional properties in several respects recapitulates ancient debates about act and potency. (For discussion of the relationship of this recent debate to the theory of act and potency, and of other issues surrounding the theory, see Feser 2014b, Chapter 1.)

### 1.2.2 Hylemorphism

In change, there is, again, both the potential that is to be actualized and the actualization of that potential. Consider the ink in a dry-erase marker. While still in the pen it is actually liquid. But it has the potential to dry into a triangular shape on the surface of the marker board. When you use the pen to draw a triangle on the board, that potential is actualized. Having dried into that shape, the ink has yet other potentials, such as the potential to be removed from the board by an eraser and in the process to take on the form of dust particles. When you erase the triangle and the dried particles of ink fall from the board and/or get stuck in the eraser, those potentials are actualized.

Now, what we have in this scenario is, first of all, a determinable substratum that underlies the potentialities in question – namely, the ink.

We also have a series of determining patterns that that substratum takes on as the various potentials are actualized – patterns like *being liquid*, *being dry*, *being triangular*, and *being particle-like*. The determinable substratum of potentiality is what in Aristotelian philosophy of nature is meant by the term “matter,” and a determining pattern that exists once the potential is actualized is called a “form.” Since change is real, matter and form in these senses must be real. Matter is, essentially, that which needs actualizing in change; form is, essentially, that which results from the actualization. Note that any determining, actualizing pattern counts as a “form” in this sense. A form is not merely the shape of a thing, nor is it necessarily a spatial configuration of parts (though shape and spatial configuration are kinds of forms). *Being blue*, *being hot*, *being soft*, etc. are also forms in the relevant sense.

Change is not the only phenomenon that points to the distinction between matter and form. Note that a form or pattern like *triangularity* is universal rather than particular. It is the same pattern that one finds in green triangles and red ones, triangles drawn in ink and those drawn in pencil, triangles used as dinner bells and those used on a billiards table, and so forth. Triangularity is also perfect or exact rather than approximate. For example, being triangular in the strict sense involves having sides that are straight rather than wavy. Now, the triangle you draw on the marker board has straight sides, but only imperfectly or approximately. It is also a particular instance of triangularity rather than triangularity as such. Hence there must not only be something by virtue of which the thing you’ve drawn is triangular, but also something by virtue of which it is triangular in precisely the imperfect way that it is. There must also be something by virtue of which triangularity exists in *this particular* point in time and space.

Now if being triangular is a way of being *actual*, being triangular only in an imperfect way is a way of being *potential*. For insofar as the triangle’s sides are only imperfectly straight, the ink in which you have drawn it has, you might say, only partially actualized the potential for triangularity. And insofar as the triangle has been drawn in some particular time and place, the potential in question is a potential at *that* time and place, rather than at another, that has been actualized. Now, that by virtue of which what you have drawn is actually triangular to the extent it is, is what Aristotelian philosophy of nature calls its *form*; while that by virtue of which it is limited, or remains merely potential, in the extent to which it is triangular, is its *matter*.

Insofar as form accounts for whatever permanence, unity, and perfection or full actuality there is in the natural world, it represents, as it were, the Eleatic side of things. The triangle drawn on the marker board persists to the extent that it retains its triangular form, is identical to other triangles insofar as it is an instance of the same form they instantiate, and is perfect or complete in its actuality to the degree that it approximates that form. Insofar as matter accounts for the changeability, diversity, and imperfection or mere potentiality that exists in the natural world, it represents the Heraclitean side of things. The triangle drawn on the board is impermanent insofar as its matter can lose its triangular form, is distinct from other things having the same form insofar as it is one parcel of matter among others which instantiate it, and is imperfect or potential to the extent that it *merely* approximates the form.

Matter is passive and indeterminate, form active and determining. The same bit of matter can take on different forms, and the same form can be received in different bits of matter. Hence matter and form are as distinct as potentiality and actuality. Still, just as potentiality is grounded in actuality, so too does matter always have *some* form or other. If the ink in our example is not in a liquid form, it is in a dry, triangular form, and if not that then in the form of particles. And if the particles are broken down further so that the ink is in no sense still present, then the form of the chemical constituents of the ink would remain. If matter lacked *all* form it would be nothing but the pure potentiality for receiving form; and if it were *purely* potential, there would be no actuality to ground it and it would not exist at all.

The distinction between form and matter is not, however, the *same* distinction as that between actuality and potentiality, but rather a special case of that distinction. Everything composed of form and matter is thereby composed of actuality and potentiality, but not everything composed of actuality and potentiality is composed of form and matter. An angelic intellect or a Cartesian *res cogitans*, being incorporeal, would not be a compound of form and matter, but it would still be a compound of actuality and potentiality (insofar as God would have to create it and thus actualize what would otherwise be its merely potential existence). The distinction between form and matter is an application of the distinction between actuality and potentiality to *corporeal* things, specifically - to the physical objects we know through experience. Hence, whereas the theory of actuality and potentiality has completely general metaphysical applicability, the proper application of the distinction between form and matter is within the philosophy of nature.

Now, several further distinctions are needed in order to set out the Aristotelian analysis of what it is to be a corporeal *substance*. First, there is the general distinction between any substance and its attributes. Consider a solid, gray, round, smooth stone of the sort you might pluck from a river bed. The solidity, grayness, roundness, and smoothness are *attributes* of the stone, and the stone itself is the *substance* which bears these attributes. The attributes exist *in* the stone whereas the stone does not exist *in* any other thing in the same sense. Substances, in general, just are the sorts of things which exist in themselves rather than inhering in anything else, and which are the subjects of the attributes which do of their nature inhere in something else. This is true of corporeal substances like stones, and it is true of incorporeal substances too, if such things exist.

Corporeal substances are, again, composed of form and matter, but here two further distinctions must be made. If we abstract from our notion of matter *all* form, leaving nothing but what I have called the pure potentiality to receive form, we arrive at the idea of *prime matter*. (More on this below.) Matter already having some form or other – that is to say, matter which is actually a stone, or wood, or water, or what have you, and is not merely potentially any of these things -- is *secondary matter*. There is a corresponding distinction between kinds of form. A form which makes of what would otherwise be utterly indeterminate prime matter some determinate concrete thing of a certain kind is a *substantial form*. A form which merely modifies some secondary matter – and in particular, which modifies matter which already has a substantial form – is an *accidental form*. A corporeal substance is, to state things more precisely, a composite of *prime matter* and *substantial form*.

The distinction between substantial form and accidental form is illuminated by comparison with the different but related Aristotelian distinction between *nature* and *art* – that is to say, between natural objects on the one hand, and everyday artifacts on the other. Hence, consider a *liana vine* – the kind of vine Tarzan likes to swing on – as an example of a natural object. A *hammock* that Tarzan might construct from living liana vines is a kind of artifact, and not a natural object. The parts of the liana vine have an inherent tendency to function together to allow the vine to exhibit the growth patterns it does, to take in water and nutrients, and so forth. By contrast, the parts of the hammock – the liana vines themselves – have no inherent tendency to function together as a hammock. Rather, they must be arranged by Tarzan to do so, and left to their own devices – that is to say, without pruning, occasional rearrangement, and the like –

they will tend to grow the way they otherwise would have had Tarzan not interfered with them, including in ways that will impede their performance as a hammock. Their natural tendency is to be liana-like and not hammock-like; the hammock-like function they perform after Tarzan ties them together is extrinsic or imposed from outside, while the liana-like functions are intrinsic to them.

Now the difference between that which has such an intrinsic principle of operation and that which does not is essentially the difference between something having a substantial form and something having a merely accidental form. Being a liana vine involves having a substantial form, while being a hammock of the sort we're discussing involves instead the imposition of an accidental form on components each of which already has a substantial form, namely the substantial form of a liana vine. A liana vine is, accordingly, a true *substance*, as Aristotelian philosophers understand substance. A hammock is not a true substance, precisely because it does not qua hammock have a substantial form – an *intrinsic* principle by which it operates as it characteristically does – but only an accidental form. In general, true substances are typically natural objects, whereas artifacts are typically not true substances. A dog, a tree, and water would be true substances, because each has a substantial form or intrinsic principle by which it behaves in the characteristic ways it does. A watch, a bed, or a computer would not be true substances, because each behaves in the characteristic ways it does only insofar as certain accidental forms have been imposed on them from outside. The true substances in these cases would be the raw materials (metal, wood, glass, etc.) out of which these artifacts are made.

It is important to emphasize, however, that the correlation between what occurs “in the wild” and what has a substantial form, and the correlation between what is man-made and has only an accidental form, are only rough correlations. For there are objects that occur in nature and apart from any human intervention and yet have only accidental forms rather than substantial forms, such as piles of stones that gradually form at the bottom of a hill, tangles of seaweed that wash up on the beach, and beaver dams. And there are man-made objects that have substantial forms rather than accidental forms, such as babies (which are in an obvious sense made by human beings), water synthesized in a lab, and breeds of dog. Of course, no one would be tempted in the first place to think of these as “artifacts” in the same sense in which watches and computers are artifacts. But even objects that are “artificial” in the sense that they not only never occur “in the wild” but require significant scientific

knowledge and technological expertise to produce can count as having substantial forms rather than accidental forms. Styrofoam would be one possible example (Stump 2003, p. 44).

The basic idea is that it seems to be essential to a thing's having a substantial form that it has properties and causal powers that are irreducible to those of its parts (Stump 2006). Hence water has properties and causal powers that hydrogen and oxygen do not have, whereas the properties and causal powers of, say, an axe seem to amount to nothing over and above the sum of the properties and powers of the axe's wood and metal parts (Stump 2003, p. 44). When water is synthesized out of hydrogen and oxygen, what happens is that the prime matter underlying the hydrogen and oxygen loses the substantial forms of hydrogen and oxygen and takes on a new substantial form, namely that of water. By contrast, when an axe is made out of wood and metal, the matter underlying the wood and the matter underlying the metal do not lose their substantial forms. Rather, while maintaining their substantial forms, they take on a new accidental form, that of being an axe. The making of Styrofoam seems to be more like the synthesis of water out of hydrogen and oxygen than it is like the making of an axe. Styrofoam has properties and powers which are irreducible to those of the materials out of which it is made, which indicates the presence of a substantial form and thus a true substance.

There is a further complication to the story. On the Aristotelian-Thomistic account, among the attributes of a thing, we need to distinguish those that are *proper* to it from those which are not. It is the former alone which are labeled "properties" in Aristotelian-Thomistic philosophy, with the others referred to as "contingent" attributes. (This contrasts with the very loose way the term "property" is used in contemporary analytic philosophy, to refer to more or less any feature we might predicate of a thing.) The properties or proper attributes of a substance are those which "flow" or follow from its having the substantial form it does. Being four-legged, for example, flows or follows from having the substantial form of a dog. It is a natural concomitant of "dogness" as such, whereas being white (say) is not, but is merely a contingent attribute of any particular dog. Now this "flow" can, as it were, be blocked. For instance, a particular dog might, as a result of injury or genetic defect, be missing a leg. But it wouldn't follow from its missing that leg that being four-legged is not after all a true property of dogs, nor would it follow that this particular creature was not really a dog after all. Rather, it would be

a *damaged or defective instance* of a dog. When determining the characteristic properties and causal powers of some kind of thing, then, we need to consider the *paradigm case*, what that kind of thing is like when it is in its mature and normal state.

So, a thing counts as a true substance when it has a substantial form rather than a merely accidental form, and the mark of its having the former is that in its mature and normal state, it exhibits certain properties and causal powers that are irreducible to those of its parts. A corporeal substance is a composite of a substantial form and prime matter, related to one another as actuality and potentiality; and once in existence, a corporeal substance or substances constitute the secondary matter that is the subject of an accidental form or forms. This is the Aristotelian doctrine of *hylomorphism* (or *hylomorphism*), the name of which derives from the Greek words *hyle* (or "matter") and *morphe* (or "form").

The Thomistic interpretation of hylomorphism insists on the doctrine of the *unicity* of substantial form, according to which a substance has only a single substantial form. Suppose *A* is a substance, and has *B* and *C* as parts. Since *A* is a substance, it has a substantial form. Do *B* and *C* have further substantial forms of their own? If they did, then they too would be substances. In that case, though, *A*'s form would relate to *B* and *C* as an accidental form relates to secondary matter. But then *A* wouldn't really have a substantial form after all, and thus not really be a substance. So, if *A* really is a substance, then its parts *B* and *C* must not themselves have substantial forms or amount to true substances in their own right. There is only the single substantial form, the form of *A*, which informs the prime matter of *A*. Another way to look at it is that if *B* and *C* had substantial forms, then *they* would be what actualizes the prime matter so that it constitutes a substance (or two substances in this case, namely *B* and *C*). In that case, the prime matter wouldn't *potentially* be a substance, but would already *actually* be a substance. That is to say, it would be secondary matter. But then there would be nothing left for the substantial form of *A* to do qua actualizer of prime matter. It would serve merely to modify an already existing substance and thus amount to an accidental form rather than substantial form. So, again, a substance *A* can really only have one substantial form.

To see the implications of this, consider a concrete example like water, which has hydrogen and oxygen as its parts. Since water is a substance, it has a substantial form. But since a substance can have only a single substantial form, it follows that the hydrogen and oxygen in water

don't have substantial forms. That entails in turn that hydrogen and oxygen don't exist in water as substances. Now, this may seem odd, since hydrogen considered *by itself* and oxygen considered *by itself* each do seem to be substances. They have their own characteristic irreducible properties and causal powers, after all. But the lesson we should draw from these considerations, according to the Thomist, is that hydrogen and oxygen do not exist *actually* in water, but only *virtually*. Notice that the claim is *not* that they don't exist in water *at all*. It is rather that they don't exist in water *in the way* that they exist when they exist on their own. The situation is comparable to the Aristotelian's account of what is really going on in Zeno's paradox of parts scenario, in which the parts are present – they are not nothing or non-being – but only potentially rather than actually.

This too may sound odd, but it should sound less so upon reflection. Consider that if hydrogen and oxygen were actually present in the water, then they should possess their characteristic properties and powers. That means that we should be able to burn the hydrogen, and to boil the oxygen at  $-183^{\circ}\text{C}$ . But we cannot do either. Hence the substantial forms of hydrogen and oxygen cannot be present, in which case the *substances* hydrogen and oxygen cannot be present. Furthermore, if hydrogen and oxygen were actually present, then for something to be water would be for it to have a merely accidental form, and properties and causal powers reducible to those of hydrogen and oxygen. But that is also not the case, since water has powers and properties that a mere aggregate of hydrogen and oxygen does not. Hydrogen and oxygen are present in water, then, in the sense that water has the *potentiality* to have hydrogen and oxygen drawn out of it – by electrolysis, say. (More on this issue in a later chapter. For discussion of the relationship of hylemorphism to contemporary debates over reductionism, and of other issues surrounding the theory, see Feser 2014b, chapter 3.)

### 1.2.3 Limitation and change

As indicated in the preceding section, two of the motivations for hylemorphism have to do with its application to the critique of static monism's denial of multiplicity and of change. These lines of argument for hylemorphism are sometimes labeled the *argument from limitation* and the *argument from change* (Cf. Koren 1962, chapter 2).

The basic idea of the first line of argument is, again, that a form is *of itself* universal, so that we need a principle to explain how it gets tied