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THE FOUR CAUSES*

It is usually assumed that when Aristotle distinguishes between the four causes¹ a natural scientist should study, he is referring to (1) the matter and (2) the form of a thing, (3) that which brought it into existence, and (4) its purpose. On this basis, it must remain obscure what the four items in this list have in common such that all and only the four of them should be called “causes.” In what sense does the form or the purpose of a thing *cause* this thing? What is the *effect* of matter or form? And why should there be exactly four causes? For instance, why is not the weight of a thing a fifth kind of cause; and if the reason is that the weight of a thing is one of its forms, why should the material constitution of a thing not also count as one of its forms? Moreover, many properties of a thing appear to be reducible to its purely material features. Could we perhaps reduce all of them? It seems that we might do without either material or formal causes. Above all, the final cause does not appear to belong in a list of causes that all natural things have. In large areas of modern science, we do not refer any longer to purposes, and where we still do so, we try not to.

When Aristotle presents his system of four causes, he does so without arguing for it. It has therefore been claimed that we “do not know how Aristotle arrived at the doctrine of the four causes.”² In this paper, I will point out that there is in fact a fairly simple rationale for his scheme. This rationale explains Aristotle’s division; it need not reflect the way in which Aristotle arrived at it. My aim is to say what Aristotle said, not in the sense of reporting what he said, but rather in the sense of repeating and elaborating on what he said. I will show that his four-fold distinction naturally arises from the combination of two distinctions that apply to all natural beings. First, concerning any natural change, we may distinguish between the thing that changes and the

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¹ I use the term “cause” here only because it is the standard translation of αἰτία. I pretend not to know what “cause” means, so that the meaning may emerge from the ways in which Aristotle actually uses the term. The labels “material cause,” “formal cause,” and so on, are not used by Aristotle. I also use them without putting any weight on their literal meaning.

² William David Ross, ed., *Aristotle’s Physics* (New York: Oxford, 1936), p. 37.

change that it undergoes. Neither of these could be studied without in any sense referring to the other. Second, we may ask out of what a natural thing comes to be what it is, and we may ask an analogous question about a natural change. Conversely, we may ask what a thing or a change naturally comes to be. Again, the two questions, out of what something comes to be what it is, and what it comes to be, cannot be separated. I will maintain that within the cross-classification that results from combining these two distinctions, the so-called material cause occupies the slot for that out of which a thing comes to be when it goes through a natural change, and the formal cause is what it naturally comes to be. Likewise, the efficient cause is that “out of which” a natural change comes to occur; and the final cause is what the change naturally comes to be when it occurs.³

I. NATURAL CHANGES

We must first clarify what it is for a change to be natural. Aristotle writes that a *substance* is natural if it has in itself a principle of motion and rest (*Physics* B1 192b13–16). He also tells us that in one sense, the typical development of a natural thing may be called its nature (φύσις, 193b12–13). A change should accordingly be natural, first, when the thing that undergoes this change has, in some sense, “in itself” a principle that governs this change. Second, a natural change should constitute a development that is typical, that is, natural *for* the changing thing.

Aristotle also says, misleadingly, that natural things differ from artifacts in that they have an innate *impulse* to change (ὁρμή, 192b18–19). This seems to imply that a change is natural to the extent that the changing thing is or contains that which initiates the change. But as Aristotle clarifies in *Physics* Θ4, that a natural thing possesses an internal principle of motion and rest need not mean that it initiates motion or rest. The principle may as well merely govern the way in which

³ Wolfgang Wieland, *Die aristotelische Physik* (Göttingen: Vandenhoeck and Ruprecht, 1992), pp. 111 and 266, has claimed that in *Physics* B3, Aristotle only discusses the causes of persistent things. But Aristotle could not discuss the causes of natural things without at the same time considering the ways in which they change. Allan Gotthelf, in contrast, supports the position defended here by arguing that “coming to be for the sake of is ... prior to being for the sake of”—“The Place of the Good in Aristotle’s Natural Teleology,” *Proceedings of the Boston Area Colloquium in Ancient Philosophy*, iv (1988): 113–39, on p. 136. Against Gotthelf, David Charles has maintained that although a reduction of the final causes of things to those of processes would be possible, “it appears” that Aristotle had not attempted such a reduction and that it would constitute a “major task”—“Teleological Causation in the Physics,” in Lindsay Judson, ed., *Aristotle’s Physics: A Collection of Essays* (New York: Oxford, 1991), pp. 101–28, on pp. 105–06. The reduction, however, can be accomplished in a single sentence: Things and states have final causes insofar as they are, typically or as a matter of intention, involved in processes that have final causes.

things of its kind are affected by the impact of others (255b30–31). Moreover, as Wieland has pointed out, a change may very well be natural for a thing even if the relevant causal chains (in the modern sense of “cause”) begin outside this thing.⁴ By showing, for instance, that the movements of an animal have causal antecedents outside this animal, one cannot prove that they are not natural for it (cf. *Physics* Θ6, 259b1–20). Otherwise, we would have to assume that all natural movements are spontaneously initiated by the things which undergo them, by what Kant would have called “causality of freedom.” In order to avoid this counterintuitive result, we had better not assume that the principle of motion and rest Aristotle is referring to is that which initiates motions or stops them. Rather, what he seems to have in mind is a principle that determines whether a change is natural for a thing, and whether the course it takes is typical of a change that is natural for this thing. If a change proceeds in accordance with such a principle, it may be called natural *for* the changing thing. That a principle of motion and rest is “in” a natural thing then means that the criteria according to which its movements and its development may be assessed as natural or typical arise exclusively from a proper account of its nature. The principle is not so much in the changing thing as it is in the correct account of its natural kind. We need not look beyond this account in order to see whether what happens with the thing is natural or not.

As a consequence, an artifact that moves by itself does not thereby undergo a change that is natural for it by Aristotelian standards. This would only be the case if one could give a self-contained account of this artifact that implies a principle according to which its movements qualify as typical or successful. But artifacts are, by definition, designed and maintained from outside, and whether they work as they should will always depend on what their designers or users want them to do. There is nothing *intrinsically* wrong with an artifact that does not work. In this sense, artifacts behave according to external principles of motion and rest, even if they move by themselves.⁵ In contrast, whether natural things “work” as they should may be decided by applying standards that are exclusively determined by their own nature. This is why we apply the concept of health to animals and plants, but not to artifacts. For to be healthy is to be in good condition according to intrinsic standards.

⁴ Wieland, *Die aristotelische Physik*, p. 234.

⁵ That something is an artifact implies that it is subject to external standards. If there were self-replicating artifacts, their offspring would cease to be artificial to the extent to which their form is not any longer determined by external standards.

That the principle of motion and rest follows from the nature of a thing means that it accounts for the way in which the behavior of this thing is characteristic of it. For instance, what a beaver does when it is building a dam is subject to a certain standard according to which it may count as typical or appropriate. This standard is tied to the specific nature of beavers. A cat would not do anything typical when building a dam, and it would not be clear what movements would be natural and appropriate for a dam building cat. Therefore, what a beaver does when it is building a dam is a natural change, whereas what a cat would do when building a dam would not be a natural change. The principle according to which beavers build their dams is not a universal and external law that would also apply to cats, but a standard that is specific and inherent to the natural kind of beavers.

I have said that a change counts as natural, first, when the account of the changing thing includes a principle of motion and rest; and second, when the change is natural *for* this thing. Since the principle of motion and rest inherent to the changing thing is that according to which the change may be said to be natural or not, both requirements amount to the same. A change is natural for a thing if and only if the account of the thing includes or implies a principle of motion and rest according to which it may be judged to be typical or successful. Since this principle determines what changes are typical for a natural thing, and since "nature" may also be taken to refer to the typical development of a thing, the principle of motion and rest inherent to a thing will also determine its nature in this sense.

The following are examples of natural changes. According to Aristotle, when a beaver comes to be, matter that formerly made up a certain amount of menstrual fluid changes into the body of a beaver. When a beaver comes to be mature, a beaver kitten changes into a mature beaver. Both are natural changes that beavers undergo. Further, when a beaver builds a dam, a pile of wood changes into a wooden dam. This is also a natural change, since it is natural for a beaver to build a dam out of wood. It is not, however, natural for the wood to turn into a dam. Dams are artifacts, and the principles of dam building apply to a beaver's dam only derivatively, by applying to the motions of a dam building beaver. In *Physics* B3, Aristotle discusses four possibly illuminating questions that a natural scientist may and should ask about such natural changes.

II. WHAT OUT OF WHICH THE THING COMES TO BE

A first question that one may ask about any natural change is out of what the resulting thing comes to be what it is ($\tau\acute{o}\ \epsilon\acute{\xi}\ \acute{o}\hat{\upsilon}\ \gamma\acute{\iota}\gamma\nu\epsilon\tau\alpha\acute{\iota}\ \tau\iota$, 194b24). The beaver kitten comes to be out of certain stuff, the mature

beaver comes to be out of a beaver kitten, and the dam comes to be out of wood. However, to determine the required meaning of the phrase “out of ...” is more difficult than it might seem. For instance, a book may be out of paper, out of letters, it might be written out of a certain desire, or it may be out of print.

In a first attempt to single out the relevant sense of “out of,” we may take the “cause out of which” to be that of which the changing thing *consists*. But Aristotle also says that in the relevant sense of “out of,” the conclusion of a syllogism may be said to come to be out of its premises (195a18–19). Since it is possible to derive a true conclusion from inconsistent premises, that out of which the conclusion comes to be cannot be that of which it consists. A true statement does not consist of a contradiction in any meaningful sense of “consist.” Thus when Aristotle says that the “cause out of which” is “present in” the result of the change (ἐνυπάρχον, 194b24), he cannot literally mean that in all cases the resulting thing still consists of it.

Alternatively, one might want to say that that out of which a thing comes to be is that which makes its continued existence possible, such that it must persist as long as the thing persists.⁶ Consider, however, the stuff out of which a beaver comes to be. Since living beings constantly exchange their matter, there will be less and less of this stuff left in the growing beaver, and once it has left the organism, the beaver in no way depends on it for its continued existence. If the matter of the beaver were that out of which it came to be, and at the same time that on which it still depends for its existence, we would have to admit that beavers gradually dematerialize during their lives. For there will be less and less of the stuff left that is both that out of which they came to be and that on whose presence they still depend.

Note, however, that Aristotle does not simply equate the “cause out of which” with the matter of a given thing. He rather lists matter (ὕλη) only as one possible instance (195a17). It is thus possible that for some natural changes, that out of which the resulting thing comes to be is not its matter. If this is so, we need not suppose that there is a parcel of matter that persists during *all* the changes in the life of a living being. We may solve the puzzle of the dematerializing beaver by distinguishing different kinds of change and focusing on one kind of change at a time. Sometimes a beaver’s matter changes its form;

⁶ This is not exactly analogous to the case of the syllogism. The premises of a syllogism are sufficient, but they need not be necessary to establish the conclusion. The suggestion above is that the matter of a thing might be what is necessary, but not sufficient for the existence of a thing. In fact, the matter of a thing is neither necessary nor sufficient for the continued existence of this thing.

sometimes, the beaver exchanges its matter. However, if that out of which a thing comes to be is not in any case the stuff of which it consists, we need a more general account of what it is. In *Metaphysics* H6, Aristotle indicates the lines along which such an account should proceed. That out of which a thing comes to be when it undergoes a natural change is *that which potentially is the result*. That which actually is the menstrual fluid is also potentially the beaver embryo. This embryo and the beaver kitten are potentially the mature beaver, and that which actually is a pile of wood and other materials is potentially a dam.

We need to distinguish two kinds of potential here. There are potentials that are, as it were, used up when they are realized. For instance, a couple has the potential to divorce, but a divorced couple no longer has this potential. Other potentials are not used up when realized. When a beaver actualizes its potential to build a dam, it retains this potential. Aristotle emphasizes that the cause out of which a thing comes to be is not used up but remains present in the thing.

There are two senses in which that which results from a natural change still is that out of which it came to be. First, an actual *F* is also a potential *F*. The result of a natural change is thus still the same as the thing out of which it came to be. Both are potentially the result; one of them is it *merely* potentially, the other one is potentially the result because it is actually the result.⁷ The mature beaver is still the same as the beaver kitten, insofar as they both are potentially a mature beaver. The difference is only that the beaver kitten changed from merely potentially being something to potentially *and* actually being that thing.

Second, in *Metaphysics* H6, Aristotle writes that “the proximate matter and the form are one and the same thing, one potentially and the other actually” (1045b17–19). Sally Haslanger considers three interpretations of this passage: matter and form may be “one and the same” by being (1) identical, (2) two aspects of the same, or (3) two parts of the same.⁸ She argues convincingly against (1) and (2). This, however, does not imply that (3) is correct. Rather, Aristotle’s statement in H6 has the logical structure of, for instance, “George Bush and Barack Obama are the same: one formerly, the other presently” (uttered in 2009). It does not follow from this that Bush and Obama are identical, two aspects of the same or two parts of the same. In the same sense, *A* may be the same

⁷ Cf. Mary Louise Gill, *Aristotle on Substance: The Paradox of Unity* (Princeton: University Press, 1989), pp. 178–80. In his commentary on *Metaphysics Z and H* (New York: Oxford, 1994), David Bostock reads “merely potential” where Aristotle says “potential” (p. 225), rendering Aristotle’s doctrine nonsensical (pp. 283–84).

⁸ Haslanger, “Parts, Compounds, and Substantial Unity,” in T. Scaltsas, D. Charles, and M. L. Gill, eds., *Unity, Identity, and Explanation in Aristotle’s Metaphysics* (New York: Oxford, 2001), pp. 129–70.

as *B*, one potentially and the other actually; and still, *A* and *B* need not be identical, or two aspects or parts of one thing. When a potential is actualized, it is not *combined with* its actualization; and when matter is formed, it is not combined with its form. It actually becomes what it potentially was. It follows in any case that the matter and the form of natural things are not two numerically different things. The matter of a natural thing is not one of its components, parts, or constituents.

III. WHAT THE THING COMES TO BE

The matter that makes up a certain portion of menstrual fluid comes to make up a beaver. The beaver comes to be a mature beaver. A pile of wood and other materials comes to be a dam. Taking, in each of these cases, that as given out of which the respective thing comes to be, we may ask *what* it naturally comes to be. That out of which a thing naturally comes to be is something that potentially is this thing. What it comes to be is what it potentially is. For instance, the beaver kitten is what potentially is a mature beaver, and a mature beaver is what the beaver kitten potentially is. There are, of course, innumerable things that a portion of menstrual fluid, a beaver kitten, or a pile of wood might possibly come to be. When we ask what they *naturally* come to be, we are only interested in a certain range of these. More specifically, we are interested in what a thing would come to be as a result of a change that proceeds according to a principle of motion and rest inherent in this (or another) thing.

That into which a thing changes when it develops according to its nature has also been called its “formal cause,” presumably because the specification of that into which a parcel of matter changes involves a specification of the form it takes on. This label, however, is misleading insofar as it makes us think that that into which a thing changes is a mere form. That into which a beaver kitten changes when it undergoes a natural change is a mature beaver, and a mature beaver is certainly not a mere form. That toward which a natural change takes place is rather, as Aristotle puts it in *Metaphysics* Λ3, a concrete substance or τόδε τι (1070a11).⁹

There is a sense of “form” that still applies in such cases. The *paradigmatic* form of a thing, also called its *essence*, is *what* this thing is. It is

⁹ Aristotle says in 1070a2 that form (εἶδος) is *that into which* a thing changes; he cannot mean a mere form here. Also, when Aristotle says in *Metaphysics* H6 1045b17–20 that matter is potentially what form (μορφή) is actually, “form” cannot be mere form. Bostock diagnoses nonsense, since it follows that the form actually has the features of the formed thing (*Metaphysics Z and H*, p. 284; cf. note 7 above). But this is precisely what we must assume. (We must *not* assume that the form of a thing is a separate thing on a par with its particular instances.)

what this thing comes to be (or should come to be) as a result of its natural development. When we call a living being a “form of life,” we use “form” in this sense. What a thing is, its paradigmatic form, is what its correct definition defines. The correct definition of a beaver does not define a mere form. It defines a formed compound, something that has four feet and sharp teeth. No mere form has four feet or sharp teeth.

Aristotle makes it clear enough that in *Physics* B3, he is talking about the paradigmatic form (παράδειγμα) and the essence (τὸ τί ἦν εἶναι) of a natural thing (194b26–27). Since the paradigmatic form is what a thing turns into when it undergoes a natural change, the essence of a naturally changing thing is literally “what it was to be”: a beaver, a mature beaver, a dam.¹⁰

That the paradigmatic form of a natural thing should be that which results from its natural development will strike many as extremely odd. For instance, if the paradigmatic form of a thing is what this thing is, the paradigmatic form of a compound thing must also be compound. But does Aristotle not, in *Metaphysics* Z4 and Z10, deny that the paradigmatic form of a thing involves its matter?

In Z10, Aristotle seems to imply that the paradigmatic form of a natural substance cannot be a composite of form and matter. He says that man, taken in general, is a composite of a sort *and not* an οὐσία (1035b28–30), and arguably, the paradigmatic form of a thing is what Aristotle calls an οὐσία here. What he says might thus indicate that in general, no composite can be a paradigmatic form. But nothing requires this reading. The reason why man, taken generally, is not an οὐσία may as well be that no *universal* is an οὐσία, as Aristotle proves in Z13.

In Z4, Aristotle argues that a formula by which a thing is said to be something else cannot be a proper definition (1030a10–11). For instance, a compound expression such as “white man” is not a proper definition (and does not designate an essence), since to be white is not in all cases to be a man and hence, in the formula “white man” something (“white”) is said of something else (“man”). In contrast, to be two-footed is in any case to be a certain kind of animal, and to say that some animals of this kind are two-footed is not to say something *else* of them; they are not two-footed independently of being this kind of animal. For the same reason, it seems, the definition of a substance

¹⁰ Cf. Monte R. Johnson, *Aristotle on Teleology* (New York: Oxford, 2005), p. 48. “What it was to be” would of course not be a correct *literal* translation of τί ἦν εἶναι, which is more accurately rendered as “what it is for a thing to be this kind of thing.” In any case, the “was” does not allude at a past state, but rather at a possible discrepancy between what a thing actually is and what it is supposed to be.

should not involve a reference to its matter, since the form is spoken of as something different from the matter (cf. Z3, 1029a23–24). But if the paradigmatic form of a thing does not involve its matter, it seems that it cannot be a compound.

Now it is true that when we say what a thing is, we do not refer to the particular portion of matter of which it is made. But this does not mean that we refer to a bundle of properties and features instead. For instance, when we say that Socrates is the particular human being consisting of *this* particular amount of flesh and bones, we say *who* he is, and not merely *what* he is. We say *what* he is only when we say that he is *a* human being. Still, *a* human being is not a bundle of features and properties.

Paradigmatic forms may indeed be shared by many items: What a thing is may be what other things are as well. What this is, a beaver, may also be what that other living being is. However, we must not conclude from this that what a thing is is a shared property. Although all beavers may also share certain properties, what each of them is—a beaver—is not a property. The difference between a paradigmatic form and its instances is not the one between a set of properties and their bearer. It is, rather, the difference between a *generic* instance (*an S*) and a *particular* one (*this S*).¹¹ Each beaver is *an* instance of its kind, although only one of them is *this* particular instance of this kind.

The answer to the question raised above is that in one sense, a definition should not refer to the matter of the defined thing: it should not involve a reference to *this* or *that* particular matter. However, the definition of a thing may very well involve facts about the general material constitution that all things of the respective kind share (which Gill calls “functional matter”).¹² We should recall in this context that natural things are what they are in virtue of possessing an inherent principle of motion and rest. Any account of what a natural thing is must refer to the ways in which such things naturally change. But, Aristotle argues in *Metaphysics* Z11, one cannot treat a thing as

¹¹ One should think that in general, “*X is an F*” implies “There is an *F* such that *X is this F*” But the “*this*” in the latter phrase may be taken to be either anaphoric or demonstrative. As an anaphor it would not refer to the *X* but to its paradigmatic form *F*: there is a paradigmatic form such that *this* form is what *X* is. On the other hand, if “*this*” is a demonstrative referring not to the paradigmatic form but to the particular instance, “*an F*” cannot be taken to refer to the paradigmatic form itself. There is still a difference between being an *F* and being *this F*.

For more on generic individuals, see Gregory N. Carlson and Francis J. Pelletier, *The Generic Book* (Chicago: University Press, 1995), and Michael Thompson, *Life and Action* (Cambridge: Harvard, 2008), chapter 4.

¹² Gill, *Aristotle on Substance*, p. 133.

something that changes without considering both its material and formal aspects; that is more generally, without distinguishing between that which may come to be something and what it naturally comes to be. Hence, the contrast between the material and the formal cause is essential to all natural things (1036b28–32).¹³

Note further that the matter of a substance, considered *as matter*, is nothing but this substance by way of privation (H1, 1042b3). We can only refer to it, as matter, by specifying what it potentially is. Now as Aristotle says in Z7, the form of a privation is the form of what is missing (1032b3–4). Hence, the matter of a thing has, as such, no form of its own (cf. Z10, 1036a8–9). Its form is the form of what it potentially is, and this is (or is part of) the paradigmatic form of the substance. Although a definition may refer to the constituent parts and the functional matter of a thing, it must therefore refer to them by way of their form; but since this is the form of what they potentially are, they do not directly figure in the definition *as matter* (cf. 1035a7–9).

I conclude that the formal cause of a natural thing is not its mere form, but a paradigmatic formed compound. It is not a property or feature of the thing, and *a fortiori* not a *necessary* property or feature. Essences are not necessary properties. But while we must be very careful not to confuse the paradigmatic form of a natural thing with properties, features, or bundles of them, we must also not confuse it with a particular individual. The paradigmatic form is that which is defined, and no particular thing can be defined (as particular). Further, even a thoroughly typical particular instance of a kind would not be the same as the paradigmatic form with a view to which it qualifies as thoroughly typical. No particular instance of a kind can *be* that with a view to which its own perfection is measured. Nonetheless, whereas the paradigmatic form is not a particular instance of its kind, it is still a generic *instance* of it.¹⁴

¹³ See Michael Frede and Günther Patzig, *Aristoteles 'Metaphysik Z'* (Munich: Beck, 1988). The general point that all natural things are material follows if one reads αἰσθητὸν in 1036b28; cf. Ernst Tugendhat, *TI KATA TINOS* (Freiburg: Alber, 1958), p. 111. If Frede and Patzig are right and one should read αἰσθητικὸν (*Kommentar*, p. 210), the point is that, more specifically, beings capable of sensation must consist of a certain kind of matter. In any case, that natural or sensing beings necessarily consist of matter does not imply that matter must be part of their definition (*Kommentar*, p. 212). What belongs to the *object* of a definition need not have to be mentioned in the definition itself.

¹⁴ Frede and Patzig point out that the essence of a thing is not a feature or property (*Einleitung*, p. 44), and they claim that for Aristotle, the form of a natural thing is as particular as this thing itself (p. 48). Paradigmatic forms, however, are neither as universal as features or properties, nor as particular as concrete, spatiotemporal things. They are generic instances.

Recall once again that a change is natural insofar as it is governed by a principle of motion and rest that is implied by a proper account of the nature of the changing thing. We may now restate this as follows: Whether a change is natural for a thing depends on what the thing is, that is, on its paradigmatic form. The paradigmatic form of a thing determines the typical course of the changes that are natural for it. For instance, the change by which the beaver kitten turns into a mature beaver is natural for the beaver kitten by virtue of the paradigmatic form of beaver kittens. The beaver kitten "was to be" a mature beaver. Although it may not yet fully exemplify the features associated with this form, since it is not yet mature, "mature beaver" is its paradigmatic form, since for a beaver kitten it is natural to grow into a mature beaver. It need not be the case that a natural thing actually comes to be "what it was to be." A beaver kitten may fail to develop into a mature beaver. If this happens, it falls short of its own paradigmatic form. This shows again that the paradigmatic form of a thing cannot be a set of features it has: Nothing can fall short of its own features.

The paradigmatic form of a natural thing is what it is supposed to turn into as a result of its natural development. This means that the paradigmatic form of a thing does not change (*Metaphysics* Z8, 1033b5–8). What the changing beaver is supposed to be is clear all along, and *it* does not undergo any change. In this respect, the paradigmatic form is also not the same as the particular thing that actually undergoes the change. The paradigmatic form of a thing is what it comes to be in a natural change, but it is not that which changes and comes to be something. The paradigmatic form of a thing is specified by the definition of that thing, and the definition of a thing does not change when the thing changes.¹⁵

Hence, what a thing is, its paradigmatic form, differs from the particular thing itself in at least three respects. First, other things of the same type may share it, so that it is what other things are as well. Second, since the paradigmatic form of a naturally changing thing is what it is supposed to change into, things may fall short of their own paradigmatic form. The paradigmatic form sets a standard that the thing might fail to meet. Third, the paradigmatic form of a thing does not

¹⁵ We may refer to the changing thing (1) as a changing compound, (2) as that which has the potential of being the result of the change and remains present in it, or (3) as what it "was to be" (cf. Tugendhat, *TI KATA TINOS*, p. 74). Insofar as a compound is first in one and then in another state, it changes. Insofar as the same thing is potentially the result of a change, it does not change; since when the change has taken place, it still potentially is the result of the change. Finally, the paradigmatic form of a changing thing does not change, since its definition does not change. Hence, the matter and form that are involved in a natural change do not themselves change.

change when the thing changes. But in one sense the paradigmatic form is still what the thing is: it is not *this* particular, but still *a* generic instance of its kind.

IV. WHENCE THE CHANGE COMES TO OCCUR

Turning from naturally changing things to the changes they undergo, we may again ask *out of* what or *whence* they come to occur (ὅθεν, 194b29).¹⁶ That out of which a change comes to occur seems to differ from that out of which a thing comes to be, because changes occur in time. I have argued that when a thing comes to be what it potentially is, it remains the same in the sense that it still is potentially what it actually is. Like the beaver kitten, the mature beaver still potentially is a mature beaver. In contrast, the potential for a certain change to occur seems to be a potential that is used up when it is realized. When a change comes to occur, it goes through a number of subsequent stages, none of which need last throughout the entire change. Therefore, that out of which a change comes to occur does not seem to persist in the change. For instance, when a beaver is felling a tree, it is biting chips off the trunk until the tree falls, and we may say that biting chips off the trunk is potentially the same as felling the tree. It is that out of which the latter comes to be. However, when all chips are bitten off the trunk, this stage of felling the tree is over, and that which potentially was the felling of the tree lies in the past. For this reason, that out of which a natural change comes to occur may seem to be only the "first source" that initiated it (ἡ ἀρχή... ἡ πρώτη, 194b29–30).

But as we have already seen, when Aristotle speaks of the principle of motion and rest inherent in a natural thing, he is actually referring to that which determines what changes are natural for that kind of thing. Since he uses the same term, ἀρχή, both for this principle and the "cause whence," that out of which a change comes to occur may also be taken to be the principle that determines which changes are natural for the changing thing, rather than the impulse that initiates them. This principle persists throughout the change.

Consider further what a beaver is doing when it is building a dam. Obviously, it does not just kick off a process that would then run on its own. Rather, the beaver continuously keeps doing things that contribute to building the dam, and it keeps adjusting the movements that, for instance, the wood makes on its own. It does not simply initiate the movements that take place, but it directs them and thus causes them to be what they are. That out of which a change comes

¹⁶ Cf. *De Generatione Animalium* A18, 724a21–31: in some sense, the efficient cause is "that out of which."

to be what it is is not only its beginning. That which determines the natural course of the change is what the beaver keeps doing, in accordance with its nature, in order to make the change what it is.

Aristotle also identifies the “cause whence” of a change with the *agent* that brings the change about, or even with the agent’s capacity of doing so.¹⁷ This is really the same as above. For we cannot, in this context, separate an action from its agent and the agent’s capacities. What the beaver keeps doing determines the distinctive course of building a dam only insofar as it is in turn determined by the principle of motion and rest inherent in the beaver. Hence, any specification of the steps that are naturally involved in building a beaver’s dam must refer to the nature of the beaver. The same motions, when performed by an animal of a different kind, would not be governed by the same principle of motion and rest. Conversely, we cannot separate the agent from what it does. We may say that an agent causes an action; but of course, it is not the mere presence of the agent that causes the action, but precisely the agent’s initiative or activity that does so. A natural thing may be said to be that out of which a change comes to be only insofar as it acts (cf. *Physics* B3, 195b3–6). A beaver that does not change would not determine the course of any change.

What is commonly called the “efficient cause” of a natural change is thus at the same time (1) the agent that directs this change according to its nature and (2) what this agent does in accordance with its nature in order to do so. The agent is the efficient cause of the change only insofar as it acts, and the actions are the efficient cause of the change only insofar as they are governed by the agent’s innate principle of motion and rest. The same actions done by something else need not be the efficient cause of any natural change. In the end, the efficient cause is a changing thing that causes a changing thing, or what is the same: a change in a thing that causes a change in a thing.

Note further that by doing all the things that need to be done in order to build the dam, the beaver *is* already building the dam. We may point at the beaver while it is biting chips off a tree and say: “this beaver is right now building a dam.” The beaver does not perform the action of building a dam *in addition* to performing all the steps it involves. Hence in some sense, that out of which building the dam comes to be what it is is also the very same as building the dam. I have suggested, in the beginning of this section, that that out of which a change comes to be does not last throughout the change. This turns out to be

¹⁷ *Physics* B3, 194b30–32. In *Metaphysics* Λ3, Aristotle speaks of the moving cause (1070a21–2).

partly misleading. For any step that is involved in a change, there is a description under which it does indeed last throughout the change. For instance, insofar as biting into a tree already *is* the same as felling it, it lasts as long as felling the tree does. This result is similar to the one reached with regard to the changing thing. That out of which the beaver comes to be is that which potentially is the beaver, and that out of which building a dam comes to occur is that which potentially is the building of a dam. When the beaver has come to be, the same thing that potentially was the beaver is both actually and potentially the beaver. When building the dam comes to occur, the same change that potentially is the building of a dam is also an actual dam building. This analogy is encouraging, since it might indicate that the so-called "final cause" is what a change naturally comes to be when it occurs, just as the formal cause is what a thing comes to be when it develops according to its nature. Let me therefore turn to the final cause.

V. WHAT THE CHANGE COMES TO BE

Again, we should be able to take that out of which a natural change comes to be as given and ask *what* the change comes to be when it occurs. When a beaver is felling a tree and arranging its parts in a certain way, what the beaver is doing may be said to "turn out to be" or "turn into" the building of a dam. We may also say, on this basis, that the beaver acts *in order to* build a dam. What a change comes to be, or that into which a change turns, may therefore in a first approximation be taken to be its end, its direction, the resulting change itself, or that for the sake of which it occurs.

I have argued that the efficient cause of a natural change is not only an initial impulse. For the same reasons, that into which a change turns should not be taken to be only its final stage.¹⁸ For instance, if a beaver leaves out one of the initial steps that are involved in building a dam, what it does might not turn out to be proper dam building. The description of what a change turns into will thus involve an outline of the entire pathway by which its final stage is reached.

I have also argued that the formal cause of a thing, if it is that into which it is supposed to change, must be a compound. We see now that in a similar sense, what a change turns into should be taken to consist of several steps and stages. If the final cause of a natural change is indeed what it comes to be, it will not only include its final stage but a sequence of steps that are typically involved in changes of this

¹⁸ If the final cause of a change is not its final stage, the eternal revolution of the stars may also be said to have a final cause. Although this movement does not end, it still has a determinate shape and typical course.

kind. When Aristotle says that it is ridiculous to identify the final cause of a human's life with her death, this may well be what he has in mind (*Physics* B2, 194a30–33).¹⁹ For although death does indeed belong to life as its final stage, a complete life will typically involve much more than death. A human life naturally turns into a whole series of events, and not only into its end.

For similar reasons, that into which a change turns cannot only be its direction. The direction of a change is that into which it proceeds, but it does not determine its entire natural course. In *De Anima* B4, for instance, Aristotle refers to a change that has a direction but no final cause. The movement that fire makes is directed, primarily upward but also in all other directions, and it seems to be typical for fire to move in these ways. Nonetheless, the spread of fire has no final cause. This has nothing to do with whether the spread of fire has a *purpose* or not. What fire lacks in the first place is a limit (πέρας, 416a15–17). Since the Greek equivalent for “to proceed” (περαίνειν) derives from the same root as the word for limit (πέρας), the limit of a change may be taken to be the pattern according to which it proceeds.²⁰ We have already seen that in some sense, that according to which a natural change proceeds is the principle of motion and rest that arises from the definition of the thing that undergoes the change. The possibility that we are presently considering is that “for the sake of” really means as much as “according to.” A change may thus be said to occur for the sake of the limit according to which it proceeds.²¹ This is in fact what Aristotle says in *De Motu Animalium* 6 (700b13–6): The movements of living beings have a limit (πέρας), and this limit is that for the sake of which (οὐ ἔνεκα) they occur.

In *Metaphysics* Θ6, Aristotle claims that all actions that have a limit (πέρας) are only means to an end, and never themselves ends

¹⁹ Aristotle writes that wine does not naturally turn into vinegar, and that humans do not naturally turn into corpses (H5, 1044b34–45a6). Obviously, he cannot mean that it is not natural for humans to die. The reason why it is not natural for them to turn into corpses is that humans and their remains do not have a common nature and that therefore, a change from one to the other cannot be governed by one and the same principle of motion and rest. It cannot be natural *for humans* to end up being corpses because there is no time at which a human being is a corpse. The human being ceases to exist when the corpse comes to be.

²⁰ Cf. *De Partibus Animalium* 641b23–25; cf. James G. Lennox, *Aristotle: On the Parts of Animals* (New York: Oxford, 2001), p. 146. In the *Philebus*, Socrates also establishes a close connection between τέλος and πέρασ; cf. for instance 24B.

²¹ “Ἐνεκα may well mean “with a view to.” Cf., among many possible examples, Plato, *Gorgias* 493e (ἔνεκα τούτων = so far as this is concerned, on that score); *Politeia* 548d (ἔνεκα φιλονικίας = in point of conscientiousness); 582d (ἐμπειρίας ἔνεκα = regarding experience). That a process occurs ἔνεκα X may thus mean that it is to be assessed as typical or complete with a view to X.

(1048b18–19). On the face of it, this seems to mean that the end of an action is not its limit, and that to occur for the sake of an end is not the same as to occur according to a limit. But that an action is not an end does not imply that it has none; and the end it has may very well be the same as its limit. If the end is the same as the limit, then Aristotle is claiming that actions that *have* a limit *are* not limits (at least not their own). Actions with an end do not coincide with their end, since as long as they occur, the end has not been reached. By the same token, they do not coincide with their limit, since as long as they occur, the pattern according to which they occur has not been completed.²²

In *De Generatione Animalium* A1, Aristotle also suggests that the final cause of a natural change is its typical course as it is determined by the relevant principle of motion and rest. He tells us that “nature flees the limitless (ἄπειρον), for the limitless is without end (ἄτελές), and nature seeks an end (τέλος)” (715b15–16). The end that nature seeks when it flees the limitless should be the limit, and there is no reason for identifying this limit with a *purpose*. That nature seeks an end means that all natural changes have a limit, which is determined by the principle of motion and rest inherent to the changing thing.

That to be for the sake of something is the same as having a limit or determinate shape is also implied when Aristotle says in *Physics* B2 that all changes that *might* be due to thought are for the sake of something (196b21–22). The reason for this is that one could not possibly intend to do something entirely unspecific. We can only intend to perform an action when we know in advance what kind of action it will be (where a failed instance of a kind still counts as an instance of this kind). Hence, the things that might be done intentionally must at least have some typical and determinate shape according to which they are supposed to proceed when performed. If the final cause of a change is that according to which it proceeds, all and only such changes could possibly be intended that have a final cause. This however does not imply that a change is for the sake of something only when it is intended with a further end or purpose in view. Rather, we may only purposely intend to realize changes which already *have* a final cause.

I conclude that this is indeed how we should understand Aristotle. The final cause of a natural change is primarily the “limit” or standard

²² In Θ6, Aristotle distinguishes κινήσεις, which are complete only when they are over, from ἐνέργειαι, which may be complete before they are over. Ἐνέργειαι coincide with their own end: they may be both perfect, in the sense of complete, and ongoing. Ἐνέργειαι, however, are not natural changes. If they have a typical form, this form is more like the formal cause of a *thing* than the final cause of a change: it is the actualization of a potential that is still present in the result.

pattern according to which it proceeds.²³ This limit is the (ideal) course that changes of this kind typically take, and with a view to which they are called natural or unnatural. A change that could take any turn whatsoever without ceasing to be a typical and complete instance of its kind would not be an instance of any specific kind, and it would have no determinate shape. As Aristotle says, nature would “flee” such a change; that is, no such change could possibly be a natural one. And although only changes that proceed according to a certain principle may be brought about with a purpose in view, this does not mean that the final cause according to which they proceed is a purpose.

One might object at this point that Aristotle often identifies the final cause with a *good* or even the *best*.²⁴ Does this not imply that after all, the final cause is a good that is achieved by realizing a change? It does not; at least not in the sense that the good would be a further, external purpose. Rather, that the limit of a change is its final cause in the sense of a good or the best only means that it is the *best-case scenario* for that kind of change.²⁵ When the beaver bites into a tree in order to fell it, the best-case scenario is that the tree eventually falls. In this sense, that the tree falls is the best of biting into its trunk. Recall that for a beaver in that situation, biting into a tree *is* felling it. Hence, if felling the tree is indeed the “purpose” of what the beaver is doing, we must admit that this “purpose” also *is* what the beaver is doing. Hence in fact, the good that is achieved when a beaver bites into the trunk of a tree does not differ from what it does. It is not an external purpose. Accordingly, we may also say that felling the tree is the limit of biting into its trunk, and in a further step, we may say that this limit is the purpose for the sake of which the beaver bites into the tree. However, we may do so only because in this case, the “purpose” of what the beaver is doing is felling the tree, which is also what it is doing.

There is a simple reason why the limit or typical course of a natural change seems to differ from its final cause. Since we commonly already refer to changes in terms of their typical form, it will rarely be informative to state explicitly their immediate final cause. We would say, for instance, that the final cause of biting into a tree is the typical course that biting into a tree takes, and although this would be a true statement, it would not be worth our attention. It is certainly much more

²³ I do not claim that Aristotle always speaks of the final cause in this sense. I maintain, however, that the ways in which he uses the term are explicable in terms of this basic use. For instance, a process may have an *external* final cause, such that it happens “for the sake of” the “limit” of a numerically different process to which it typically contributes.

²⁴ See, for instance, *Physics* B3, 195a23–24: τὸ τέλος καὶ τὰγαθόν; 194a33: βέλτιστον.

²⁵ In the *Nicomachean Ethics* B6, 1106b29–31, Aristotle reminds us that the bad is a form of the unlimited (ἄπειρον), and the good of the limited (πεπεράσμενον).

informative to be told that the final cause for the sake of which a beaver bites into the trunk of a tree is the typical course that *felling a tree* takes. But nonetheless, since for a beaver in that situation, biting into the trunk of a tree *is* felling it, it remains true that the final cause of what it does is the course it typically takes. To say that the beaver does something in order to do something else is only to redescribe what it does.²⁶

We may also meaningfully say that a natural thing changes for the sake of its own nature. For we have already seen that the typical course of a natural change is determined by the principle of motion and rest inherent in the changing thing. Hence, when a natural change proceeds according to its final cause, the changing thing will also behave according to its paradigmatic form. This is what it means for both to be "good."²⁷ Since a natural change is a change that is natural *for* the thing that changes, we may thus also say that it is "best," in the sense of *natural*, for the changing thing to change in this way and not in another. In this sense, the final cause of a change is also determined by what is best for the changing thing. What is best for a thing is what it naturally develops into.²⁸

What is natural for a thing need not necessarily be pleasant for it. In some cases, it may well be "best" for a living being to suffer, namely in such cases where it is natural for it to suffer. In any case, we could not even determine what is beneficial for a given thing without already knowing what it is to be a "good" instance of its kind.²⁹ What is good for a beaver may not be good for a cat, since what it is to be a good beaver is not what it is to be a good cat.

So far I have argued that the final cause of a change is the limit according to which it proceeds. This limit is that with a view to which a particular change counts as a typical or atypical instance of its kind. Further, that with a view to which a change is judged to be typical is the course it would typically take. Since the final cause is the typical course that we specify when we say what kind of change it is, it is also the *essence* of the change itself, in the same sense in which the paradigm-

²⁶ The possibility of taking the aim of an intentional action to be that very action in a broader description has been pointed out by G.E.M. Anscombe (*Intention* (Oxford: Blackwell, 1957), §26), and Thompson (*Life and Action*, pt. II). I apply their insight to natural changes in general.

²⁷ As Wieland puts it, "βέλτιστον ... means the inner perfection of a thing ... ἄγαθόν or βέλτιστον is thus only a predicate that essentially applies to every τέλος as such" (*Die aristotelische Physik*, p. 264). I have already argued that the τέλος of a change is its limit.

²⁸ I should emphasize that I do not suppose that we may know what is natural for a thing *before* knowing what is best for it. Rather, knowing one is knowing the other and vice versa.

²⁹ Cf. Gotthelf, "The Place of the Good in Aristotle's Natural Teleology," p. 117. In *Physics* B7, Aristotle explains that he uses "better" *relative to a certain life form*: διότι βέλτιον οὕτως, οὐχ ἀπλῶς, ἀλλὰ τὸ πρὸς τὴν ἐκάστου οὐσίαν (198b8–9).

matic form is the essence of a natural thing. I will now argue further that, just as the paradigmatic form of a natural thing is a generic instance of its kind, the essence of a natural change is also a generic instance of its kind. The reason for this is that in general, there is no real difference between a change and the course it takes. When we observe a change taking its course we do not observe anything further beyond the change itself. That a change takes its course is not a further change that the first change undergoes. Hence, the typical course of a certain kind of change *is* a typical change of this kind. As a consequence, the present analysis of the final cause matches that of the formal cause given above. The paradigmatic form of a thing is what its definition defines, and although the object of the definition is not a mere form but a formed compound, it is not a particular instance of the defined kind. It is a generic and prototypical instance. Likewise, the final cause of a natural change is "what it was to be": not *this*, but *a* change of its kind. It is that which is characterized in its correct definition, and hence a generic and prototypical instance of this kind of change.³⁰ Moreover, I have argued that a thing may fall short of its paradigmatic form. In the same sense, a natural change may fall short of its final cause. This happens when it is interrupted before it is complete, or when it is completed in an atypical way.

This is why Aristotle can say, in *De Generatione Animalium* A1, that the formal and the final cause of an item are in several respects the same (715a8–9). The reason is, first, that the final cause is for the change what the paradigmatic form is for the changing thing. Both the formal and the final cause are accounts (λόγοι) of the entity in question.³¹

Second, since the typical course of a natural change is determined by the paradigmatic form of the changing thing, the final cause of the change is also determined by the formal cause of the thing. Conversely, since the ways in which natural beings change belong to their nature, the natural changes they undergo determine their paradigmatic form. The distinction between the form of a thing and the form of its natural development is to a certain extent an abstract one. It may often seem that there is exactly one mature form of a living being, and that this is the paradigmatic form. But for a natural thing to be natural is to develop and go through several stages, such that all of these stages belong to what it is to be that kind of thing. That is, a proper account of the

³⁰ I have argued that the efficient cause is not only an agent or an action, but an acting agent. For the same reasons, the final cause must include an agent. The paradigmatic instance of a kind of natural change must involve a paradigmatic instance of a changing thing. It must be a generic change of a generic thing.

³¹ Cf. also *De Anima* B4 (415b14–15) and *De Partibus Animalium* A1 (639b15–16).

paradigmatic form of a natural thing will include an account of its natural development.

Despite these similarities between final and formal causes, it should be noted that they also differ in at least one important respect. There might be a thoroughly perfect and presently existing natural thing. It is, for instance, at least possible to imagine a thoroughly typical and complete beaver. However, it is for conceptual reasons impossible to imagine a perfect and still presently ongoing change; for instance, a perfect felling of a tree. For to imagine a process is to imagine it as ongoing, and as long as the felling of the tree is going on, it is not yet over. But at least for such processes as felling a tree, to be complete would involve being over, so that this process cannot be complete before it is over. On the other hand, if it is over, it is not any longer going on. Moreover, for every stage of felling a tree, at least one other stage will not be going on at present. Therefore, it is impossible to imagine a perfect and yet presently ongoing felling of a tree. In this sense, the final cause of a natural change is *external* to any concrete instance of its type. The typical course of a kind of change necessarily extends beyond any of its particular instances. It includes what has happened before each present instant and what is supposed to happen after it. For instance, when the beaver bites into the tree in order to fell it, felling the tree goes beyond biting into its trunk. This is closely related to what I have said about the efficient cause: that it does not any longer seem to be present in the change for the sake of which it occurs.

Looking back at the efficient cause, we may now see that it is the same as the final cause in two respects. First, both the efficient and the final cause are in some sense that which determines the typical course that a natural change takes. The efficient cause is that which causes the natural change to be what it is, and the final cause determines what this change "was to be." Second, when the steps occur that are involved in bringing about a change, they *are* this change. Taking steps in order to fell a tree is felling a tree. In this sense, the efficient cause is the same as the change into which it naturally turns. On the other hand, the final cause of a natural change is also what this change is, since it is its essence. It is the typical course that changes of its kind take, and as I have argued above, this is the same as a generic, typical change of this kind.

The efficient cause also differs from the final cause, in the same sense in which the paradigmatic form of a natural thing differs from that out of which it naturally comes to be what it is. The efficient cause of a natural change potentially is this change, and the final cause is what the efficient cause potentially is: that into which it should turn when it proceeds according to the nature of the changing thing. The

final cause is what a change is supposed to be; and what a change is supposed to be is not *this* particular change, but *a* change of this kind. This means that the final cause of a change may be shared by several instances of the same kind. One natural change may be what another natural change is as well. Further, the final cause of a natural change does not *occur* as such when the change occurs (cf. *Physics* B7, 198b1–4). Again, we must not confuse the essence of a particular entity with that very entity. As has been explained above, the definition of a thing should not include a reference to a particular portion of matter. In the same sense in which the particular matter of a thing does not belong to its essence, the particular time at which a change occurs does not belong to its essence.³²

VI. CONCLUSION. AND SOME HISTORY

It should be fairly clear by now how the four Aristotelian causes can be brought into a system, and why a natural scientist must refer to all of them in her explanations, as Aristotle claims in *Physics* B7 (198a21–24). Since the proper account of a natural thing includes a principle of motion and rest, we can only understand what it is to be that kind of thing by taking into account in what ways such things typically change. Conversely, since a natural change is a change that is governed by a principle of motion and rest in the changing thing, we could not understand natural changes without also investigating the nature of the things that are involved. Further, as Plato points out in the *Timaeus* (for example, 47E), the student of nature must always ask two kinds of question about the object of her studies: “What is it for, or where does it lead to?” and “What is required or necessary?” The first question concerns what a thing or change is supposed to be and do, the second is about that which potentially satisfies such requirements. When investigating substances, the natural scientist must therefore investigate both their paradigmatic form and that which may come to realize that form, for instance their matter. When studying natural changes, the same questions take the form of the question about their final cause or typical course and the required steps that they typically involve. In each case, the two questions are complementary, just as the matter and the form of a thing complement one another. The efficient cause is for a change what the material cause is for a thing. The final cause is for a change what the formal cause is for a thing. Whereas the material cause is that which potentially is a natural thing, the paradigmatic form is what

³² There are, of course, events that essentially occur at certain dates, like Ramadan or Christmas. But the date that will be mentioned in their definition is a generic date. The case is analogous to the case of “functional matter” dealt with above.

it naturally comes to be; and whereas an efficient cause is that which potentially is a natural change, the final cause is what this change naturally comes to be.

The four causes may be, and have been, classified according to several different criteria; and while these criteria are sometimes similar to the ones suggested in this paper, they do not exactly match. Avicenna, for instance, distinguishes between external and internal causes. He says that the formal and material cause of a thing are included in its subsistence and are part of its existence, while the efficient and final cause are not (*Kitāb ash-Shifā'*, *Metaphysics* VI,1).³³ Avicenna's efficient cause, for instance, is an *agent*, and as such clearly distinct from what it causes. This distinction between internal and external causes may be combined with Avicenna's distinction between causes of reality and causes of existence. Since there is a distinction between a thing's existence and its reality,³⁴ there is also a distinction between the causes of its existence and the causes of its reality. Avicenna writes:

In its reality, the final cause is a reason for the rest of the causes to exist as causes in action; and in its existence, the final cause is a consequence of the existence of the other causes as causes in action. It is as though the reality of the final cause is the cause of the cause of its existence, and its existence the effect of the effect of its reality. Its reality, however, is not a cause unless it comes about as an image in the soul or something similar (VI,5).³⁵

This makes good sense in cases where the final cause literally is something like a goal in an agent's mind. The representation of this goal (its reality) causes the agent to bring it into existence, so that the existence of the goal state is caused by an action that is caused by the representation of this goal state. Causes of essence may thus be taken to be causes that operate via a representation or desire in an agent. For Avicenna, it seems, only agents who are capable of representing goals states can be efficient causes.³⁶

³³ G.C. Anawati et al., eds. (Cairo: Matba'a al-Amīriyya 1960), p. 258.

³⁴ Reality = *shay'īyya*, from *shay'* = Latin *res*. Compare the medieval notion of *realitas objectiva* as the objective content of an idea.

³⁵ Anawati et al., eds., p. 292; my translation. The Arabic words for "actuality" (*fī'l*), "efficient" (*fā'iliyya*), and "agent" (*fā'il*) derive from the same root.

³⁶ This is subject to several qualifications that I cannot discuss here. The word for "intention" (*ma'nān*)—which Avicenna uses in his *Kitāb al-Ishārāt wa-t-Tanbīhāt* II,4 (Forget, ed. (Leiden, 1892), p. 140)—may refer to the meaning or import of something; the word for "soul" (*nafs*) may also be used as a reflexive pronoun. Taking all this into account, one might be able to construe Avicenna as saying that all efficient causes must possess in themselves a certain directedness (instead of having an intention in their minds).

Aquinas, in his account of the four causes, follows Avicenna.³⁷ He claims, first, that all efficient causality necessarily involves final causality. For an efficient cause is necessarily a cause of something specific: what it causes must be of some determinate type and have a certain limit. Hence, there can be no efficient causality without final causality, just as there can be no actual matter without form. And since matter and form are relevant only when a thing changes, namely when the matter is shaped by an efficient cause such as to take on a certain form, the final cause is the most important of all causes. All this is compatible with the account of the Aristotelian doctrine given in this paper. Material and efficient causes are indeed necessarily causes *of something*, and what they are causes of are the paradigmatic form and the final cause, respectively.

However, Aquinas then goes on to argue that there can be no final causality *nisi ex intentione finis*, and that therefore, all efficient causation must be a sort of intentional action.³⁸ He writes:

That which possesses reason moves toward an end by itself, because it can freely determine its own actions, by use of its will and reasoning capabilities. That however which lacks reason tends toward its end by a natural inclination. It is, as it were, moved by something else and does not move by itself. For it does not understand the reason that is provided by an end and therefore, it cannot ordain anything to an end, but is only directed toward it by something else. In this sense, the whole of nonrational nature relates to God as a tool to an agent. (*Summa Theologiae* IaIIae 1,2 c.a.)

According to Aquinas, nonrational beings cannot move by themselves, that is, they cannot efficiently cause changes. He argues, following Avicenna, that all efficient causation involves final causality, and that final causes can only act by representing goal states to intentional agents. This implies that all natural changes must ultimately go back to some intentional action, performed either by human beings or by God (angels and demons aside). In the world as Aquinas depicts it, only rational agents can be efficient causes.

This is of course only a very rough sketch of two episodes in the history of Aristotle's division of causes. It may well be too fragmentary to be accurate. Supposing it is correct, however, there are two possible

³⁷ See *De Principiis Naturae* §3; *Summa Theologiae* IaIIae 1,2 c.a.; *Summa Contra Gentiles* III,1 §2.

³⁸ Again, an alternative reading is possible. As Paul Hoffman points out ("Does Efficient Causation Presuppose Final Causation? Aquinas vs. Early Modern Mechanism," (unpublished manuscript)), the *intentio finis* may simply be an inclination towards a certain end state (cf. *Summa Theologiae* IaIIae 12,1 c.a.). The passage from IaIIae 1,2 c.a. quoted above, however, clearly states that all directedness is due to a rational agent.

reactions to Avicenna and Aquinas. First, one may argue that there are no final causes in nature. But then, by the same token, there will be no efficient causes in nature. The laws of physics will only bring events under general laws, rather than offering causal explanations in any strict sense. This is in fact what many philosophers, from Hume to Russell, have suggested. Alternatively, one may point out that since there is indeed efficient causality beyond intentional agency, there must also be *final* causality in the absence of intentional agency. That is, if there are laws according to which certain events naturally result in other events, these laws will describe their final cause.

What one cannot do, within an Aristotelian framework, is to maintain that there are efficient causes, but no final causes in nature. This would be to sever the conceptual link between efficient and final causality, disregarding the fact that all efficient causes are causes of determinate movements and thus are necessarily complemented by final causes in the sense specified in the body of the present paper. That a cause is a cause of something specific means that it naturally turns into something specific when it occurs; and what a change naturally turns into is its final cause.

The first reaction, that there are neither final nor efficient causes in nature, has its obvious limitations when it comes to accounting for the behavior of living beings. This is of course what critics of Descartes have always emphasized, but it is rarely noticed that despite all such criticism, we remain Cartesians in that we still tend to assume that final causality must be confined to some "mental realm." The quite natural and harmless teleology that is involved when we classify natural things according to paradigmatic forms and when we expect a natural process to take a specific course has been mystified by the assumption that all teleology, not only of the kind reflected in human intentionality, is confined to the sphere of intentional actions. On the other hand, once we realize that the gap between natural things and intentional agents is not as radical as it seems, since paradigmatic forms and final causes may be found on both sides, we should have fewer problems with questions that have puzzled thinkers of the twentieth century, such as the nature of biological functions and natural kinds, or the demand for an entirely naturalistic account of the human mind. There is indeed hope for such a naturalistic account, since after all, naturalism need not defy teleology.

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