

## CHAPTER 4

### CAUSAL EXPLANATIONS IN THE SCIENCE OF NATURE

Natural science seeks the causes of motion. These causes are found in the nature of things and in outside factors. One baffling question is whether everything that happens has a cause, since some things happen by chance, which seems to be the absence of any rational explanation or cause.

**What is chance?** (Book 2, Lessons 7-10)

#### **Opinions on the subject**

There are two opposite extremes among opinions regarding chance. The first is to deny chance altogether and attribute everything to **determined** causes. Thus if a man went to market to buy a suit and there met a debtor who paid him an old debt, this encounter is attributed to good luck—yet it had a determinate cause: the deliberate intention to buy a suit, which was also the cause of finding the debtor. Thus chance as a cause is fictitious.

The opposite opinion is that **everything** happens by chance: Aristotle states that certain men stated chance to be the cause of the heavens and of all the parts of the world. And they said that the revolution of the world and all the consequent seasons and happenings on this earth are from chance. Thus Democritus held that from the concurrence of atoms movable of themselves the heavens and the whole world were constituted by chance.

A third opinion makes chance a divine reason which we cannot understand, something like divine providence. But the arrangement of things by God cannot be called chance, since such events are reasoned and ordered.

#### **Distinctions needed for defining chance**

Some things happen always or regularly in the same way, while other things, like having six fingers, are exceptional. Chance is something that is exceptional to the rule; since such exceptions occur, it is not right to say that everything is determined.

Regularity is a characteristic of things that happen by nature, since nature always acts in the same way unless impeded. Human behaviour, coming from free, will is not necessarily regular, but the will, like nature, acts for a purpose, unlike what happens by chance. Chance results are unintended and unforeseen in the case of volitional acts, and exceptional in the case of natural causality; both the will and nature are accidental causes of what happens by chance.

#### **Definition of chance**

Chance may now be defined as: “the accidental cause of exceptional or unintended results of choice or nature acting for another purpose”. Thomas uses “chance” as a generic term, and “fortune” (or “luck”) for unintended results of human choice.

Chance and fortune are termed **good** or **bad** according to their effect on people. Also, just as chance applies to something that **happens** without being intended, it can likewise be applied to what does **not happen**, i.e. to missing what was intended, as when we say someone worked in vain.

To what genus of cause is chance reduced? Since it pertains to what happens by nature or by intellect (and will), and these are causes “whence comes the beginning of motion”, chance is reducible to the **efficient** cause.

**Natural science demonstrates through all four causes** (Book 2, Lesson 11)

Chapter 1 noted how all four causes apply to natural science, and Chapter 2 defined each of these causes. As for the **material** cause, a scientist may demonstrate that because something is composed of contraries it will necessarily corrupt. As for the **efficient** cause, a scientist may demonstrate that as the sun's position moves to the north the rainy season comes, but as it goes back south the dry season follows. But both material and efficient causes can be impeded from having their normal effects, and the presence of these causes does not necessarily demand that their effects follow.

The **formal** cause is used in a hypothetical demonstration stating: "If such-and-such a thing is to be produced, then such-and-such material is necessarily required." As for **final** cause, a natural scientist may demonstrate that something is so because that is **more fitting**, for example, "The front teeth are sharp because they are better thus for biting food, and nature does that which is better." Nevertheless this does not mean that nature always does what is better absolutely speaking, but as befits the substance or nature of each thing—otherwise it would give every animal a rational soul, since that is better than an irrational soul.

### **Nature acts for an end** (Book 2, Lesson 12)

Nature is among the number of causes which act for the sake of something. And this is important with reference to the problem of providence. For things which do not know the end do not tend toward the end unless they are directed by one who does know, as the arrow is directed by the archer. Hence if nature acts for an end, it is necessary that it be ordered by someone who is intelligent. This is the work of providence.

Those who attack final causality reject the supposition that nature is always seen to do what is best and most fitting, e.g. that a foot is made the way it is for the sake of walking. Arguing against this they would say that the good or utility which comes about from an operation of nature simply **happens** (by chance), while the process itself is determined by the necessity of matter. Thus it is the necessity of matter whereby the sun's heat causes water to evaporate and become clouds, which later cool, condense and fall as rain. The rain may **happen** to fall on crops and help them grow, but it may equally well **happen** to fall on ripe grain and spoil it.

They argue the same way when speaking of the parts of animals: Front teeth were not made sharp and back teeth broad for the convenience of eating, but they simply **happened** that way and the utility followed.

To the objection that such usefulness follows always or for the most part, and as such must be intended by nature, they answer that in the beginning many non-viable forms came and went and only the fit survived.

They state that in the foundation of the world the four elements came together to constitute natural things, and there were many and various dispositions of natural things. Now wherever everything came together in just the way that is suitable for some utility, as if they had been made for the sake of this, such things alone were preserved—since they had a disposition apt for preservation not from any agent intending an end, but from that which is "per se in vain", i.e. from chance. Whatever things did not have such a disposition were destroyed and do not exist today. Thus Empedocles stated that in the beginning there were certain beings generated which were part-oxen and part-men.

After stating this position (the essentials of later Darwinism) Aristotle gives several arguments against "natural selection by chance":

- What happens always or for the most part (regularly) is not from chance.
- Nature always acts as though for an **end**. This is clear from the similarity between nature and art;

just as art proceeds towards a definite end with determinate means, so does nature. Thus medicine tries to imitate natural processes.

- The purposiveness of nature is most evident in animal behaviour, such as the activity of spiders and bees, which appear so intelligent. Yet they do not act from intelligence, but through nature, as is evident from the fact that they always act in the same way. For every swallow makes its nest in a similar way, and every spider makes its web in a similar way—which would not be the case if they were acting from intellect and art, for every builder does not make a house in a similar way, since the artisan is able to decide on the form of the artifact and can vary it.
- The form of a new life is the **end** of generation, and the nature of an end is that other things be done for the sake of it. Therefore the process of generation is for the sake of an end.

In reply to objections against nature's acting for an end, Aristotle declares:

- The “sins of nature”, such as monstrosities, are not evidence that nature is not purposeful, because (1) like art, the recognition of errors supposes that there is a right way for achieving a certain end. (2) The determined principles and determined order of development, as in the case of an embryo, indicate that nature acts for a determinate end. (3) Both animals and plants have their own specific seed to produce their like and not indiscriminate offspring.
- The **agent** and the **matter** are not sufficient reasons for the way a thing develops, because nature always proceeds from the same principle to the same end, unless there is some impediment. Just as when a man has a habit of going to a particular place at a particular time it is because of an abiding intention, such as to buy something, so the regularity of nature is for a specific purpose.
- The fact that nature does not **deliberate** is no argument that it does not act for a purpose, because even **art** does not deliberate.

The artisan does not deliberate in so far as he possesses the art, but in so far as he fails from the certitude of the art—whence the most certain arts do not deliberate, as the writer does not deliberate as to how he should form the letters. Even those artisans who do deliberate, once they have found the certain principle of the art, do not deliberate in carrying it out. Thus the harpist, if he should deliberate before touching each string, would be considered most inexperienced.

From this it is evident that not to deliberate occurs to some agents, not because they do not act for an end, but because they have determined means by which they act. Whence nature, since it has determinate means through which it acts, for this reason does not deliberate.

For in no other respect does nature seem to differ from art except that nature is an intrinsic principle, and art is an extrinsic principle. For if the art of ship-making were intrinsic in the wood, the ship would be made by nature in the same way that it is now made by art...

Whence it is evident that nature is nothing but a certain kind of art, i.e. the divine art, impressed upon things, by which these things are moved to a determinate end. It is as if the shipbuilder were able to give to timbers that by which they would move themselves to take the form of a ship.