The First Men Who Knew Everything

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- A Spiritual Exercise in Unfamiliarity -

The Cosmological Newcomer

Imagine how it must have been to be Nicolaus Copernicus. According to legend, the Polish astronomer lay comatose in his retreat in Frombork, Poland, when the first printed version of his work *De revolutionibus orbium coelestium*[1] was laid in his hands. He awoke, looked at his book, and died peacefully. The year was 1543, but most likely the astronomical work lay finished already in 1530. Its publication had been putt off for 13 years. Back in 1530, what did Copernicus feel as he put the final full stop to his manuscript? Was he satisfied at having brought the work to its conclusion? Was he relieved at finally having his giant labour behind him? Or perhaps he was suddenly afraid of the possible consequences that might follow publication? Copernicus certainly hesitated to take *De revolutionibus...* to print, but he was eventually persuaded by friends and colleagues. When finally the work was published, the first print run of only 400 copies failed to sell out. Low initial demand, however, had not been the largest of Copernicus' concerns; in fact, he had written the book in a very technical language with the intention that it would be read primarily by a very select group of people, namely his fellow astronomers. From these, Copernicus was hoping, the meaning of the book would disseminate into the rest of society. This strategy of peer appeal was a preemptive attempt

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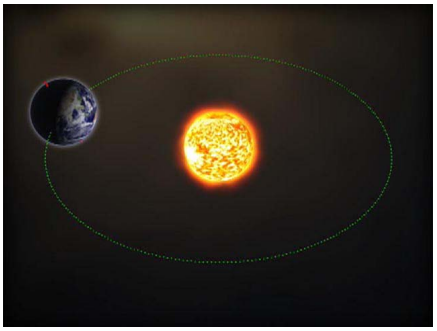
1 Meaning "On the Revolutions of the Heavenly Spheres".

to steer clear of the controversy that the novel and challenging ideas of *De revolutionibus...* might generate. The central proposal of *De revolutionibus...*, and that idea which we would eventually come to remember as one of the seminal events in the history of science, was of no less than cosmic dimensions. In *De revolutionibus orbium coelestium*, Copernicus moved the Earth and halted the Sun.



Heliocentrism[1], the theory that Copernicus offered to the world, is the astronomical model where the Sun is the stationary center around which the Earth and the other planets revolve. We might add, though, that the idea of heliocentrism, when it was presented in *De revolutionibus...*, was not, in fact, an entirely original idea[2]; but although it was not, the publication of Copernicus' work in 1543 nonetheless managed to cause quite a disturbance. For many centuries, the prevailing model of the universe had been that of geocentrism[3], which places the Earth as the orbital center of all celestial bodies, and during the ages this idea had become firmly cemented as scientific knowledge. To many of Copernicus' contemporaries, whose minds were accustomed to hard-and-fast schemas and conceived of the world, confirmed by the Holy Scriptures, as immutable, the idea of heliocentrism was completely incomprehensible.

Even before the publication of *De revolutionibus...*, rumors circulated about its central theses. Already in 1539, Martin Luther is quoted as saying: "Mention has been made of some new astrologer, who wanted to prove that the Earth moves and goes around, and not the firmament

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1 From Greek *hēlios* ("sun") + *kēntros* ("center").

2 The first known heliocentric model came many centuries earlier; it was presented by Aristarchus of Samos (310 BC - ca. 230 BC).

3 From Greek *gē* ("earth") + *kēntros* ("center").

of the heavens, the Sun and the Moon... . This fool wants to turn the entire art of astronomy upside down! But as the Holy Scriptures show, Joshua ordered the Sun, and not the Earth, to halt!" Copernicus was thus well warned that *De revolutionibus...* would be attacked with Scripture upon its publication. In 1542, he wrote its preface, dedicating it to Pope Paul III, a known scholar and astronomer, hoping to free himself and his work of any suspicion of heresy. But for all Copernicus' efforts, for *De revolutionibus...* there was much hardship to come. Starting already in 1553, Copernican teachings were condemned by the universities, and by 1620 *De revolutionibus...* would find itself on the Index of Prohibited Books[1]. Two centuries would pass before heliocentrism would eventually, and by the efforts of many later thinkers, replace geocentrism as our accepted understanding of astronomy.

The reactions to *De revolutionibus...* may in all fairness seem harsh; the critique it received may seem clearly biased and the arguments against the idea of heliocentrism may, to some, seem outright deluded. In the cosmological battle between heliocentrism and geocentrism, between Copernicus and the scientific community of the 16th century, we, in our age, would surely side with Copernicus. However, we should not forget that we are influenced by more than 450 years of scientific history, of paradigm shifts, of the cementing of ideas, of improvements on theories by the tidying up of their loose ends. We are already accustomed to the idea that the Earth revolves around the sun, not the other way around, and so we need no special convincing. The same cannot be said of the scientific community of the 16th century[2].

The Last Man Who Knew Everything

Science, before it shot out its many specializied branches with which we, today, are familiar (in so far as we can count them all), had a different appearance altogether. In the Renaissance,

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1 A list of publications that were deemed by the Catholic Church to be immoral or contain theological errors, for which reason they were prohibited. The list was announced by Pope Paul IV in 1559 and abolished by Pope Paul VI in 1966.

2 Thomas Kuhn asserts (in The Structure of Scientific Revolutions, 1962) that Copernicus' contemporaries were in fact quite right to dismiss his cosmology; at the time, it simply lacked credibility.

the general ideal of the learned was that of the polymath[1], someone who is not only very knowlegdeable, but whose expertise spans a great number of different subject areas. The road to achieving polymath ability was through the rounded, universal education; namely, by attending the university, where a student would be trained in a broad array of science, philosophy, and theology. Embodying the humanism of the Renaissance era, the polymath is a man that can do all things if he will.

Of all the remarkable polymaths, one is perhaps more remarkable than most. Athanasius Kircher[2], a Jesuit scholar, was both a linguist, a geologist, a music theoretician, a magnetist, an exegesist, a Sinologist, a botanist, a student of microorganisms and a medical thinker, was an accomplished illustrator, and is generally considered to have been the founder of Egyptology. Not the timid thinker, Kircher even went so far as to produce his own cosmology; the range of his knowledge was literally unearthly.

In more recent times, some have referred to Kircher, not without a trace of satire, as "The Last Man Who Knew Everything".[3] Let us look at how the satire plays out: on one hand you might say that Kircher was simply the last person who had the *opportunity* to know everything there was to know, more or less, as the total body of accumulated knowledge within the world of 17th century European academia was severely smaller in Kircher's day than it was soon to become in its massive expansion during the Age of Enlightenment. The other side of the satire aims a somewhat lower blow at Kircher himself: to some, Kircher only *thought* he knew

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1 From Greek *polumathēs* ("having learned much"), from *polu-* ('much') + the stem of *manthanein* ('learn.').

2 Born in Geisa, Buchonia, 1601 or 1602 (one of the few things of which he himself was not certain), died in Rome in 1680.

3 Others have also received this title: Gottfried Wilhelm Leibniz (1646-1716), Thomas Young (1773-1829), and Joseph Leidy (1823-1891), to mention some. Evidently we are fascinated by the idea of omniscient men.

everything. Even within his own lifetime, and especially during his later years, serious efforts were made by other scholars to debunk Kircher's results and to mock his foolishness. In his *De charlataneria eruditorium*[1] Johann Burkhard Mencke describes three different pranks played on the Jesuit scholar: the first involved a purpotedly Egyptian manuscript sent by one Andreas Müller to Kircher, which he translated without noticing that it was a forgery. The second involved the discovery of a stone figure on a construction site in Rome. Kircher was called to the site to authenticate that the figure was indeed antique, and he offered a "beautiful interpretation of the circles, the crosses, and all the other meaningless signs." In the third prank, Kircher received silk paper inscribed with Chinese-like characters. Unable to translate it, he expressed his confusion as to its significance to the bearers of the gift. With great delight, they held it up to a mirror and the following words appeared: *Noli vana sectari et tempus perdere nugis nihil proficientibus* ("Do not seek vain things, or waste time on unprofitable trifles"). But perhaps Kircher's learnings suffered its most serious blow in 1716, a year after the publication of *De charlataneria...*, when Gottfried Wilhelm Leibniz dismissed his famous interpretative translations of the hieroglyphs, which were based on the assumption that Ancient Egyptian was the language of Adam and Eve and could not be translated by words, "but expressed only by marks, characters and figures." The founder of Egyptology, Kircher's own translations of hieroglyphs were quite nonsensical.

A Journey in His Mind

The world maybe was smaller in the 17th century, and the rules of scholarly pursuit were not as rigid as those of modern science; still, how did Kircher, in the span of a human lifetime, manage to excel at so many different disciplines and amass such a huge body of knowledge? Ceaseless curiosity and an encyclopedic approach to reading were no doubt indispensable to his omniscience, but the Jesuit scholar was certainly also assisted by his own elastic imagination. It is not unthinkable that Kircher's imaginative ability owed some tribute to the Jesuit tradition of "Spiritual Exercises" in which a person seeks to discern the life of Jesus by imagining, through a set of meditations, what it must have been like to actually

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1 Meaning "The Charlatanry of the Learned", 1715.

have been in Jesus's sandals. By thus shifting his perspective simply through the power of imagination, the meditator would be able to reflect on his relationship to God in ways that would otherwise have been inaccessible. We see a rather similar method of attaining new insights reflected in Kircher's cosmology, the *Itinerarium extaticum coeleste*[1], which is written as an "imaginary voyage"; a literary genre that presents its narrative in the frame of a fictional travel account. In the *Itinerarium...*, Kircher, under the alias of Theodidactus[2], is escorted into the secret recesses of outer space by an angel who goes by the appropriately celestial name of Cosmiel. Together, the two dispel Aristotle's crystalline spheres and propel smoothly into yielding fluids of the infinite universe.

In the *Itinerarium exstaticum coeleste*, Kircher applied the power of his vivid imagination to explore an aspect (of astronomical dimensions) of the external world. Through his mind he sought to gain insight into a field of knowledge that was otherwise inaccessible to his earthly vessel. Now, for reasons that are perhaps obvious, one would assume that Kircher never applied this imaginative method to himself; that is to say, that Kircher never imagined being Kircher. But you might say that this is not exactly the case. In the late 1660s, Kircher, who was deathly ill to the point that his physician despaired of his recovery, sought permission to self-medicate and was allowed access to the Roman College pharmacy where he took a soporific potion of his own devising. The potion induced "a deep and most delightful dream that lasted the entire night". What did a sick, sweaty, half-delirious Kircher fantazise about in the late 1660s? Gaspar Schott, a disciple of Kircher, happily supplied the answer in "The Dream of Father Athanasius Kircher"[3]: "He dreamed that he had been elected Supreme Pontiff". In more familiar terms, Kircher imagined being pope. His dream was the fantasy of a world in his own image, a universal celebration of knowledge and faith from the heart of Rome, the Eternal City. In his waking life, Kircher had spent many years in Rome, advising popes and cardinals about obelisks and secrets, and he had more than his share of ideas about the nature of good spiritual leadership. At the core of Kircher's quest for omniscience, there was a strong conviction that the world would be a better place if knowledge perpetuated the

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1 Meaning "Ecstatic Celestial Journey".

2 Meaning "taught by God".

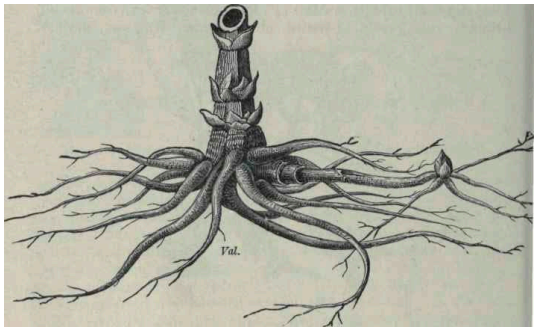
3 Published in 1667.

true faith. His dream of papacy is a testament to his vision that knowledge might transform the world.

Kircher, The Last Man Who Knew Everything, lived in a time of transition, and the new world that was taking shape around him during his later years was starting to look vastly different from the one he was familiar with. It is difficult to say what would have happened if Kircher's dream had come true; where we would be now if the world had been made in his image. But how might *our* world look through the eyes of Athanasius Kircher? Let us adjust our specula, shift our perspectives, and imagine that we were, all of a sudden, unaware of certain newer aspects of the world. Let us try to locate within ourselves a certain sense of unfamiliarity.

At the Center of Everything

Before the Sun stopped and the Earth began to move, the situation in the universe looked a little bit different. The familiar geocentric model that was standardized by the late Greek-Roman astronomer Claudius Ptolemy is so amiable in that it places us, the people of the Earth, at the center of everything. No doubt, the discovery of geocentrism must have been one of double thrill: both of the joy of scientific advancement in itself and of the confirmed importance of the Earth as the center of the cosmos. However, Ptolemy was not the one to actually discover geocentric thinking; as with any thought of great clarity there are roots that go much deeper. Obscured beneath the surface of the ground the rhizome spreads adventitiously; only on occasion does it develop its vertical shoots, which we may pick and celebrate.



The roots of geocentrism in classical antiquity go back at least some 800 years before Ptolemy. One early example of Greek geocentric cosmology proposed by Anaximander in the 6th century BC is the idea that the Earth is in fact not exactly a sphere, but is shaped, rather, like a section of a cylinder, which is then suspended at the center of everything. The celestial bodies, i.e. the Sun, Moon, and planets, are actually a concealed fire, which can be observed through holes in great, invisible wheels surrounding the Earth. Contemporary with Anaximander's model was another, held by the Pythagoreans, which proposed, contrarily, that the Earth was in fact spherical, but that it was not placed at the center of the universe; rather, it was in motion around an unseen fire. At some point between the 6th and the 4th century BC, we assume, these two models merged and the accepted cosmological notion among learned Greeks became that of a spherical Earth at the center of the universe.

However, when gazing out at the universe from its very center, Greek astronomers were baffled to observe how the other planets would seemingly slow down in their movements, stop entirely, and even move backwards. This was very strange, as the planets were supposed to be revolving around the Earth in perfect circles. So why would they not simply settle for their regular orbits? It was clear that the basic geocentric model would have to need some improvement. The credit goes to Ptolemy in the 2nd century AD for providing an explanation for these back-and-forth movements and thus removing the largest inconsistency between the geocentric model and empirical observations. In the Ptolemaic system[1], the deviations in the movements of the planets are accounted for in part by several unobserved, hypothetical spheres, around which each planet revolves in a smaller orbit, called an *epicycle*, while also circling the Earth in a larger orbit, called a *deferent*. In addition, the center of the larger orbit would not exactly be the Earth, but rather a point in space in its proximity. This manner of orbiting is indeed "eccentric"[2], as the planets revolve

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1 As described in Ptolemy's *Almagest* (meaning roughly "Great Work"), 2nd century AD.

2 From Greek *ekkentros*, from *ek* ("out of") + *kentron* ("center").

around some offset, empty point in space rather than the actual center of the universe, namely the Earth. But regardless, Ptolemy had managed to tidy up some of the loosest ends of early geocentrism.

So uplifted was Ptolemy by his improved geocentric model that he wrote an epigram, the only known venture into the realm of poetry made by the great cosmological thinker:

> Well do I know that I am mortal, a creature of one day
> But if my mind follows the winding paths of the stars
> Then my feet no longer rest on earth, but standing by
> Zeus himself I take my fill of ambrosia, the divine dish.

Perhaps Ptolemy really did enjoy his fill of ambrosia, the food of the Greek gods which bestows immortality upon whomever consumes it, for his ideas have surely left permanent ripples in our minds. His proclaimed apotheosis, his elevation to divinity, will maybe not appeal to those who are of a more modest nature; and some might feel that the idea of geocentrism, of placing ourselves at the very center of everything, borders on the megalomaniacal. However, as the epigram begins, Ptolemy is also but "a creature of one day". As his ideas survive and transcend him, his transient human body is returned to the Earth. Imagine the flow of time: that unbeatable torrent by which we are endlessly flooded. No matter escapes the cosmic deluge; even mountains disintegrate eventually, and we humans, frail organisms, scatter much more quickly and are soon lost in the sediments at the river bottom of time. Now, consider the following scenario: that we have, for the last 12,000 years or so, been in a geological epoch known as the Holocene[1], the second epoch of the Quaternary Period, which began about 2.6 million years ago. Comparatively, the species to which we belong dates only about 200,000 years. As a thought experiment conducted from within the limits of our organic frailty, imagine a geological epoch defined by the evidence and extent of human activities on the natural systems of the Earth: an "Anthropocene"[2], if you allow - an age even *named* after ourselves. How could we ever get there? What ambrosia would we have to eat? Indeed,

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1 From Greek *holos* ("whole") + *kainos* ("recent").

2 From Greek *anthropos* ("human being") + *kainos* ("recent").

wrapping his head around questions like these, the natural philosopher must sometimes feel a dizziness diffuse throughout his mortal body.

Cooking up Ambrosia

Imagine being a student of geology, the history of the Earth. As you study the strata, the layers of the Earth, you unfold a map of time, like the rings of a tree. The newer strata form superpositionally, on top of the older ones, so the further down you go, the further you go back in time. Through various kinds of sediments, layers of rock or chalk, of fossilized organic material, you try to read the stories told by the ancient strata. What did the world look like during the millennia of their formation? What events seperate the different types of layers? Well, in the geological time scale, the different parts of history, which are distinguishable from one another as significantly different strata, are seperated by major events of often diluvial[1] proportions, such as volcanic winters, ice ages, and mass extinctions. These kinds of events are game-changers; when they occur, they affect the systems of the Earth so significantly that they show up distictly in the strata. In other words, when speculating about an Anthropocene, we have to imagine a situation where humanity is able to affect or control the systems of the Earth to a very large extent. We would have to be able to make an "event-layer", so to speak, with a potential for long-term preservation. A direct way of creating such an event-layer, on a local scale, could be through urban constructions, cities, and various kinds of persistent deposits. But in order to create an event-layer on a larger scale, in order to "change the game", we would have to increase the effects of our activities to natural systems of huge proportions. Could we actually change the composition of the oceans or the air? Certainly,

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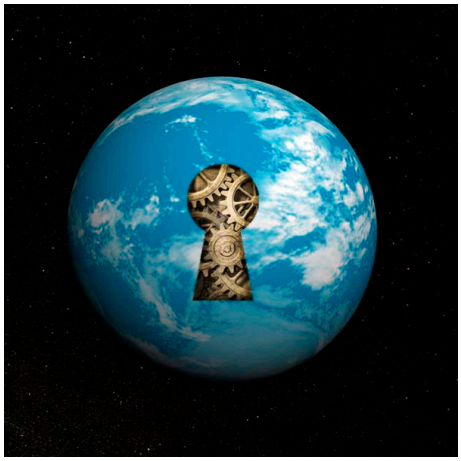
1 From Latin *diluvium* ("flood"), from *diluere* ("wash away").

to be able to challenge the elements, to even be on par with the water or the air, we have to bring turbulently expand our jurisdiction.[1]

Kircher also turned his mind to geology[2]; however, when it came to *the* diluvial event, the Great Flood, his focus lay not so much on the event itself, but rather on the vessel, the Arc. In his *Arca Noë*[3] Kircher gives a detailed account of the construction of the Arc, listing its dimentions, which species of animals were brought as passengers, and even going so far as to describe how excrement was stored in the bilge. Why was this interesting to Kircher? Well, Noah had built the Arc, that vessel for the world, on instructions from God, The Divine Mind who speaks in the perfect languange. Reconstructing the Arc was, to Kircher, an exercise in understanding God's intelligence as it was manifested through Noah, and an undertanding of His mind was a key to understanding the natural world as well.



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1 We have to emphasize that this is speculation. When considering the hypothetical criteria for any new geological epoch we come across a central problem: there is a very considerable delay in the way in which the Earth tells its geological history. What takes place on the surface of the Earth does not immediately show up in the strata; it takes thousands of years for the various layers to form, and for them to become significantly distinguishable. Therefore, a geological epoch defined by human activities would not yet be identifiable.

2 See especially his *Mundus Subterraneus* (meaning "Subterranean World"), 1664–1678.

3 Meaning "Noah's Arc", 1675.

The Question of the Question

The sphere that we inhabit generously provides circumstances that are most beneficial to our existence. As Aristotle puts it: "If one way be better than another - that, you may be sure, is nature's way." And yet, these circumstances in turn require that we walk a more or less determined path through life: we are, for example, dependent upon certain resources such as water, food, air, and reproductive talent. Straying too far from this path would, unfortunately, lead to our natural demise; however, the very exercise of human intelligence surely encourages some inquisitive deviations. Indeed, imagine if, somehow, it were possible to simulate the natural systems of the Earth; or, in other words, through the ability of human intelligence to exercise complete mastery over the circumstances to which we are bound with our lives. We may be tempted to search for an uninhibited path, one where we could be free from our natural confinements. But is there even such a path in life that does not lead through nature? And if we wish to walk it, how should we progress? In order to find the answer to this riddle it is pivotal that we know how to look. In antiquity we trace two fundamentally different types of inquiry that are both most central in their own right: the first is to ask oneself "What earlier circumstances came *before* these?", the other is to ask "What *purpose* do these circumstances serve?" The first, which we might call the *mechanistic*[1], is concerned with explaining phenomena in purely physical or deterministic terms and prefers to base its explanations on empirical knowledge, whereas the other, which we can call the *teleological*[2], is concerned with the final causes of things and explains phenomena as the process of arriving at these causes.

To better convey the former, the mechanistic approach, we might look at an early example: the old idea of atomism.[3] In his didactic poem *De rerum natura*[4], Lucretius, the Roman poet-

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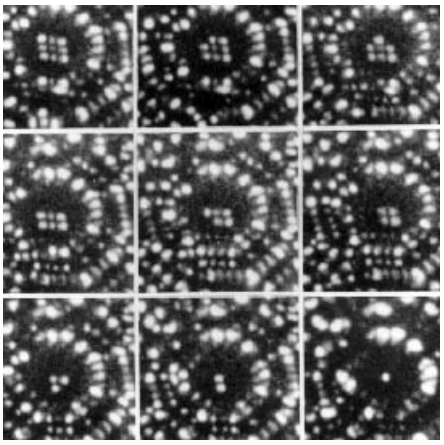
1 From Greek *mēkhos* ("contrivance"/"machine").

2 From Greek *telos* ("end") + *-logia* from root of *legein* ("to speak").

3 As developed in the West by Democritus in the 5th century BC.

4 Meaning "On the Nature of Things", 1st century BC.

philosopher, relates to us how atomism works by posing the encouragingly simple question: "*Why has everything in the world not yet decayed?*" It requires no cutting-edge technology to observe that all materials are subject to irreversible decay; organic materials decompose, rocks can be worn down by water, things can get mixed up and will not so easily seperate again. And yet, we see in nature that there are mechanisms to recreate "pure" materials, such as water, air, metals, etc. Seemingly, materials possess some inherent quality that allows them to somehow be demolished and rebuilt. How is this so? The solution proposed by atomism is the existence of certain indivisible "building blocks" of nature, namely the atoms, which are so small as to be invisible to the human eye. Furthermore, the atoms have various properties which affect the larger structures they compose, those that are available to our perception. For example, iron atoms are strong and have hooks that lock them into a solid whereas water atoms are smooth and slippery. The manifestations and characteristics of materials like iron and water, then, are the result of the properties of the atoms of which they are composed. Now, atoms themselves are, of course, very, very small, but the scope of the idea of atomism is indeed grand, for it allows us to consider that the universe is composed *mechanically*; which is to say that the world we see around us is in fact somewhat accidental – it is simply the current result of an immense complex of natural mechanisms that have no inherent purpose as such (or at least, some argue, if they do have a purpose it is "beyond the ability of human perception and understanding to judge"). Then, in order to understand the workings of nature, and in order to progress, we need to study its mechanisms, we need to study only what is tangible.



Teleology, on the other hand, holds that final causes exist in nature; it looks to the purpose of phenomena to explain *why* they are occurring. It may seem peculiar, but in a sense teleology will "go further" than mechanism in explaining the world. For example, mechanism, when looking to previous circumstances to explain occurring phenomena, might be able to identify some minimal unit, say the atom, as the most primary reason, but if there is anything beyond this unit, if the very smallest thing in the universe is the result of some previous circumstance,

then it is beyond the scope of mechanism to explain. Teleology, however, if introduced to the idea of the smallest possible, indivisible unit, would still be able to ask: "Well, where did this unit come from?" To teleology, it would be very strange indeed if there could not exist a reason even beyond that which is observable; if the mechanistic mode of explanation stops at the smallest unit, then obviously natural mechanisms alone do not sufficiently provide the answers to our questions. In other words, it would seem that there must be something which is primary to and seperate from even the most basic natural mechanisms; some creative instance that is not a part of nature, but is its cause. Now, being a part of nature ourselves, we have no direct access to observe this cause; our only means of approaching it is by trying to understand its reflection, the natural world. So, what we are lead to ask is: To what end does the natural world behave like it does? How do the purposes we see in nature reflect that which is beyond it?

Watching the Watchmaker

So, what direction should we choose for the future: that of mechanism or that of teleology? What are their uses, and to whom, so to speak, should we pose their questions? And who are we to ask? As we have seen, mechanism proposes that natural phenomena, such as the existence of inorganic materials like iron or water, are governed not by some inherent will or purpose, but are, simply, the accidental outcomes of natural circumstances. It could seem plausible that a mechanistic approach to nature would aid us in uncovering its mysteries. We would have to deal, simply, with what is tangible, what we can observe, and that could take us anywhere. And who is to say that mechanism should limit our study to the realm of inorganic materials? What would happen if we were to bring living organisms into the mechanistic light? By the force of our will, let us try to imagine that all of nature, including the organic domains of creatures and plants, is merely the necessary outcome of certain natural circumstances. What are then these circumstances? Surely, the complexity of the structures of living organisms are incomparable to those of inorganic materials, and yet, organisms can obviously only be composed of the available natural building blocks. Without question, organisms and inorganic materials differ from each other in some fundamental way, but how *are* they actually different – what circumstances prevent them from being the

same? Surely things would be simpler if they were. In speculum, let us suppose that there were some special component necessary to the formation of living organisms, which was somehow installed in the organism itself already at the very point of its conception. An "instruction", or "codex", if you will, for putting together building blocks in a very particular way, ensuring that the outcome, the total composition of building blocks, is not something like a rock or a body of water, but is more complex, an organism – and an organism with a very specific set of characteristics; not a giraffe[1], if borne by a camel and a leopard. But let us ask, why do camels and leopards not mate to produce giraffes? Well, supposing that they do not, the logic of teleology would say that such a phenomenon does not occur because it would not serve any purpose that would be supplement to achieving any final cause. What we see is camels joining with other camels to reproduce more camels, and leopards joining with other leopards to reproduce more leopards; as opposed to the camel and leopard interspecies scenario, reproduction within singular species, as confirmed by the fact that it occurs, evidently correlates with the inherent purpose of nature (if, of course, nature is on the right track). We could imagine, for example, that camels simply like other camels, like leopards like leopards, and therefore both species want more of the same; or, to give another example, that it would be very confusing to everybody if anybody could give birth to anybody. Mechanism, on the other hand, if it were introduced to cross-reproduction between camels and leopards, would probably be surprised, but then it would start looking for plausible explanations for the phenomenon in preceding circumstances. However, if it has not yet had the opportunity to make such an observation, mechanism would assume the normal occurrence of very close resemblance between the characteristics of parent and offspring organisms to be a matter of, it goes without saying, natural mechanisms. Some mechanisms that allow organisms to reproduce their own characteristics rather precisely in their offspring is somehow passed on from each generation to the next. Supposing, of course, that one generation actually manages to produce a new one.

1 Also known as the *camelopard* from *kamēlopardis* from *Greek kamēlos* ("camel") + *pardalis* ("leopard").

Let us look at the beaver.[1] Part of the beaver's plan[2] is to build a dam; in fact, without its dam, the beaver would probably be very bad off. The dam gives protection from predators like coyotes, wolves, and bears, and it also serves as the beaver's flood control, a way of preserving the wetland habitat in which the beaver thrives. The dam is, in other words, a very important part of the beaver's plan to survive and reproduce. Without it, the beaver would be the rodent version of a sitting duck; an unintimidating slab of nutrition who would soon be overcome by its natural predators and fall out of the race altogether. It may seems apparently perplexing, however, that the mechanistic beaver's plan, which is conceived by no will and must operate by natural mechanisms alone, relies to such an extent on something that the beaver *makes*, namely the dam. Surely, making something, and not least doing it right, means that you have to know what you are doing, does it not? Well, this beaver does not have the ability to know what it is doing. It is a combination of building blocks that could just as well have been put together differently and situated in many different, unforseen places – if it weren't for a "codex". In other words, it is the reproduction of the codex, the natural mechanism that is primary to the construction of the beaver, which is of the most principal importance; it is a premise of the beaver itself. If the beaver had a mind, and if that mind were capable of doubting, then the beaver would consult the codex with many questions. It would ask for instructions on how to build a good dam, how to grow a strong tail, how to catch many fish, and so on, and the codex would provide the answers. As it is, however, the beaver neither can nor needs to ask about these things, and the codex neither can nor needs to answer; there is, in other words, no interested communication between the two, and there could not be, because neither have the wit to think. The beaver is not the only one submerged in oblivion; it is joined by the disinterested codex. Like the beaver does not think when building a dam, the codex does not think when building a beaver. It simply does what it does. To stay in the game, the codex does need to build a "good" beaver, a set of characteristics that are suitable to reproduce the codex itself, but it pays no consideration to *how* the beaver is built; if the beaver must rely on dams to survive, then that is simply how it is. To the unwitting codex, there is no essential difference between a beaver and a dam. It is simply a matter of "whatever works".

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1 The beaver is a pious animal that, if it is hunted and has no chance of escape, bites off its testicles and throws them to its pursuer, whereby it is spared.

2 Apparent teleology is often useful for explaining animal behaviour.

Similarly, we might add, mechanism, because it concerns itself with disinterested, accidental occurrences, also succeeds by the premise of "whatever works" – whatever explanation that (for whatever reason) seems most plausible gains adherence. Even the seemingly most bizzarre phenomenon has its seemingly *most* plausible explanation in preceding circumstances.

But what, then, of humans? Let us attempt to follow another lead from Lucretius' *De rerum natura*: "Nothing in the body is made in order that we may use it. What happens to exist is the final cause of its use." According to Lucretius, the matter seems simple enough: the human organism, everything in the human body, is determined as the result of circumstances that preceded it. It has not been made *for* us; it is accidental. But what of all the things *we* make? Humans might not be among the strongest, fastest, or most durable of livings creatures, but we are exceptionally good at making things, some of which permit us to stay in the game, others of which have more dubious uses. It is not without an element of pride that we behold our greatest inventions, and we are prone to think with a special appreciation of those people who able to conceive of them. Their minds impress upon us a notion of limitless conceptual possibilities, not least because they appear to vastly outperform our own. A mind without limits; what would Lucretius have to say to that? Would he argue that the only limitless thing is the extent of natural mechanisms? Then, as with the beaver's dam, all that we make, all that of which we conceive, would derive from natural mechanisms. Humanity is running off a program, the codex, which determines even our ability to think. Supposing that this is truly the case, we might certainly feel somewhat stripped of our free thought, our minds invaded by natural mechanisms, as it were. But it is an endless loop of repetition to predict one's next thought as determined by nature (e.g. "What will nature have me think next? What

will nature have me think next?...” ad infinitum); so let us not be distracted by the sound of that broken record. Consider instead: if indeed our very ability to think is determined as the outcome of natural mechanisms, then the same mechanisms must have determined our very conceptualization of them. It is difficult not to appreciate this irony; for example, people like Democritus or Lucretius, whom we think of as prominent advocates of mechanism, we also consider to be great *thinkers*. The point might very well be that it does not particularly matter if our ability to think is in fact determined by natural mechanisms – it is still there. The ability is ours regardless.

Given the right circumstances, we can really put our minds to something. We have the relative freedom to direct our thoughts towards animals, towards philosophy, towards pleasure etc. – even all the way towards nothing. We are at least somewhat conscious and capable of pursuing end purposes, our own or common interests, and are not just limited to the reproduction of a codex. This freedom of choice, the drive towards end purposes, is the “will” that teleology would ascribe to nature also, and that mechanism would certainly not; it is a central object of disagreement between the two. But what if we, for a moment, forgot about that disagreement; what if we assumed that it does not particularly matter if nature is truly driven by end purposes? As we have already indicated, the cause of the human mind, the question of whether our ability to think and to exert our will is determined by natural mechanisms, is not necessarily of great importance to that actual ability. What if the same can be said of nature? If the beaver is at any level of consciousness *aware* of constructing its dam, and if dam-construction is then an expression of how the beaver consciously whishes to spend its time, then should we not just let the beaver do as it pleases? Well, for the sake of speculation, let us try to imagine a scenario where that is somehow not an option. Here, the hypothetical “Anthropocene” might serve a purpose. Suppose that we ever reached that stage of geological history where human activity would be the deciding factor on the natural system of Earth, where the extends of the human mind permeates through all of nature. In such a scenario, what would be the key to understanding nature, if not to understand ourselves? Do we understand ourselves?