

‘...from this fountain [the will of God] it is that those laws, which we call the laws of Nature, have flowed.’ Roger Cotes



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The Christian Roots of Laws of Nature

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SUMMARY

The search for the laws of nature is routinely seen as a central task of science. This way of presenting the scientific enterprise arose in the 17th century, with Descartes and Newton being the most influential figures in this regard. The founding fathers of modern science self-consciously appealed to the Creator God in order to ground the idea of laws governing nature. Here the biblical background for the early modern concept of laws is examined. The link between the idea of creation and two leading features of laws of nature, as used in modern science, is also discussed: their mathematical form and the importance of experimentation in their discovery. Thus the question arises: Can laws be understood without reference to a divine Lawgiver?

Laws of nature in early modern science¹

The search for the laws governing nature is a central feature of modern science. It is most pervasive in physics, often seen as the most fundamental science: physics textbooks typically open with Newton's three laws of motion. But other sciences have their laws also: Mendel's three laws of inheritance in biology, or Proust's law in chemistry. The frequent use of the metaphor of laws of nature during modern times is in stark contrast with earlier periods of history. Only two or three instances have survived of Greek pre-Christian sources which employ the metaphor of law resembling the modern sense². Although the metaphor is sometimes found in Roman (particularly Stoic) and medieval sources, it is not until the scientific revolution in the 17th century that laws of nature become a stock expression in scientific contexts.

The founding fathers of modern science appealed to laws of nature against the older Aristotelian-inspired appeal to the substantial natures of things. Decisive in the introduction of law-talk into the emerging science were two figures: Descartes and Newton. Descartes, in his *Principia philosophiae*, called the three fundamental rules at the basis of his mechanistic kinematics, "the first laws or principles of nature".

¹ A parallel account of the emergence of the early modern concept of laws of nature is to be found in: Peter Harrison. 'Religion and the Rise of Science', *Faraday Paper* 21.

² Ruby, Jane E. 'The Origins of Scientific "Law"'. *Journal of the History of Ideas* 47, no. 3 (1986), p. 354 (art. pp. 341–59, doi:10.2307/2709657).

In the treatise *Le Monde*, which he wrote in the early 1630's, but which was published after his death, Descartes invites the reader (in chapter 6) to imagine a world in which the behaviour of material things can be described in geometric terms, but which would be entirely devoid of form in the scholastic sense of the word. The goal of this exercise is, of course, to convince the reader that such a world is not imaginary, but is the very world in which we live. The laws of nature, attributed to the divine Lawgiver are sufficient:

For God has so marvelously established these laws, that while we had supposed that he creates nothing more than what I said, and even that he put in this neither order nor proportion, but that he composes Chaos, the most confused and the most tangled that the Poets could describe: they are sufficient to cause the parts of this Chaos to untangle themselves, and ready themselves in such good order, that they will have the form of a very perfect World, and in which one sees not only Light, but also all the other things, from the general to the particular, that inhabit this real world ³.

Newton, at the beginning of his major work, the *Principia* (1687), writes: "The moderns, rejecting substantial forms and occult qualities, have endeavoured to subject the phenomena of nature to the laws of mathematics" ⁴. This work, with its three laws of motion and the law of universal gravitation, founded "classical" physics, and set the paradigm for any successful science. Once again, the laws of nature are seen as grounded in creation. In the preface to the second edition (1713), Roger Cotes, acting as a spokesman for Newton, affirms that "from this fountain [the will of God] it is that those laws, which we call the laws of Nature, have flowed" ⁵.

The introduction of laws of nature, in place of Aristotelian categories, is more than a change in

vocabulary. In Aristotelian-inspired natural philosophy, change must be explained in terms of properties of entities considered individually, as substantial forms are individual categories, based on the inherent properties of things. A physical account in this framework can only use local conditions and local interaction. Despite the search for local explanations by many early scientists, the science that emerged gives centre stage to forces of interaction that depend on the relative distance between two objects (as in Newton's law of gravitation).

Laws of nature and biblical monotheism

The leading figures in emerging modern science were Christian theists. When pressed to explain how non-rational beings can obey the laws of nature, they explicitly appeal to the omnipotence and the wisdom of the Creator. The framework of biblical monotheism leads to a conception of natural order with a distinctive flavour. Given that the Creator is all-wise, he created an ordered universe. Given that he is all-powerful and has no rivals, the order which he has created applies universally and without restrictions.

Biblical language lacks the technical rigour utilised in the modern sciences. (One can argue that this is deliberately so, in order to allow people from all ages and all walks of life to understand the message.) Nonetheless, the biblical canon contains striking portraits of the universal and beautiful natural order set out in creation. This is particularly true of its first part, the Hebrew Bible. In these texts, legal metaphors are used quite frequently.

From the very first page of the Bible onwards, faith in the all-powerful and wise God gives the biblical writers the assurance that they live in an ordered world. In the midst of adversity, the believer finds comfort in the unchanging natural order, guaranteed by God himself: "Forever, Lord, your word is established in the heavens. Your faithfulness endures from

³ *Le Monde ou Traité de lumière*, [163?], *Œuvres de Descartes*, ed. Charles Adam, Paul Tannery, Paris, (Paris : Cerf/Vrin, 1909), vol. XI, pp. 34f.

⁴ *Mathematical Principles of Natural Philosophy*, preface to the 1st ed. (1686), transl. Andrew Motte,

rev. Florian Cajori, (Berkeley: University of California Press, 1934), xvii.

⁵ *Mathematical Principles of Natural Philosophy*, xxxii.

generation to generation; you founded the earth and it holds firm. Because of your judgements, they remain standing even today; for the whole universe is your servant" (Psalm 119:89-91) ⁶. The laws that the Creator gave to natural phenomena are even described quantitatively:

He determined the weight of the wind,
And fixed the measure of the waters.

When he determined a law for the rain
And a trajectory for the lightning and thunder,

He saw wisdom and rendered it manifest,

He established it and sounded it. (Job 28:25-27; cf. 38:25) ⁷.

Of specific interest are several passages which stress the limits imposed on the sea as well as the laws that even the waves must obey. Thus speaks Wisdom personified, in the book of Proverbs:

The Lord possessed me at the beginning of his activity, before his most ancient works. [...]

When he made firm the skies, I was there, when he traced a circle on the surface of the abyss.

When he strengthened the clouds from above, when the springs of the abyss showed their power.

When he established his order for the sea, that the waters might not disobey his commandment, when he arranged the foundations of the earth.

⁶ The translation of the biblical texts is mine, from the original texts.

⁷ McLeish, T. Faith and Wisdom in Science. Oxford :OUP (2014), ch. 5, provides a contemporary illustration of how an eminent physical scientist could find in Job remarkable reflections on God's relation to the natural order, and even a series of questions that presage those asked by scientists today.

⁸ For a detailed study of the biblical texts on natural order, with specific attention paid to the texts using legal metaphors, see Lydia Jaeger. *Einstein, Polanyi and the Laws of Nature*, West

Then I was before him, like a master workman; I was daily his delight, rejoicing before him always.

(Proverbs 8:22+27-30; cf. Jeremiah 5:22; 31:35-36; Psalm 104:9; Job 26:10; 38:8-11)

In the cultural setting of the Hebrew biblical texts, the sea often symbolises the forces of chaos. God commanding the sea amounts to the universality of his created order. Certain biblical passages explicitly express the conviction that the laws of creation are universal, such as Psalm 119, cited previously: "Because of your judgements, they remain standing even today; for the whole universe is your servant." (Psalm 119:91; cf. Jeremiah 33:25; Psalm 148, using the process of enumeration) ⁸.

In the biblical texts, there is no conflict between God's sovereignty and natural order. Natural order expresses the Creator's faithfulness and wisdom. Interestingly, this does not lead to occasionalism, the view that God alone has causal powers, laws of "nature" being no more than divine "habits". In the biblical view, nature has its own functional integrity. As the Creator, God upholds the whole of creation and its order *as order*. Jack Collins has made a detailed exegetical case in order to show that the biblical authors distinguish between the ordinary course of nature and special divine action ⁹.

The biblical writers did not derive their conviction of a universal natural order from observing nature alone – their rudimentary understanding of the world around them did not allow them to infer the lawful character of, for

Conshohocken (PA): Templeton Foundation Press (2010), pp. 139-170.

⁹ C. John Collins, "Miqreh in 1 Samuel 6:9," *The Bible Translator* 51 (2000), pp. 144–147, points out that the use of the word *miqre(h)* ("coincidence," "chance") presupposes this distinction (with even an experiential test set up by the Philistines, in order to discriminate between a natural and a miraculous happening). For a fuller discussion, see Collins, John C., *The God of Miracles: An Exegetical Examination of God's Action in the World*. Wheaton, IL: Crossway, 2000.

example, meteorological phenomena (which even today can escape long-term predictability). It was their faith in the one, transcendent God which grounded their conviction of the universality of the created order. It led them to “see the universe as a unity, organized and internally related in all its parts, and permeated as well by a single will” ¹⁰.

Mathematical laws in nature

Biblical theism provided the backdrop against which the modern notion of laws of nature took shape in the 17th century. The pioneers of modern science appealed to the Creator-Lawgiver for their belief in laws obeyed by nature. The distinguished sinologist Joseph Needham even defended the thesis that this belief was one of the major reasons why modern science emerged in the West, rather than in the culturally and technically more advanced China. Obviously, many factors came into play in the scientific revolution, and it would be wrong to offer an exclusively religious belief-based account. Nevertheless, it can be conclusively argued that “the idea of mathematical laws of nature ... is unique to the early modern West and is underpinned by theological considerations that arise out of Western monotheism” ¹¹.

The Christian natural philosophers such as Descartes gave a mathematical form to the laws of physics (an ideal to be aimed at in other sciences as well) and directly linked the mathematics to the universal natural order which the omnipotent and all-wise Creator had established. The English philosopher and historian Robin Collingwood went so far as to write that “the possibility of an applied mathematics is an expression, in terms of natural science, of the Christian belief that nature is the creation of an omnipotent God” ¹².

Galileo is famous for claiming that the book of nature is written in mathematical language. This

was a clear break with antecedent scientific practice. Aristotle had argued that each science should be built up deductively from its own fundamental principles. This excluded the use of mathematics in “natural philosophy”, the realm of causal explanations. Mathematical methods could be used in so-called “subalternate sciences”, meaning scientific disciplines which applied mathematical tools to their subject matter, as for example astronomy, optics, and mechanics. From the 16th century onwards, these disciplines were known as “mixed mathematical sciences,” of an inferior status to natural philosophy. They used rules framed in mathematical language (as the rules of refraction and reflection in optics); these were, however, more akin to calculation tools than to universal laws of nature in the modern sense. In astronomy, such mathematical rules lent themselves to an instrumental reading, as all efforts continuously failed to provide an account of Ptolemaic (and Copernican) astronomy in terms of principles derived from Aristotelian philosophy of nature. As long as one stuck to the Aristotelian framework, it was impossible to consider that they provided a description of how the world was “in reality”. The title of Newton's magnum opus *Mathematical Principles of Natural Philosophy* was therefore revolutionary at the time.

The re-emergence of a Christian Platonism at the Renaissance certainly helped to pave the way for the modern concept of laws of nature. Nevertheless, Plato himself had taught that mathematical forms are only imperfectly realised in material objects (*Timaeus* 50b, 53b, 56c). But early modern scientists referred to God's omnipotence and wisdom, which allowed him to create a natural order that perfectly reflects his will. Kepler defended himself along these lines in *The Secret of the World*:

¹⁰ Walter Eichrodt. *Theology of the Old Testament*. 2 vols. 1935. Old Testament Library. Translated by J. A. Baker. Philadelphia: Westminster (1967), p. 112.

¹¹ Peter Harrison. ‘Laws of Nature, Moral Order, and the Intelligibility of the Cosmos’, in *The Astronomy Revolution: 400 Years of Exploring the Cosmos*, ed. by Donald G. York, Owen Gingerich,

and Shuang-Nan Zhang, Milton (UK), Taylor & Francis (2011), pp. 375 (art. p. 375–86).

¹² Robin G. Collingwood. *An Essay on Metaphysics*, Oxford: Clarendon (1940), p. 254. Clearly, belief in the omnipotent and all-wise Creator has its grounding in the Hebrew Bible and is therefore shared with Jewish thought.

I shall have the physicists [i.e. the natural philosophers] against me [...], because I have deduced the natural properties of the planets from immaterial things and mathematical figures [...]. I wish to respond briefly as follows: that God the Creator, since he is a Mind, and does what he wants, is not prohibited, in attributing powers and appointing circles, from having regard to things which are either immaterial or based on imagination. And since he wills nothing except with absolute reason, and nothing exists except by his will, then let my adversaries say what other reasons God has for attributing powers, etc., since there was nothing except for quantities? ¹³

Kepler is aware of the centrality of creation for the new approach which he adopts, when he writes in *The Harmony of the World*, that his use of geometry “is acceptable, though not to Aristotle (who did not believe that the World had been created and thus could not recognize the power of these quantitative figures as archetypes, because without an architect there is no such power in them to make anything corporeal), yet it is acceptable to me and to all Christians, since our Faith holds that the World, which had no previous existence, was created by God in weight, measure, and number” ¹⁴.

The historian of science John Henry sees a similar dynamic at work in Descartes' reference to created laws:

Descartes, writing ... as a mathematician in the forefront of efforts to develop the new physico-mathematics proposes precise laws of

interaction in physics (inspired ... by the use of laws in the subordinate mathematical sciences). Almost immediately, however, Descartes realizes he is now playing a somewhat different game. While putative laws in the abstract system of mathematics needed no justification beyond their definition, the new *physical* laws that he was proposing needed a metaphysical underpinning. In pursuit of this new metaphysics, Descartes had to consider the nature of God's interactions with the world and turned, accordingly, to traditional providentialist theology ¹⁵.

What had been devices for calculation, were now seen as describing a universal natural order. It was God's infinite rationality and his sovereignty over the world which turned mathematical rules into laws of nature.

The contingency of created laws and the empirical method

Since the resurgence of Aristotelian thought in the 13th century, if not before, scholastic natural philosophers confessed allegiance to empiricism: thought is grounded in sense perception. Nevertheless, their scientific practice did not include any planned experimental activity. Observation was claimed to be the basis of scientific generalisations, but it was either pre-scientific common-sense experience, or it was taken from written sources without personal verification. In fact, medieval science consisted very much in commenting on written sources of the past, in particular Aristotle. Thus Edward Grant speaks paradoxically of an “empiricism without observation”¹⁶ :

¹³ Kepler, Johannes, *Mysterium Cosmographicum: The Secret of the Universe*, 2nd Latin ed. 1621, trans. by A.M. Duncan, The Janus Library, New York (Abaris Books, 1981), p. 123.

¹⁴ Kepler, Johannes. *The Harmony of the World*, Book II, ch. XXV Proposition. Translated by E. J. Aiton, A. M. Duncan, and J. V. Field. *Memoirs of the American Philosophical Society* 209. Philadelphia: American Philosophical Society, 1997, p. 115. The final phrase quotes from *Wisdom of Solomon* 11:20.

¹⁵ John Henry. ‘Metaphysics and the Origins of Modern Science: Descartes and the Importance of Laws of Nature’, *Early Science and Medicine* 9 (2004), p. 97 (art. pp. 73-114).

¹⁶ Edward Grant, *God and Reason in the Middle Ages* (Cambridge: Cambridge University Press, 2001), 181.

Solutions to problems about the physical world were almost always resolved by appeal to rational and logical arguments. Empiricism served this process only insofar as it provided the ingredients for imaginary thought experiments. But one should never doubt that reason ruled medieval natural philosophy ¹⁷.

In the new scientific method, experiments became a decisive element in testing existing theories and developing new ones. The idea of created laws of nature played an important role in this paradigm shift. As natural order depends on the free will of the Creator, it could be different from how it actually appears. Pure reasoning is insufficient to discover scientific reality. The link between the non-necessary character of creation and the experimental method is established explicitly in Newton's empiricism. The preface to the second edition of the *Principia* (1713) states that:

From this fountain [the will of God] it is that those laws, which we call the laws of Nature, have flowed, in which there appear many traces indeed of the most wise contrivance, but not the least shadow of necessity. These therefore we must not seek from uncertain conjectures, but learn them from observations and experiments. He who is presumptuous enough to think that he can find the true principles of physics and the laws of natural things by the force alone of his own mind, and the internal light of his reason, must either suppose that the world exists by necessity, and by the same necessity follows the laws proposed; or if the

order of Nature was established by the will of God, that himself, a miserable reptile, can tell what was fittest to be done ¹⁸.

Creation *ex nihilo* plays the decisive role here because it offers a new understanding of the contingency of the natural order. Compare the Greek demiurge with the biblical Creator: The demiurge imposes form on pre-existing matter, but only imperfectly so, because matter does not owe its existence to the demiurge and can therefore offer resistance. Empirical science cannot prosper in such a worldview, since humans can grasp the form imposed by the demiurge using reason alone, given that the mind which gave form to matter is itself finite, just as they are. Experiments are not essential. Creation *ex nihilo*, by contrast, brings everything under the reign of the Creator. The Church Fathers strongly opposed the idea of pre-existing matter. Thus Basil of Caesarea wrote, in his *Hexaemeron*: "If matter is uncreated, it has a claim to the same honours as God, since it must be of equal rank with Him." Instead, God "created matter in harmony with the form which He wished to give it" ¹⁹.

The quote taken from the *Principia* above nicely illustrates how this new understanding provides a foundation for the empirical approach of modern science. For on the one hand, material reality can be described scientifically, since it finds its origin in God, who is both omnipotent and rational. On the other hand, rational speculation is not enough to understand the natural order, since the latter is the result of the free act of a transcendent God. They must learn through their experiments the laws that God has actually

¹⁷ *Ibid.*, p. 182.

¹⁸ *Mathematical Principles of Natural Philosophy*, xxxii. Cf. Kepler, Johannes. *The Harmony of the World*, Book V, ch. X. Translated by E. J. Aiton, A. M. Duncan, and J. V. Field. Memoirs of the American Philosophical Society 209. Philadelphia: American Philosophical Society, 1997, p. 495, underlines that contrary to the ancient Greeks, the Christian faith holds the Creator to be an *infinite* mind. This restricts rationalistic speculations: "We consider it to be quite useless to ... summon the natural senses or reason to hunt out what the eye

has not seen, the ear has not heard ... Indeed we deservedly subject the created mind, however great its pre-eminence may be, to its Creator."

¹⁹ Basil, *Hexaemeron* II.2, transl. Blomfield Jackson, *From Nicene and Post-Nicene Fathers*, Second Series, vol. 8, ed. Philip Schaff and Henry Wace (Buffalo, NY: Christian Literature Publishing Co., 1895), revised and ed. for New Advent by Kevin Knight (<http://www.newadvent.org/fathers/32012.htm>, retrieved May 5, 2017).

established in creation, as Michael Foster wrote in 1934:

The element in nature which depends upon the *voluntary* activity of God, is incapable of becoming an object to reason, and science therefore must depend, in regard to this element, upon the *evidence* of sensation. The ... conclusion follows that only a created nature is a proper object of an empirical science²⁰.

Laws without a Lawgiver?

The theological foundation on which early modern science emerged has been largely forgotten, and science is practised today by scientists of all faiths and none. Most of the time, they do not reflect on what justifies the main assumptions of the scientific method, such as the orderliness of nature and human ability to understand the natural order. Nevertheless, it is a valid question to ask if laws of nature can be accounted for without reference to an omnipotent Creator. Not only theists, but also some atheists, answer this question in the negative. What are the alternatives?

Some simply limit themselves to brute regularities in nature, without any necessity. According to Norman Swartz (1939 -), "regularists eschew a view of Laws of Nature which would make of them inviolable edicts imposed on the universe. Such a view ... is simply a holdover from a theistic view. It is time to adopt a thoroughly

naturalistic philosophy of science, one which is not only purged of the hand of God, but is also purged of its unempirical latter-day surrogate, namely, nomological necessity"²¹.

Regularity accounts face, among other difficulties, the problem of distinguishing between accidental general truths and generalisations based on natural order. For example, all golden and all uranium spheres which have ever existed (and most certainly will ever exist) have a diameter smaller than one kilometre. This fact about uranium spheres flows from natural order because of the instability of uranium atoms. But not so for the fact about golden spheres. It seems to be happenstance that gold is too rare (and too expensive) to make such a large sphere.

Contemporary philosophers of science – like contemporary scientists – do not often discuss theological underpinnings of their work. And there is no one-to-one correspondence between a philosopher's personal belief and his view on laws of nature. Thus Bas van Fraassen is sceptical about laws, while at the same time making room for religious belief²². On the contrary, the atheist philosopher David Armstrong maintains an objective account of laws, but tries to offer an inner-worldly grounding in the forms of universals, which are not necessary, but to be discovered by empirical science. They are thus *a posteriori*²³. Nancy Cartwright sides with Swartz, cited above, in considering that laws of nature are not intelligible without God: "I think that in the concept of law there

²⁰ Michael B. Foster, "The Christian Doctrine of Creation and the Rise of Modern Natural Science" *Mind* XLIII (1934): 464f. The series of articles, published by Michael Foster in *Mind*, gave rise to a debate. The history of this debate is retraced in Wybrow Cameron, ed., *Creation, Nature and Political Order in the Philosophy of Michael Foster (1903–1959): The Classic Mind Articles and Others, with Modern Critical Essays*. Lampeter, UK: Mellen, 1992. In a nutshell, I consider that the basic outline of his conceptual analysis still holds, but that it needs to be supplemented by more precise historical scholarship with regard to the actual history of ideas.

²¹ Norman Swartz. "Laws of Nature." In *The Internet Encyclopedia of Philosophy*. Online: <http://www.iep.utm.edu/lawofnat/>, section

"Naturalizing Philosophy" (retrieved March 10, 2025).

²² Bas C. van Fraassen, *The Empirical Stance*. New Haven, CT: Yale University Press, 2002, pp. 177f, 193; 251, n.1; 255, n. 32. Cf. Jaeger, Lydia. "Bas Van Fraassen on Religion and Knowledge: Is There a Third Way beyond Foundationalist Illusion and Bridled Irrationality?", *American Catholic Philosophy Quarterly* 80 (2006), pp. 581–602.

²³ David M. Armstrong, "Can a Naturalist Believe in Universals?" In *Science in Reflection*, edited by Edna Ullmann-Margalit, Boston Studies in the Philosophy of Science 110, Dordrecht: Kluwer, 1988," pp. 105-106 (art. pp. 103-115).

is a little too much of God. We try to finesse the issue with possible worlds, fictive regularities, and *ceteris paribus* clauses. But in the end the concept of a law does not make sense without the supposition of a law-giver”²⁴.

But why should Aristotelian capacities, which she introduces instead, in order to explain why things of a certain sort behave in certain ways, be able to get by without God? To be sure, the legal metaphor brings out more clearly the relationship to the Creator who establishes the laws of nature. But if one does not want to accept as a brute fact, for example, that all electrons follow in their behaviour the same law, neither should one be happy to declare that each has the same capacity (which then explains their common behaviour). As John Wheeler put it: "No acceptable explanation for the miraculous identity of particles of the same type has ever been put forward. That identity must be regarded, not as a triviality, but as a central mystery of physics"²⁵.

Given that contingent facts – be they regularities in natural behaviour, natural laws, Armstrong’s *a posteriori* universals or Aristotelian-type capacities – easily invite a recourse to a transcendent foundation which explains them, one other option is to deny the contingency of the natural order altogether and derive the order instead from mathematical necessity. Hume reflected on this possibility in his *Dialogues concerning Natural Religion*. He took as an example the fact that the figures composing a number divisible by 9 always add up to a number which can itself be divided by 9. He then asks:

Is it not probable, I ask, that the whole œconomy of the universe is conducted by a like necessity, though no human

algebra can furnish a key, which solves the difficulty? And instead of admiring the order of natural beings, may it not happen, that, could we penetrate into the intimate nature of bodies, we should clearly see why it was absolutely impossible, they could ever admit of any other disposition?²⁶

But why think that this is a live option? If the laws of nature are in fact laws of mathematics, they are necessary, and therefore the same in all possible worlds. But philosophers and scientists have invented many worlds with laws that differ from ours. Every coherent, but empirically falsified physical theory, offers a model of such a world. What is more, the empirical approach of modern science is based on the contingency of the natural order. Experimentation serves precisely to distinguish between the different theories, all of which are “theoretically”, or mathematically, possible.

A more promising solution can be traced back to the Enlightenment philosopher Immanuel Kant. He proposed a “transcendental” deduction of the laws, which means that he derived them from the conditions which have to be presupposed so that scientific knowledge is possible. In fact, certain principles of invariance must apply, in order to allow for a scientific description of an object, property or process. For example, the fundamental laws must be the same in different places and times. Otherwise scientific results would not be reproducible. Transcendental explanations of laws are a powerful tool. Not only can the fundamental structures of classical mechanics be derived in this way, as Kant realised²⁷, but also relativistic and quantum mechanics lend themselves to similar

²⁴ Nancy Cartwright, “Natural Science 'Natural' Enough? A Reply to Philip Allport.” *Synthese* 94 (1993), p. 299 (art. pp. 291–301).

²⁵ John A. Wheeler. “Beyond the End of Time” (1971). In *Black Holes, Gravitational Waves and Cosmology: An Introduction*, New York: Gordon & Breach, 1974, p. 305 (art. pp. 286–307). The “father” of classical electrodynamics James Clerk Maxwell proposed an argument for the existence of God, based on the regularity of the atomic components of matter. Cf. Lydia Jaeger, “Nancy

Cartwright’s rejection of laws of nature and the divine Lawgiver”, *Science and Christian Belief* XXII, 2010, pp. 81-86.

²⁶ David Hume, *Dialogues Concerning Natural Religion*, 1779, D 9.10, <http://www.davidhume.org/texts/dnr.html> (retrieved March 13, 2025).

²⁷ Immanuel Kant, *Metaphysical Foundations of Natural Science*, 1786, *passim*.

treatments²⁸. Thus transcendental reasoning highlights the coherence of the fundamental laws of classical, relativistic and quantum mechanics²⁹.

Nevertheless, it cannot claim to completely explain the order observed in science. On the one hand, transcendental deductions are not known for all laws. On the other hand, Kantian reasoning presupposes but does not explain the fact that we live in a world in which science is possible. Certain physical laws must necessarily be valid if we are to arrive at a scientific description of nature – but this does not explain the remarkable fact that we live in such a well-ordered world. Therefore, the transcendental deduction simply pushes the need for explanation one step further back: instead of the observed laws themselves, it is now the scientific practice that calls for an explanation³⁰.

These considerations show that non-theistic explanations of the natural order explored by science fall short of achieving their aim. Therefore the question why laws of nature (or their stand-ins) are valid is still with us. The classic answer – pointing to the transcendent Creator – still remains persuasive.

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²⁸ Peter Mittelstaedt, *Philosophical Problems of Modern Physics*, trans. Robert Cohn and John Stachel (Dordrecht: Reidel Publishing Company, 1976) *passim*.

²⁹ Bitbol, Michel, 'A Cure for Metaphysical Illusions: Kant, Quantum Mechanics and the Madhyamaka', in *Buddhism and Science* (Columbia University Press, 2003), pp. 325–61, combines a neo-Kantian approach with a Buddhist view of reality, providing a very detailed case for his conviction that Buddhism better accounts for quantum mechanics than the Christian worldview. (See also his *First Person Physics*, Oxford University Press, forthcoming.) More work needs to be done in order to compare Buddhist and Christian justifications of science. My intuition is that the basic presuppositions of the modern

scientific method still apply in contemporary physics. Some of the "paradoxes" in quantum mechanics nevertheless lead us to take into account the situatedness of all human knowledge, more strongly than Classical Western epistemology has done. This is in tune with the biblical motif that humans are part of the created order: they come to know creation from within.

³⁰ Orr, James Tristan Ward, *The mind of God and the works of nature: laws and powers in naturalism, Platonism, and classical theism*, Leuven, Peeters, coll. « Studies in philosophical theology » 65, 2019, provides a book-length argument, using the resources of analytical philosophy, for the thesis that theistic accounts of laws explain best "the weak modality of natural necessity", which is somewhere in between strict logical necessity and pure contingency (p. 194).