Facts and Theories in Science and Theology: Implications for the Knowledge of Human Origins

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Abstract: This article examines the status of facts and theories in science and theology. The biblical worldview upholds human knowledge, while highlighting its limited, situated and personal character. Some developments in 20th century science and epistemology confirm such an understanding of knowledge. Of particular relevance here are the failure of logical empiricism and Kuhnian, Polanyian and presuppositional epistemologies. Comparing the construction of scientific and theological knowledge, this article focuses on what science and theology contribute to the study of human origins and how to harmonize specific insights gained in both fields. It explores a non-reductionist, multidimensional model of intellectual inquiry in which both science and theology can contribute to our understanding of human reality.

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There is a wide range of opinions held by Christians on the status of human knowledge. It is probably safe to consider that every epistemology there is has been adopted by at least one Christian thinker. Nevertheless, discussions about human origins cannot avoid tackling questions of the character of scientific and theological knowledge. In order to evaluate what science and theology tell us about origins, we need to have some grasp of the nature and value of their respective statements. This article does not aim to lay out a complete epistemological map, nor does it provide extensive argument for the choices made. More modestly, it provides a sketch of what I take to be important ingredients for a Christian theory of knowledge and then formulates some insights which can guide our thinking in the field of human origins.

The conception of knowledge adopted here can be characterized as realist, situated, and personal. After explaining in the first section what is meant by this triad, the second part of the article draws out

four implications for scientific knowledge of human origins. When as Christians we struggle with what science reveals about human origins, we should keep in mind the following points:

1. neo-Darwinian evolution is the framework theory of contemporary biology, and thus neither proven “fact” nor “just a theory”;
2. methodological naturalism is too restrictive, as scientific methodology should follow the evidence;
3. reductionism is a favorite form of idolatry in our scientific age;
4. there are different forms of rational inquiry, each with its own method and legitimate domain.

The third section compares the elaboration of scientific and theological knowledge, paying special attention to the distinctive nature of the ultimate authoritative source of knowledge in each of these two fields (natural revelation for science, Scripture for theology). The fourth section draws out seven implications for the role of scientific knowledge in theological accounts of human origins:

1. the Enlightenment dichotomy of facts and values must be overcome, so that both science and theology have the right to teach us facts about the real world;
2. exegesis comes before science in understanding biblical texts;
3. conflict between a certain understanding of biblical texts and scientific findings provides motivation for exploring alternative textual interpretations, which have then to be assessed on purely exegetical grounds;
4. all that the Bible teaches is true; but the Bible does not teach all truth;
5. there are biblical teachings relevant to scientific questions;
6. the Bible is the unique source of authoritative teaching in theology, so that science should not control the construction of dogma;
7. natural science cannot fully comprehend human nature and specific theological insights have to be allowed for, in order to arrive at a correct understanding of human nature.

1. Ingredients of a Christian Epistemology

1.1. Realism: Knowledge as Limited and True

A Christian epistemology which takes its starting point from creation involves the recognition that the world was created by the Logos (Gen 1:3, 6, etc.; Ps 33:6; John 1:1–3); and that humans are created in God’s image (Gen 1:26–27). Thus nature was given an objective structure, which has to be discovered and not simply constructed; and human beings are capable of gaining knowledge of the natural order, sharing some of the privileges of their Creator. The creation mandate they received includes the exploration of nature and the task of constructing a rational discourse in accordance with the structure of the created world (Gen 1:28; 2:19–20). From a biblical point of view, the scientific enterprise is not only possible and legitimate, but in some sense a duty. Thus it is not surprising that the

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The doctrine of creation played a role in the scientific revolution in early modern times and encouraged a positive attitude towards natural science.

At the same time as creation provides a foundation for the scientific enterprise, it places restrictions on it: human knowledge is always that of creatures, thus limited in scope. No scientist (or philosopher, or theologian) can claim complete knowledge, which is the privilege of God alone (1 Sam 16:9; Isa 46:9–10; Heb 4:13). The limitations of human knowledge are expressed in the scriptural theme of the incomprehensibility of God’s work in creation and redemption. Although humans can gain access to some true knowledge, they can never fully comprehend reality (Ps 139:6+17–18; Eccl 3:11; Isa 40:13).

Whereas the limitations of all creaturely knowledge seems at first to thwart epistemological claims, the neo-Calvinist theologian Cornelius Van Til points out that divine incomprehensibility provides the only context in which human knowledge can be recognised as both limited and true:

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\text{If one does not make human knowledge wholly dependent upon the original self-knowledge and consequent revelation of God to man, then man will have to seek knowledge within himself as the final reference point. . . . Then he will have to hold that if he cannot attain to such an exhaustive understanding of reality, he has no true knowledge of anything at all. Either man must then know everything or he knows nothing. This is the dilemma that confronts every form of non-Christian epistemology.}\]

As long as human knowledge claims to be autonomous, it cannot rest content with partial knowledge. Whatever humans know would be under constant threat from the unknown part of reality, which could be so widely irrational, as to annihilate whatever partial rational understanding humans have been able to establish. But if human knowledge is anchored in God’s knowledge of reality, it is freed from the impossible strive for omniscience. Thus the humble recognition of the derivative nature of human thought liberates us from the rationalist obligation of exhaustive knowledge, which will forever remain out of our reach.

**1.2. Presuppositionalism without Relativism: True Knowledge as Situated**

An epistemology starting from creation takes seriously the fact that knowing humans are creatures. As creatures, their knowledge is not disconnected from the context in which they live. This context is multifaceted. It has material aspects outside the individual (economic conditions and availability of techniques), corporal aspects of the individual (the shape of sense organs and brain structures processing information), and relational aspects: humans are always part of an inherited history and part of a community. All these different aspects of the context we live in have an impact on our knowledge. To echo a famous book title: there is no “view from nowhere.”

Science is no exception to the situated character of human knowledge. It also is a social activity within a historically situated community. Socio-political factors play a role in the construction of what is accepted as scientific knowledge. The scientific community has its own specific mechanisms which suppress deviant opinions, through several years of academic training of newcomers to the field and the peer-review process for scientific publications. These mechanisms are not arbitrary power structures, but essential to best practice.

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The rigorous historical research of Thomas Kuhn, and in particular his epoch-making *The Structure of Scientific Revolutions*, helped to establish the awareness of the communal character of the scientific enterprise. Before Kuhn, Michael Polanyi had already stressed the foundational character of fiduciary frameworks for all knowledge, but without finding the same wide audience as Kuhn later encountered.⁵

Every epistemology which acknowledges the situated character of knowledge is threatened by relativism. If knowledge cannot be abstracted from its context of discovery, how can it be objectively true? The unique resources of biblical theism protect recognition of situated knowledge from relativism. First, the human knower is not the only knowing subject. The Creator also has knowledge, even complete knowledge of reality. As his perspective is all-embracing, it guarantees the complementarity of the different perspectives accessible to humans.⁶ Second, creation by the Logos gives rise to an objective natural order, which is at least partially knowable to humans. Thus our human perspectives are really this: limited, but valuable perspectives of the one created reality, and not some worthless illusions, disconnected from reality. Without making creation foundational to his epistemology, Michael Polanyi recognised that God alone can guarantee our knowledge, once we accept its situated character: “⁷

We undertake the task of attaining the universal in spite of our admitted infirmity, which should render the task hopeless, because we hope to be visited by powers for which we cannot account in terms of our specifiable capabilities. This hope is a clue to God.”⁷

1.3. Personal Knowledge

Inspired by the success of Newtonian physics, many thinkers since the Enlightenment have pursued the ideal of formal knowledge: all truth expressed in logical or mathematical language. Developments in formal logic at the end of the 19th century motivated the search for a purely formal language which could formulate and prove every true statement, using only empirical data in addition to logical formalism. Following Bertrand Russell’s research into the foundation of mathematics (in particular his *Principia Mathematica*, published with Alfred Whitehead between 1910 and 1913), logical empiricism (or positivism) of the Vienna circle, since the 1920s, was the strongest voice for the formal understanding of knowledge:

> What unites men in language are structural formulae; in them the content of the common knowledge of men presents itself. Subjectively experienced qualities—redness, pleasure—are as such only experiences, not knowledge; physical optics admits only what is in principle understandable by a blind man too.⁸

⁵ Kuhn acknowledged his debt towards Polanyi: Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962), 44.

⁶ Divine knowledge guarantees this complementarity in principle, notwithstanding the fact that we only imperfectly implement these perspectives, so that tensions may continue to exist.


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Biblical theism cannot accept such an abstract vision of knowledge. For sure, it holds to realism: human knowledge is in contact with the created, and therefore objective, order of the world. But at the same time, the world is understood as created by a personal God. His image—humanity—shares in his personal character. Thus knowledge is always personal. The fact that it is held by persons is no accident but essential to its very nature. Thus Christians are in tune with what can be called the return of the knowing subject in the epistemology of the second half of the 20th century.

The most stunning proof of the impossibility of complete formalisation even in mathematics was provided by Kurt Gödel’s incompleteness theorems in 1931. The Austrian mathematician showed that in each axiomatic system (sufficiently rich in order to include arithmetic), there exists a (true) undecidable sentence. Thus the axiomatic basis is necessarily incomplete. Truth exceeds what can be formalised. In the following decades, more and more scholars reacted against the formalist ideal of logical empiricism and underlined the essential role of persons in the construction of knowledge. Michael Polanyi, in particular, placed his original epistemology under the title of Personal Knowledge (1958). Polanyi considers that “all knowledge is either tacit or rooted in tacit knowledge. A wholly explicit knowledge is unthinkable.” Tacit knowledge is immediate, implicit knowledge, which is accepted without discussion and explicit proof. It is the part of knowledge, which one cannot write down on paper or enter into a computer. As tacit knowledge is involved in every act of knowledge, knowledge is always incarnated, held by rational beings, persons. It cannot be reduced to formal statements. “We can know more than we can tell”—the leitmotiv of Polanyian epistemology is in harmony with biblical theism, which also stresses the personal character of ultimate reality.

2. Implications for Scientific Knowledge of Human Origins

Having laid out the triad—realist, situated and personal—which characterises the conception of knowledge which this article takes as best adapted to Christian theism, let us now see what this triad implies for the understanding of our origins. Without claiming comprehensibility, the article will set forth four guiding principles for learning from science and theology about human origins.

2.1. Neither Proven “Fact,” nor “Just a Theory”: Neo-Darwinian Evolution as the Framework of Contemporary Biology

Thomas S. Kuhn’s The Structure of Scientific Revolutions set off a revolution itself in epistemology. Based on historical research, he offered a new conception of science. His picture of scientific progress is neither inductive and cumulative, as logical empiricism would have it, nor hypothetico-deductive, as Karl Popper argued. Scientists do not normally try to falsify their theories, but use them as conceptual frameworks for more detailed studies. Anomalies (which always exist, as no experiment perfectly

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matches theoretical expectations) are suppressed, and opponents are silenced, in order to progress with “normal science.” But when anomalies multiply, the scientific enterprise enters into a crisis. There are three possible outcomes to such a crisis: either a solution is found, which explains after all the observed anomalies inside the old framework; or no solution is found, and the crisis continues; or, in the most interesting case, a new framework is creatively developed. After a while, this new framework is accepted by the entire scientific community, and becomes “normal science.”

Kuhn’s contention that the scientific community no longer lives in the same world after a scientific revolution, that the old and the new paradigms are incommensurable, provoked a heated debate. Taken at face value, it leads directly into relativism. If one wants to use Kuhn’s insights in the context of a Christian epistemology, a more modest interpretation is best. Yes, all science is dependent on presuppositions; it is done in community, where some convictions are just not open for debate. But no, this does not imply that a scientific community can choose whatever paradigm pleases them; and rational communication is possible (at least up to a certain point) between proponents of conflicting framework theories.

Such a picture of scientific practice provides some valuable insights for the origins debate. It goes beyond current caricatures: creationism and Intelligent Design as pseudo-science, or worse deception, on the one hand, and evolution as an atheist assault on religious faith and morality, on the other. But it also supplies some explanation of the high emotional stakes involved in the debate on both sides. In particular, understanding neo-Darwinian evolution as a Kuhnian paradigm shows that is neither “just a theory,” nor is it a scientific “fact.” Whether we like it or not, neo-Darwinian evolution is the framework theory of contemporary biology. It is the paradigm within which the scientific community proceeds with its research, and science relies on routine mechanisms to exclude those who disagree. This is nothing peculiar to biology, but happens in other scientific fields as well: no article presenting a perpetuum mobile will ever get the editorial attention of a physics journal. Thus it will not even get the chance of being peer-reviewed.

It also is not sufficient to point out some unexplained facts, in order to shake the confidence neo-Darwinian evolution enjoys. As-yet-unexplained anomalies are part-and-parcel of normal science. Only when anomalies multiply does scientific practice enter into a crisis. And even then, the old framework theory will not be abandoned as long as there is no new coherent research program to replace it. Most

13 From personal observation: used to open non-aggressive, rational debate in theology and philosophy among proponents of conflicting views, it was quite a surprise for me to observe how difficult, or even impossible, the dialogue between those defending creationism and those defending (naturalistic or theistic) evolution can be.

14 Debates about the relevance of evolutionary explanations may surface among different subcultures in the biologists’ community. A telling example is the controversy about the claim that 80% of the human genome is functional, made by scientists involved in the ENCODE project. Dan Graur et al., “On the Immortality of Television Sets: ‘Function’ in the Human Genome According to the Evolution-Free Gospel of ENCODE,” Genome Biology and Evolution 5 (2013): 578–90, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3622293, criticizes ENCODE scientists for “divorcing genomic analysis from its evolutionary context,” whereas “progress in understanding the functional significance of DNA sequences can only be achieved by not ignoring evolutionary principles.” As cellular biologists, ENCODE scientists use a biochemical systems approach rather than evolutionary criteria to define functionality. Cf. the blog by Ewan Birney, the lead analysis coordinator for ENCODE, “ENCOD: My Own Thoughts,” Ewan’s Blog: Bioinformatics at Large, 5 September 2012, http://genomeinformatician.blogspot.fr/2012/09/encode-my-own-thoughts.html; also John S. Mattick and Marcel E. Dinger, “The Extent of Functionality in the Human Genome,” The Hugo Journal 7:2 (2013): n.p., http://www.thehugojournal.com/content/7/1/2. (Thanks to Zachary Ardern for informing me about this controversy and providing references.)
(opponents and proponents alike) consider that neither “creation science,” nor Intelligent Design offers such an alternative paradigm. Thus they should not be treated as rivals to established science, at least at this stage of history.

2.2. Methodological Naturalism as Too Restrictive: The Scientific Method Follows the Evidence

Methodological naturalism is considered by many—believers and unbelievers alike—as the norm in natural science. This consensus is more problematic than it may seem at first sight. On a foundational level, modern science is, in fact, not naturalistic: the idea of creation underlies many key presuppositions of scientific methodology, including the very existence of a stable natural order, accessible to human exploration. And close historical attention shows that there is not one scientific method which could define ideal science. Not only knowledge gained from science, but also scientific methodology should follow—and has historically followed—the evidence.

Larry Laudan’s “triadic network of justification” provides some interesting insights in how science works in the absence of an a priori agreed scientific methodology. In the “hierarchical model of justification,” which Laudan attributes to Karl Popper, Carl Hempel and Hans Reichenbach, three levels are distinguished: facts, methods and epistemological values. If a discordance crops up at one level, scientists, according to this model, rely on the next higher level in order to solve it. Thus, divergent views in assessing the facts can be harmonised by methodological considerations. In a similar vein, divergent opinions concerning research methods makes it necessary to appeal to general cognitive values.\textsuperscript{15}

This hierarchical model certainly provides some insight into conflict solving mechanisms in science, but Laudan points out that it needs to be completed, allowing also for interaction from the inferior to the superior level or levels. Otherwise, conflicts concerning epistemological values in science would be without any solution,\textsuperscript{16} whereas rational procedures exist, building on the inferior levels. For example, scientists banish “utopic values,” that is values for which “we do not have the foggiest notion how to take any actions or adopt any strategies which would be apt to bring about the realization.”\textsuperscript{17} They also reject those epistemological values which are contrary to the best available scientific theories. Thus, around 1800, most scientists abandoned the empiricist insistence that theories should not include unobservable entities, as many branches had adopted theories using them. “This episode illustrates how the existence of broad agreement about which scientific theories are the best can play a crucial role in resolving differences between thinkers with respect to the goals they explicitly confess.”\textsuperscript{18}

In order to account for the flexible interactions between theories, methods and values in scientific practice, it is thus necessary to abandon the hierarchical model in favour of a “triadic network of justification,” with mutual interactions between the three levels. Theories constrain methods, and methods justify theories. Methods exhibit the realizability of cognitive values, and values justify methods. And theories and values must harmonize with each other.\textsuperscript{19} The direct consequence of the triadic network of justification is that there is no a priori fixed scientific method. That does not mean

\textsuperscript{15} Larry Laudan, Science and Values: The Aims of Science and Their Role in Scientific Debate (Berkeley: University of California Press, 1984), 23–27.

\textsuperscript{16} Ibid., 41.

\textsuperscript{17} Ibid., 51.

\textsuperscript{18} Ibid., 57–61.

\textsuperscript{19} Ibid. 63, in particular illustration 2.
that “anything goes.” Scientific practice includes feedback loops from theories to methods and goals. Thus fruitful theories confirm chosen methods, whereas sterile methods, which do not lead to greater knowledge, will be abandoned.

Recognising that the scientific method is not fixed once and for all frees us to explore possible limits to methodological naturalism. Alvin Plantinga has called Christian scholars to actively research domains where naturalistic science may not be well adapted. In his terms, Christians should join others in Duhemian science—that is, the part of science agreed on between Christians, atheists, and believers of other faiths. But they should also pursue Augustinian science, which relies more directly on Christian assumptions. In fact, Christian scientists have more options in front of them than atheists, when trying to understand human nature. In addition to naturalistic explanations, they can explore alternatives to monism about the human mind, and undirected evolution is not “the only game in town.”

A particularly tricky topic, in regard to origins, is design. In the light of what we have seen, it will not do to exclude \textit{a priori} any consideration about design from “science.” The decisive question is not if design is a science stopper, but if it has occurred. If design leads us beyond the field of standard natural science, then so be it. There is no reason why we should restrain ourselves to a predefined set of allowed explanations. The important question is rather whether design is a fruitful concept, if design theories enable us to make better sense of world we live in.

Del Ratzsch has provided important epistemological work on design. While arguing for a place for design in science, he points out that the concept of design used by prominent advocates of Intelligent Design is confused. In particular, it is wrong to define, as does William Dembski design as the “set-theoretic complement of the conjunction regularity-or-chance.” Design is not necessarily of this gap-like kind, and can be achieved by using regular and chance processes. On the contrary, design is essentially linked to the mind and is not reducible to non-rational categories. Ratzsch defines design as “an intentionally produced (or exemplified) pattern, where a pattern is an abstract structure that resonates, matches or meshes in certain ways with mind, with cognition.” Because design is exhibited in patterns which appeal to the mind, it is possible for a rational being to recognise design, without having proven that no naturalistic scientific explanation exists.

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2.3. Reductionism: A Favourite Form of Idolatry in Our Scientific Age

Human beings, as creatures, cannot claim to fully comprehend reality; their knowledge is limited. Thus there cannot be one all-comprehensive theory of reality. Different ways to approach reality have their own domain of application and validity. In particular, no scientific discipline can claim to provide a complete picture of what there is, nor should it be considered as the norm to which all other forms of rational inquiry should conform. There is no place for scientific (or physicalist, or biologist) imperialism in a Christian epistemology.

On the contrary, the ideal of formal knowledge leads directly to reductionism, with its effort to describe all the sciences with the model of mathematical physics:

The goal ahead is *unified science*. The endeavour is to link and harmonise the achievements of individual investigators in their various fields of science. From this . . . springs the search for a neutral system of formulae, for a symbolism freed from the slag of historical languages; and also the search for a total system of concepts. . . . In science there are no “depths”; there is surface everywhere. . . . Everything is accessible to man; and man is the measure of all things.²⁶

But in fact, such a dream forgets what inspired modern science at its outset. Against the ambition of much of Hellenistic and medieval science to describe the *essence* of things, early modern science only tried to capture certain “affections” of objects, by adopting a specific point of view (kinematic, for example, in Galileo’s famous inclined plane experiments). A science aiming at describing the *nature* of things, is bound to seek the one, true definition:

The idea of a science, for an ancient Greek, was not only the idea of a science of *x* but the idea of the complete science of *x*. There could be only one science of a given thing: for unless it grasped the essence of the thing it was not a science of it, and one thing had only one essence. When that was discovered, all the “properties” of the thing could be deduced.²⁷

Modern science owes its success to the rigorous application of restrictive research methodologies, appropriate to each scientific discipline. It is thus ironic that some seek to absolutise knowledge thus obtained. This is why Evandro Agazzi castigates “reductionism as the negation of the scientific spirit.”²⁸

The more humble project of modern science is in tune with the biblical theme of the incomprehensibility of divine works (cf. section 1.1 above). Whereas it does not lead to general scepticism, it puts a hold on the strive for a “theory of everything.” Only God has exhaustive knowledge of the natural order, as he has created it. Human beings live in a world which is not of their own making, and must adopt multiple, limited viewpoints when probing reality. No human theory can exhaust the richness of creation.

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Why does reductionism exert such a strong pull on many philosophers and scientists? Reduction presents practical advantages: whenever we succeed in reducing one field of enquiry to another, our intellectual understanding and our technological mastery increase. But such pragmatic benefits do not justify reductionism, which absolutises such limited research programs and pretends to reduce all of reality to one basic level. Herman Dooyeweerd offers an explanation of reductionism as the inner-wordly quest for unity, in the face of experiential multiplicity, when the unifying ground in the Creator is no longer acknowledged. Humans who have lost sight of the transcendent ground of all being, still retain nostalgia for unity. Rather than seeking it in God, they turn to visible reality and attempt to establish a unifying principle within it. But "by seeking itself and its absolute origin in one of these aspects [of experience], the thinking I turns to the absolutization of the relative." In opposition, those who find the unifying principle not in creation but in the Creator, are able to acknowledge all of reality’s multiform richness, without imposing a reductionist view on it or abandoning the hope for unified knowledge and falling prey to relativism.

Acknowledging reductionism as a form of idolatry will help to detect and resist ideological uses of scientific theories. Inside natural science, we can recognise plural methodologies, an insight we will elaborate in the next section. And beyond natural science, we constantly have to remind ourselves that science does not tell us all that there is to know about humans, an insight we will return to in the last section. In particular, we can evaluate biological findings on the grounds of their scientific merits, without adopting evolution as a worldview that claims to define humanity’s place in the world. In fact, philosophical and theological conclusions drawn from scientific theories are very often not as straightforward as many (on both sides of the debate) proclaim.

2.4. An Ordered Web of Plural Sciences

As human knowledge is always partial, science can never give a complete picture of reality. This is true for science as a whole, and also for each specific discipline. Not one, but many forms of rational enquiry should be used when exploring human origins. But it is certainly not satisfactory to use different perspectives, one alongside the other, without trying to relate them. Personal knowledge provides an interesting starting point to make some progress in connecting the different perspectives.

Michael Polanyi outlined a hierarchy of knowledge which helps us to understand how different scientific practices are related: the proportion of personal implication varies in accordance with the domain of enquiry. The more the object of knowledge is itself of personal character, the more important the personal dimension of knowledge gets:

Facts about living things are more highly personal than the facts of the inanimate world. Moreover, as we ascend to higher manifestations of life, we have to exercise ever more personal faculties—invoking a more far-reaching participation of the knower—in order to understand life... the logical gap between our comprehension and the specification of our comprehension goes on deepening as we ascend the evolutionary ladder.

In the New Testament perspective, the natural order itself is of personal origin, as it is created by the Logos, the second person of the Trinity. Thus knowledge of it always has a personal dimension.


30 Polanyi, *Personal Knowledge*, 347.
Nevertheless, quite in harmony with Polanyi’s perspective, the degree of personal implication varies. Exploration of the material world implies less existential engagement than the understanding of those beings created in the image of the personal Creator God. Apprehension of the animal world requires an intermediate degree of personal involvement, as animals anticipate, in varying degrees, human personal capacities, without ever fully expressing them. The influence of metaphysical presuppositions and faith commitments will grow with the increase of personal implication, and become progressively more important as knowledge moves closer to the summit of existential engagement, that is knowledge of God.

The hierarchy of personal knowledge leads to an ordered web of multiple sciences, quite in opposition to scientific imperialism. In fact, we have to be very careful in the use of the word “science” itself. In its current meaning, it denotes natural science. Its singular form carries with it the pretension that there is one, and only one, science. But what is proposed here is a larger perspective, more in tune with the German Wissenschaft, or the medieval scientia. Rational inquiry is not limited to natural sciences, the humanities can also claim the honorific title of “science,” without submitting to a reductionist methodology. Each human science can pursue the methodology best adopted to its research domain. In the context of Christian theism, the plurality of sciences does not lead to a fragmented vision of knowledge, as God has created a coherent world and has exhaustive knowledge of all reality. This leads to a unified, but nonreductionist epistemology: norms of rational inquiry apply everywhere, but there exist different forms of rationality.

3. The Construction of Scientific and Theological Knowledge Compared

It is not appropriate here to offer a comprehensive account of how facts and theories relate in theology and how theological knowledge is achieved. But in order to assess the role scientific knowledge can play in theological constructions, it is worthwhile pondering some similarities and differences in the methods employed in both fields.

There are significant points of contact between scientific methods of inquiry and Christian theology, particularly Evangelical theology. Both recognize an ultimate source of authority: natural order explored by observation and experiment for natural science, Scripture for theology. In both fields, the construction of theories and knowledge from the ultimate source of authority is not a straightforward, inductive process. Background assumptions and communal paradigms play a vital role. In natural and human sciences as also in theology, metaphysical and faith commitments become ever more important, the closer questions get to matters of existential concern. These methodological parallels show that the common opposition between the scientific mind and faith is certainly over-simplistic.

Nevertheless, there are undeniable differences between scientific and theological practices. One decisive difference between the two inquiries can be found in the distinctive nature of its ultimate source of authority: natural revelation for science, special revelation for theology. Science is part of the cultural mandate that humanity received at creation, whereas theology is (predominantly) part of redemption history. This is not to deny the role of general revelation in theological theorizing. Different Christian theological traditions define more or less broadly the scope of natural theology; they describe in various ways the relationship between natural and revealed theology. But all agree that natural theology, only based on general revelation, does not encompass the whole field of theology. It does not even reach the most distinctive Christian features of it, for example knowledge of the incarnation and salvation by grace.
When reflecting on the distinctive nature of the ultimate sources in science and theology, several features stand out. They have important implications for the status of knowledge in both fields. First, as a result of sin, illumination by the Spirit is the prerequisite of sound theological work, whereas science only depends on common grace, which God grants to all humans because of his faithfulness to his creatures.

Second, the once-and-for-all of salvation in Christ implies the closure of the biblical canon, whereas natural revelation is on-going as it is co-extensive with (visible) reality. Thus on-going progress is to be expected in science, whereas theology has a special call to reflect and elaborate on the “faith that was once for all delivered to the saints” (Jude 3). Comprehension of this faith can deepen throughout history, but no new revelation is to be expected in theology, whereas science is constantly seeking new experimental evidence.

Third, God freely decides what he does in salvation and what he reveals of himself in Scripture, whereas humans are called to take care of and to subdue nature. Thus, the constructive contribution of the human researchers is more crucial and far reaching in science than in theology. Science also has ethical constraints on its experiments. Nevertheless, a more active, constructive part of humans is proper to its exploration, whereas in theology, observation is predominant over experimentation.

Fourth, a more far-reaching constructive implication of the researcher is also required because of the non-verbal character of natural revelation. Natural revelation is structured by the Logos (John 1:3; Heb 1:2–3) and thus accessible to rational discourse. Nevertheless, the path from non-verbal natural revelation to scientific theorizing is longer than the path from verbal special revelation in the Scriptures to theological dogma. The word is closer to reason than the world (although the world is not foreign to reason, having been created by the Logos). Thus scientific knowledge is more provisional than theological knowledge.

4. Implications for the Role of Scientific Knowledge in Theological Accounts of Human Origins

4.1. Beyond the Fact-Value Dichotomy: The Illusion of Non-Overlapping Magisteria

A very common conception of the relationship between science and theology considers that science leads us to a better knowledge of the workings of nature (the “how”), whereas theology is concerned with the meaning of nature and the values which should direct our action (the “why” and the “for what”). Building on the Kantian distinction between knowledge and faith, truth claims are restricted to natural science (modeled after mathematical physics), whereas values (aesthetic, teleological, religious) are not objects of knowledge, but belong in the realm of private convictions, for which it would be incongruous to ask for universal validity and public recognition. But once we recognize the personal character of all knowledge, we can no longer hold to the opposition between facts and values, inherited from the Enlightenment. Even in the hardest science, knowledge includes a personal dimension. Thus there is no strict dichotomy between science and humanities, and it would be wrong to exclude history, art, philosophy, theology, etc. from the quest for universal truth. The norm of truth finds applications

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31 In personal correspondence, John Hilber pointed out a useful analogy: archaeologists examine monuments, iconography, and ancient texts. Although all three sources offer valuable and unique information about ancient times, texts provide a more direct access to history because of their verbal character.
in all regions of knowledge, even if different forms of rationality operate in each discipline. Thus the apostle Paul speaks of the “truth of the gospel,” which has to be actively preserved (Gal 2:5, 14).

Inspired by Augustine and Polanyi, the British ecumenical theologian Lesslie Newbigin has offered an epistemology which confesses the gospel as public truth in the context of Western culture shaped by the dichotomy between scientific objectivity, on one hand, and axiological as well as religious relativism, on the other. Newbigin developed his analysis of Western civilization in the context of mission. Having served in India for over thirty years, he was able to take a fresh look at Western life and thought. He strived for a conceptual framework which would, once again, show the pertinence of the Christian message for all aspects of life. Relinquishing the Enlightenment separation between facts and values is key in achieving this goal. Taking into account the personal character of all knowledge provides the epistemological justification for this step.

This better integrated view of knowledge shows that one common harmonization strategy between biblical and scientific data on human origins is misleading. Some authors distinguish, in the biblical creation texts, between a kernel of spiritual truths and a clothing relying on ancient science. Only the former carries any authority for us, whereas we know the latter to be factually wrong. But limiting biblical authority to “matters of faith and life” is unsatisfactory theologically, epistemologically, and scientifically. Theologically: because the God who inspired Scripture is the Creator of all reality and thus can speak an authoritative word to all regions of knowledge. Epistemologically: because the distinction perpetuates the Kantian dichotomy of knowledge and faith, which has been abandoned since the return of the knowing subject in recent epistemology. Scientifically: because, over the course of history, science has invaded areas which had seemed to be the preserve of religion, as for example the origin of the universe and life, or the question of whether humans have a soul. Thus there may be no territory from which science is completely and definitely excluded. Thus the idea of non-overlapping magisteria should be doubtful for theologians and scientists alike.

The Chicago Statement on Biblical Inerrancy is still pertinent when it declares the unrestricted authority of Scripture:

We deny that Biblical infallibility and inerrancy are limited to spiritual, religious, or redemptive themes, exclusive of assertions in the fields of history and science.

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33 Ibid., chs. 1, 2, 4; and Lesslie Newbigin, Truth To Tell: The Gospel as Public Truth (Grand Rapids: Eerdmans, 1991), passim.
34 This strategy is favoured by Denis O. Lamoureux, who speaks of the “message-incident principle” (“No Historical Adam: Evolutionary Creation View,” in Four Views on the Historical Adam, ed. Matthew Barrett and Ardel B. Caneday [Grand Rapids: Zondervan, 2013], 50).
36 The Chicago Statement on Biblical Inerrancy (1978), Article XII, http://library.dts.edu/Pages/TL/Special/ICBI_1.pdf. As long as the Bible is the Word of God, all its affirmations are trustworthy. Thus it is not sufficient to exclude any “deceptive intent,” but any error simpliciter (pace Denis Lamoureux, “Beyond the Cosmic Fall and Natural Evil,” Perspectives of Science and Christian Faith 68 [2016]: 57n17, who only wants to exclude that God lies).
Over against a compartmental view of knowledge, we should remember that both science and theology give us access to interpreted facts. Models of human origins have to take into account data obtained from both sources. Obviously, the differing methodologies of natural science and theology are to be acknowledged. In particular, we should not expect biblical language to comply to modern standards of scientific accuracy, as divine revelation accommodates itself to the understanding of its recipients. But what Scripture has to say (or not) about human origins should not be limited by any *a priori* decision, but should emerge from paying close attention to the texts themselves.

4.2. Exegesis before Science

As careful study of the biblical texts is decisive for the construction of theological accounts of human origins, it is necessary to address the question of what place the knowledge obtained in the natural sciences can legitimately occupy in biblical exegesis. Two pitfalls must be avoided. On one side, alignment with current scientific knowledge should not govern our exegetical choices, otherwise we would impose on the text knowledge that is foreign to its original context of composition and would ultimately place science above biblical authority. We would not take seriously the conviction that God revealed himself in history, to people living in a given cultural context.

On the other side, the fact that a certain interpretation is consistent with the scientific information should not incline us against it. Just because we might be tempted to look for concordist interpretations given the current climate of scientism does not mean that it is absolutely necessary to interpret the biblical text in opposition to scientific models. Rather, we should not worry too much about current knowledge (at least initially), but put ourselves in the place of the first readers and read the text with the eyes of those for whom it was originally written. This is why the choice between different interpretations of the beginning of Genesis should not be made in reference to the science of our time. It is important for the validity of the interpretation adopted that it was the natural understanding of the first readers. In this evaluation, scientific knowledge can intervene, but only to the extent that it was available to the human author and his first readers. What they believed about the world, as informed by the science of their time, is part of the background assumptions that help us understand the true meaning of the text. For example, the judge Jotham knew as well as we do that trees do not anoint kings or speak. It is legitimate to take into account this “scientific” knowledge in order to reinforce the interpretation of his story as allegorical (Judg 9:8–15). Applied to the Genesis texts, this means that decisions on their literary genre should be taken on the basis of clues discernible by their original readers. In particular, those who prefer a literary understanding of creation stories (as I do myself) have the task of demonstrating that a careful reader at the time of writing could discern the non-literal meaning of the textual elements well before geology and biology were able to push anyone to reconsider the literal interpretation.

Responsible exegesis should strive to read the Bible texts in their original historical context if it takes seriously the incarnation of the Word in human history. But secondly, we must not avoid asking the question of the relationship to modern science; otherwise our faith would be schizophrenic. It is precisely because of the doctrine of creation that we cannot accept the separation between knowledge and faith. As we confess that God is the Creator of this world described by science, we cannot withdraw to an inner devotion and cultivate a spirituality of the heart, regardless of the best available scientific knowledge. The theologian will not avoid confronting the knowledge of the origins obtained from the

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Bible with reconstructions of the past offered by the natural sciences today. But this comparison occurs at a later stage, after his own exegesis of the texts.

4.3. Comparison with Scientific Data as External to Exegesis

If the comparison between our understanding of the biblical texts and current scientific knowledge comes after the work of exegesis, what should we do if our findings are conflicting? Is it ever legitimate to overturn our interpretation of the Bible owing to scientific considerations? The Chicago Statement on Biblical Inerrancy declares:

We . . . deny that scientific hypotheses about earth history may properly be used to overturn the teaching of Scripture on creation and the flood.38

This principle is sound. Otherwise we would place science above Scriptural authority and allow science to assume the role of magisterium deciding on the interpretation of the Bible. But the principle may be more complicated to apply in practice than it first appears, because our understanding of biblical texts is fallible. We are convinced that natural and special revelation do not contradict each other, as they have the same divine Author who is absolutely trustworthy. Therefore, scientific knowledge should be allowed to provide undermining evidence against certain conclusions drawn from our interpretation of biblical texts. Only scientific knowledge available to the human author can help us to establish the meaning of the text (as long as we reject a sensus plenior incomprehensible to the human author). Nevertheless, further scientific knowledge may be an extra-exegetical stimulus to reconsider the solidity of the currently accepted interpretation of the text. Scientific evidence should not control or constrain exegesis. Nevertheless, it could lead us to hold some understandings more tentatively, exploring alternative ways of interpreting the text.

There is some concern that the above considerations are a slippery slope allowing natural science to gain predominance over biblical teaching. The danger is real, and science should never be allowed to dismiss some understanding of biblical texts as impossible. It may only provide motivation for examining alternative readings of the text, where the choice between these options needs to be achieved on exegetical grounds alone. And we should also remember that not only science can undermine our confidence in some understanding of Scripture, but that central biblical teachings can also legitimately undermine our certainty that some scientific theories constitute true knowledge. What we understand about the world on biblical grounds will motivate us to re-examine scientific findings if they contradict what we have learned from special revelation. Science as well as exegesis is a fallible human undertaking.

4.4. All That the Bible Teaches Is True, but the Bible Does Not Teach All Truth

The Bible is completely reliable when it speaks on scientific subjects: it remains to be decided when indeed it does. If evangelical interpretation cannot exclude that the Bible teaches scientific information, neither should it draw hasty scientific conclusions from Scripture. A truly respectful reading of the text will take all necessary precautions to understand its true meaning. Hence the strategic position of considerations on the proper interpretation of Genesis. The literal interpretation should not, incidentally, benefit from a favorable a priori: if the composition of the text suggests a non-literal genre, the literal interpretation is not more faithful than a literary interpretation, on the contrary. The decision

38 The Chicago Statement on Biblical Inerrancy, Article XII.
for or against a literal interpretation cannot be made without patient study of each text, taken both on its own and seen in the broader context of the biblical canon.

When we study the biblical texts in order to find scientific assertions, we notice that the harvest is rather meager. Biblical language lacks the precision of scientific discourse. Most times, the Bible uses a language that remains close to appearances. When, for example, the psalmist says that the sun “rises at one end of the heavens and makes its circuit to the other” (Ps 19:6), he is not giving a geocentric astronomy lesson, but simply describing what he sees—what every person sees, regardless of the astronomical model to which he adheres. Do we not continue, over 400 years after Copernicus, to speak of sunrise and sunset?

The ancient Near East knew many scientific texts (on arithmetics, trigonometry, astronomy, medicine). They follow specific literary genres. It has to be said that these genres are not represented in the Bible. The Bible mentions contributions that Solomon made that may be similar to the Listenwissenschaft of his time (1 Kgs 5:13), but it is telling that they are not included in the sacred text. The Bible is not a science textbook.

That the Bible uses ordinary language, without seeking scientific precision, is the necessary condition for it to be understood by people of all times and cultures. On this matter, Calvin employs the bold image of the stuttering of the Spirit. Concerning the fact that the story of Genesis mentions the creation of the “two great lights,” the sun and moon (Gen 1:16), while Saturn is bigger than the moon, he wrote:

The Holy Spirit had no intention to teach astronomy. Accordingly, as Saturn though bigger than the moon is not so to the eye owing to its greater distance, the Holy Spirit would rather speak childishly [in French: “bégayer,” that is stutter] than unintelligibly to the humble and unlearned. 39

Therefore, one should not lament the limited scientific data that can be derived from the Bible. This is the very condition of the universality of its message. That the Bible does not speak of dinosaurs—so be it! It does not mention Eskimos either—but for a rather mysterious reason it is the absence of dinosaurs that seems to cause the problem for modern readers. More seriously: let is it be remembered that Evangelicals believe all that the Bible teaches is true, but do not believe it teaches everything.

4.5. The Relevance of the Bible for Scientific Knowledge

Why is it important to maintain the biblical truth about scientific claims if we find so little in Scripture? It is first a matter of principle, as we have seen, not to separate faith and knowledge. But its importance is not limited to maintaining a principle: the Bible’s teaching is significantly relevant to science. This is particularly the case for the presuppositions of scientific practice, which often remain unconscious: to do science, we must be convinced that nature is orderly, that man can understand this order and that it is worth understanding. All these beliefs underlying science are justified by the doctrine of creation. There are even strong indications that faith in the Creator contributed to the rise of modern science during the sixteenth and seventeenth centuries. 40


In addition to underpinning several fundamental beliefs of science, does the Bible also contain precise scientific information? The answer to this question will depend very largely on which interpretation we adopt of the biblical texts and the delimitation of what we consider scientific. Without developing arguments, I will only mention three scientific claims that, in my opinion, the Bible implies: the temporal beginning of the universe, the common origin of humanity, and the fact that man is more than just his body (in traditional language, he is said to have a soul).

The list of scientific teachings found in the Bible is not, *a priori*, subjects for which we consider that the Bible should provide clear guidance. But it is to be worked out by diligent reading of the Word. Thus it will depend on the interpretations we are led to adopt and in particular on the conclusions about the literary genre of the Genesis texts. Needless to say, any teaching on scientific matters in the Bible must be located in explicit statements. We should resist any temptation to uncover hidden anticipations of modern scientific knowledge in scriptural texts using allegorical exegetical methods. The historical rootedness of biblical revelation prohibits the use of a similar methodology that is popular in some strands of Quranic apologetics.

### 4.6. Sola Scriptura: The Bible as the Unique Source of Authoritative Teaching

Any effort to change, complement or abandon truths revealed in Scripture on the basis of scientific findings flies in the face of the Reformation principle of *Sola Scriptura*. Once again, this does not mean that natural revelation has no role to play in theology. In fact, special revelation presupposes general revelation. Salvation history takes place in the wider framework of world history, starting at creation. The incarnation was possible in so far as humans are created in the image of God (John 10:34–36). Scriptural revelation uses human languages; the very possibility of employing human words in order to signify spiritual matters is rooted in creation.

But we should be very cautious not to allow insights gained only from the observation of nature to control our construction of theological knowledge. Christians are warranted to hold certain truths on the basis of science alone. But such knowledge should not be considered part of church dogma. Thus it does not control church discipline. Consider two examples.

First, it is science, not the Bible, that teaches us that many diseases are caused by invisible agents (e.g., bacteria and viruses). There is no problem for a Christian to accept such knowledge, as we don't believe that the Bible teaches all truth. In certain cultural settings, it may even be an important task for the Church to teach this insight and related hygienic standards, in order to improve public health. Nevertheless, such an explanation of diseases should not be considered part of the Church's confession of faith. Divergent views on the origin of disease should not exclude anybody from fellowship.

Second, most (i.e., all but a very small fraction of) research biologists consider young earth creationism to be bad science. Evangelical and non-Evangelical biologists hardly differ in their stand on this matter. But that does not imply that rejection of young earth creationism should become an integral part of the Church's teaching on natural history in general and on human origins in particular. Differing views on this matter need to be tolerated.

### 4.7. Natural Science Cannot Fully Comprehend Human Nature

The epistemology defended in this article leads to the recognition of plural *Wissenschaften* (see section 2.4 above). This has specific consequences for knowledge about our origins. There are facts about humans which fall outside the competence of the natural sciences, but which we learn from other
disciplines. Psychology and sociology cannot be reduced to natural science, nor can philosophy and theology be discarded as providing no independent insights about human identity. This does not mean that natural science does not give us precious information about who we are and where we come from. But we cannot expect to know everything which is worth knowing about humans from this one source.

Probably the oldest and best-known non-reductionist family of arguments concerns the nature of rational thought. It can be traced back through Descartes to Plato’s *Phaedo*. The backbone of the argument is the general truth that what there is (being) cannot determine what there should be (norms). Natural science aims at describing what exists. But rational thought is a normative endeavor. Affirming that something is true (or false) thus cannot be expressed in purely scientific terms. In the 20th century, versions of this argument have been elaborated (among others) by C. S. Lewis, Karl Popper, Thomas Nagel, and Alvin Plantinga.

The normative character of rational thought is not the only threat to a reductionist understanding of mind. There are other features of thought which are problematic, such as consciousness and intentionality. Theists are not the only philosophers to point out the difficulties of the reductionist program. And the mind is not the only aspect of humans which that defies reductionism. Relational notions—such as trust, friendship, sense of transcendence—seem in their very essence to go beyond what natural scientific method can capture. Remember that one of the hallmarks of scientific practice is the repeatability of experiments. The outcome of an experiment should not be affected by which scientist performs it. But the essence of true relationships is that it does matter to whom we are relating.

The irreducible nature of humans has direct implications for any exploration of human origins. Natural scientific studies, important and fascinating as they are, will never tell us all there is to be known. In particular, there is no straightforward way to translate important philosophical and theological concepts into natural scientific ones. This is true for two very important notions for human origins. Consider first the image of God. Genesis 1 tells us that this is the distinctive feature of humans. But how (if at all) does the image of God express itself in terms of genetics or paleontology? What criteria should we use in order to decide that a certain hominid is “in the image of God”? Is it a genetic trait? Or (more likely) the mastery of language, moral responsibility, religious consciousness? Is “being in the image of

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43 Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False* (New York: Oxford University Press, 2012), argues that rational norms and moral values are real, but cannot be explained by standard natural science.


God” a biological or a cultural trait? Or perhaps both? Or is it neither, but a covenant relationship which God established at some point in history? It is unlikely that any scientific progress will ever allow us to answer these questions with confidence. At best, we can construct plausible models.

Similar uncertainties surround a second key concept: moral and spiritual corruption. But here an additional difficulty raises its head. Not only is it hard to know how to translate such corruption into terms amenable to scientific inquiry, but according to traditional doctrine, it is the result of a unique historical event. In that case, what kind of evidence could paleontologists hope for, in order to confirm its occurrence? It is very unlikely that any unique event leaves paleontological traces, even if it is theologically decisive. But if we have learned the anti-reductionist lesson well, we know that this does not prove that it did not happen. We only have to look for other sources of knowledge, beyond science. To use Blaise Pascal’s famous words:

Know then, proud man, what a paradox you are to yourself. Humble yourself, weak reason; be silent, foolish nature; learn that man infinitely transcends man, and learn from your Master your true condition, of which you are ignorant. Hear God.

If we do not allow Scripture to contribute specific insights on the origin of human corruption, we end up with a significantly different understanding of the human condition. Take as an example Denis Lamoureux’s reformulation of Romans 12:2 and 13:14: “Let Jesus be the Lord over our evolutionary past, encouraging our pair- or group-bonding inclinations and denying our self-preserving inclinations.” His is the picture of two sets of instincts, both naturally present in humans because of their evolutionary past, one evil and one good (parallel to Jewish, Cherokee and Buddhist considerations). But this misses the specific light that original sin throws on human experience: all aspects of our nature are created and all are corrupted by sin. This holds for pair- or group-bonding inclinations and for self-preserving inclinations. There is nothing intrinsically wrong with aiming at self-preservation, and pair- or group-bonding inclinations provide plenty of occasions for sinful behavior. Such a view locates sin in what humans are, thus inevitably leading to deny certain aspects of human nature their legitimate due. It is difficult to see how it can avoid, in the final analysis, deriving sin from the conditions of God’s creation work—and thus from God himself, as he supremely controls these conditions by his omnipotence.

Theologians cannot work in isolation from the best intellectual knowledge of their time. Science certainly is an important part of this. But they should not allow science to silence specific insights gained from their specific source of knowledge, that is Scripture. As Jack Collins writes:

A major goal of the Christian story is to enable those who believe it to make sense of the world. If we abandon the conventional way of telling the Christian story, with its components of a good creation marred by the Fall, redemption as God’s ongoing work to restore the creatures to their proper functioning, and the consummation in which

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48 Ibid., 43–45.

the restoration will be complete and confirmed, then we really give up all chance of understanding the world.\textsuperscript{50}