

Overlapping Magisteria

Why NOMA Fails to Separate Science, Metaphysics and Religion

NOMA

In a 1997 essay called “Nonoverlapping Magisteria” (NOMA), the palaeontologist Stephen Jay Gould argues that there is no conflict between science and religion, and that there cannot be one. The two “magisteria” cover separate domains, so they don’t answer the same questions. Science deals with the empirical universe: what it is made of (facts) and why it works as it does (theories). Religion’s domain is value and meaning. On this view, no conflict can arise as long as religion doesn’t push into empirical territory, and science doesn’t push into values.

Gould was an American writing in a specific context: creationist opposition to evolution, which runs strong in the United States. So he is well aware that conflicts do happen. But he puts them down to fundamentalists who want their religion to encroach on scientific fact, and thereby violate NOMA — and, in the other direction, to arrogant champions of scientism who claim that science can refute religion.

Dawkins’s Critique

In *The God Delusion*, Richard Dawkins pointed out two major weaknesses in NOMA:

- It’s false that religions make no factual claims open to empirical testing. For Dawkins, the existence of God is a hypothesis about the kind of reality we live in: “The God Hypothesis suggests that the reality we inhabit also contains a supernatural agent who designed the universe and — at least in many versions of the hypothesis — maintains it and even intervenes in it with miracles, which are temporary violations of his own otherwise grandly immutable laws.” If that is the claim, then whether it is true has consequences for what we can observe.
- Even if the two magisteria were entirely separate — and they aren’t — science and religion aren’t in symmetrical positions. Scientists earned their authority on factual questions by producing evidence for their theories. It’s far less clear what religious authority on questions of value and meaning is supposed to rest on. Dawkins puts the question directly: “What are these ultimate questions in whose presence religion is an honoured guest and science must respectfully slink away? [...] I would prefer to say that if indeed they lie beyond science, they most certainly lie beyond the province of theologians as well.” (p. 65)

What comes next in Dawkins — that theologians have nothing interesting to say about anything — is more polemical than demonstrative, and I don't take it up in that form. But the question underneath it is a real one: what exactly does the expertise we credit to religion rest on? That's the thread I pick up at the end.

The two criticisms aren't of the same order, and it's worth separating two levels that this debate tends to run together. The first, on which I focus, is a metatheoretical question: does NOMA work as a principle of demarcation between science and religion? I'll argue that it doesn't. The second concerns the substantive questions themselves: my own views on the questions NOMA claims to reserve for religion — does the soul exist? is there really a conflict? I state these where they come up, but flag them for what they are, because my main argument doesn't depend on them.

One point of terminology. By “conflict” I don't necessarily mean ongoing social hostility between scientific and religious institutions. I mean something narrower: a contradiction between a doctrine and an item of scientific knowledge, a competition between explanations, or a tension between different ways of forming and justifying beliefs. It's mainly these logical and epistemic dimensions that concern me here.

NOMA Version 1: Separating Values from Facts

Let me say why I agree with Dawkins. First, NOMA does rest on a point one could grant: the basic distinction between values and facts. David Hume famously observed that there is no logical route from a factual statement (“is”) to a normative or imperative one (“ought”). This is the well-known is–ought problem. So Gould is right that nothing science discovers about the nature of the world — a question of fact — can by itself tell us how we ought to treat other animal species, which is a question of value.

But Gould underestimates something just as basic. No ethical argument can move from purely factual premises to a normative conclusion; granted. Yet hardly any complex ethical argument is free of factual premises, at least implicitly. Take animals again. Indifference to animal suffering has often been traced to a belief in the sharp separation of animal from human nature — a belief much harder to defend in the light of modern biology. In the same way, many live ethical questions — stem cells, same-sex marriage, euthanasia, abortion — look different depending on whether you start from naturalistic or religious premises.

To see exactly why Hume's point doesn't stop a question of fact from bearing on a question of value, here is a schematic version of the reasoning, often implicit, behind religious opposition to abortion:

Premise 1 (value): Homicide must be prohibited.

Premise 2 (fact): Homicide consists in killing any individual possessing a human soul.

Premise 3 (fact): Very early after conception, the human embryo possesses a human soul.

Intermediate conclusion (fact, from premises 2 and 3): Abortion is homicide.

Final conclusion (value, from premise 1 and the intermediate conclusion): Abortion must be prohibited.

I don't claim this captures all opposition to abortion, but it does roughly schematise part of it. The point is only to illustrate something you would find in any ethical discussion: among the premises of an ethical argument, the moral ones (premise 1 here) are almost always accompanied by factual ones (premises 2 and 3). Science and logic may have nothing to say about the moral premises, but they can at least potentially shed light on the factual ones. And the final ethical conclusion depends on both. Indeed the deepest disagreements probably lie on the factual side.

Still, it's worth being precise about how much this shows. It doesn't yet establish that religion is wrong, or even that there is a conflict. It establishes only that facts are *relevant* to questions of value, and that the watertight boundary NOMA posits already leaks on this side. That's a first breach, not the decisive blow — Gould himself concedes that sorting the two domains can become complex and difficult. The real asymmetry, the one Dawkins pointed to, comes later. First I need to show that NOMA leaks just as badly on the other side: metaphysics.

NOMA Version 2: Separating Science from Metaphysics

I think Gould was at least partly aware of this. But somewhere in his essay he switches the thesis he is defending — probably without noticing — in order to shield it from exactly this objection. He begins by qualifying his position:

“Many of our deepest questions call upon aspects of both magisteria for an adequate answer—and the sorting of legitimate domains can then become complex and difficult. To cite just two broad issues involving evolutionary facts and moral arguments: Since evolution made us the only creature with advanced consciousness, what are our responsibilities to other living things? What does our genealogical connectedness to all other organisms imply about the meaning of our lives?”

Gould then discusses the fact that Christians — Pope Pius XII in particular — really were troubled by the ethical implications of evolutionary theory. But he ends by

noting that they found a solution, thanks to John Paul II, straight out of a strict application of NOMA:

“The sciences of observation describe and measure the multiple manifestations of life with increasing precision and correlate them with the time line. [...] The moment of transition to the spiritual cannot be the object of this kind of observation.”

The trouble with Gould’s argument is that he has just slipped, imperceptibly, from a NOMA separating “facts” from “values” to a NOMA separating “purely empirical facts” from “metaphysical facts.” Whether a human soul exists, and when it appeared in the course of evolution, is not a question of values. It is a question of fact. Whether that fact is purely metaphysical, and therefore beyond the reach of any scientific investigation, is a claim that needs examining — and I’ll examine it. But either way, separating metaphysics from science is not the same thesis as separating values from science. Gould is thus inconsistent in his use of the NOMA principle, and it is precisely this inconsistency that lets him escape the objection that questions of value involve questions of fact.

At this stage NOMA can still be salvaged, provided religion’s magisterium is redefined. Religion wouldn’t merely handle values; Gould also has to grant — and implicitly does grant — that it handles the magisterium of metaphysics, that is, questions of fact and existence inaccessible to any direct experiment, such as the existence of God or the nature of the soul.

But I don’t think this version of NOMA is any more defensible than the first. To show why, I need a detour through what metaphysics actually is.

The distinction between physics and metaphysics comes from Aristotle, for whom the two did not have different objects of study, only different levels of generality. The sharp separation of metaphysics from physics — that is, from the sciences — is owed to the empiricist tradition, and still more to its positivist form. The idea was that science should deal only with what is accessible to experience, and that whatever is not accessible to experience is not accessible to human knowledge at all. The corollary, for most positivists, was that metaphysics was ruled out as a legitimate field of inquiry: as a domain inaccessible to experience and observation, it was an empty domain, to be dropped from human inquiry.

For reasons too long to set out here — but which turn largely on the impossibility of drawing any fundamental line between the observable and the unobservable — the near-consensus in epistemology today is that positivism was a dead end, and metaphysics has become a perfectly legitimate field of philosophical inquiry again. Take atoms: calling them observable entities is quite arbitrary. In one sense we

observe them under an electron microscope; in another, everything we observe is a highly indirect consequence of their existence.

More importantly, as metaphysics was rehabilitated, the close links between physics and metaphysics that already existed in Aristotle and in antiquity were re-established — so much so that many philosophers now regard metaphysics as one of the two main areas of philosophy of science, alongside epistemology. Roughly: epistemology studies the status of our scientific knowledge, and metaphysics draws out its ontological implications, that is, what our scientific theories tell us about the nature of what exists. As the philosopher of science Michael Esfeld puts it, metaphysical hypotheses have to take the results of the sciences into account if they are to stand any chance of grasping the being of nature; there is no privileged access to being that pure reflection reaches without passing through the scientific study of nature. Conversely, every scientific theory calls for an interpretation that determines what it says about nature (Esfeld, *Physique et métaphysique*, p. 2).

This conception of metaphysics isn't peculiar to Esfeld; it is broadly mainstream in analytic philosophy of science. For books taking the same approach, see Tim Maudlin's *The Metaphysics Within Physics*, James Ladyman and Don Ross's *Every Thing Must Go: Metaphysics Naturalized*, David Wallace's *The Emergent Multiverse*, or Steven French's *The Structure of the World* — all written by some of today's most influential philosophers of physics. Broadly speaking, the philosophical presupposition behind this whole approach is what is called philosophical naturalism, which Daniel Dennett sums up as follows:

“My fundamental perspective is naturalism, the idea that philosophical investigations are not superior to, nor prior to, investigations in the natural sciences, but in partnership with them, the philosophers having the special task of trying to clarify and unify these often conflicting perspectives so that they can be merged into a single vision of the universe...”

So to defend the idea that metaphysics and science belong to two separate magisteria, Gould would need arguments against what is now the majority position in philosophy of science. The PhilPapers survey of professional philosophers puts naturalism at 64% among philosophers of science.

The Case of the Soul

I don't want to leave this at the level of appeals to authority, so let me take up a specific case Gould discusses himself: the existence of the soul. Let me be clear about what I'm trying to establish. My aim is not to show that the soul doesn't exist — that's a separate question, and I'll say a word about it at the end of this section. My aim is

only to show that the question of the soul is a factual one, and that science has a grip on it. That's all I need: if science is relevant here, then the metaphysical version of NOMA collapses, whether or not the soul exists. Gould claims the opposite:

“But I also know that souls represent a subject outside the magisterium of science. My world cannot prove or disprove such a notion, and the concept of souls cannot threaten or impact my domain.”

In fact, scientific attempts to establish the existence of the soul as an immaterial substance independent of the body are legion. They have all failed so far, but it is simply false to say the soul was *a priori* an experimentally untestable hypothesis. Even now, a good deal of work in parapsychology, and in research on near-death experiences, can be read as attempts to test various hypotheses about the existence and nature of the soul.

Since Descartes, people have often noted a tension between the conservation laws of physics — of energy and of momentum — and the idea of an immaterial soul acting on the body: to alter a piece of behaviour, such a soul would have to intervene in the chain of physical causes. The argument isn't decisive on its own; replies are available. But it does show that the soul hypothesis is far from physically neutral. It has implications science can discuss, which is exactly the point at issue.

Next, making the soul fit evolutionary theory is awkward at best. It would require some form of discontinuity, whereas everything we know about human evolution points to gradual change — not only in how our bodies work, but in our mental characteristics too. Finally, our increasingly precise knowledge of how the brain works, together with what we have learned from cases of brain dysfunction, places constraints on any conception of the soul severe enough to make it very hard to defend. (See the neuroscientist Julien Musolino's *The Soul Fallacy* for a full critique of the notion from the brain sciences.)

One could try to escape all this by withdrawing the soul somewhere unreachable: a soul that doesn't act on the body, leaves no neural signature, breaks no law — in short, a soul with no observable effects at all. Against that soul, admittedly, science has nothing to say, and NOMA looks safe. But the escape route costs twice over. Empirically, it isn't what believers believe: Musolino's work on how firmly the body-soul split has taken hold in the general public suggests that around 80% of Americans hold some form of dualism — and the soul they believe in *acts*, survives, answers for our deeds. The causally inert soul is a philosopher's reconstruction, not the actual religious belief. Philosophically, an entity designed to make no observable difference escapes refutation only by becoming explanatorily idle: you keep it solely in order to shelter it. We'll meet this manoeuvre again — emptying a belief of content to make it uncontestable — because it lies at the heart of the whole discussion.

It's worth noting, finally, that belief in the soul is far from insensitive to the progress of knowledge. Among philosophers of mind — the people whose job is to work out what our knowledge of the brain implies about the workings of the mind — interactionist dualism is almost unanimously regarded as discredited: close to 77% of philosophers of cognitive science describe themselves as physicalists, holding that the workings of the mind are entirely realised by physical and chemical processes. Note that most of those who don't declare themselves physicalists don't declare themselves non-physicalists either, but ticked "other," which means dualism certainly accounts for well under 23%. In a lecture available online, Musolino reports the results of a study published in *Nature* on belief in the immortality of the human mind among American scientific elites: 35% in 1914, down to 8% in 1998 — while, in the meantime, considerable progress was made in our understanding of how the mind works.

I won't draw more from this than it carries. The decline doesn't *prove* the soul doesn't exist; that would confuse a sociological statistic with an argument. But it does indicate something precise, and sufficient for my purposes: belief in the soul is permeable to scientific knowledge, and it recedes as science advances. Which is exactly what we would not observe if the question were, as Gould would have it, beyond the reach of science.

A word, finally, on what I personally believe — which the reader can skip without losing anything of what precedes. For my part I lean firmly towards the soul not existing: the accumulation of constraints I've just described seems to me to make the hypothesis highly improbable. But that is a first-order conviction, distinct from my main thesis. The main thesis requires only this: the question falls within the reach of science, and NOMA is wrong to remove it.

Is There Really a Conflict?

Let me turn to the more general question of whether there is really a conflict between science and religion. Gould says repeatedly that there is no incompatibility between, say, Christian faith and modern science, evolutionary theory in particular. He rests this on three points: (1) biblical scripture is not to be read literally but must be interpreted and taken in a metaphorical sense; (2) many modern scientists are Christians and see no incompatibility between their religion and evolution; (3) the popes themselves have held that there is no incompatibility between evolution — properly interpreted — and religion — properly interpreted. These points seem to me fundamental to the whole discussion.

First, Gould underestimates what happens once you grant yourself the latitude to interpret a religious text however you like. Religion risks losing much of its own content: if you allow yourself to reinterpret any passage as the need arises, the text

stops constraining anything and ends up reflecting only the convictions you bring to it. Some passages in the Bible are meant metaphorically — and they're fairly easy to spot. Others are ambiguous. Others again seem to claim they are recounting history as it happened. What sense can we make of those if they too must be read metaphorically? Are Adam and Eve metaphors? Metaphors for what, exactly? I am convinced that such reconciliations between biblical passages and current scientific knowledge are possible, given enough interpretive ingenuity. But the fact that a reconciliation is always available proves nothing in itself: with enough interpretive ingenuity, almost any doctrine can be squared with almost any fact, so a compatibility obtained after the event is no argument for the reading proposed. (One might object that non-literal readings of these texts are very old indeed. In the appendix — Box 1 — I explain why that antiquity isn't enough to save the manoeuvre.)

This brings me to my second point. The position of “enlightened” believers, as opposed to fundamentalists, has shifted rather curiously over history on the question of what does and doesn't belong to Christian faith. For much of Christian history, the fixity of species and the historicity of Adam and Eve were held to be closely bound up with doctrinal orthodoxy, and calling them into question could be seen as theologically dangerous. (The fate of monogenism — the idea that all humanity descends from a single couple — offers a still-living example of this process: see Box 2 in the appendix.) Now, if I define the Christian religion as everything Christians have believed at some point, minus everything science has refuted, and decide that any text refuted by scientific knowledge must be reinterpreted metaphorically, then I can easily claim my religion is compatible with science. But there is a price: I end up with an artificial conception of religion, manufactured for the sole purpose of making it compatible with the scientific record. This form of immunization against any risk of refutation is a real problem: a position built so that it can never be contradicted loses much of its point in the process.

On the third point, it's worth noting that John Paul II held evolution to be compatible with Christianity as long as it confined itself to describing man's physical evolution and left his spiritual dimension alone. But cognitive neuroscience, comparative psychology, palaeoanthropology and evolutionary approaches to cognition are all trying to do precisely that: to place human mental capacities within a continuous natural history. It is notable, incidentally, that Gould long opposed certain forms of evolutionary psychology, whose implications sit badly with the version of NOMA he defends.

These three responses — the metaphorical rereading of scripture, the appeal to believing scientists, the restriction of religion to the “spiritual” — have a family resemblance worth naming. Each works as the same *immunizing strategy*, to borrow

the term Maarten Boudry and Johan Braeckman use for the recurring patterns by which belief systems achieve invulnerability to evidence and criticism (“Immunizing Strategies and Epistemic Defense Mechanisms,” *Philosophia*, 2011). Faced with an awkward finding, you subtract a little of religion’s empirical or metaphysical content, until nothing is left that could conflict with science. *Ad hoc* metaphorisation empties the texts; the causally inert soul, met earlier, empties the metaphysics of mind. In both cases, compatibility with science is bought at exactly the price of what made the religious claim a claim. And the same movement, pushed to its limit, is what we find in the most serious version of NOMA.

Because NOMA can be defended differently from the way Gould defends it. Rather than claiming — falsely — that religions *make no* factual statements, one can claim that a properly understood religion *should* confine itself to value and meaning, and leave the facts to science. That is the prescriptive version of NOMA, and it is the stronger one. The tempting objection is that every religion involves, by definition, a metaphysical dimension: a view of man, of his place in the universe, of his fate after death. But I’m wary of that purely definitional objection. There are forms of religiosity that deliberately do without metaphysics — some strands of Buddhism, Ursula Goodenough’s religious naturalism, Don Cupitt’s non-realist theology, or R. B. Braithwaite’s reading of religious statements as expressions of moral commitment. An empirical observation serves better than a definition: religions as actually lived and historically constituted almost all carry a massive metaphysical and factual dimension.

And here is the decisive point: these counter-examples don’t save prescriptive NOMA, they bury it. If NOMA holds only for a religion purged in advance of every metaphysical claim — a religion corresponding to a very small minority of what people actually profess — then NOMA has stopped being a peace treaty between science and religion as it exists. It has become a demand: religion may keep its territory, provided it gives up everything that made it a religion. The supposed accommodation is really an abolition in velvet gloves — and it arrives, by another route, at the same conclusion as mine.

The Asymmetry of Expertise

Before concluding, I want to come back to the point Dawkins only sketched: the asymmetry between the expertise scientists have acquired on questions of fact and the expertise Gould grants religious traditions on questions of value and meaning.

Two things need separating first: being right, and having expertise. A person or a tradition can arrive at a true conclusion by luck. Expertise requires more — a sufficiently reliable route to the truth, one capable of producing correct judgements

non-accidentally and, as far as possible, of detecting and correcting its own errors. So the question isn't merely whether a religion can hold a sound precept. It's what would entitle us to treat religion, as such, as a privileged source of moral knowledge.

Suppose a religious tradition gets a moral question right. Three explanations are possible.

It may be right by accident, like a stopped clock that gives the correct time twice a day. A truth arrived at accidentally is obviously not expertise.

It may be right because its revelation is genuine: a truthful supernatural source really exists, it communicated certain truths, and the tradition transmitting them is a reliable channel. But each of these is a claim about facts — the existence of the source, the reality of the communication, the reliability of the transmission. Religious expertise can then be grounded only at the cost of factual statements precisely incompatible with the separation NOMA demands.

Or, finally, a tradition may have gradually grasped something true about the human condition: the importance of reciprocity, the demands of cooperation, the shared vulnerability of human beings, the impartiality of certain norms. Religious traditions have unquestionably preserved, deepened and transmitted such insights, and theologians have produced profound moral and psychological analyses. But once the reasons supporting those analyses can be examined independently of revelation, their force belongs to the argument itself, not to the sacred status of its historical vehicle. In that case the tradition holds no specifically religious expertise: it is taking part in shared moral reflection.

The trilemma is therefore complete. Either religion is right accidentally, and there is no expertise. Or its authority rests on a real and reliable revelation, and it depends on factual claims that bring NOMA down. Or it is right for reasons accessible to human reflection, and the authority belongs to those reasons rather than to religion as such. In no case does Gould get what he needs: an expertise that is real, specifically religious, and compatible with the separation of magisteria.

One might still object that this dismisses too quickly the hypothesis of a privileged religious access to the truths of meaning and value. But such a hypothesis ought to leave some epistemic traces. A field of expertise does not necessarily produce immediate or complete agreement, but it normally has recognised means of comparing judgements, identifying errors and gradually improving the reliability of its conclusions.

Religious traditions hardly present such a picture. Traditions diverge deeply and durably on metaphysics, on human conduct, on the meaning of existence. More

importantly, they have no shared procedure for resolving their disagreements that is independent of each one's own authorities. The texts, spiritual experiences and institutions to which a tradition appeals are generally not accepted as probative by the others. This divergence doesn't directly prove that all religious doctrines are false; it shows only that we have no clear reason to credit any one of them with reliable and privileged access to normative truth.

A symmetrical objection arises here. Secular moral philosophy has its own lasting disagreements: consequentialists, deontologists and virtue theorists have not converged on a common doctrine. Why grant it a legitimacy denied to religions?

The relevant difference isn't experimental method versus no method. It is publicly examinable reasons versus reasons of authority. Moral philosophers advance premises and arguments that anyone can discuss, contest or reformulate without first having to acknowledge the sacredness of a text or the authority of an institution. They do not ask others to accept a conclusion merely because they are the authorised custodians of a revelation.

A religious tradition can of course develop its positions through internal rational work, subtle and accumulated over centuries. But only two possibilities remain. Either that work rests on reasons anyone can examine and take up, in which case its authority is that of moral reflection, not of revelation. Or it rests, in the last resort, on the claim that a given text is revealed or a given institution divinely authorised — in which case the normative claim depends on factual propositions that NOMA specifically forbids religion to assert. There is no fourth way.

This argument assumes neither that all religious moral positions are false, nor even that objective moral facts exist. A religion may be right by luck, because its revelation is genuine, or because it converges on reasons available to everyone. My point is only that nothing within NOMA's framework grounds the particular authority Gould grants religious traditions over questions of value and meaning. NOMA doesn't merely ask that they be allowed to take part in moral discussion; it credits them, on that ground, with a legitimacy of their own, even with a kind of sovereignty. It is that legitimacy, and not the possible truth of this or that precept, that remains without foundation.

Conclusion

NOMA is an appealing position. It is conciliatory, and it preserves the autonomy of science without rejecting religious people. It can therefore look like the moderate position par excellence — and anything moderate can seem reasonable. But as we have just seen, it rests on fragile foundations and does not survive serious examination.

NOMA fails, then, in all three of its forms. As a separation between facts and values, it overlooks the factual premises on which many moral judgements depend. As a separation between science and metaphysics, it ignores that metaphysical claims are constrained by the sciences as soon as they purport to describe what exists and acts in the world. As a prescription requiring religion to renounce all factual claims, it does not reconcile science with historically constituted religions: it redefines them beyond recognition.

NOMA also enjoys real favour in academia, where those who oppose it often expose themselves to the charge of “scientism” (see the collection edited by Maarten Boudry and Massimo Pigliucci, *Science Unlimited? The Challenges of Scientism*, and in particular Boudry’s own contribution, “Plus Ultra: Why Science Does Not Have Limits,” and Stephen Law’s). The various domains of human thought have always cross-fertilised one another, in a process the biologist E. O. Wilson popularised under the name *consilience*: “Literally a ‘jumping together’ of knowledge by the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation.” As Boudry puts it: “Human knowledge is a tight-knit web, and there is no way to disentangle ‘science’ (no matter how you construe it) from such neighboring disciplines as history, philosophy or even metaphysics (Ladyman et al. 2007). If it’s not entangled in the web of knowledge, chances are that it’s not knowledge at all.”

Any banishment of science from a domain should therefore be regarded with suspicion — all the more so because the “domain” withdrawn from science turns out, on inspection, to be carved out by the same manoeuvre every time. You remove in advance everything science might contradict, and then express surprise that it has nothing to say there.

Appendix

Box 1 — Does the antiquity of allegorical reading count as an objection?

One will object that non-literal reading of the Bible is no recent invention, and that’s correct: allegory is as old as Christian exegesis. Philo of Alexandria already applied it to the Torah; Origen explicitly distinguished several senses of scripture; the Middle Ages codified the “four senses,” whose history Henri de Lubac traced (*Exégèse médiévale: Les quatre sens de l’Écriture*, Aubier, 1959–64). But it is worth looking closely at what that tradition did — and what it did not do.

It was generally additive rather than simply subtractive: the spiritual sense was often laid over the literal and historical sense without abolishing it. The events were held to be both real and meaningful. Augustine’s case is decisive here, because it cuts against intuition: the greatest promoter of the spiritual reading of

Genesis is also the author of a commentary on its literal sense (*De Genesi ad litteram*), which maintains the historicity of Adam and of the Fall. On an interpretation defended notably by Ian A. McFarland, Augustine's insistence on a historical Adam strengthens over the course of his work, in step with the elaboration of his doctrine of an original sin transmitted to his descendants (*In Adam's Fall*, Wiley-Blackwell, 2010). Aquinas locks the principle in: the spiritual senses are founded on the literal sense, which alone can ground an argument (*Summa Theologiae*, I, q. 1, a. 10). Origen is an important qualification, though: in Book IV of *On First Principles* he explicitly grants that certain passages did not take place in the literal sense. But in his case these de-literalisations are motivated by reasons internal to the text — impossibility, incoherence, anthropomorphism — and not by any external scientific refutation.

What is distinctive about the modern period, then, is not figurative reading as such, but a gesture of an altogether different kind: *subtractive*, triggered from *outside* by the sciences, and — this is the essential part — *unidirectional*. The fixity of species becomes figurative when evolution takes hold; the universal flood when geology rules it out; the six days of creation when cosmology and palaeontology forbid them. Each readjustment plugs exactly the anomaly science had just opened, and one never sees the reverse: no discovery has ever made a passage literal again once it had become metaphorical.

The development of modern Catholic exegesis offers a precise institutional example of this shift. In *Praestantia Scripturae* (1907), Pius X declared that Catholics were bound in conscience to submit to the decisions of the Pontifical Biblical Commission, and that publicly contesting them could constitute grave fault. The Commission's decree of 30 June 1909 on the first three chapters of Genesis did not impose word-for-word literalism: it allowed metaphorical expressions, non-scientific language and several interpretations of the "days." It did, however, require that a real historical core be maintained, and refused to reduce those chapters to myths or legends devoid of objective reality. In 1948, a letter from the Commission to Cardinal Suhard considerably softened the practical reach of these responses, specifying that they should not stand in the way of further scientific research. It did not formally revoke the 1909 decree, but proposed a reading of it more open to the progress of exegesis.

This is why the antiquity of allegory is not a good counter-argument. It would hold if the modern procedure were the same as the ancient one. But it differs in its direction (subtracting historicity instead of enriching it), in its trigger (an empirical threat rather than a reason internal to the text), and in running only one way. One can, admittedly, raise this readjustment into a principle — Augustine's, which

Galileo would take up in his *Letter to the Grand Duchess Christina*: do not stake faith on what the study of nature establishes. But that principle, taken seriously, concedes the essential point: on everything touching matters of fact, scripture yields to science. Honest de-literalisation is not a reconciliation between two sovereign magisteria; it is the tacit admission that only one of them settles questions of fact — which is the very immunizing structure I am describing here.

Box 2 — Monogenism, a boundary still moving

Of all the facts the tradition held to be historical, monogenism — the idea that all humanity descends from a single couple, Adam and Eve — is the most instructive, because in it one can watch de-literalisation actually happening, and at three different speeds. It was untouchable for a long time, not out of stubbornness, but because it carried original sin: from Paul (Romans 5) to the Council of Trent (Session V, 1546), the fault of an individual Adam, transmitted to all his descendants, required a single ancestor. There seems to have been no lasting, frontal Christian challenge to this scheme before the modern period. The first famous one is Isaac La Peyrère's: his *Præadamitæ* (1655) asserted the existence of men before Adam. The book was burned in Paris almost at once, and its author imprisoned, then forced to recant and convert (see R. H. Popkin, *Isaac La Peyrère, 1596–1676*, Brill, 1987).

When the pressure became scientific, the magisterium held the line as long as it could: *Humani Generis* (1950) still refuses the faithful the liberty to embrace polygenism, on the grounds that it is not apparent how it can be reconciled with an original sin proceeding from a real individual Adam (Pius XII, *Humani Generis*, §37). That condemnation has never been the object of a formal retraction comparable to the explicit abrogation of a decree. In practice, however, a large part of subsequent Catholic theology has accepted demographic models incompatible with the biological descent of all humanity from a single recent couple, reinterpreting the relation between Adam and original sin. Most of the faithful have no idea the doctrinal difficulty exists.

Meanwhile, population genetics has made the literal reading untenable in its most natural form: the diversity of our genome is incompatible with the idea that recent humanity as a whole descends biologically from a single isolated couple (F. J. Ayala, “The Myth of Eve,” *Science*, 1995; D. Venema and S. McKnight, *Adam and the Genome*, Brazos, 2017). One must be exact, though: genetics does not allow us simply to convert present-day diversity into a single date beyond which a founding

couple would become possible. Some very particular models have argued that an extremely ancient bottleneck of two individuals cannot be formally excluded, but this possibility is not a consensus result in palaeogenetics. The favoured models describe instead a history of structured ancestral populations, with repeated separations and admixtures; and the “effective size” geneticists estimate is not to be confused with the actual number of living individuals.

Recent attempts at reconciliation therefore shift Adam and Eve towards a position that no longer corresponds to that of a couple constituting the whole human biological population on their own: a couple situated within a larger population, theological representatives of humanity, or universal genealogical ancestors without being the sole genetic source of everyone alive (S. J. Swamidass, *The Genealogical Adam and Eve*, IVP Academic, 2019; see also K. Kemp, “Science, Theology, and Monogenesis,” 2011). These constructions may well be coherent, but they save monogenism by turning it into a thesis that no longer produces the genetic consequences naturally associated with the traditional reading.

One reservation, finally, against too simple a reading. On this particular point, “accommodating science” was not on the side of moral progress: Christian monogenism affirmed the unity of humankind, whereas the pre-Adamite and then polygenist lineage — from La Peyrère to the racial theories of the nineteenth century — fed so-called scientific racism (see D. N. Livingstone, *Adam’s Ancestors*, Johns Hopkins, 2008). The example illustrates the *structure* by which a belief is immunized, not any moral superiority on the part of those who contest it.

Bibliography

Aquinas, Thomas, *Summa Theologiae*, I, q. 1, a. 10.

Augustine, *The Literal Meaning of Genesis (De Genesi ad litteram)*.

Ayala, Francisco J., “The Myth of Eve: Molecular Biology and Human Origins,” *Science*, vol. 270, 1995, pp. 1930–1936.

Boudry, Maarten, and Johan Braeckman, “Immunizing Strategies and Epistemic Defense Mechanisms,” *Philosophia*, vol. 39, no. 1, 2011, pp. 145–161.

Boudry, Maarten, “Plus Ultra: Why Science Does Not Have Limits,” in Maarten Boudry and Massimo Pigliucci (eds.), *Science Unlimited? The Challenges of Scientism*, University of Chicago Press, 2017, pp. 31–52.

Boudry, Maarten, and Massimo Pigliucci (eds.), *Science Unlimited? The Challenges of Scientism*, University of Chicago Press, 2017.

Buggs, Richard, and S. Joshua Swamidass, exchange on the limits of genetic inference concerning a two-individual bottleneck, *Nature Ecology & Evolution* Community, 2017–2018 (online).

Council of Trent, Session V (1546), decree on original sin.

Dawkins, Richard, *The God Delusion*, London, Bantam Press, 2006.

Dennett, Daniel C., *Freedom Evolves*, New York, Viking Penguin, 2003, chapter 1, “Natural Freedom.”

Esfeld, Michael, *Physique et métaphysique*.

French, Steven, *The Structure of the World: Metaphysics and Representation*, Oxford University Press, 2014.

Galileo Galilei, *Letter to the Grand Duchess Christina* (1615).

Gould, Stephen Jay, “Nonoverlapping Magisteria,” *Natural History*, vol. 106, no. 2, March 1997.

Hume, David, *A Treatise of Human Nature* (1739–40), Book III.

John Paul II, *Message to the Pontifical Academy of Sciences on Evolution* (1996).

Kemp, Kenneth W., “Science, Theology, and Monogenesis,” *American Catholic Philosophical Quarterly*, vol. 85, 2011, pp. 217–236.

Ladyman, James, Don Ross, David Spurrett and John Collier, *Every Thing Must Go: Metaphysics Naturalized*, Oxford University Press, 2007.

La Peyrère, Isaac, *Præadamitæ*, 1655.

Larson, Edward J., and Larry Witham, “Leading Scientists Still Reject God,” *Nature*, vol. 394, 1998, p. 313.

Livingstone, David N., *Adam’s Ancestors: Race, Religion, and the Politics of Human Origins*, Johns Hopkins University Press, 2008.

Lubac, Henri de, *Exégèse médiévale: Les quatre sens de l’Écriture*, Paris, Aubier, 1959–1964.

Maudlin, Tim, *The Metaphysics Within Physics*, Oxford University Press, 2007.

McFarland, Ian A., *In Adam's Fall: A Meditation on the Christian Doctrine of Original Sin*, Wiley-Blackwell, 2010.

Musolino, Julien, *The Soul Fallacy*, Prometheus Books, 2015.

Origen, *On First Principles (Peri Archōn)*, Book IV.

PhilPapers Surveys (D. Bourget and D. Chalmers), surveys of professional philosophers (online).

Pius X, *Praestantia Scripturae*, motu proprio, 18 November 1907.

Pius XII, *Humani Generis*, 1950 (§37).

Pontifical Biblical Commission, Reply on the historical character of the first three chapters of Genesis, 30 June 1909.

Pontifical Biblical Commission, Letter to Cardinal Emmanuel Suhard on the sources of the Pentateuch and the historicity of Genesis 1–11, 16 January 1948.

Popkin, Richard H., *Isaac La Peyrère (1596–1676): His Life, Work and Influence*, Leiden, Brill, 1987.

Rahner, Karl, “Theological Reflexions on Monogenism,” in *Theological Investigations*, vol. 1, 1961.

Swamidass, S. Joshua, *The Genealogical Adam and Eve: The Surprising Science of Universal Ancestry*, IVP Academic, 2019.

Venema, Dennis, and Scot McKnight, *Adam and the Genome*, Brazos Press, 2017.

Wallace, David, *The Emergent Multiverse*, Oxford University Press, 2012.

Wilson, Edward O., *Consilience: The Unity of Knowledge*, New York, Alfred A. Knopf, 1998 (definition of consilience, pp. 7–8).