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Nietzsche's Antichrist: The Birth of Modern Science out of the Spirit of Religion

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Nietzsche argued that the Greeks were in possession of every theoretical, mathematical, logical, and technological antecedent for the development of what could be modern science. But if they had all these necessary pre-requisites what else could they have needed? Not only had the ancient Greeks no religious world-view antagonistic to scientific inquiry, they also lacked the Judeo-Christian promissory ideal of salvation in a future life (after death). Subsequently, when Greek culture had been irretrievably lost, what Nietzsche regarded as the “decadent” Socratic ideal of reason ultimately and in connection with the preludes of religion and alchemy developed into modern science and its attendant ideal of progress and redemption not in the afterlife but in “the future.”

In point of fact, one is not philologist and physician without being anti-Christian as well. As philologist one peers behind the “holy books”, as physician behind the physiological depravity of the typical Christian. The doctor says “uncurable”, the philologist says “fraud” ... (AC 47)

The Spirit of Science

Posing the logical and conceptual question of the genesis and development of modern scientific culture beginning with his first book on The Birth of Tragedy through to the very end of his productive life with The Antichrist, Nietzsche challenges our assumptions regarding the continuous development of modern science as such,¹ the path of

¹ See Friedrich Nietzsche, Kritische Studien-Ausgabe, ed. Giorgi Colli and
scientific progress, as we assume science "progresses" along a single "sure" road—as Kant puts it in the second preface to the Critique of Pure Reason. Nietzsche contends that the 'Pre-Platonic' philosophers, Thales and Anaximander, Heraclitus and Empedocles, were well advanced along this path, including the Alexandrian scientists of the first three centuries B.C.E., Euclid and Hippocrates, Aristarchus and Eratosthenes, Archimedes, Hipparchus, etc. But ancient Greek science would be shattered by a change akin to the decisive triumph of Socrates and Euripides over ancient tragedy. Nietzsche makes this striking claim at the very end of his The Antichrist and the reason would have everything to do with the rise of the singular new tradition that also elicits his lamentation: "Two thousand years, and not a single new god." Nietzsche's account manifestly differs from the standard story of the opposition between science and religion. For Christianity, with its linear promise of salvation now gives rise to modern science replete with its own analogous assurances of precisely techno-scientific redemption. Here I explore Nietzsche's claim when he writes, with explicit reference to science: "Everything essential had been found in order to begin to go to work." Something had to have intervened because although everything had been ready to go, in the Kantian sense, of the conditions for its possibility, what would become modern science was not to develop for centuries more—a thousand years if Duhem and others are right about medieval science, a few hundred years more if we prefer to follow the standard story of the scientific revolution.

It is in the context of this twofold loss (of both ancient tragedy and ancient Greek science) that I seek to unpack Nietzsche's rueful musing in The Antichrist: "The whole work of the ancient world in vain." Counter the standard readings which would limit the reawa-

Mazzino Montinari (Berlin: de Gruyter, 1980) [KSA], vol. 1, p. 804, 813; and see KSA 8, p. 405.
3 Nietzsche Der Antichrist [AC], §19; KSA 6, 185.
4 "Alles Wesentliche war gefunden, um an die Arbeit gehn zu können." AC 59; KSA 6, p. 248.
5 Friedrich Nietzsche, AC §59; KSA 6, p. 247.
kening of antiquity to the Renaissance, Nietzsche, who had hoped in his first book on tragedy and music for a 19th century rebirth of the possibilities of the ancient world, now suggests that everything has gone to ground, gone to grass.

Many Nietzsche scholars have been disinclined to read Nietzsche on ancient science, and even after my own study on Nietzsche’s Philosophy of Science but also in spite of the now more than half a dozen sizable book collections dedicated to the theme of Nietzsche and science, most philosophers (and philologists, as most Nietzsche scholars tend to be literary historians rather than philosophers these days) are convinced that Nietzsche has nothing to offer reflections on science. To date and despite the attempts of younger thinkers, simply to argue for a connection between Nietzsche and science only meets resistance, in spite of Nietzsche’s own dramatically explicit characterization of his first book on tragedy as having framed nothing less than what he named “a new problem … the problem of science itself, science considered for the first time as problematic, as questionable.”

Part of the reason for this opposition is surely Nietzsche’s scientific formation as a scholar of classical philology. Even in this his own field, Nietzsche is rarely read as any kind of ‘authority’ on the an-


8 Friedrich Nietzsche, Die Geburt der Tragödie [GT], § ii; KSA 1, p. 13.
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cients or as if he were an expert philologist. This is absurd not least because and certainly at the outset of his career he was one of the more conventionally recognized new scholars by the leading scholars of his time. Nietzsche had formidable training as a philologist, he studied with the best men of his day and enjoyed their best endorsement and made notable achievements, including canonic contributions to his field, especially prosody. For this reason, that is, although his expertise in philology is undeniable, while Nietzsche is read in philosophy (although in Europe as a whole and especially in Germany there are increasingly fewer university professors who specialize in his work), he remains unread in classics or ancient philology. For this reason many scholars of antiquity who work on ancient Greek science will never have read his work.


12 The one exception, again (see note 9 above) is prosody but even there Nietzsche is relegated to a footnote and it is common to misrepresent Nietzsche’s own claims for ‘music’ with respect to his first book—I try to unpack these claims in the last three chapters of The Hallelujah Effect: Philosophical Reflections on Music, Performance Practice, and Technology (Surrey: Ashgate, 2013).
Indeed, Nietzsche’s discoveries seem to require that we ourselves rediscover them in his own writings and add them again and again to ancient scholarship, whether with respect to the tragic artwork, lyric poetry, theoretical reflections on philological method, and above all with regard to science as such.

For these and other reasons, independently of Nietzsche, the mathematician and ancient historian, Lucio Russo has made the case for an original scientific “revolution,” accomplished as early as 300 BC but subsequently “forgotten.”13 While Nietzsche follows a tradition of scholarship that would set the date back and if he also details different achievements and if other contemporary scholars in addition to Russo have also made comparable claims,14 Russo’s claim deserves our attention as much for its documentation as for its sheer conventionality: showing that the Greeks were more advanced both mathematically and in engineering technologies than traditional scholarship has supposed. Confining his claims to today’s flatly positivist historiography—which is increasingly the mode—Russo tracks the scientific contributions of later antiquity through the third century of the current era.15 But even earlier than the Alexandrian scholars Russo emphasizes, Charles Kahn some time ago in his invaluable, Anaximander and the Origins of Cosmology,16 as well as, more recently, Robert Hahn, Dirk Couprie, and other scholars have been making important contributions to a growing understanding of Greek science, an understanding that, so I argue here, would have been advanced in different ways by Nietzsche himself were scholars familiar, as they are not at all familiar, with his contributions.17

15 Quite to the contrary Hence and Russo’s critics argue that he seems to attribute almost every level of mathematical and theoretical sophistication to them.
17 This work remains to be done and the current classicist scholars who write on Nietzsche, like Glenn Most and James Porter and others, can appear to
Yet one cannot merely add Nietzsche and stir. Thus I once found myself compelled to point out that reading Nietzsche on the philosophy of science required more than a change in our views of Nietzsche but and much, much rather, our understanding of philosophy of science as such. In other words, to read Nietzsche on science entails that we do philosophy of science differently. The result: a philosophy of science that would be, perhaps for the first time, a critical philosophy or even a whole range of critical philosophies of science.

It only compounds matters that Nietzsche’s reflections on ancient Greek science radically depart from the way we think about that tradition (in part this may be why we find it hard to see what he writes about Greek science). For Nietzsche, contra Russo, the achievements of what Nietzsche called Hellenism, i.e., of what he also call the “Alexandrians,” reflects less the inception of a revolution to come than it outlines what would have been a different tradition of Greek science in eclipse, effectively speaking, from the start. Inasmuch as Nietzsche’s approach to history does not have to wait for a Herbert Butterfield to eschew non-presentist elements, and hence qua historically minded, Nietzsche emphasizes the specifically “Alexandrian” “decadence” he argued to have been of a piece with Aristotle’s serve as monitors ambitioning to keep Nietzsche from having any bearing on their own respective fields. In the past Hugh Lloyd-Jones could count as an exception along with William Arrowsmith. Intriguingly, Jonathan Barnes, the specialist in ancient philosophy is an exception perhaps because he undertook to look at Nietzsche’s own expert engagement with Diogenes Laertius. One of the central reasons I call attention to Nietzsche’s engagement with Lucian beyond the obvious (the source for Nietzsche’s Übermensch is taken from Lucian’s Journey to Hell [Kataplous] departs from this expert engagement), as a contemporary of Diogenes Laertius: an expert in the latter will know the former. See Babich, “Becoming and Purification: Empedocles, Zarathustra’s Übermensch, and Lucian’s Tyrant,” in: Vanessa Lemm, ed., Nietzsche and the Becoming of Life (New York: Fordham University Press, 2014), pp. 245–261; 359–368.

Babette Babich, Nietzsche’s Philosophy of Science, 1.

and Plato's contribution to philosophy. In his earlier work, Nietzsche had traced the trajectory of what he called nihilism through the 19th century genealogy of the modern technological and consumerist preoccupation with distraction and satisfaction back to nothing less than the initially Hellenistic "demand for such an Alexandrine earthly happiness." 

Like Russo inter alia, Nietzsche frames his observations on the foundations of science and mathematics within a tradition of scholarship on ancient philosophy. Invoking the triumphant "the spirit of science" manifest in the person of Socrates (whom Nietzsche regarded as the demon of reason itself) and Euripides who revolutionized (and who was, for Nietzsche, responsible for the death of) the tragic cult in this same rational spirit (ergo tragedy 'dies at its own hand'), the result sacrificed the achievement of antiquity as a whole only to install in its place a new tradition, the Judeao-Christian tradition: "I have no word that could articulate my feeling about something so monstrous [so Ungeheueres]." This sentence is virtually impossible to unpack and in the remainder of the essay to follow, I hope to illuminate it by reflecting what Nietzsche says about science in antiquity.

Nietzsche's references to architecture are extensive, and I don't have time to review these other than to note that Nietzsche's sustained engagement with what he called monumental history, and hence precisely with buildings and monuments, include metaphors of decadence, literally falling statues, beyond Aristotle's famous reference and paralleling the architectural investigations of Robert Hahn and others. And then there is music for Nietzsche, where

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20 The history of science is often inevitably given a Comtean rather than Hegelian expression. See Peter Dear's account of George Sarton, the long time editor of Isis, in his "The History of Science and the History of the Sciences: George Sarton, Isis, and the Two Cultures," in: Isis 100 (2009), pp. 89–93.

21 Ibid.

22 Friedrich Nietzsche, AC §59; KSA 6, p. 247 f.

23 See here Robert Hahn, Anaximander and the Architects: The Contributions of Egyptian and Greek Architectural Technologies to the Origins of Greek Philosophy (Albany: State University of New York Press, 2001) and
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Nietzsche’s own studies of Ancient Greek lyric poetry concentrated on quantitation. Important too and in addition to the more mainstream and received discussions of mathematics in antiquity (Brumbaugh, etc), we might add the ‘new’ archaeological layerings of Kittler’s mathematic-musical reflections24 and we can also add Jay Kennedy’s widely trumpeted in the press (‘wide’ is a relative term but scholarship mostly passes without popular notice) for his re-invention or rediscovery of work done for many years (by so many others) on stichometry in Plato’s dialogues (i.e., on the very music of the text in a sense related to the “music” about which Nietzsche writes in reference to tragedy).25 And just in addition, although this is


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yet more complicated, there is Nietzsche’s long standing writing on causality, deliberately looking backwards and forwards (and in the process inspiring and anticipating Freud on the workings of the unconscious). Hankinson’s study of cause includes several chapters matching Nietzsche’s approaches to the question of causality, including Stoic causality and skepticism.26 To this one may add ancient reflections on medical physiology (I have touched on related themes in my explorations of the techniques of ancient bronze with reference to Pliny,27 in the context of a review of the mechanical practical technology available in ancient Greece).28

There is indeed an enormous range of connections and interconnections with received scholarship and I mention these facets (and there are others) to foreground the physical, i.e., the archaeological artifact (again: Nietzsche’s “monumental history”), all in addition to the sheer scope and power of engineering in the ancient world simply to outline the context in which Nietzsche could go on to raise the question of the theoretico-mathematico-logical as this includes spe-

28 See here both Manfred Barthel’s popular account: *Die Enkel des Archimedes. Eine etwas andere Kulturgeschichte* (Witten: Neuhaus, 1995) as well as Horst Bredekamp’s *Antikensehnsucht und Maschinenglauben. Die Geschichte der Kunstkammer und die Zukunft der Kunstgeschichte* (Berlin: Wagenbach, 1992), an approach at once stylistically disenchantment-oriented as well as esoteric. And see too, as already noted, Lucio Russo’s *The Forgotten Revolution*. On Greek science as indicated in a broader sense, see not only Arpad Szabó, *Das geozentrische Weltbild* (München: dtv, 1992), but also, again, Kahn’s *Anaximander and the Origins of Greek Cosmology*, in addition to Fritz Kraft, *Geschichte der Naturwissenschaft I. Die Begründung einer Geschichte der Wissenschaft von der Natur durch die Griechen* (Freiburg im Breisgau: Rombach, 1971). In addition, see here, again, the joint work of Couprie, Hahn, and Naddaf, *Anaximander in Context*. 

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specifically scientific methodology: "—methods, one must repeat ten times, are the essential, as well as being the most difficult, as well as being that which has habit and laziness against it longest," culminating in Nietzsche's observation in his *Antichrist* that "[...] all the scientific methods were already available." The point articulated towards the end of Nietzsche *The Antichrist* invites us to reflect on the lack of consequentiality of this entire complex of assembled engineering prowess and mathematical and scientific methodology for the Greeks.

What on earth happened? The short answer has to do with the Alexandrian grammarians, the longer answer for Nietzsche has to do, as everything has to do for Nietzsche with Christianity.

As I have emphasized this elsewhere, "method" attained its acme—a high point that continues to determine scholarship—with the "Alexandrian grammarians," a high perfection also attested by an abundance of scientific (read if one prefers: scholarly) methodologies: not only theoretical, but mathematical, and technological. Nietzsche asks us to reflect on this as a scientific question—he had been, after all, raising the question of science from the start of his intellectual life, writing in his "Attempt at a Self-Critique," the later written pre-

29 Friedrich Nietzsche, AC §59; KSA 6, p. 247.
30 Ibid. ("alle wissenschaftlichen Methoden waren bereits da."). In fact as Nietzsche glosses, developing this parallel still further, Plato and Socrates may be correlated with what he calls an antagonism to the natural sciences as such (KSA 7, p. 548), which he explains in terms of the scientific orientation of Epicurus and Pythagoras, especially together with Democritus as providing the foundation for the natural sciences. Cf. Friedrich Nietzsche, KSA 7, p. 557.
31 Nietzsche's use of the term 'Alexandrinian', so in abundance in his first book, would merit a study all its own. Here it will have to suffice to cite his claim as we can perhaps use it to understand the sense of the new title that he eventually uses to replace the original subtitle of *The Birth of Tragedy*: "Aufklärung" und alexandrinische Bildung ist es—besten Falls!—, was Philologen wollen. Nicht Hellenenthum" (KSA 8, p. 75; cf. too p. 121). Nicholas Martin expresses the distinction as one between a kind of bibliographical or source-scholarly preoccupation and a creative mode in his discussion of Wolf and the tradition of 'Alterthumswissenschaft' in Nicholas Martin, *Nietzsche and Schiller: Untimely Aesthetics* (Oxford: Oxford University Press, 1996), p. 130 ff.
face to The Birth of Tragedy, that he should be counted as the very first thinker to raise the question of science "as a question" (even Heidegger, imitating Nietzsche's thunder in his The Question in the Wake of Technology, does not exceed him in this). Just what are we to make of this circumstance?

Why, Nietzsche asks, does modern science, now setting its origination back by centuries, manage to manage to take as long as it takes to become modern science? What is required for modern science as we know it? Nietzsche's answer (and this is completely counter-intuitive) is that science requires religion itself: religion of the eschatologically-oriented Judaeo-Christian kind. But as we all already know: science and religion are mortal enemies. If this had been Nietzsche's claim, that is, had Nietzsche simply opposed religion and science, he'd be merely be one among many other historians of mythos underway to logos. Instead, Nietzsche argues that ancient religion does not oppose ancient science. In this sense, Nietzsche anticipates more recent theorists of the history and philosophy of science, beginning with his almost contemporary, the scientist and philosopher and historian of science, Pierre Duhem and continuing with G. E. R. Lloyd and others. As Karl Löwith observes, here following Heidegger, this would be the point of the "Anti-Christian repetition of Antiquity."32

The Nietzschean project calls for an antidote to the "Alexandrian," and it is in this spirt that Nietzsche had somewhat misguidedly imagined Wagner as an "Anti-Alexander"33 in the last of his Untimely Meditations.

Nietzsche would come not only to relinquish his hopes for Wagner as ally but also to recommend an entirely different strategy, seeking less to cut through the complexity of the "Gordian knot of Greek culture" but and much, much rather, "to retie it again after having been [so] cut/unravelled."34 A similarly nuanced question,
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likewise seeking to reweave the strands of Greek culture after the flatfooted scholarly unraveling of these same strands, forms the core of Nietzsche's theoretical reflections on the Greek musical artwork or tragedy.\(^{35}\)

What Nietzsche named the "binding of the scientific impetus" [Bändigung des Wissenstriebes] became for a time the watchword of German Nietzsche scholarship in the 1970's and 1980's. A now largely becalmed research project—perhaps as a result of its association with drives and the will to power—key here is Nietzsche's contention that modern religion is no enemy of modern science but exactly its ally as he writes in *The Gay Science*\(^ {36}\) and where he goes on to count science the "latest and greatest" form of the religio-ascetic ideal at the conclusion of his *On the Genealogy of Morals*.\(^ {37}\)

 Nonetheless, the alliance of science and religion is a marriage just as reft, to use Nietzsche's original metaphor, as the uneasy union between Apollo and Dionysus. Already alive to "factual sensibility," [Thatsachen-Sinn],\(^ {38}\) the ancient Greek empirical sensibility, contrary to Russo's revolutionary idealization of the scientific turn, corresponded for Nietzsche not to some Archimedian or Eudoxan flash of insight but represented an "already centuries-old tradition."\(^ {39}\) Contra Russo, this was not a revolution dawning in Hellenistic Greece but the tail of an already declining comet, complete with a variety of technological, scientific schools and traditions of the same.

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\(^{35}\) I say nuanced because Nietzsche alludes to this same anti-banausic insight in his "What is Noble," an emphasis recurring in his understanding of the Greek relationship to art as part of the ideal of perfecting one's own "statue," becoming as it were, a work of art. See here, with specific reference to the working of sculpture in Nietzsche's texts, Babette Babich "Skulptur [Bildhauerkunst]," in: Christian Niemeyer, ed., *Nietzsche Lexikon* (Darmstadt: Wissenschaftliche Buchgesellschaft, 2009), pp. 325-328.

\(^{36}\) Friedrich Nietzsche, *Fröhliche Wissenschaft* [FW] §300; KSA 3, p. 539.

\(^{37}\) I develop this further in Babette Babich, *Nietzsche's Philosophy of Science*, chapter five.

\(^{38}\) Friedrich Nietzsche, AC §59; KSA 6, p. 248.

\(^{39}\) Ibid.
As a historian, Nietzsche’s claim is that what should compel research attention is what may seem incidental. For Nietzsche, writing in the traditional and religious context of The Antichrist, what is significant is that from the start and throughout (apart from a certain unhistorical tendency to historical mythology, i.e., science is science is science, which matches the assumption that religion is religion), the Greek tradition of natural philosophy or science was not repressed. In other words, there was no anti-empiricist movement in antiquity. Hence for Nietzsche, there was no parallel, quite contra Russo’s title, to the routine account of the scientific revolution, as politicized as it romanticized, as we like to tell ourselves that story, inventing a parable based on a certain ordering of the solar system as a simple progression from an ancient geocentric schema towards the heliocentric account, which latter was already known to the Greeks, and so deploying our traditional model of the scientific revolution/persecution in modernity’s favorite myth, namely that of Galileo’s suppression by the church. For Nietzsche, such a supposed antagonism to the aims of science may not be invoked in antiquity because not only was there no Christian church but there were no religious traditions opposing the discoveries and inventions of ancient Greek engineering and science. To the contrary as the theatrical de-

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40 Although there are classical historians to this day who, rather whiggishly, continue to assume this, and many of these argue for scholastic readings of Aristotle (similarly ahistorically). But see Pierre Duhem’s To Save the Phenomena: An Essay on the Idea of Physical Theory from Plato to Galileo, trans. E. Dolan and C. Maschier (Chicago: University of Chicago Press, 1969) for historical background. I discuss this in Babette Babich, “Continental Philosophy of Science: Mach, Duhem, and Bachelard,” in: Richard Kearney, ed., Routledge History of Philosophy: Volume VIII (London: Routledge, 2003), pp. 175–221, esp. p. 187 f. Feyerabend offers a reading of Galileo and the church (and politics) including the empirical evidence his telescopes provided (Feyerabend argues that Galileo’s argument is not based as we tend to suppose on ‘science’), that cuts nicely to the chase. For Feyerabend, it is neither hermeneutically nor scientifically rigorous to argue the history of science ‘sub specie aeternitatis’ as are inclined to desire. Paul Feyerabend, Against Method (London: Verso, 1975), p. 106.

41 Note again that that for Nietzsche, the decadence he describes will begin even before Plato.
vice deployed for dramatic effect of the *deus ex machina* would illustrate.\textsuperscript{42}

The claim shatters two icons of our tribe, namely the ideal of Galileo's scientific heroism together with similarly ideal readings of Plato. Was Socrates not put to death for not subscribing to the gods of the state, which lack of faith is often assumed to have made the second charge against him, corrupting the youth, reduplicative? Nietzsche does not concern himself here with Galileo (and the problem of Socrates is more complicated). Having authored a study of Greek religion and as acquainted as he was with the scope of then-contemporary philological thought, Nietzsche had yet another question in mind. Given, as he argued that there was no religion to play the modern anti-science role, the question that then deserves our attention is why modern science fails to develop from this promising start in antiquity? It is worth noting his point here in the framework of scientific progress. Given the availability of the necessary logical, mathematical, theoretical, and even an ample range of practical, engineering prerequisites why did science not develop? All these preconditions would make the difference in the age of science to come more than a thousand years later, i.e., they were and they would remain indispensable prerequisites. Nietzsche's point is that all these preconditions were at hand, already, in Greece and yet—this is the mystery—they all went nowhere.

We might as well ask whether speaking of the enlightenment (revelation) makes any sense apart from the presupposition of the dark ages, i.e., the era of the church, and of the same religious superstition we suppose the mightiest opponent of science to this day? For religion is the key ally as Nietzsche argues, antecedent to, or, as he writes in *The Gay Science*, the active *prelude* to modern science (more on this below). Indeed, some of the millenarian hopes that we have for science in the age of the singularity and our ongoing dream of redemption through science and technology demonstrate the still ongoing effects of this origin, the effective birth of modern science out of the spirit of religion.

\textsuperscript{42} I refer here to the history of this term which had its origins in religious festivals and rites.
The question and the issues it involves as a question should be emphasized just because classicists and historians of philosophy tend not to pose such questions but also because and more perniciously we take ourselves to know that the relevant answer would have to be social. Thus scholars like to note (without reflecting on the significance of) the vulgar status of the technician or artist or technical craftsman in the judgment of noble youth in ancient Greece, an anti-banausic sensibility repeated in philosophy. Nietzsche's distinguishes this ancient sensibility vis-à-vis the artist in antiquity from the 19th century cult of art for its own sake as indeed from the artist-ideal of the "genius." Other scholars collapse the themes (thus severing the Gordian knot of Greek culture, a simplification we pursue with a good conscience). Hence it is common to read that, and in spite of their mathematical and technical prowess, the Greeks failed to develop modern science owing to their denigration of the practical, due, in turn, to their disdain for the empirical (here, just casually, we may think of the arguments concerning Aristotle's putative scholasticism). Greek diffidence vis-à-vis science is accordingly argued to derive from a classically anti-banausic tendency, a diffidence which has made the reception of Kahn's scholarship as indeed of Russo's studies but especially those of recent scholars rather less resounding than their work merits. It is this paradigm Nietzsche challenges from his first book to his Antichrist.

The convenient, if simplistic anti-banausic assumptions applied to ancient science and technology yields the contemporary image of the Greeks as so many antique 'mandarins': if not themselves horrified by technology than at the very least innocent of it. To this extent, the above mentioned studies of Greek scientific technologies cannot but collide with an entrenched paradigm of primitive antiquity (and these studies have been despite their exemplary scholarship astonishingly little received). Nevertheless, to make a related point, any listing of

43 There are exceptions, Lynn White, David Noble, and even Peter Dear, in descending order. But see Alistair Crombie and Pierre Duhem on another level altogether as well as Alistair Crombie, cited below.

44 Or see Robert Hahn, already cited above, or, further, Dirk L. Couprie, Heaven and Earth in Ancient Greek Cosmology: From Thales to Heraclides Ponticus (Frankfurt am Main: Springer, 2011).
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the machine and theoretical technologies available in Greek and Roman antiquity is stunningly impressive. And as Derek de Sola Price first brought to popular attention, this technical prowess is most dramatically attested by discovery of the bronze Antikythera mechanism in the year of Nietzsche’s death in 1900, not least because the mechanism itself appears almost “modern” – a bronze disc of layered and machined gears – so modern indeed that its discovery is akin to finding Paley’s watch, not on the heath as the Scots theologian argued in 1802 (echoing Hume and a much longer tradition), but in the waters of the Adriatic (we are only today, 114 years, arranging to send specially outfitted divers to the site in question to look for other artifacts that might be found there). The Antikythera mechanism has been studied and variously theorized over the past century, using every available modern technology for the purpose, from x-rays to the latest medical and physical scanning techniques (and which mechanism, and despite all this study we by no means fully understand) confirming Nietzsche’s emphasis on the achievements of ancient Greek science in not only theoretical detail but practical, technological sophistication.


46 The practical and skeptical dimension in question led the Belgian philosopher René Berthelot to speak of Nietzsche as a pragmatist, comparing him to Pierce and James but not less and this is the most important for the context, to Poincaré. See Berthelot, *Un romantisme utilitaire: étude sur le mouvement pragmatiste. I, Le pragmatisme chez Nietzsche et chez Poincaré* (Paris: F. Alcan, 1911).

Once again, the challenge facing Nietzsche's proposed plan to reweave the warp and woof of Greek culture is that these very same achievements themselves remain the object of ongoing intellectual resistance to the claims of modern scholars (no matter how conservative) as well as to Nietzsche's more nuanced claims (there tends not to be an intersection of such claims inasmuch as scholars, even Nietzsche scholars, tend not to know Nietzsche's claims in general).

But even this scholarly circumstance is thematized in Nietzsche's theory of what counts as scientific knowledge. For Nietzsche, familiarity is the essence of what we take ourselves to know and the earmark of any knowledge claim. The goal of our knowledge, Nietzsche writes again and again in his published and unpublished works, is conscientiously reductive. We reduce the unknown to the known. Nietzsche's most important corollary is that anywhere we are unable to reduce the unknown to the known, we know—end can know—nothing.

Declaring in The Gay Science that "We simply lack any organ for knowledge," Nietzsche proposes to reflect upon what we take to be knowledge, a reflection which entails a reflection on what knowledge would have to be: regarded from a rigorous perspective or taking a philosophical perspective on the question of knowledge (as of science) from antiquity to Kant. From this critical perspective on knowledge, claims to know simply mean that something strange has been "reduced to something familiar." Reduced to the familiar, it is also eliminated from concern, thus we leave off questioning and it is just when we cease to question (this is what Nietzsche called the problem of science conceived as a problem, as problematic) that we take ourselves to know.

The oddity of the former point to be emphasized calls for attention. Nietzsche is asking us to reflect on what it might mean that the mechanism, supported with MRI technology, see Tony Freath et al., "Decoding the Ancient Greek Astronomical Calculator Known as the Antikythera Mechanism," Nature. Vol. 444 (2006), pp. 587-591. See here, again, Lucio Russo, The Forgotten Revolution, p. 375f.

48 Friedrich Nietzsche, FW §354; KSA 3, p. 593.
49 Friedrich Nietzsche, FW §355; KSA 3, p. 593f.
Greeks could indeed as they did in fact and *already* possess every theoretical, mathematical, and technical-engineering prerequisite for the development of modern science without going on from these prerequisites to develop these same "preludes to science," as he famously names them in his *The Gay Science*, into our own modern science? As Nietzsche reminds us, Greek natural science was articulated from the start from the perspective of "the natural sciences, in association with mathematics and mechanics." Thus just from a modern scientific perspective, the Greeks *ought to have been* "on the best possible road" to modern science but, sheerly historically, they weren't. Once again, if they had everything they needed, the technology, the mathematics, the methodology, no churchly antiscience piety, what on earth were they missing?

It is by raising such an explicitly Kantian genealogical discussion of the necessary, as Nietzsche would always emphasize the prerequisites for science, that Nietzsche can question the iconic developmental model of Western science as such. And to the same extent, the Greeks, source of so much that we regard as the heart of Western scientific culture, present a conundrum, a conundrum Nietzsche articulates in the spirit of his lifelong effort to raise the question of science to (and in and with) his own science of philology.

What is required for the development of modern science? Will it be mathematics? That the Greeks had, some say they invented it. Ditto for theory. As for technology, the extant mechanisms in our possessions, never mind the ones for which there is textual attestation, suggest that a lack of engineering technology is by no means the answer.

Nietzsche's complex suggestion which he had to be sure been arguing since his first book on tragedy (where he also thematizes science) is that modern science would need the Socratic faith in reason, the very same faith that would prove particularly resonant with monotheistic religion: specifically the Judeo-Christian tradition as

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50 Friedrich Nietzsche, AC §59; KSA 6, p. 247.
51 Ibid.
52 Scholars from Otto Neugebauer to G. E. R. Lloyd to John J. Cleary and so on have explored this.
such, add the promise of salvation and what emerges looks very like the progress ideal of science.

Stylistically distant as it is from the more current reflections on Greek scientific philosophy that can also be adduced in support of his assertions, Nietzsche’s claim is anything but obvious. And here, writing in his posthumously published *Antichrist*, although similar reflections appear throughout his work, it is significant that Nietzsche provides *even less* source material for his claims⁵³ than Nietzsche offered for his discussion of the metric origins of tragedy out of the spirit of music in *The Birth of Tragedy*.⁵⁴

In this sense, Nietzsche emphasizes the indispensability of religion for the development of modern science rather than and as is commonly supposed its antipode. Indeed, as the medieval historian Lynn White has also argued (here echoing Duhem) but also as the historian of science Alistair Crombie has emphasized as did indeed the philosopher of science Stanley L. Jaki and Patrick Heelan, modern science remains a religiously indebted, Judeo-Christian undertaking.

Yet to argue for science’s religious "preludes," to use Nietzsche’s terminology in *The Gay Science*, is not to argue that science itself is overtly or consciously "religious" or that it toes the line of religious dogma. Instead by claiming in *On the Genealogy of Morals* that science is the most developed form of the religious ascetic ideal, Nietzsche argues that science (and here he includes the whole of scholarship and its institutional enterprises) claims or presupposes the very same orientation to the world as religion.⁵⁵ To say this is to say that science stands in the place of religion. It's the next, best, religious thing and it is what we believe in today.

Continuing the above noted references to ancient science, there is a further tradition in the history of science importantly pioneered by

⁵³ The references in the foregoing footnotes makes it plain that further documentation can be had if desired.
⁵⁴ I offer a discussion of some of his reasons for this in Babette Babich, *The Hallelujah Effect*.
Frances Yates and Betty Jo Teeter Dobbs and now and more recently by Lawrence Principe among others who have explored the literary and experimental basis of what Nietzsche names the "preludes" of science and our all-too-human—all-too-Alexandrine—we might say—a taste for occult and secret powers, a taste that turns out to be less a hindrance or a prejudice than indispensable for the cultivation not only of the ideal or theoretical constructions of natural science but its most practical or applied techniques. Thus Nietzsche asks if science itself could exist if "the path" as he speaks of the "preludes of science," had "not been prepared by magicians, alchemists, astrologers and witches whose promises and pretensions first had to create a thirst, a hunger, a taste for hidden and forbidden powers?" 

Nietzsche's more nuanced claim (and Heidegger takes this from Nietzsche) is that modern science elevates itself contra religion to the status of religion. If in antiquity, science was prized "as the means to virtue," specifically modern science, like modern art, demands instead to be pursued for its own sake. And just as the artist like the

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56 Friedrich Nietzsche, FW §300; KSA 3, p. 538.
59 Friedrich Nietzsche, FW §123; KSA 3, p. 479.
60 In this spirit, the historian of science, Peter Dear, characterizes "modern science" (which he notes is often described by today's scholars as "technoscience" marking its practical or applied character) as a chimera or "hybrid" for reasons similar to those Nietzsche recounts. In The Intelligibility of Nat-
Christian seeks to be well-paid, so Nietzsche contends, so too we moderns—as Socrates taught us—expect that reason (aka science) will 'improve' life. Scientific millenarians as we are today, we continue to invoke the advances of science (progress) and point to the promise of further benefits, unimaginable riches: heaven on earth.

If Nietzsche's genealogical concern was the origin or birth of modern science, Nietzsche also raises the question of the general origins of logic as such as indeed of modern, empirical science (and we note that he distinguishes these). Here And we may conclude by recalling Nietzsche's own closing remarks on methods of science in antiquity asking his readers (as he typically does) if he has been understood: "Does one comprehend this? Everything essential had been found in order to begin to go to work."61 In this way, Nietzsche's challenge to conventional assumptions in The Antichrist do not depart from his earliest concerns with the Socratic invention of reason in The Birth of Tragedy and what he details as Alexandrian culture in his Untimely Meditations. And yet he frames the question with uncharacteristic force, especially for this master of rhetoric and subtlety. For Nietzsche, we have lost the culture of antiquity along with the special grace of its achievements. To the extent that the scholars themselves, the philologists even as Nietzsche says and perhaps especially the archaeologists, are to blame for this loss, Nietzsche invites us to think outside the same scholarly box that always excluded his thinking, both in his own day and in ours. And were we to accept his invitation: what kind of revolution in thought might that inaugurate for us?

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61 Friedrich Nietzsche, AC §59; KSA 6, p. 248.