A SECOND LOOK

C. C. Gillispie’s
Genesis and Geology

By Nicolaas A. Rupke*

Scholars whose first book is not given the enthusiastic reception they had hoped for may take heart from Charles Gillispie’s experience. When his 1949 doctoral dissertation, entitled “Geology and Genesis,” was published in 1951—the two title nouns having changed places—the initial reaction from America’s leading history of science journal gave no indication that Genesis and Geology was to become one of the classics of science history. Isis carried a middle-of-the-road review by George A. Foote from Wayne University, who mixed frank praise with stern criticism and ended with the following lukewarm recommendation: “This book should be welcomed by any persons concerned with the general problem of the relationship of science and religion.” Across the Atlantic, in the country that was the setting of Gillispie’s story, early reaction was low-key, too. The Times Literary Supplement published a modest review, narrowing the book’s topicality to a “Prelude to Darwin.” Less auspicious yet, the Notes and Records of the Royal Society gave Gillispie’s theme no higher mark than “entertaining” and slighted his study as one concerned with merely “popular and expository works,” rather than with the scientific classics. In a one-column notice in Nature, the doyen of the history of British geology, Victor A. Eyles, followed this belittling trend: Gillispie “is not a geologist, or even a scientist,” he warned, limiting his main approbation to the quality of the documentation by “upwards of six hundred text references.”1

Further afield, however, the exceptional quality of Gillispie’s study was recognized from the start. The Amsterdam historian of science Reijer Hooykaas, one of very few authorities on Gillispie’s particular subject, awarded Genesis and Geology

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a respectably lengthy review in the Archives Internationales d'Histoire des Sciences, concluding with the following accolade: “Not often did we read a book with so much interest and pleasure.” Better still, Sten Lindroth, expert on Linnaeus and professor of the history of science at the University of Uppsala—and one not known for bestowing excessive praise—recommended the book to the readers of Lycnos as a brilliant achievement of historical scholarship: “For a very long time, this reviewer has not read a history of science work of such high quality.” It was not until 1959 that the republication of Genesis and Geology as a Harper Torchbook signaled its success; even as late as 1976, however, the Isis Cumulative Index made no mention of Gillispie’s masterpiece, either under the rubric “Geology” or under that of “Religion: relation with geology.”

Gillispie presented his study as a prehistory to Darwin’s Origin of Species, covering the period 1790–1850. The road to Darwin, he contended, wound through a series of primarily geological controversies, in part engendered by religious differences. These pitched Wernerian Neptunists against Huttonian Vulcanists, Cuvierian catastrophists and Bucklandian diluvialists against Lyellian uniformitarians, and creationists such as Adam Sedgwick against the unknown author—Robert Chambers—of the evolution-spousing Vestiges of the Natural History of Creation. Gillispie’s main thesis—his most widely cited proposition—was that these controversies did not represent a clash of science with theology but stemmed from religious differences within the scientific community itself; the conflict was not one of religion versus science, but of religion within science. After all, several of the leading geologists were as much clerical and devoutly religious as they were scientific. The issue at stake, Gillispie maintained, was less Old Testament history than a belief in divine providence to which, to a greater or lesser extent, all the scientific dramatis personae held. The religious scientists looked for miraculous breaks in the course of nature as evidence of God’s care, whereas their freethinking colleagues removed divine design to the distant enactment of immutable laws. If Darwin’s theory of evolution by natural selection represented the final invalidation of the design argument by standing it on its head, then the course of the debates in question was a step-by-step lessening of the scientific evidence for divine providence. That the debates were primarily geological resulted from the fact that geology added a historical perspective to the perception of nature, enlarging the meaning of divine providence from the maintenance of “balance” in the world to the exercise of “government” over the changes that make up the history of the earth.

Gillispie’s interpretation marked a radical departure from the popular warfare model of the development of science, familiarly exemplified by the twinned citation of J. W. Draper’s History of the Conflict between Religion and Science (1874) and

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A. D. White’s *History of the Warfare of Science with Theology in Christendom* (1896).4 While discarding this model, Gillispie also did away with the forerunners model, demonstrating that to achieve a proper understanding of Darwin, one had to study not just his precursors but also the scientific culture from which he emerged, however much the representatives of that culture may have held creationist convictions. The geological controversies themselves were, of course, familiar territory, but Gillispie retold them in unfamiliar detail. In doing so, he abandoned the “great men” tradition of scientific historiography and showed how paying attention to the participation of a host of lesser figures enriched our understanding of the historical events.5 For example, he drew attention to William Buckland, who during the 1820s was “the foremost English geologist, the chief architect of the catastrophist synthesis, and very probably the most talked-about scientist in Britain” (p. 98). Furthermore, to the satisfaction of his TLS reviewer, Gillispie cast the spotlight on the “sympathetic figure” of Hugh Miller, not least because of his manly, Scottish forthrightness, and in spite of his anti-Vestiges stance (p. 181).

However novel and significant these features of *Genesis and Geology* were, they did not—I believe—represent the most innovative and meritorious aspect of the book. This was that in one fell swoop it placed the study of early nineteenth-century geology on a properly historical footing, setting a standard of historical scholarship in the history of science and defining, by example, what it meant to write about the scientific past as history. Let us remember what the state of the art was by the time Gillispie wrote his doctoral thesis. Anyone wanting to read about the history of the earth sciences needed to turn to Karl Alfred von Zittel’s *History of Geology and Palaeontology* (English translation, 1901), Archibald Geikie’s *The Founders of Geology* (2nd ed., 1905), or Frank D. Adams’s *The Birth and Development of the Geological Sciences* (1938).6 In these books the historiography of the earth sciences consisted of a simple distillation of main discoveries and theories, associated with the leading lights of the subject and cited from standard textbooks and from papers published in scientific proceedings and transactions. Gillispie, trained as a historian, completely changed this. He depicted British geology in his chosen period as an intricate activity in which both major and minor figures were irreplaceable participants, in which both “winners” and “losers” mattered, in which scientific theories could not be adequately appreciated without an understanding of the religious, philosophical, and sociopolitical beliefs of their advocates, and in which, moreover, scientific institutions mattered as well as the scientists themselves. Geology was removed from an abstract level of cognitive isolation and placed in the hustle and bustle of the society in which its practitioners lived and worked. In a single paragraph of Gillispie’s account one could find the technical terms of geology intermingled with discussions of Tories, Whigs, Benthamites, and Tractarians. Suddenly, the landscape around the various geological theories was lighted up, and regional differences, ideological anchor grounds, and other real-life complexities became visible. Casual ref-

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5 These participants were regarded as “lesser figures” when Gillispie wrote his book; they have since been rehabilitated, thanks in part to Gillispie’s work.

erence was made to historical sources not then routinely used by historians of geology—such as the *Edinburgh Review* and the *Quarterly Review*—and to issues not previously considered relevant—such as the sociopolitical leanings of the cited periodicals.7

With Gillispie’s *Genesis and Geology*, the history of the earth sciences became historical scholarship as we now know it. Even Hooykaas’s *Natural Law and Divine Miracle*, another much-acclaimed 1950s addition to the literature on the subject, had none of the historical sophistication of *Genesis and Geology*, though Hooykaas’s discussion of uniformitarianism was commendably differentiated.8 This is the lasting legacy of the book and the main reason—I should like to suggest—that it merits a second look. In retrospect, the appearance of *Genesis and Geology* marked a slow but significant turn in the development of the historiography of geology, and this pivotal position makes a rereading an ideal occasion for reflecting on where subsequent scholarship has taken the themes of Gillispie’s book.

Not in every respect did Gillispie move ahead of contemporary historiographical practice. The feature that probably dates the book most is the judgmental, positivistic brushstroke of the narrative, shading the geologists of the story with the black-and-white of wrong-and-right.9 However much Gillispie included the “losers” with the “winners” in his account, he never let go of the categories themselves, and he never let the reader lose sight of the fact that he, as a historian, belonged to the party of the winners. He argued with the Huttonians against the Wernerians, and with the Lyellians against the Oxbridge diluvialists. “Gratuitous Lyell’s assumption may have been,” Gillispie commented, “but it opened the way for scientific progress, while Buckland’s blocked the very path he sought to tread” (p. 135). The growth of geology was depicted in the form of a simple dialectic: two theories, polar opposites, one “right” and the other “wrong,” one the eventual “winner” relegating the “loser” to the dustbin of history. A number of perceptive qualifications aside, this is how Gillispie depicted the development of geology, and this is how philosophers and scientists continue to prefer the history of science to be written. The considerable success of Anthony Hallam’s *Great Geological Controversies*, with its neat, cognitive categorization of geological debates, is witness to that.10

In spite of such imperfections, Gillispie’s pioneering study was left unchallenged for a remarkably long time—approximately a quarter of a century. One of the first

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7 Ironically, Foote, in his *Isis* review (cit. n. 1), sternly rebuked Gillispie for not having made adequate use of source material: “Where,” he demanded, “is the valuable periodical *The Athenaeum*? This journal perhaps supplied the best coverage of science throughout the period under discussion, and particularly covered the problems of natural theology” (p. 256). It would seem that Foote’s criticism expressed a certain *jalousie de métier*. To be fair to him, he knew what he was talking about: in the same volume of *Isis* in which his review of Gillispie’s book appeared, Foote had published an article that used the *Athenaeum* as a source: George A. Foote, “The Place of Science in the British Reform Movement, 1830–1850,” *Isis*, 1951, 42:192–208. By contrast, the (at best) lukewarm reaction to *Genesis and Geology* in the *Times Literary Supplement. Nature*, and the Notes and Records of the Royal Society reflected the fact that the reviewers in question were proponents of the “great men” approach and believed that Gillispie had raked up a lot of trivialities.


departures from his account has been to question the accuracy of the judgments about “right” and “wrong” and, more fundamentally, the adequacy of the geological categories as such to capture the quintessence of geology during the period 1790–1850.  

Already in 1959 Hooykaas argued that there was nothing inherently unscientific about catastrophism. This view was helped along on the coattails of a scientific reappraisal of Lyellian gradualism, as Philip H. Kuenen put forward his neocatastrophist theory of turbidity currents, Stephen Jay Gould asked “Is uniformitarianism necessary?” and meteorite impact became a respectable hypothesis to account for some of the Cretaceous-Tertiary boundary changes. It was not until the second half of the 1970s, however, that Gillispie’s particular categorization began to crumble under the weight of the literature in which Lyellian triumphalism was censured. Lyell was brought down to earth in a series of critical studies of the Principles of Geology, by Michael Bartholomew, W. F. (S. F.) Cannon, Pietro Corsi, Philip Lawrence, Roy Porter, Martin Rudwick, and others, that recognized the tendentious nature of Lyell’s historical introduction to the Principles, highlighted his fervent opposition to organic evolution, and laid bare his persistent rejection of evidence for the progressive nature of the fossil record. In the meantime other historians, in particular David Oldroyd, Alexander Ospovat, and such formerly East German scholars as Martin Guntau and Otfried Wagenbreth, began giving more sympathetic consideration to the Freiberg School of Abraham Gottlob Werner. Rather than condemning Werner and his followers for having been wrong in the question of basalt lithogenesis or crustal dynamics, the revisionists appreciated them for their contributions to stratigraphy and to the development of the very concept of a geological history. The Wernerians

11 One could argue—as does one anonymous referee of this essay—that it is inconsistent to reject a Whiggish progress model of nineteenth-century science, condemning the use of such categories as “winners” and “losers,” while at the same time arguing for progressive changes in the present-day historiography of science. The apparent inconsistency vanishes, however, if we consider that striving for progress today is part of defining our own values; what is objectionable in discussing early nineteenth-century geology in terms of “good guys” and “bad guys” is not that there weren’t such people, but that these characteristics tend to reflect present-day values and not those of the period under consideration.


across Europe, together with the Bucklandians in England, were reinterpreted from obstructionist "losers" to pioneers of historical geology.

In the case of Buckland, it was shown that Gillispie's casting him in the role of Britain's leading catastrophist of the 1820s failed to capture his contemporary significance, even that of his *Reliquiae diluvianae*. Buckland's most hostile opponents were the biblical literalists, whom Gillispie ignored; they recognized that Buckland's adoption of Cuvierian catastrophism reduced the role of Noah's deluge from having deposited the entire sedimentary record to having caused a handful of mere surface phenomena, later attributed to glacial action (see Figure 1). That Buckland initially emphasized the deluge as a geological agent had little if anything to do with his religious beliefs; rather, it was part of a strategy to win acceptance for geology in the University of Oxford: geology's bearing on such a widely recorded event in human history established its credibility as an academic subject in a humanities-dominated institution of learning. Buckland made significant contributions to stratigraphy and paleontology and worked out a system of historical geology based on the concept of a gradually cooling earth and a progressive succession of life forms through time. Diluvialism was incidental to this system, and he never formulated a synthesis of catastrophism as Lyell did for the theory of uniformity. The issue that divided Buckland from his former pupil Lyell was less the physical effect of the deluge than the progressive nature of the geological record. Our awareness of the importance of the progressivist synthesis in early nineteenth-century geology has grown

*Figure 1. John Martin's mezzotint The Deluge (1828).* The question of whether the biblical flood had been an agent of major geological change was at the heart of the early nineteenth-century debates about divine providence in nature.
as a result of Rudwick’s *The Meaning of Fossils*, Peter Bowler’s *Fossils and Progress*, and Gould’s *Time’s Arrow, Time’s Cycle*.15

In *From Mineralogy to Geology* Rachel Laudan has brought together much of this revisionist work. She contends that the main contribution of early and mid-nineteenth-century geology was not the vindication of uniformitarian theory but the establishment of the stratigraphic column—geology’s greatest construct. Laudan is particularly concerned with rehabilitating Werner, and she draws attention to the so-called Wernerian radiation, the spread of the Freiberg School across Europe. Intense rivalry developed among some of the stratigraphers delineating the rock formations that represented periods of earth history; the fierce conflict that broke out cannot be captured by the categories of “right versus wrong” or “catastrophe versus uniformity.” As Martin Rudwick has shown in considerable detail for the Devonian and James Secord for the Cambrian-Silurian, the stratigraphic boundary disputes were chapters in cultural anthropology in which educational, political, social, and psychological issues were formatively intertwined with geological ones.16

The study of geology as a social practice, exemplified by Roy Porter’s *The Making of Geology*, further reduced the positivist categories to irrelevance. When geology was considered as the sum total of its institutions—rock and fossil collecting, fieldwork, societies, and so forth—“right versus wrong” simply became inapplicable. Moreover, the social approach gave rise to the question of why geology became so popular around the turn of the eighteenth century. Porter saw a link with the Romantic fashion of the period; the contemporary interest in travel was a Romantic form of wanderlust and meshed well with geological fieldwork. “Romanticism broadly encouraged exploration of the natural environment,” Porter maintained. A form of geology that particularly captured the Romantic imagination—I believe—was cave research: Buckland’s cave work of the 1820s and the *Reliquiae diluvianae* should be seen as part of this fashion, rather than as an instance of biblical apologetics. To the Romantics, caves represented archives of earth history in which the records of bygone ages lay stored in the form of breccias of vertebrate bones. Michael Shortland has challenged this interpretation, arguing that the Romantics constructed caves as places of repose and retreats from political turmoil. “The cave not only pointed backwards but locked into a series of traditional British images of the ancient, the serene, and the sacred.”17 The geologists, by contrast—and this is Shortland’s point—


went below ground not as Romantics, but as miners. Buckland, in particular, by groping about on all fours in the grime and dirt of cave floors, expressed empathy with the manly hardship of those who had to hack a living from the bowels of the earth. This question of the extent to which the beginnings of modern geology are to be found within the high culture of Romanticism provides scope for significant further debate, in which the consideration of national context—German and French, as well as British—is likely to prove essential.

Gillispie, by restricting the religious issue to that of providentialism, never quite delivered what his title promised; there was very little of “Genesis” in his book. Foote did not fail to point this out: “The lack of balance which results from the deliberate omission of clerical opposition to geology, . . . is often disturbing.” To a certain extent, this was the result of Gillispie’s ill-disguised contempt for the Bible-believers among the participants in the controversies. Later authors pointed out, however, that in order to locate geological controversies accurately, one needs the coordinates of the positions taken by all parties concerned. Whatever the intellectual quality of the writings of George Bugg, Granville Penn, and other “Scriptural geologists,” their books enjoyed a wide readership and carried the imprimatur of traditional learning. By not allowing for their participation in the scrummage, Gillispie made the dynamics of the debates appear distorted, with Buckland cum sui looking more traditionalistic than they actually were. During the past decade sympathetic consideration has begun to be given to the “fundamentalists”; it is to be expected that in the wake of Ronald Numbers’s pathbreaking The Creationists, in which twentieth-century flood geology is turned into a denominationally differentiated story of religious and scientific culture, its nineteenth-century antecedents will receive increased attention. This part of the “Genesis and geology” story, too, offers much scope for further research.

New scholarship has not always diverged from Gillispie’s early positions. For example, later historians have followed his lead in “demilitarizing” our interpretation of the controversies between science and religion. In the lengthy historiographical introduction to his Post-Darwinian Controversies, J. R. Moore sketched the development of the warfare metaphor and argued that the sharp polarizations and well-circumscribed parties it implied were inapplicable to the nineteenth-century debates. This nonmilitaristic trend was continued in God and Nature, a collection of essays edited by David Lindberg and Ronald Numbers. Various authors have moved away from contrasting religious ideas with scientific ones; they prefer to look at the participants in the geological debates as members of social networks, each of which

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had its own political agenda. Such contextualizing has made it possible to see that geology, no less than religion, could be used as an instrument of power in a struggle for factional hegemony. As early as 1964 W. F. Cannon argued that the Oxbridge geologists, seen by Gillispie as “obstructionists,” were in fact “Broad Church” reformists who encouraged the cultivation of the sciences. Others, such as J. H. Brooke and Jack Morrell and Arnold Thackray, developed this theme further, showing how natural theology was not, as Gillispie thought, the last stumbling block on the road to Darwin, but functioned as the means by which latitudinarian Anglicans fostered interdenominational cooperation, especially through the British Association for the Advancement of Science, which they dominated. 20 Natural theology, in this context, has been rehabilitated from Paleyan obscurantism to stimulant of scientific growth. David Kohn, Camille Limoges, Edward Manier, and J. R. Moore, among others, have pointed to Darwin’s debt to the Paleyan design argument. They argue that the theory of evolution by natural selection, in its reliance on the phenomenon of adaptation, was structured by the functionalism of natural theology. 21

It should be added that Gillispie himself had perceptively stated that “in one sense Darwinism is Paleyism inverted” (p. 219). Yet to attribute the demise of the design argument to the Origin of Species is incorrect. Gillispie did not actually bring biology within the purview of his study, and subsequent scholarship by Stephen Jay, Dov Ospovat, Philip Rehbock, Phillip Sloan, and others on the history of British biology during the period 1830–1860 has shown that the ascendancy of the design argument was brought to an end during the three decades immediately preceding the Origin of Species. During that period, at various London institutions such as the Hunterian Museum, the Royal Institution, the University of London, and the Museum of Practical Geology, a new generation of scientists became established who did not belong to the Oxbridge elite. These men had been educated at the University of Edinburgh and in some instances also on the Continent. They brought with them an epistemology that was different from both Cuvierian functionalism and Paleyan natural theology—namely, the transcendentalism of Romantic idealism, which emphasized form over function as an explanatory criterion. Promulgating this epistemology served to establish the independence of a metropolitan scientific culture, away from Oxbridge domination. 22


22 L. S. Jacyna, “The Romantic Programme and the Reception of Cell Theory in Britain,” Journal of the History of Biology, 1984, 17:13–48; Ospovat, Development of Darwin’s Theory; Philip F. Reh-
The height of this transcendentalist tradition was probably Richard Owen’s work on the vertebrate archetype, but Owen was by no means the only transcendental anatomist. Joseph Henry Green, Robert Knox, Martin Barry, W. B. Carpenter, and Edward Forbes have all been identified as “philosophical anatomists.” Transcendentalism had a certain consanguinity with evolutionary ideas, and Owen, for one, was a closet evolutionist, while his colleague and rival, Robert Grant, openly advocated the transformism of Etienne Geoffroy Saint-Hilaire. Adrian Desmond, in *The Politics of Evolution,* argues that below the layer of figures regarded as minor when Gillispie wrote his thesis—Buckland, Sedgwick, and their *confrères*—there existed an underworld of medical dissidents, centered in the private anatomy schools, medical unions, and Nonconformist colleges, who actively promoted evolutionary ideas. The social egalitarianism of these radical democrats merged seamlessly with the notion of evolutionary self-development; the threat they represented to the medical corporations and other institutions of privilege indicates the connotation of sociopolitical destabilization that transformist ideas carried, throwing light on Darwin’s delay in coming forward with his theory of evolution and on Sedgwick’s well-known horror-stricken objections.23 Desmond’s thesis and the question of the politics of both Paleyan functionalism and Owenian transcendentalism define yet another area in which further debate and new research may prove fruitful.

There is one feature of *Genesis and Geology* upon which subsequent scholarship has failed to improve, and that is its readability and appeal to an interdisciplinary audience. The scope of Gillispie’s study was felicitous, combining breadth with coherence, and the subject matter, which was—and continues to be—of wide interest, held pride of place over methodology. Although highly significant for its innovations in approach, the book’s main attraction was the subtitle’s promise to inform us about “the impact of scientific discoveries upon religious beliefs in the decades before Darwin.” Gillispie’s later *Edge of Objectivity,* too, appealed to a wide readership, although the same cannot be said of his more recent *Science and Polity in France at the End of the Old Regime.* The direction of our concern as historians of science during the past two decades or so has been toward specialized topics and narrow chronological scopes, selected to exemplify analytical tools, for the purpose of professional self-legitimation. *Gentlemen of Science* and *The Great Devonian Controversy*—to mention two of the tallest skyscrapers among subsequent historical work in the general area of Gillispie’s topic—may well dwarf *Genesis and Geology* in length, archival sources mined, and sheer numbers of facts reported, but they have little of the reader-friendly handsomeness of this enduring classic.24
