

The claim that creationism is a science rests above all on the plausibility of the biblical flood

by Stephen Jay Gould

G.K.CHESTERTON once mused over Noah's dinnertime conversations during those long nights on a vast and tempestuous sea:

And Noah he often said to his wife

when he sat down to dine,

"I don't care where the water goes if

it doesn't get into the wine."

Noah's insouciance has not been matched by defenders of his famous flood. For centuries, fundamentalists have tried very hard to find a place for the subsiding torrents. They have struggled even more valiantly to devise a source for all that water. Our modern oceans, extensive as they are, will not override Mt. Everest. One seventeenth-century searcher said: "I can as soon believe that a man would be drowned in his own spittle as that the world should be deluged by the water in it."

With the advent of creationism, a solution to this old dilemma has been put forward. In *The Genesis Flood (1961)*, the founding document of the creationist movement, John Whitcomb and Henry Morris seek guidance

from Genesis 1:6-7, which states that God created the firmament and then slid it into place amidst the waters, thus dividing "the waters which were under the firmament from the waters which were above the firmament: and it was so." The waters under the firmament include seas and interior fluid that may rise in volcanic eruptions. But what are the waters above the firmament? Whitcomb and Morris reason that Moses cannot refer here to transient rain clouds, because he also tells us (Genesis 2:5) that "the Lord God had not caused it to rain upon the earth." The authors therefore imagine that the earth, in those palmy days, was surrounded by a gigantic canopy of water vapor (which, being invisible, did not obscure the light of Genesis 1:3). "These upper waters," Whitcomb and Morris write, "were therefore placed in that position by divine creativity, not by the normal processes of the hydrological cycle of the present day." Upwelling from the depths together with the liquefaction, puncturing, and descent of the celestial canopy produced more than enough water for Noah's worldwide flood.

Fanciful solutions often generate a cascade of additional difficulties. In this case, Morris, a hydraulic engineer by training, and Whitcomb invoke a divine assist to gather the waters into their canopy, but then can't find a natural way to get them down. So they invoke a miracle: God put the water there in the first place; let him then release it.

The simple fact of the matter is that one cannot have any kind of a Genesis Flood without acknowledging the presence of supernatural elements.... It is obvious that the opening of the "windows of heaven" in order to allow "the waters which were above the firmament" to fall upon the earth, and the breaking up of "all the fountains of the great deep" were supernatural acts of God.

Since we usually define science, at least in part, as a system of explanation that relies upon invariant natural laws, this charmingly direct invocation of miracles (suspensions of natural law) would seem to negate the central claims of the modern creationist movement -- that creationism is not religion but a scientific alternative to evolution; that

creationism has been disregarded by scientists because they are a fanatical and dogmatic lot who cannot appreciate new advances; and that creationists must therefore seek legislative redress in their attempts to force a "balanced treatment" for both creationism and evolution in the science classrooms of our public schools.

Legislative history has driven creationists to this strategy of claiming scientific status for their religious view. The older laws, which banned the teaching of evolution outright and led to John Scopes's conviction in 1925, were overturned by the Supreme Court in 1968, but not before they had exerted a chilling effect upon teaching for forty years.

(Evolution is the indispensable organizing principle of the life sciences, but I did not hear the word in my 1956 high school biology class. New York City, to be sure, suffered no restrictive ordinances, but publishers, following the principle of the "least common denominator" as a sales strategy, tailored the national editions of their textbooks to the few states that considered it criminal to place an ape on the family escutcheon.) A second attempt to mandate equal time for frankly religious views of life's history passed the Tennessee state legislature in the 1970s but failed a constitutional challenge in the court. This judicial blocking left only one legislative path open -- the claim that creationism is a science.

The third strategy had some initial success, and "balanced treatment" acts to equate "evolution science" and "creation science" in classrooms passed the Arkansas and Louisiana legislatures in 1981. The ACLU has sued for a federal-court ruling on the Louisiana law's constitutionality, and a trial is likely this year. The Arkansas law was challenged by the ACLU in 1981, on behalf of local plaintiffs (including twelve practicing theologians who felt more threatened by the bill than many scientists did). Federal Judge William R. Overton heard the Arkansas case in Little Rock last December. I spent the better part of a day on the stand, a witness for the prosecution, testifying primarily about how the fossil record refutes "flood geology" and supports evolution.

On January 5, Judge Overton delivered his eloquent opinion, declaring the Arkansas act unconstitutional because so-called "creation science" is only a version of Genesis read literally -- a partisan (and narrowly sectarian) religious view, barred from public-school classrooms by the First Amendment. Legal language is often incomprehensible, but sometimes it is charming, and I enjoyed the wording of Overton's decision: "...judgment is hereby entered in favor of the plaintiffs and against the defendants. The relief prayed for is granted."

Support for Overton's equation of "creation science" with strident and sectarian fundamentalism comes from two sources. First, the leading creationists themselves released some frank private documents in response to plaintiffs' subpoenas. Overton's long list of citations seems to brand the claim for scientific creationism as simple hypocrisy. For example, Paul Ellwanger, the tireless advocate and drafter of the "model bill" that became Arkansas Act 590 of 1981, the law challenged by the ACLU, says in a letter to a state legislator that "I view this whole battle as one between God and anti-God forces, though I know there are a large number of evolutionists who believe in God.... it behooves Satan to do all he can to thwart our efforts..." In another letter, he refers to "the idea of killing evolution instead of playing these debating games that we've been playing for nigh over a decade already" -- a reasonably clear statement of the creationists' ultimate aims, and an identification of their appeals for "equal time," "the American way of fairness," and "presenting them both and letting the kids decide" as just so much rhetoric.

The second source of evidence of the bill's unconstitutionality lies in the logic and character of creationist arguments themselves. The flood story is central to all creationist systems. It also has elicited the only specific and testable theory the creationists have offered; for the rest, they have

only railed against evolutionary claims. The flood story was explicitly cited as one of the six defining characteristics of "creation science" in Arkansas Act 590: "explanation of the earth's geology by catastrophism, including the occurrence of a worldwide flood."

CREATIONISM reveals its nonscientific character in two ways: its central tenets cannot be tested and its peripheral claims, which can be tested, have been proven false. At its core, the creationist account rests on "singularities" -- that is to say, on miracles. The creationist God is not the noble clock winder of Newton and Boyle, who set the laws of nature properly at the beginning of time and then released direct control in full confidence that his initial decisions would require no revision. He is, instead, a constant presence, who suspends his own laws when necessary to make the new or destroy the old. Since science can treat only natural phenomena occurring in a context of invariant natural law, the constant invocation of miracles places creationism in another realm.

We have already seen how Whitcomb and Morris remove a divine finger from the dike of heaven to flood the earth from their vapor canopy. But the miracles surrounding Noah's flood do not stop there; two other supernatural assists are required. First, God acted "to gather the animals into the Ark." (The Bible tells us [Genesis 6:20] that they found their own way.) Second, God intervened to keep the animals "under control during the year of the Flood." Whitcomb and Morris provide a long disquisition on hibernation and suspect that some divinely ordained state of suspended animation relieved Noah's small and aged crew of most responsibility for feeding and cleaning (poor Noah himself was 600 years old at the time).

In candid moments, leading creationists will admit that the miraculous character of origin and destruction precludes a scientific understanding. Morris writes (and Judge Overton quotes): "God was there when it

happened. We were not there.... Therefore, we are completely limited to what God has seen fit to tell us, and this information is in His written Word." Duane Gish, the leading creationist author, says: "We do not know how the Creator created, what processes He used, for He used processes which are not now operating anywhere in the natural universe.... We cannot discover by scientific investigation anything about the creative processes used by God." When pressed about these quotes, creationists tend to admit that they are purveying religion after all, but then claim that evolution is equally religious. Gish also says: "Creationists have repeatedly stated that neither creation nor evolution is a scientific theory (and each is equally religious)." But as Judge Overton reasoned, if creationists are merely complaining that evolution is religion, then they should be trying to eliminate it from the schools, not struggling to get their own brand of religion into science classrooms as well. And if, instead, they are asserting the validity of their own version of natural history, they must be able to prove, according to the demands of science, that creationism is scientific.

Scientific claims must be testable; we must, in principle, be able to envision a set of observations that would render them false. Miracles cannot be judged by this criterion, as Whitcomb and Morris have admitted. But is all creationist writing merely about untestable singularities? Are arguments never made in proper scientific form? Creationists do offer some testable statements, and these are amenable to scientific analysis. Why, then, do I continue to claim that creationism isn't science? Simply because these relatively few statements have been tested and conclusively refuted. Dogmatic assent to disproved claims is not scientific behavior. Scientists are as stubborn as the rest of us, but they must be able to change their minds.

In "flood geology," we find our richest source of testable creationist claims. Creationists have been forced into this uncharacteristically vulnerable stance by a troubling fact too well known to be denied:

namely, that the geological record of fossils follows a single, invariant order throughout the world. The oldest rocks contain only single-celled creatures; invertebrates dominate later strata, followed by the first fishes, then dinosaurs, and finally large mammals. One might be tempted to take a "liberal," or allegorical, view of Scripture and identify this sequence with the order of creation in Genesis 1, allowing millions or billions of years for the "days" of Moses. But creationists will admit no such reconciliation. Their fundamentalism is absolute and uncompromising. If Moses said "days," he meant periods of twenty-four hours, to the second. (Creationist literature is often less charitable to liberal theology than to evolution. As a subject for wrath, nothing matches the enemy within.)

Since God created with such alacrity, all creatures once must have lived simultaneously on the earth. How, then, did their fossil remains get sorted into an invariable order in the earth's strata? To resolve this particularly knotty dilemma, creationists invoke Noah's flood: all creatures were churned together in the great flood and their fossilized succession reflects the order of their settling as the waters receded. But what natural processes would produce such a predictable order from a singular chaos? The testable proposals of "flood geology" have been advanced to explain the causes of this sorting.

Whitcomb and Morris offer three suggestions. The first -- hydrological -- holds that denser and more streamlined objects would have descended more rapidly and should populate the bottom strata (in conventional geology, the oldest strata). The second -- ecological -- envisions a sorting responsive to environment. Denizens of the ocean bottom were overcome by the flood waters first, and should lie in the lower strata; inhabitants of mountaintops postponed their inevitable demise, and now adorn our upper strata. The third -- anatomical or functional -- argues that certain animals, by their high intelligence or superior

mobility, might have struggled successfully for a time, and ended up at the top.

All three proposals have been proven false. The lower strata abound in delicate, floating creatures, as well as spherical globs. Many oceanic creatures -- whales and teleost fishes in particular -- appear only in upper strata, well above hordes of terrestrial forms. Clumsy sloths (not to mention hundreds of species of marine invertebrates) are restricted to strata lying well above others that serve as exclusive homes for scores of lithe and nimble small dinosaurs and pterosaurs.

The very invariance of the universal fossil sequence is the strongest argument against its production in a single gulp. Could exceptionless order possibly arise from a contemporaneous mixture by such dubious processes of sorting? Surely, somewhere, at least one courageous trilobite would have paddled on valiantly (as its colleagues succumbed) and won a place in the upper strata. Surely, on some primordial beach, a man would have suffered a heart attack and been washed into the lower strata before intelligence had a chance to plot temporary escape. But if the strata represent vast stretches of sequential time, then invariant order is an expectation, not a problem. No trilobite lies in the upper strata because they all perished 225 million years ago. No man keeps lithified company with a dinosaur, because we were still 60 million years in the future when the last dinosaur perished.

TRUE science and religion are not in conflict. The history of approaches to Noah's flood by scientists who were also professional theologians provides an excellent example of this important truth -- and also illustrates just how long ago "flood geology" was conclusively laid to rest by religious scientists. I have argued that direct invocation of miracles and unwillingness to abandon a false doctrine deprive modern creationists of their self-proclaimed status as scientists. When we

examine how the great scientist-theologians of past centuries treated the flood, we note that their work is distinguished by both a conscious refusal to admit miraculous events into their explanatory schemes and a willingness to abandon preferred hypotheses in the face of geological evidence. They were scientists and religious leaders -- and they show us why modern creationists are not scientists.

On the subject of miracles, the Reverend Thomas Burnet published his century's most famous geological treatise in the 1680s, *Telluris theoria sacra* (*The Sacred Theory of the Earth*). Burnet accepted the Bible's truth, and set out to construct a geological history that would be in accord with the events of Genesis.

But he believed something else even more strongly: that, as a scientist, he must follow natural law and scrupulously avoid miracles. His story is fanciful by modern standards: the earth originally was devoid of topography, but was drying and cracking; the cracks served as escape vents for internal fluids, but rain sealed the cracks, and the earth, transformed into a gigantic pressure cooker, ruptured its surface skin; surging internal waters inundated the earth, producing Noah's flood. Bizarre, to be sure, but bizarre precisely because Burnet would not abandon natural law. It is not easy to force a preconceived story into the strictures of physical causality. Over and over again, Burnet acknowledges that his task would be much simpler if only he could invoke a miracle. Why weave such a complex tale to find water for the flood in a physically acceptable manner, when God might simply have made new water for his cataclysmic purification? Many of Burnet's colleagues urged such a course, but he rejected it as inconsistent with the methods of "natural philosophy" (the word "science" had not yet entered English usage):

They say in short that God Almighty created waters on purpose to make the Deluge ... And this, in a few words, is the whole account of the business. This is to cut the knot when we cannot loose it.

Burnet's God, like the deity of Newton and Boyle, was a clock-winder, not a bungler who continually perturbed his own system with later corrections.

We think him a better Artist that makes a Clock that strikes regularly at every hour from the Springs and Wheels which he puts in the work, than he that hath so made his Clock that he must put his finger to it every hour to make it strike: And if one should contrive a piece of Clockwork so that it should beat all the hours, and make all its motions regularly for such a time, and that time being come, upon a signal given, or a Spring toucht, it should of its own accord fall all to pieces; would not this be look'd upon as a piece of greater Art, than if the Workman came at that time prefixt, and with a great Hammer beat it into pieces?

Flood geology was considered and tested by early-nineteenth-century geologists. They never believed that a single flood had produced all fossil-bearing strata, but they did accept and then disprove a claim that the uppermost strata contained evidence for a single, catastrophic, worldwide inundation. The science of geology arose in nations that were glaciated during the great ice ages, and glacial deposits are similar to the products of floods. During the 1820s, British geologists carried out an extensive empirical program to test whether these deposits represented the action of a single flood. The work was led by two ministers, the Reverend Adam Sedgwick (who taught Darwin his geology) and the Reverend William Buckland. Buckland initially decided that all the "superficial gravels" (as these deposits were called) represented a single event, and he published his *Reliquiae diluvianae* (Relics of the Flood) in 1824. However, Buckland's subsequent field work proved that the superficial gravels were not contemporaneous but represented several different events (multiple ice ages, as we now know). Geology proclaimed no worldwide flood but rather a long sequence of local events. In one of the great statements in the history of science, Sedgwick,

who was Buckland's close colleague in both science and theology, publicly abandoned flood geology and upheld empirical science -- in his presidential address to the Geological Society of London in 1831.

Having been myself a believer, and, to the best of my power, a propagator of what I now regard as a philosophic heresy, and having more than once been quoted for opinions I do not now maintain, I think it right, as one of my last acts before I quit this Chair, thus publicly to read my recantation...

There is, I think, one great negative conclusion now incontestably established -- that the vast masses of diluvial gravel, scattered almost over the surface of the earth, do not belong to one violent and transitory period...

We ought, indeed, to have paused before we first adopted the diluvian theory, and referred all our old superficial gravel to the action of the Mosaic flood... In classing together distant unknown formations under one name; in giving them a simultaneous origin, and in determining their date, not by the organic remains we had discovered, but by those we expected hypothetically hereafter to discover, in them; we have given one more example of the passion with which the mind fastens upon general conclusions, and of the readiness with which it leaves the consideration of unconnected truths.

As I prepared to leave Little Rock last December, I went to my hotel room to gather my belongings and found a man sitting backward on my commode, pulling it apart with a plumber's wrench. He explained to me that a leak in the room below had caused part of the ceiling to collapse and he was seeking the source of the water. My commode, located just above, was the obvious candidate, but his hypothesis had failed, for my equipment was working perfectly. The plumber then proceeded to give me a fascinating disquisition on how a professional traces the pathways of water through hotel pipes and walls. The account was perfectly

logical and mechanistic: it can come only from here, here, or there, flow this way or that way, and end up there, there, or here. I then asked him what he thought of the trial across the street, and he confessed his staunch creationism, including his firm belief in the miracle of Noah's flood.

As a professional, this man never doubted that water has a physical source and a mechanically constrained path of motion -- and that he could use the principles of his trade to identify causes. It would be a poor (and unemployed) plumber indeed who suspected that the laws of engineering had been suspended whenever a puddle and cracked plaster bewildered him. Why should we approach the physical history of our earth any differently?

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