Demythologizing Uniformitarian History

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When I use a word… it means just what I choose it to mean—neither more nor less. Lewis Carroll

Abstract

Although monolithically applied within historical geology, uniformitarianism itself is a non-scientific axiom. It represents the only possible hold on history for naturalists, since their positivism restricts knowledge to observation. It is demonstrably falsified by at least three tests for truth:

(1) There is imprecision and potential contradiction in the definition itself.
(2) Even a consistent definition contradicts empirical evidence of both modern processes and products of past processes.
(3) Finally, the underlying concept of the uniformity of natural law, a necessary condition for uniformitarianism, cannot be justified within the naturalist worldview.

Biblical history, which recognizes a revelatory basis for knowledge, is shown to be superior to uniformitarian mythology, and naturalism is shown to be without an adequate grasp on any history whatsoever.

Introduction—A Context for Debate

The twentieth-century theologian, Rudolph Bultmann, is known for his program of "demythologizing" the Bible. He attempted to strip away what was called the outer husk of superstition and myth from the Scriptural accounts, and find the essential kernel of divine truth inside. In a somewhat similar manner, this paper undertakes to "demythologize" uniformitarian history, and separate myth from reality. However, the program of demythologizing undertaken in this paper differs because it is not the husk of uniformitarianism that is disposable mythology, but the essential core of the concept that requires discarding.

The role of uniformitarianism in modern geology cannot be fully appreciated outside of its connections to naturalism and positivism. Those relationships are poorly understood absent an appreciation of the importance of worldviews (Noebel, 1991). Metaphysical Naturalism (also called secularism, materialism, etc.) is a worldview based on a fundamental denial of the existence of the supernatural (Nash, 1997; p. 119). Positivism is a way of thinking linked to modern manifestations of naturalism by a misplaced enthusiasm for the scientific method. Positivism has resulted from the substitution of a mechanistic metaphysic for a mechanistic methodology (Glover, 1984), and has therefore closed off all other roads to truth save science. Although the rigorous positivism of the "Vienna Circle" has long since been abandoned, variants of the same principle enjoy widespread acceptance, especially in the sciences. Adler (1992, p. 32-34) reprinted an excellent litmus test for positivism first published earlier this century (Adler, 1941) that reveals the extent of the position, both then and now.

One of the drawbacks of positivism is the implication that knowledge is restricted to the constraints of human observation, both in space and time. Thus the naturalist has no grasp on history, especially the postulated prehistory of billions of years demanded by modern advocates. This is a severe dilemma, since naturalists (especially Marxists) use their interpretation of earth history as an argument against Biblical theism. The relationship of uniformitarianism to naturalism cannot be comprehended apart from the desperate need for a historical method created by the modern naturalist's affinity for positivism. Noted skeptic, Antony Flew (1997, p. 49) recognizes this dilemma in his arguments against miracles.

> The basic propositions are, first, that the present relics of the past cannot be interpreted as historical evidence at all unless we presume that the same fundamental regularities obtained then as still obtain today.

Quite apart from geology, uniformitarianism in a general, philosophical sense is the presumption that allows

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an escape from the temporal limits of positivism. Uniformitarianism is the only possible handle on history for naturalists. If a strict natural uniformity can be asserted, then a "scientific" explanation of history is possible, and no recourse to revelation is demanded by logical necessity (see Figure 1a). Philosophical uniformitarianism found its home within geology because that discipline is the repository of history for naturalists.

The application of uniformitarianism to geology in the works of Charles Lyell (1797-1875) illustrates this relationship. Gould (1965) asserted that early nineteenth-century geologists led by Lyell sought consciously to supplant the Biblical framework of earth history. He reiterated this point later stating, "Lyell had a vision of the earth and its history" (Gould, 1984, p.9). Although the author is not familiar with any discussion of the subject, it would be interesting to investigate the influences of David Hume's skepticism and possibly, Immanuel Kant's phenomenological method on Lyell and his peers. After all, Hume argued that repeatable observations outweigh the evidence of nonrepeatable ones. The implications of this position (as restated by Antony Flew) may have been apparent to Lyell.

> If this assumption is correct… one should not believe in the historicity of any unusual events from the past (since none are repeatable). Likewise, even historical geology is unrepeatable in practice, since the fossil record was formed only once and has not been repeated. So also is the history of our planet unrepeatable. Yet it has happened. Hence, if Flew [and Hume] is right, the science of geology should be eliminated, too! (Geisler, 1997, p. 84; brackets added).

If Lyell and his followers were to accept the new skepticism and the new naturalism, their grasp on any historical interpretation would have to be consolidated. They may have been forced to a position of extreme uniformitarianism in order to save a skeptical approach to history.

Lyell and his followers did not directly attack the Bible. Instead they choose the indirect method of attacking the applicability of the derivative catastrophic paradigm to geological interpretation. Their goal of minimizing the Bible's historical significance was achieved by the use of a bait-and-switch strategy that equated naturalistic gradualism with the fundamental methodology of science (Gould, 1984, p. 10). The template of the biblical historical record was replaced by a skeptically objective "empirical" science.

> The entire geologic record, with all its evidence of vast upheaval and mass extinction, was, for the first time, integrated within the sphere of empirical investigation. (Gould, 1965, p. 224)

Contrary to Gould's celebration, the early geologists did not lead geology from the bondage of Biblical history into the promised land of empirical neutrality. Instead, they merely traded one set of presuppositions (Christian) for another (naturalist). In one of geology's great ironies, Lyell and other early proponents of uniformitarianism not only failed to discover an objective approach to earth history, but even more importantly, they failed to understand that biblical theology remained a vital, but unseen, component of their own concept. Those connections are

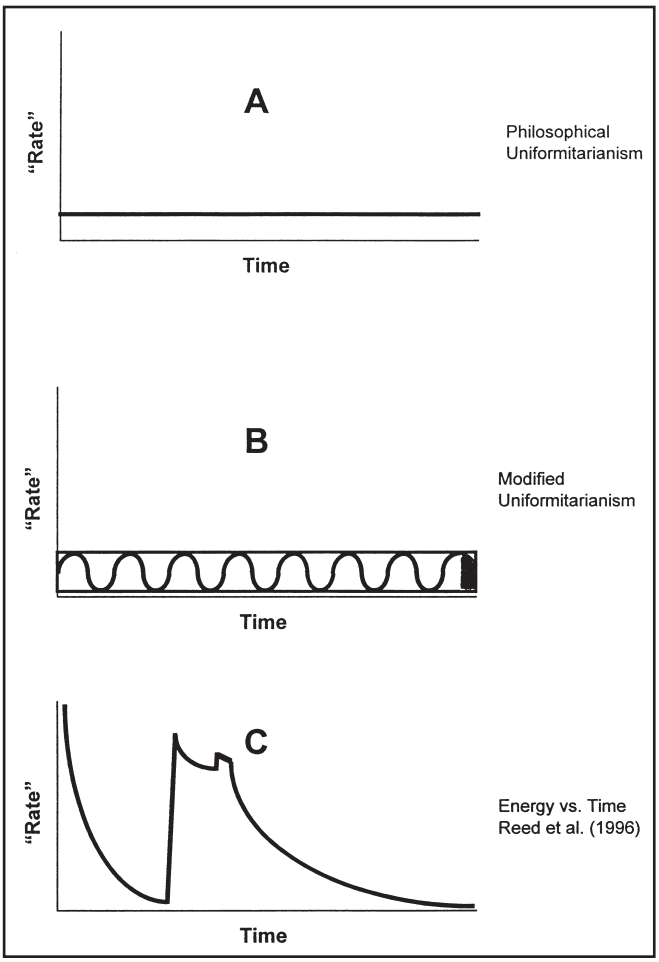

Figure 1. Comparative cartoon showing strategies for interpreting the past. Methods are referenced to rates of geologic processes. Figure 1A, labeled "philosophical uniformitarianism" shows an invariant rate of process required for confident extrapolation of interpretation into the past. This graph illustrates the Principle of Temporal Invariance. Figure 1B, labeled "modified uniformitarianism", shows how the term is defined and applied at present. The shaded area represents historical observation of processes, although it cannot be shown to scale on the time axis (it would not be visible if it was). Figure 1C is the time vs. energy plot from Reed, Froede, and Bennett (1996). An entirely different method is employed; geologic processes are not extrapolated from present observations, but are deduced from revealed accounts found in the Bible.

summarized in Reed (1996), and this paper will illustrate them, partly by forcing a consistently naturalistic formulation of uniformitarianism. Unless terms are defined correctly and placed in their proper context, there can be no profitable debate on the relative merits of uniformitarianism and catastrophism in geology. As it stands at present, the issue of historical method within the larger debate between naturalism and theism cannot be considered adequately defined if naturalists are utilizing biblical theology to develop and propound an anti-biblical worldview.

Like many other modern enigmas, the challenges listed above reach below the surface and are linked to epistemological conflicts between theists and non-theists. These conflicts can be seen in different understandings of terms such as "science", "philosophy", and "theology"; and the relationships between them (Adler, 1965). Since Christians and naturalists differ with regard to these most basic definitions, it is unsurprising that derivative issues (e.g., uniformitarianism and catastrophism) are also confusing. For example, a positivist would define science as "knowledge", while a Christian should define it as "a part of knowledge constrained by philosophical and theological axioms". It is no wonder that most discussion about uniformitarianism between advocates of these worldviews often appears confusing at the outset. These issues cannot be addressed comprehensively in this paper, but will be touched upon as they relate to the present discussion.

Because naturalists easily ignore a multifaceted approach to knowledge, uniformitarianism is commonly considered scientific because of its application within historical geology. And, after all, is not all 'knowledge' science? However, application to scientific questions does not demonstrate that a principle itself is scientific. Close examination of uniformitarianism reveals that it is a principle that lies outside the reasonable bounds of science (Reed, 1996; Gould, 1984). Therefore, a thorough examination of the principle must transcend mere empirical analysis. This paper will examine uniformitarianism on two levels. The first level is a test for logical consistency in its definition and usage in geology, and this analysis will show that only a rigid definition of uniformitarianism can provide any confidence in naturalism's history. However, this rigid definition cannot pass empirical tests. Modifications inherent in the current definition of uniformitarianism will be examined, and we will see that these changes cannot save uniformitarianism from empirical weaknesses, but that they exacerbate these problems while creating new logical ones. The second level analysis will examine the concept by reference to its underlying premise of uniformity of natural law; and will demonstrate a profound contradiction between uniformity and naturalism, while simultaneously demonstrating consistency between uniformity and Christian theology. Demonstrating flaws in naturalist formulations of both uniformitarianism and uniformity should remove all credibility from the application of uniformitarianism within naturalism. The divorce of uniformitarianism from naturalism should also seriously weaken the hold of naturalism on history, reinforcing the necessity of revelatory knowledge in historical interpretation.

The First Level of Analysis: Weaknesses in the Definition

Bates and Jackson (1987) define uniformitarianism in the American Geological Institute Glossary of Geology as:

> The fundamental principal or doctrine that geologic processes and natural laws now operating to modify the Earth's crust have acted in the same regular manner and with essentially the same intensity throughout geologic time, and that past geologic events can be explained by phenomena and forces observable today; the classical concept that "the present is the key to the past". The doctrine does not imply that all change is at a uniform rate, and does not exclude minor local catastrophes...

There are five weaknesses in the definition and usage of uniformitarianism in modern geology. These include:

- the ongoing confusion between what Gould (1965) termed substantive uniformitarianism and methodological uniformitarianism,
- the truncated usage of the term, "geologic process" in the definition (above),
- the inability to define the limits of "rates" as it is qualified in the definition (above),
- the indefinite usage of the term, "present" in the definition (above), and
- the contradictions between a consistent definition and observation, of both present processes and of past products.

Gould (1965) derived a dual definition of uniformitarianism; substantive (uniformity of rate) and methodological (invariance[1] of natural law), and further subdivided them later (Gould, 1984). Austin (1979) carefully noted four meanings of uniformitarianism, and correctly criticized the vagueness of usage. It is possible to picture the various uses of the term as forming a continuum with the more easily defended assertion of the uniformity of natural law at one end point all the way over to

[1] Gould betrays his naturalist worldview by using the term, "invariance" in an absolute sense. For a Christian, this usage is theologically unacceptable, and therefore, I choose to use either "uniformity," "regularity," or "predictability" with reference to natural law.

a rigid regularity of process (including rate) at the other, with more or less flexibility of processes comprising the interior points. Even a passing acquaintance with geological literature demonstrates that the application of uniformitarianism in field interpretation usually tends toward the latter endpoint. However, when the axiom is questioned, it is defended by reference to the endpoint of the uniformity of natural law. This position is deemed unassailable, since the uniformity of natural law is a prerequisite for scientific inquiry. It is interesting to speculate about a correlation between the desire for the unknown (e.g., strata) to be correlated to the most familiar context possible (observable modern environments), and the resulting consistent pressure to force interpretation by reference to modern processes in a rigid fashion, a situation lamented by Gould (1984). He illustrated that mindset by documenting opposition to Harlan Bretz's (1969) interpretation of the Channeled Scablands of the Pacific Northwest (Sipes et al., undated).

What is the relationship between uniformity of natural law and uniformity of geologic process (or methodological and substantive uniformitarianism to follow Gould [1965])? The relationship cannot be univocal, since geologic processes are described by reference to more than the functioning of natural laws. As Gould (1965, 1984) stated, there is a difference between uniformity and uniformitarianism. Interaction between the two can best be seen as a unidirectional relationship between geologic processes and natural laws. That is, the underlying predictability of natural laws is a necessary condition to any predictability of geologic processes. However, it is not a sufficient condition. In other words, uniformity of natural law does not logically guarantee comprehensive predictability of geologic processes (since the two are not identical). For example, hydraulic principles governing the relationship between current speed and particles in sedimentary transport (uniformity of natural law) cannot predict whether the particles will be deposited in a fluvial, deltaic, or marine environment (geologic process).

This distinction between natural law and geologic process makes it clear that the use of the term, "*processes*" in the Bates and Jackson (1987) definition is incomplete, since processes have multiple aspects, most of which may vary. These include at least (1) *function*, (2) *scale*, (3) *rate*, (4) *environment*, and (5) the *potential for preservation* in the rock record. Of these aspects, only the first is directly linked to predictable natural law; the others can vary, even when *function* does not. For example, a delta has formed at the mouth of the Mississippi River where the conditions affecting the transport of the sediment load change as the river enters the Gulf of Mexico. Deltas can form when any moving volume of water transporting sediment enters another relatively quiescent body. The physical processes by which sediment grains are deposited in a predictable relationship during delta formation have been studied and related to the discipline of hydraulics. There are general 'rules' of delta formation, and these define the aspect of *function* for that particular process. However, the variables that interact in history to form a particular delta cannot be uniquely defined by the resulting deposit. For example, did fine-grained sediment in a certain bed result from low current energy, or a fine-grained sediment source? Other aspects of geologic processes; *scale*, *environment*, *rate*, and *preservation potential* cannot be uniquely and comprehensively described by reference to the uniformity of natural law, or *function*.

That being so, it is not surprising that the definition of uniformitarianism supplied in Bates and Jackson (1987) does not explicitly address each of these aspects *per se*. It mentions "*rate*", "*intensity*", and "*manner*". If the "*manner*" is the equivalent of *function*, and "*intensity* and "*rate*" refer to a similar (time-dependent) aspect of a given process, then clearly the term, "*processes*", is not completely defined. Therefore, uniformitarianism is not completely defined, either. Although Austin (1979) noted these shortcomings and proposed terminology to clarify the issue, his suggestions have not been widely applied in geology (compare Austin [1979] with Bates and Jackson [1987]).

Statements in the Bates and Jackson (1987) definition qualifying the relationship between *rate* and uniformitarianism deserve closer scrutiny. *Rate* appears to be defined, but there is an attempt to overcome a very obvious difficulty. Observable present processes do not operate at precisely uniform rates. Thus conceptual uniformitarianism requires modification, and the present definition appears to be placing boundaries on historic *ranges* of rates by reference to those limits observed in the present. The modified uniformitarianism defined by Bates and Jackson (1987) does not require a strictly invariant rate, but would require a strict invariance of the *range* of rates observed in the present. Therefore, uniformitarianism as currently defined requires invariance of *rate* within observed limits, and strongly implies that *scale* and *environment* fall within ranges observed in the present. Of course this reformulation leads immediately to the next big question about the definition.

The fourth weakness in the definition is the lack of precision in the term *present*. Does it mean this second, this minute, this hour, today, this week, this month, this year, this decade, this century, or this millennium? Or does it include the entire span of human observation, and therefore human history? Even though most historians would protest, the latter appears to be the common usage of geologists. If so, does that not imply that the "past" is therefore the period of time when no human

observations were made because no humans existed? A consistent positivism (apart from uniformitarian assumptions) cannot allow such a past. Only by assuming (without demonstrating) a *knowable* pre-human past can this definition be used. Thus, the definition of uniformitarianism itself tacitly requires that it be true even to be defined. Theists can honestly question whether or not this approach is logically circular, if naturalists do not admit that uniformitarianism in an indemonstrable axiom.

Another Logical Challenge: The Metaphysical Face of Uniformitarianism

Defining *rate* as a constrained variable rather than a constant creates a logical tension in the concept of uniformitarianism. Although field evidence forces *rate* to be a range rather than a constant, doing so adds uncertainty to the pure concept, and uncertainty is fatal because uniformitarianism must function as an axiom for naturalists. Most people understand the use of uniformitarianism as an epistemological tool. In other words, it is used as a means of understanding and explaining the rock record. It 'translates' the 'code' of the rocks. However, the use of uniformitarianism as an epistemological tool requires a metaphysical corollary of strict continuity. Ignoring for now the previous difficulty adduced from attempting to quantify the 'present', consider this point. If the present is the key to the past, and if the past is defined by events occurring in time, then this arrangement can be graphically represented by points on a line. If the present is the key to the past, then considering the present as another point on the line leads to the formula:

present point = any given point in the past

with respect to geologic processes. If present geologic processes are defined as P_n, and geologic processes at any time in the past are labeled P_1, P_2, P_3...P_{n-1}, where P_1 is the oldest, and P_{n-1} is the youngest, then a geologist can interpret the record of points 1, 2, 3...n-1 by reference to point n. If you do not like numbers, then think of 1, 2, and 3 as Cambrian, Ordovician, and Silurian. Therefore, in mathematical terms:

$$P_n = P_1 \text{ and}$$

$$P_n = P_2 \text{ and}$$

$$P_n = P_3 \text{ and...}$$

$$P_n = P_{n-1}$$

If this is true, then by the logical principle of self-identity:

$$P_1 = P_2 = P_3 = \ldots = P_{n-1}$$

This relationship defines the hidden constraint on uniformitarianism. Let us call it the Principle of Temporal Invariance. This principle would require that with respect to geologic processes, if the present is the key to the past, all points in the past must be identical to the present, and therefore identical to each other. Or as stated below by Lemon (1990, p.30): "The uniformitarian view of earth history held that all geologic processes proceed *continuously* and at a very slow pace." [emphasis added]

This principle requires geologists not only be able to interpret any one point in the past by reference to the present, but that there also be an interpretive continuity between any given points in the past. Observed differences outside the bounds of the "present" between any two parts of the rock record contradict uniformitarianism. Can philosophical uniformitarianism be saved by minor modification? It is evident from the uncertainties inherent in the definition and application of uniformitarianism that its proponents want as much "wiggle room" as possible for their concept to accommodate empirical evidence. This concept has developed from a simple idea of continuity (Figure 1a) to a present, modified version (Figure 1b) that seeks to incorporate observed variation. But does not the modification destroy the logical simplicity needed by naturalism? The Principle of Temporal Invariance greatly restricts any flexibility between the present and the past, and throughout the stratigraphic column. A corollary consequence further restricts it. For the naturalist, this Principle of Temporal Invariance must reside in nature (since nothing exists except nature) and must be absolute. If naturalism can explain natural history with certainty, invariance is required. If invariance is not observed, then either history cannot be explained, or naturalism is false. This is the dilemma of the natural historian.

Empirical observation should confirm the Principle of Temporal Invariance without exception. Please note that a universal assertion cannot stand under the weight of even one contrary piece of evidence. Based on the definition of uniformitarianism provided by Bates and Jackson (1987) and Lemon (1990), examples of past geologic processes must be the same (even in the aspects not explicit in their definition) as those operating in the present. Gould (1965) faced this dilemma. He wanted some uniformitarianism with respect to geologic processes, but recognized that empirical evidence does not support an absolute formulation (the only recourse to a non-absolute formulation of uniformitarianism is the recognition of an absolute historical reference outside of nature).

What does observation of modern processes and ancient products reveal? At best modern examples reveal that the limits of geologic processes are only invariant with respect to *function*. The observation of present variations over a few centuries cannot legitimately be used to

set a "range" of variation for past processes supposedly occurring over millions of centuries. With respect to the rock record, we find evidence of processes operating at wildly different *scales* and *rates*, and in singular *environments*. Precambrian iron formations, large, pure salt beds, regional-scale correlative strata, plateau or flood basalts, and glacial floods all find no place in the observable 'present', and directly contradict Lyell's (1881) assertion that causes "*never acted with different degrees of energy from that which they now exert*" (see Figure 1a). Not only do they contradict the conceptually pure uniformitarianism demanded by the Principle of Temporal Invariance depicted in Figure 1a, but they are also difficult to reconcile with the modified uniformitarianism of Figure 1b. These failures reinforce the relevance of a different methodology, such as the one illustrated in Figure 1c.

Only one exception is needed to invalidate a self-consistent formulation of uniformitarianism. Geologists are so accustomed to finding exceptions to a consistent definition of uniformitarianism that they allow the logical force of one exception to be lost in the myriad of such examples. When challenged, the answer to these exceptions usually appears to flip back to the position of invariant natural law (not the same as invariant geological processes), and assumes that those comfortable and defensible confines somehow shelter invariance (within slightly broader limits than previously thought) of process; including *rate*, *scale*, *environment*, and *preservation potential*. Tension between the naturalist's need for an absolute handle on history (temporal invariance) and observation (variation of process over time) rightly generates confusion. This confusion cannot be resolved by accommodating observed variation while imagining that invariance is still operative. But this has not stopped modern geologists' attempts to formulate a "catastrophic" uniformitarianism based on the vast recent increase in geologic data in the latter part of this century. The Principle of Temporal Invariance requires more than Gould's (1965) fallback position of "methodological uniformitarianism". Invariance of process is either absolute or it is not. If not, then the present is *not* the key to the past in the way geologists have been assuming it is for almost two hundred years.

Matters are even worse for the naturalist when their "wiggle room" is further restricted as the definition of the present is quantified and limited. For example the limits of variation allowable are much different if the present means "the last ten years" than if the present means "the last ten centuries." There is only one last hope for the naturalist. Perhaps variations observed in present processes somehow form a predictable pattern that can be superimposed on ancient strata. But there are not enough "data" points to determine if this is true. Even this potential salvation through cyclicity is lost when we consider that the geologic record itself is not regular with respect to time. In other words, the intervals between the ages of each bed in any given section of strata do not vary in a regular manner. Therefore, there can be no predictable cycle of time represented in the rock record that might receive an extrapolation of present patterns of variation in a predictable fashion (as is evidently desired by Bates and Jackson, 1987). The more-or-less randomized distribution of ages in the range of outcrops available for investigation demands that there is no time dependency of variation. Therefore, the Principle of Temporal Invariance must be true independent of time, and there should be no observed variation in geologic processes in the past or the present. The naturalist is in a trap of his own making; a more consistent approach to the observed non-regular variations in the "present" would be to conclude that variation increases with time into the past (Figure 2). And such a conclusion renders the presumption of only limited variation in the comparatively unlimited past, wishful thinking.

The Second Level of Analysis: How Can Uniformity be Justified?

The naturalist has trapped himself by his definition of uniformitarianism. Can an appeal to uniformity or "methodological uniformitarianism" get him out as Gould (1965) believes? As was shown above, no. However, to complete the argument, an examination of the relationship between uniformity, uniformitarianism, and naturalism is worth pursuing. First, uniformity of natural law is not unique to geology or the modern principle of uniformitarianism as it is applied in geology. Rather, uniformitarianism is a stepchild of uniformity, a fundamental principle of modern science predating uniformitarianism. If uniformitarianism is dependent upon uniformity, then it is worthwhile to examine the concept of uniformity by reference to the two competing worldviews, naturalism and biblical theism. What is the nature of the principle of uniformity, and how can it be reconciled with the tenets of each system? And if uniformity cannot be reconciled with naturalism, can there be any remaining shred of credibility for uniformitarianism?

No worldview can justify uniformity based on empirical observation. Most thinkers of the past tried to find a permanent point of reference by which observed changes could be explained. Plato preferred eternal, perfect forms, or "Ideas". Aristotle traced all motion (change) back to an "Unmoved Mover". Later, Christian thinkers recognized that the nature of God provided a stable reference point for observed changes. They accepted the connection between spiritual and physical reality inherent in such a position (based on the implication of spirit [God]

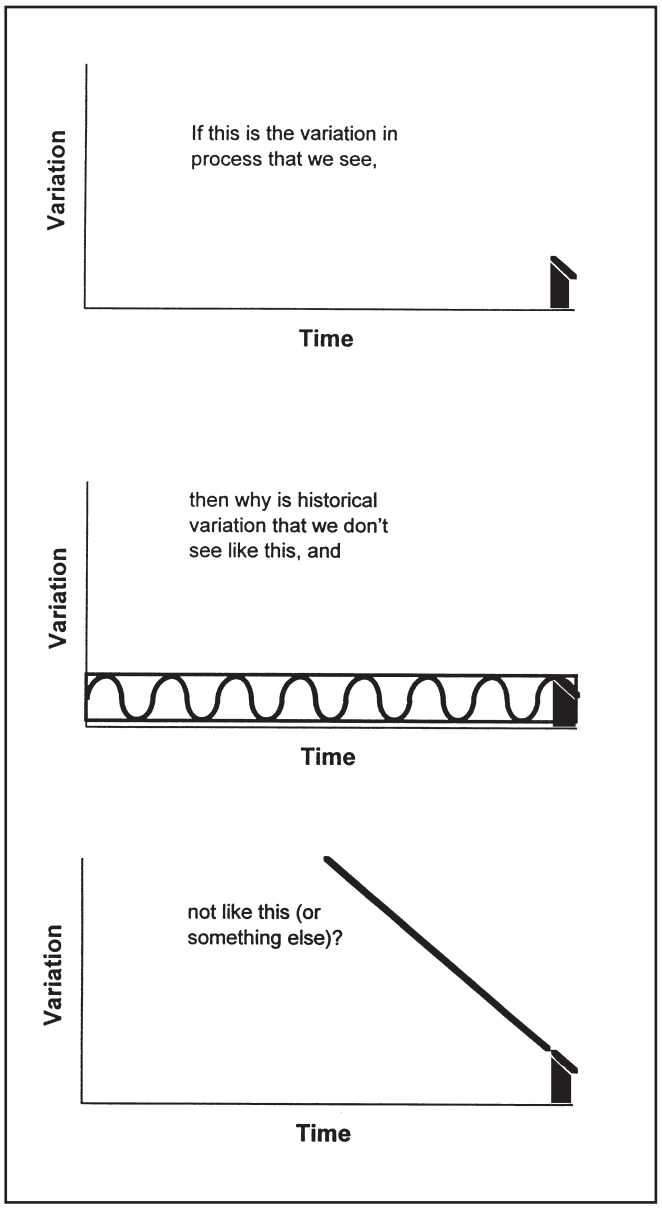

Figure 2. Cartoon illustrating the arbitrary extrapolation of modern observations into the past by modern uniformitarianism. The top figure shows a period of historically observed geologic processes. Note once again that it cannot be shown to scale with the proposed naturalist timeline of 4.5 billion years. The central figure shows historical extrapolation as done via the modern concept of uniformitarianism, with ranges of process function, rate, environment, scale, and preservation potential consistently extrapolated within limits observed during the present. The bottom figure shows a logical alternative, based on the present observation of variation in geologic processes over an extremely short period of time. The existence of a logical alternative to the extrapolation scheme demonstrates that the application of uniformitarianism is not logically or scientifically required.

creating the material universe). Modern naturalism, following Immanuel Kant, rejects an epistemological tie between the noumenal (spiritual) and phenomenal (material), and so are forced to reject God as a reference point for change. Unfortunately, since modern naturalism developed out of the cultural context of Christianity, it has never wrestled with the inconsistency of assuming on widely-accepted aspects of reality that have been historically justified by belief in God. In the new naturalist worldview, observation by man is the only possible way to truth; there is no absolute reference. Gould (1965, p. 223) states that allowing the direct providential control of nature by God violates the method of science. But if it turns out that Gould requires God to justify uniformity, then he will have a difficult choice to make – to jettison his naturalistic science, or to jettison his uniformity, naturalism's only possible hold on history.

Justifying uniformity as a universal principle is very difficult for the naturalist. Both the span and scope of human knowledge relative to earth history are just too limited. This impossibility is multiplied by the naturalist's required vast age for the earth and universe sufficient to allow the 'natural' evolution of what is currently observed[2]. The difference between this required age and the span of human existence (much less scientific observation) is so great that it would be impossible even to posit an extrapolated statistical probability of uniformity based on human observation. Therefore uniformity is not a conclusion or deduction, but it is an axiom, or to use the definition of Bates and Jackson (1987), a "doctrine". The question then becomes how to justify this doctrine.

How can a naturalist justify the axiom of uniformity of natural law? At this point we may consider that naturalism can be subdivided into either materialism or non-rational mysticism (Schlossberg, 1983). Since we are discussing the scientific application of uniformitarianism, then the division of mysticism may be ignored here. As noted earlier, the materialist side of naturalism is consistently accompanied by its handmaid, positivism. Unfortunately, the positivist faces a major dilemma. His epistemology requires an empirical test of validity, by which he isolates science as the only path to truth. But scientific principles can only be extrapolated into the past (or future) by the presupposition of uniformity, and that presupposition cannot possibly be justified empirically. The naturalist, still caught in his logical trap, must deny one of his major presuppositions—posi-

[2] Naturalism must conclude that the material universe is eternal, not just very old. Empirical evidence of change and decay contradict that supposition. However, relative to the problem at hand, even a very old universe imposes the same limits on justifying uniformity.

tivism or uniformity. He must either deny his epistemological base (allowing revelation back onto the playing field) or deny uniformity (rendering true knowledge unachievable). Gould (1965, p. 226) addresses this problem, but does not answer it (note that he does not say what justifies the assumption of invariance). He states:

> However, the assumption of spatial and temporal invariance of natural laws is by no means unique to geology since it amounts to a warrant for inductive inference which, as Bacon showed nearly four hundred years ago, is the basic mode of reasoning in empirical science. Without assuming this spatial and temporal invariance, we have no basis for extrapolating from the known to the unknown and, therefore, no way of reaching general conclusions from a finite number of observations. (Since the assumption is itself vindicated by induction, it can in no way "prove" the validity of induction - an endeavor virtually abandoned after Hume demonstrated its futility two centuries ago).

It appears that someone forgot to tell the disciples of uniformitarianism. Only by ignoring these blatant contradictions (wishful thinking) may they escape this problem. This dilemma starkly illustrates the historical irony of uniformitarianism developing within the cultural context of Christianity, attempting to replace theology with science, and then finding that the brave new world it has helped pioneer is an intellectual desert.

The issue of uniformity provides yet another problem for naturalism. The early development of modern science hinged in part on the ability of man to see the world mechanistically, and to remove the mystery of nature from the domain of the scientist into that of the theologian. Such a move was validated by the belief in a rational, immutable God who freely created and controlled physical reality. The resolution of the superiority of the Bible to Aristotle (Myers, 1987; Glover, 1984) provided a theological basis for partitioning explanation (i.e., Aristotle's four causes); removing non-mechanistic explanation from science to philosophy or theology. Gould (1965, p. 223) unwittingly notes that Lyell and his followers wanted the benefits of biblical theology without the Bible. He states:

> To become a science, they affirmed, geology needed not only an empirical theory unencumbered by biblical preconception, but also a methodology which affirmed the potential natural explanation of terrestrial development and relegated intrinsic mystery to its proper theological realm.

Unfortunately, there can be no empirical theory without some kind of preconception. If it is not the Bible, then what is it? Gould (1965) supplies no answer. Intrinsic mystery cannot be relegated to the theological realm unless there is a real theological realm, and there is communication of truth between science and theology. It is inconvenient for Gould that Christian theology includes statements of historical truth that influence geological understanding—the very thing that Lyell was trying to escape.

You cannot have it both ways. Modern naturalism does not recognize theology or first-order philosophy as knowledge-equivalents of science. However, if *some* aspects of Christianity are to be erased, then it is only fair that *all* of the Christian trappings be stripped away, allowing the return to… *Aristotle*! But not even a return to Aristotle could satisfy modern naturalism. A strictly empirical, positivist approach would more consistently note that the discontinuities and changes in variation observed within the human timeframe demand unconstrained variation in the past. In which case they have regressed beyond Aristotle to Heraclitus[3]. Of course, that conclusion renders history incomprehensible and the discipline of historical geology invalid.

Let us be fair. Can the biblical theist justify the axiom of uniformity of natural law? Logically and historically it has always been done by reference to theology, understanding that science rests on principles derived from theology. These include the rationality of God, the immutability of God, the providence of God, and the ability of man created in His image to understand truthfully, even if not completely. For the purposes of science, nature is presumed to behave mechanistically and predictably because of the rational nature of God. This behavior is consistent through time because God is immutable. This formulation must recognize that the invariance of natural law is not absolute, because this law represents the desire of the lawgiver. Or, as stated by Moore (1986), man's perception of natural laws is descriptive, rather then prescriptive. Therefore, the possibility of supernatural intervention contrary to regular natural process is left open. Naturalists have always pointed to this exception as the reason for positing a contradiction between biblical theism and the scientific method. According to Gould (1965, p. 224), Lyell wanted to postulate:

> ...another, very different type of uniformity that asserted the invariability of natural laws in space and time as a necessary condition to his contention that reference need only be made to observable processes in explaining past changes. The main force of this proposition was to eliminate supernatural explanations of material phenomena; for this unifor-

[3] Heraclitus was the pre-Socratic philosopher who advocated continuous change. He is remembered for his illustration that no one could step into the same river twice, because some aspect of the river (or the man) would have changed before it could be recrossed.

> mity denies divine intervention (the suspension of natural laws) and affirms that elucidation of earth history belongs to the domain of science. (Gould, 1965, p. 224)

It is understandable that Lyell (and his followers) would want to start their work by postulating the necessary conditions for, and conclusions of, their research. However, this practice is referred to in logic as "begging the question". Lyell wanted the ability to pretend that an absolute reference point existed, against which he could integrate observed change, but he did not want it to be God. However, this position is revealed as merely wishful thinking, and wishful thinking seems a flimsy base from which to launch an attack on the integrated and historically successful Christian formulation of uniformity, which helped birth modern science. The consequences for uniformitarianism are clear; if uniformity cannot be justified within the naturalist framework, then there is no hope for the more extreme uniformitarianism. If uniformity can only be justified within biblical Christianity, then the accompanying propositions of God as the Creator, Intervener, Revealer, and Judge must also be accepted. As C. S. Lewis stated:

> The philosophy which forbids you to make uniformity absolute is also the philosophy which offers you solid grounds for believing it to be general, to be almost absolute. The Being who threatens Nature's claim to omnipotence confirms her in her lawful occasions. Give us this ha'porth of tar and we will save the ship. The alternative is really much worse. Try to make Nature absolute and you find that her uniformity is not even probable. By claiming too much, you get nothing. You get the deadlock, as in Hume. Theology offers you a working arrangement, which leaves the scientist free to continue his experiments and the Christian to continue his prayers. (Lewis, 1961, p. 106).

Conclusion

Uniformitarianism fails on multiple fronts. Observed and inferred changes in geologic processes, both present and past, are recognized and cannot be reconciled with Lyell's rigid formulation. The modern attempt to preserve some control on the limits of change also cannot be reconciled with the naturalist worldview. Flaws in the modern definition and application of uniformitarianism discussed above demonstrate the weaknesses in this attempted reconciliation. The tension between the improbability of absolute temporal invariance on the one hand, and the naturalist's requirement that history be accessible and referenced only to nature on the other, cannot be overcome by an appeal to "methodological uniformitarianism" (Gould, 1965). Geologic interpretation requires that geologic processes (including *function*, *rate*, *scale*, *environment*, and *preservation potential*) be invariant, and thus able to be extrapolated to any point in the Earth's crust. Alternatively, geologic interpretation could be performed if the processes were not invariant, but were known at least generally from historical record (i.e., revelation of a global flood). A compressed time frame would logically add confidence to extrapolation. Thus a position that appeals to biblical revelation as the basis for understanding history is superior to naturalism.

In the biblical theist worldview, God provides an absolute external reference, and uniformity is upheld. There is no rational necessity of invariant *rates*, *scales*, or *environments* because there is a change agent (God) that has the power to intervene. Even if the intervention is done within the divinely imposed guidelines of natural law, or *function*, there is no constraint on *scale*, *rate*, *environment*, or *preservation potential*. Therefore, historical investigation in the biblical theist worldview is open to empirical investigation unbounded by the present in these aspects. And that empirical investigation is guided by the historical record that is part and parcel of the biblical worldview. Confidence in uniformity, based on theological considerations, allows an analogical comparison of past and present processes, based on an underlying uniformity of natural law. Empirical evidence from the rock record certainly supports the biblical-theist approach to uniformity, rather than the naturalists' straitjacket of uniformitarianism. Historical investigation in the naturalist worldview continues to be done under the axiom of uniformitarianism because the only alternatives, (1) man cannot understand the past, or (2) man cannot understand the past apart from revelation are both irreconcilable with fundamental tenets of the system. The uniformitarian motto, "the present is the key to the past" is shown to be logically inconsistent wishful thinking by those who also wish to reject God.

Summary: Challenges for Uniformitarianism

1. Geologic processes are not identical to natural laws. Therefore, agreement regarding the invariance of natural laws does not imply the invariance of geologic processes. Variations in *scale*, *rate*, *environment*, and *preservation potential* are all independent of invariant natural law.
2. Change is observed. Therefore, uniformitarianism cannot be absolute. However, positing ranges of energy for historical processes based only on the empirical observation of present processes is invalid. The observation of unpredictable variation in the present

can only lead to the conclusion of much greater unpredictable variation in the past. And if expanding the time scale used in the definition of the 'present' allows greater limits of variation, then extrapolation into the much greater 'past' implies unlimited variation, rather than inflexible limits. Only by adding other assumptions can such an assertion be justified.

3. The assumption that the term, "present" is equivalent to the history of human observation, and that the term, "past" is everything outside of human history involves metaphysical assumptions about reality that cannot be reconciled within a positivist approach to knowledge.
4. If uniformitarianism is valid as an epistemological tool to "translate" the "code" of strata, then the corollary Principle of Temporal Invariance must also be universally valid. The logical conclusion that all processes are invariant and thus independent of time is required if extrapolation into the distant past is valid. However, as noted in point number two above, this requirement is contradicted both by human observations in the 'present', and by the rock record of the 'past'. If the Principle of Temporal Invariance is not valid metaphysically, then neither is the assumption of uniformitarianism.
5. Even the fallback position that natural law is invariant cannot be axiomatic in a positivist approach, since the range of empirical observation is not absolute. Even a statistical extrapolation is invalid, given the percentage of time available for observation relative to the asserted age of the earth. Conversely, a theist can theologically justify the continuity of natural law as consistent with the character of God, and the guarantee of truth apart from human observation.

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