

and have not been transported, either by glaciers or streams. A variety of otherwise almost insoluble difficulties are accounted for with this disintegration explanation.

The presence of disintegrated boulders, "sand balls," and so forth in the cross stratified materials, which could not have been transported into their positions or worn round by abrasion, is explained. They have been formed in place. Many of these will exhibit a pattern of cross stratification inside, a result of disintegration. Rocks identical to the bedrock below are abundant in the gravels, since they have been formed by a reconstitution of the bedrock.

The pattern of cross stratification may show successive sets with inclined strata oriented in different directions, and there need not be any preferred orientation in a cross stratified formation. This is easily explained in the disintegration explanation, yet a sedimentary origin could occur only if currents reversed repeatedly, without destroying the pattern in underlying beds.

Conclusions

In conclusion, it has been shown that a process causing stratification may have acted on rocks of the earth's surface in the past, that is not sedimentary. Such a process would have been overlooked by geologists because of the principle of uniformitarianism, according to which past causes are limited to those found acting at the present time.

This form of stratification involves the rapid release of former high pressure on surface rocks. According to the new explanation, cross stratification, as found in natural sands and sandstones, is an effect of the shattering that accompanied release of high pressure when the continents were raised from great depths of burial under water.

The amount of pressure involved was sufficient to cause diffusion effects in recently precipitated sediments. With the new explanation a complete reinterpretation of the significance of the phenomenon of cross stratification is possible, opening the way for new insights into the recent history of the earth.

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MATHEMATICIANS DO IT AGAIN¹

DAVID J. RODABAUGH*

Creationists have often argued, rather qualitatively, that if evolution had really happened, the many gaps in the "fossil record" would be most improbable. That is true. The purpose of this paper is twofold: to obtain somewhat more quantitative estimates of the improbability, and to calculate from the presence of gaps in the fossil record being given empirically, the probability that evolution occurred. It is shown that that probability is vanishingly small; one may as well say that, the gaps being admitted, it is impossible that evolution occurred.

Bayes' Theorem

Given the fact that there are still many large gaps in the fossil record, what is the probability that the evolution model is valid? An approach to answering this type of question may be made by using Bayes' Theorem.

Some special notations are needed. The symbol $p[A]$ denotes the probability of the event A. The

symbol $p[A|B]$ denotes the probability of event A given that event B has already happened.

For example, if F represents a gap that has been filled and E represents the evolution model then $p[F|E]$ denotes the probability, assuming the evolution model, that this gap has been filled. On the other hand $p[E|F]$ denotes the probability, given that a certain gap has been filled, that the evolution model is valid.²

In this use of Bayes' Theorem, it is assumed that either the evolution model (denoted E) or the creation model (denoted C) is valid; but both cannot be valid. That is, the following is assumed:

$$p[E] + p[C] = 1. \quad (1)$$

*David J. Rodabaugh, Ph.D., is with the Department of Mathematics of the University of Missouri, Columbia, Missouri 65201. He is also an ordained minister, Pastor of the Berean Bible Church in Columbia, and is a member of the Boards of several Christian organizations.

A probability of 1 means that an event is absolutely certain and a probability of 0 means that an event is impossible.

Let A represent some event where both $p[A|E]$ and $p[A|C]$ are known. According to Bayes' Theorem, then,³

$$p[E|A] = \frac{p[A|E]p[E]}{p[A|E]p[E] + p[A|C]p[C]} \quad (2)$$

and

$$p[C|A] = \frac{p[A|C]p[C]}{p[A|E]p[E] + p[A|C]p[C]} \quad (3)$$

To apply Bayes' Theorem, an event is needed where both $p[A|E]$ and $p[A|C]$ can be estimated.

There are many gaps in the fossil record. In fact, the absence of transitional forms is characteristic of the fossil record as it is known now.⁴ Of course, interest here is not in conditional probabilities given a single gap, but in those probabilities based on the existence of a number of gaps.

Bernoulli Trials

For this reason, another concept from probability theory is needed. Let us assume the probability that an event B will occur is p and the probability that it will not occur is q. And it is assumed, of course, that one or the other will happen so $p + q = 1$. The event B might happen exactly r times out of n total trials. Such a total event (the occurrence of B exactly r times out of n total attempts) is called a Bernoulli Trial.⁵ The probability of such an event is

$$C(n,r)p^r q^{n-r} \quad (4)$$

where $C(n,r)$ is the binomial coefficient $n!/(r!(n-r)!)$.

Let G denote the existence of a particular gap and F denote the existence of transitional forms in what might have been a gap. If evolution is true, then many transitional forms between a given order and some presumed ancestral order should be expected. That is, $p[F|E]$ should be nearly 1 and $p[G|E]$ should be nearly 0.

However, if the creation model is valid then there should be significant gaps in the fossil record. In other words, $p[F|C]$ should be near 0 and $p[G|C]$ should be near 1. For the sake of argument, the values in Table 1 are assumed.

Table 1

| MODEL | $p[F model]$ | $p[G model]$ |
|-----------|--------------|--------------|
| CREATION | .001 | .999 |
| EVOLUTION | .999 | .001 |

Gish has fully documented 13 major gaps in the fossil record.⁶ (He alluded to many others as well.) Let A be the existence of these 13 major gaps in the fossil record. By letting $r = n = 13$ in Equation 4, and using Table 1, then

$$\begin{aligned} p[A|E] &= (.001)^{13} = 10^{-39} \\ p[A|C] &= (.999)^{13} = .9870777151 \end{aligned} \quad (5)$$

Let us now suppose that, before examining the evidence of these 13 gaps, evolution is assumed to be 99 per cent certain: i.e. $p[E] = .99$; $p[C] = .01$. Then, by Bayes' Theorem (Equation 2),

$$p[E|A] = 1.003 \cdot 10^{-37} \quad (6)$$

where A is the existence of these 13 gaps. Incidentally, $p[C|A] = 1 - p[E|A]$ would be represented by 36 nines after the decimal point before a digit other than nine would occur! In other words, the evolution model is essentially invalidated by the record.

G. G. Simpson⁷ has stated that nowhere is there any trace of a fossil that would close the gap between *Hyracotherium* (supposedly the first horse) and its supposed ancestral order Condylartha. He continued,

This is true of all the thirty-two orders of mammals. . . . The earliest and most primitive known members of every order already have the basic ordinal characters, and in no case is an approximately continuous sequence from one order to another known. In most cases the break is so sharp and the gap so large that the origin of the order is speculative and much disputed.⁸

Now, G. G. Simpson is a committed evolutionist (though one wonders how committed after admissions like the above). Let B be the existence of gaps between the 32 orders of mammals and the supposed ancestral orders. Then by having $r = n = 32$ in Equation 4, and using Table 1,

$$\begin{aligned} p[B|E] &= (.001)^{32} = 10^{-96} \\ p[B|C] &= (.999)^{32} = .9684910768. \end{aligned} \quad (7)$$

Let us again suppose that, before examining the evidence of the 32 gaps, Mr. Secular Scientist was 99 per cent certain of evolution. That is, Mr. Secular Scientist felt that $p[E] = .99$ and $p[C] = .01$. What should be Mr. Secular Scientist's reasoned conclusion after studying the fossil history of mammals? By Bayes' Theorem he must conclude

$$p[E|B] = 1.022 \cdot 10^{-94} \quad (8)$$

In other words, the probability of the validity of the evolution model given the gaps in the mammalian orders is about 1 in 10^{94} . Mr. Secular Scientist, if he is a totally rational man, must then abandon the theory of evolution. The only problem is, if he abandons evolution, the only alternative is special creation. To believe that would be to lose his title as Mr. Secular Scientist. After all, to be known as Mr. Sacred Scientist or even Dr. Sacred Scientist, in this "secular age" is an almost unbearable stigma (to some)!

Actually, the situation is much more dramatic than presented to this point. For evolution to have occurred there must have been transitional forms. Gaps are an almost impossible burden for the evolutionist. Transitional forms are, however, not nearly as serious for the creationist as gaps are for the evolutionist. A more accurate table might well be Table 2.

Table 2

| MODEL | $p[F model]$ | $p[G model]$ |
|-----------|--------------|--------------|
| CREATION | .01 | .99 |
| EVOLUTION | .999999 | .000001 |

In this case, $p[E] = .999$ would imply

$$p[E|A] = 1.138 \cdot 10^{-75} \quad (9)$$

and

$$p[E|B] = 1.378 \cdot 10^{-189} \quad (10)$$

where A and B are the events described earlier in this section.

While significant gaps remain in the presumed evolutionary history of all orders, let us suppose that 50 orders are examined and that significant gaps remain in 48 of them. This means that $r = 48$ and $n = 50$ in Equation 4. Then using D for this event and assuming Table 1, with $p[E] = .9$, then

$$p[E|D] = 9.424 \cdot 10^{-138} \quad (11)$$

And by assuming Table 1, and $p[E] = .999999$, then

$$p[E|D] = 1.047 \cdot 10^{-132} \quad (12)$$

This means that, even if Mr. Secular Scientist begins by assuming that evolution is 99.9999 per cent certain, then after an analysis of the event D, he must conclude that evolution has only a 1 in 10^{132} chance of being valid.

A summary of these and similar results is given in Table 3.

Table 3

| n | r | TABLE USED | p[E] | p[E event] |
|----|----|------------|---------|-------------------------|
| 13 | 13 | 1 | .99 | $1.003 \cdot 10^{-37}$ |
| 32 | 32 | 1 | .99 | $1.022 \cdot 10^{-94}$ |
| 50 | 48 | 1 | .9 | $9.424 \cdot 10^{-138}$ |
| 50 | 48 | 1 | .999999 | $1.047 \cdot 10^{-132}$ |
| 13 | 13 | 2 | .999 | $1.138 \cdot 10^{-75}$ |
| 32 | 32 | 2 | .999 | $1.378 \cdot 10^{-189}$ |
| 13 | 13 | 2 | .999999 | $1.140 \cdot 10^{-72}$ |
| 32 | 32 | 2 | .999999 | $1.379 \cdot 10^{-186}$ |
| 50 | 48 | 2 | .999999 | $1.620 \cdot 10^{-278}$ |

Therefore, even with the beginning assumption that evolution is a virtual certainty, a conditional probability analysis of the fossil record results in the conclusion that evolution is a demonstrable absurdity.

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¹The author holds to the conviction that, as biology becomes more and more quantified, the absurdities of "evolution" will become more and more apparent. See, for instance, Moorhead, Paul S., and Martin M. Kaplan, Editors. 1967. *Mathematical challenges to the neo-Darwinian interpretation of evolution*, Wister Institute, Philadelphia; and Rodabaugh, David J. 1975. The queen of science examines the king of fools, *Creation Research Society Quarterly*, 12 (1):14-18. Throughout this article, "evolution model" means the so-called general theory of evolution—that is, the "molecules-to-man" concept.

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PANORAMA OF SCIENCE

Cambrian and Other Early Pollen in the Literature

Some years ago in an article in the *Quarterly* the finding of fossil spores and pollen in Cambrian or pre-Cambrian rock in the Grand Canyon was described.¹ The plants which had produced the spores seemed to have been of kinds like those common today. Repeated checks showed no reason to suspect error or contamination. Yet scientists were skeptical of the report, including even some creationists who believe, on other grounds, that modern plants did indeed exist when the rocks were formed.

About the same time, although the report was noticed only later, other geologists made a similar find in Venezuela. Their work has since been summarized in the *Quarterly*.²

The geological literature is very extensive; and there is much more geological work completed than is reported in journals. It seemed worth while to do some hunting in the literature. Russell Brubaker, a student at Munich, has been very helpful in the search. And indeed there are reports of such modern-like spores in ancient rocks from India, Australia, Sweden, and Russia. The reports from India are the most extensive at the time of this report.

Jacob *et al.* found spores and other remains in the middle and upper Cambrian Neobolus shales of the Salt Range of Kashmir, and Cambrian of Spiti.³ As well as spores, etc., they found "... a few fragments of woody elements. ..." Work extended to the Suket shales, which contained well preserved specimens of *Fermoria*, and the Semri series of lower Vindhyan. Since they encountered "scepticism," they took "... all

possible precautions . . .", and the results were "... repeatedly checked."

Ghosh and Bose, in two articles, found "... woody elements . . .", and reported that of 30 slides "... each contained abundant carbonized wood elements and spores. ..." ^{4,5} In fact, they found quite a variety of "... microfossils, for example woods of conifers, cuticles of grasses, angiospermous wood elements, etc. ..." They concluded that it is "... fairly safe to suggest that the vascular land plants were in existence even as early as the lower Cambrian. ..."

Authors reporting on the work in Australia claimed only to extend the vascular plants back to the Silurian.⁶ The authors seemed to consider, however, that the fact that the index fossil monograptus was found along with the remains of the plants is very important. This article has some excellent illustrations.

The spores from Sweden were reported, oddly enough, in *Science*, an American journal.⁷ The things found were similar to those mentioned already.

Similar finds in Russia have been described in articles cited in the items mentioned here and published in *Nature*. But copies of the reports have not been obtained yet. Also, the articles in *Nature* contain a number of other references which are still unavailable.

It should be mentioned that, because of the findings in India, some doubted whether the strata involved were really so old. But Coates *et al.*, after careful investigation, reported that the strata are "... Cambrian or older. ..." ⁸

Jacob *et al.* summed the matter up well.