Letters

The Earthworm Theory

For partly personal reasons I would like to take mild exception to Morris M. Leighton's recent letter [*Science* **130**, 106 (1959)] expressing regret that the "revolutionary new concept of the ice age," as it was put in the newspapers, *was* put in the newspapers, partly because of a sort of unofficial wink from the editorial pages of *Science* [**128**, 1290 (1958)].

Not that I completely agree with the concept, which says that glacial till was dumped from icebergs floating on a vast periglacial lake, nor will I agree with the newspapers, since the "revolutionary new concept" dates back at least to Lyell (1835). On the other hand I'm sure everyone will agree that valuable service was rendered.

That is, by instilling precious doubt into the public mind, you automatically lend credence to another theory for the origin of the so-called glacial deposits, the Gigantovermiculous Coprolite theory, of which I happen to be the author.

My theory, which I now plan to entertain before the AAAS and have you preview on the editorial pages of *Science,* suggests that instead of having glaciers, which is a rather old scheme anyway, the Temperate Zones were periodically invaded by a slithering horde of earthworms. By a perfectly ordinary process of ingestion at one end and outgestion at the other, these animals ate solid rock and reduced it to a mixed, pulverized deposit merely by the work of their gizzards.

Major evidences for the earthworm theory are the widespread occurrence of the coprolite and the small scratches or striations common on surfaces of included pebbles. The latter are incorrectly attributed to grinding within the basal glacial ice; they are of course strain lines (*striae strainus*), indelibly etched as a natural consequence of the efforts of these little creatures to rid themselves of their gravelly excrement. Stones too large to swallow also show evidences of their gnawing appetites.

I shall now attempt to show that my theory is at least in the same realm of credibility as the iceberg theory, physicists notwithstanding. As I understand the theory, our Kansan and Illinoian deposits, plus some others, were left by icebergs floating on a vast glacial marginal lake occupying a crustal depression formed by the weight of the single glacier. We might remark that these deposits form the surficial coprolite (till, lyell) over the southern half of Iowa, the northern half of Missouri, and parts of Indiana and Ohio and a few other states. Then,

1) Where are the beaches? Such a big lake should surely have beaches. Look at Lake Agassiz.

2) Likewise where are the deltas? Likewise big lakes have them, likewise Lake Agassiz.

3) Why were the icebergs so generous, widespread, and uniform in their deposition, or were they immune to wind?

4) If the tops of individual deposited heaps were planed off by wave action, why no sorting or stratification of resulting fill?

5) Or if the clayey gumbotil layers are taken as stratification, how does one explain the lack of carbonates, the high quartz-feldspar ratio, the morphologic similarities to modern soil profiles?

6) Why should the unweathered coprolite (till, lyell) be so hard you can hardly dent it with a spade? According to competent soil engineers such as myself it shows preconsolidation, usually attributed to the weight of the ice. (Actually, of course, it is caused by the violent duodenal contractions of the earthworms.)

7) Where are the aqueous fossils, besides British Columbia?

In this last connection I must admit that the earthworms left no fossils either However, there is a logical explanation for this, and for the multiple deposition.

First we may reasonably conclude that continued eating and recycling of stones would inevitably reduce them in size, as indicated by the strain lines. If we assume that the earthworms selected larger stones and force-fed themselves with their tails, it is not unlikely that as stone diameters decreased, the earthworms inadvertently wrapped all the way around and literally met their ends and eliminated themselves.

Successive waves of earthworms might rediscover the land, but they would have to dig deep and find new stones. In this connection one may note that the European nomenclature for the Wisconsin stage is already divided into Würm I, Würm II, Würm III, and so on. What more can we ask, except that they learn how to spell?

There are other questions I could ask of the iceberg theory, but at the expense of paying attention to my own. I believe I shall now retire and await the arrival of the reporters and photographers. Profile shots only, please; I hate to look so much like Tyrone Power. Ah, science!

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