# SCIENCE

30 October 1959

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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## *Space Technology Laboratories, Inc.*

P.O. BOX 95004, LOS ANGELES 45, CALIFORNIA

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# SCIENCE

# 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?

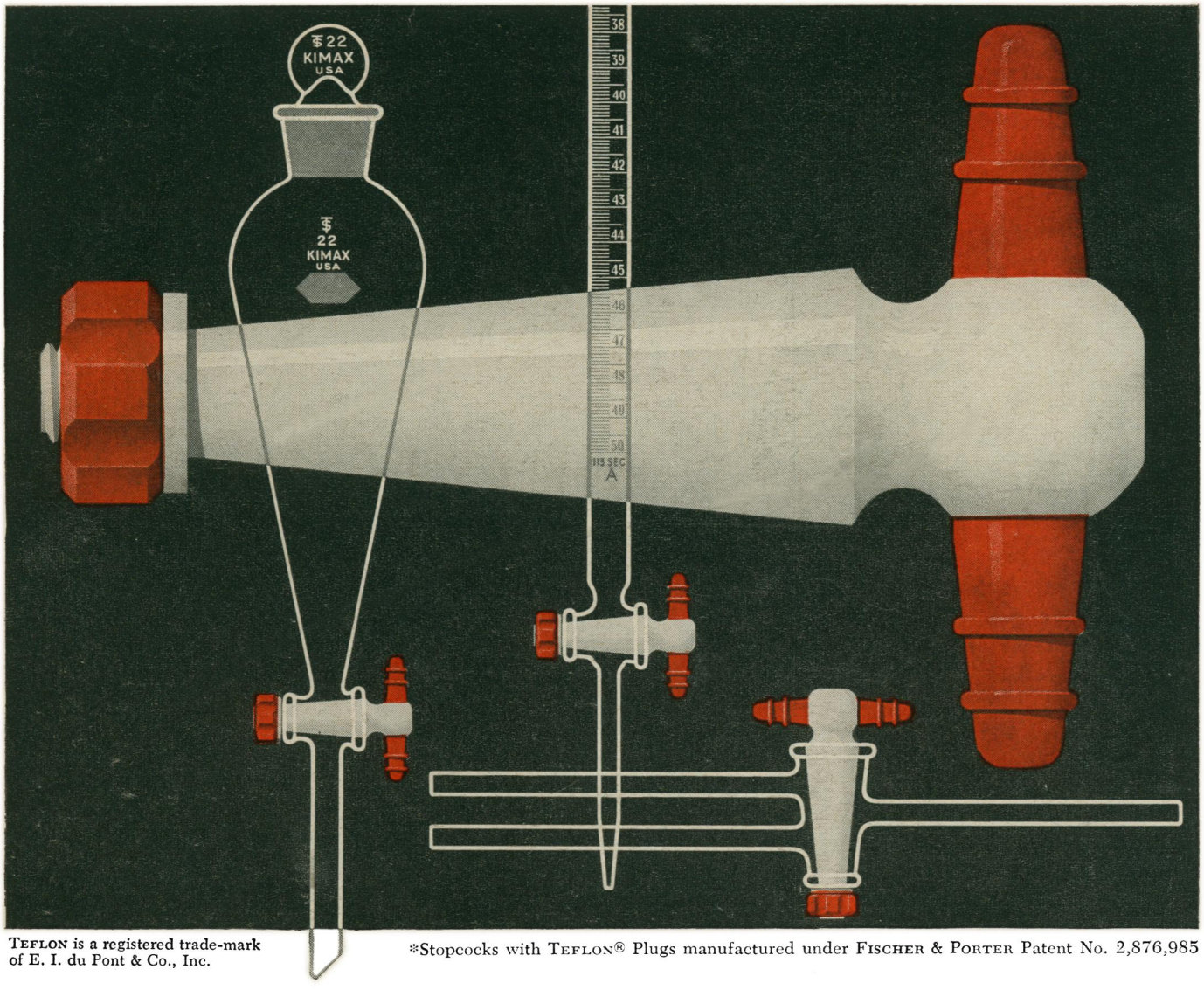
In this last connection I must admit that the earthworms left no fossils either However, there is a logical explanation for this, and for the multiple deposition.

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!

R. L. HANDY
*Iowa State University of Science and Technology, Ames*

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# APPLICATION FOR HOTEL RESERVATIONS

# 126th AAAS MEETING

## Chicago, 26-31 December 1959

The four hotels for the AAAS Chicago meeting have established special low rates and have reserved large blocks of rooms at each level within the price ranges quoted. Thus everyone making room reservations for the AAAS meeting is assured substantial savings. Further, all confirmations will state the room rate assigned.

The list of hotels and their rates and the reservation coupon below are for your convenience in making your hotel reservation in Chicago. Please send your application, *not* to any hotel directly, but to the AAAS Housing Bureau in Chicago and thereby avoid delay and confusion. The experienced Housing Bureau will make assignments promptly; a confirmation will be sent you in two weeks or less.

If desired, the hotels will add a cot at $3.00 per night—except that all children under 12 are free. Mail your application *now* to secure your first choice of desired accommodations. All requests for reservations must give a definite date and estimated hour of arrival, and also probable date of departure.

### AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

**No sessions in public rooms.* For a list of the headquarters of each participating society and section, see page 228, *Science*, 24 July.

**Rates for Rooms with Bath**

| Hotel | Single | Double Bed | Twin Bed | Suite |
|---|---|---|---|---|
| Morrison | $6.50— 9.00 | $9.00—13.00 | $11.00—15.00 | $30.00 and up |
| Hamilton | 6.50— 9.50 | 9.00—13.00 | 11.00—15.00 | 25.00 and up |
| La Salle | 7.50—10.00 | 10.50—13.00 | 12.50—15.50 | 35.50 and up |
| Sherman | 7.45—12.45 | 11.45—16.45 | 14.45—19.50 | 28.50 and up |
| *Bismark | 6.50—10.00 | 9.00—13.00 | 11.00—15.00 | |

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**Suite 900**
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Please reserve the following accommodations for the 126th Meeting of the AAAS in Chicago, 26-31 Dec., 1959:

TYPE OF ACCOMMODATION DESIRED

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Double-Bedded Room ..... Desired Rate ..... Maximum Rate ..... Number in party .....

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**(Attach list if this space is insufficient. The name and address of each person, including yourself, must be listed.)**

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(Individual requesting reservation) (Please print or type)

ADDRESS .....
(Street) (City and Zone) (State)

*Mail this now to the Housing Bureau.* Rooms will be assigned and confirmed in order of receipt of reservation.

*30–16.* Tropical Meteorology, symp., Nairobi, Kenya, East Africa. (Secretariat, World Meteorological Organization, Campagne Rigot, Avenue de la Paix, Geneva, Switzerland.)

*30–17.* Problems of Tropical Meteorology in Africa and the Neighboring Islands, symp., Nairobi, Kenya, Africa. (World Meteorological Organization, Campagne Rigot, 1, Avenue de la Paix, Geneva, Switzerland.)

**December**

*1–3.* Eastern Joint Computer Conf., Boston, Mass. (D. T. Ross, Dept. of Electrical Engineering, Massachusetts Inst. of Technology, Cambridge.)

*1–4.* American Medical Assoc. (clinical), Dallas, Tex. (R. M. McKeown, 510 Hall Bldg, Coos Bay, Oreg.)

*2–4.* Electrical Furnace Conf., Cleveland, Ohio. (E. O. Kirkendall, AIME, 29 W. 39 St., New York 18.)

*3–4.* Semiconductor Surfaces, 2nd conf., Silver Spring, Md. (R. F. Greene, U.S. Naval Ordnance Lab., White Oak, Silver Spring, Md.)

*3–4.* Vehicular Communications, St. Petersburg, Fla. (L. G. Cumming, IRE, 1 E. 79 St., New York 21.)

*3–5.* Corrosion, symp., Dresden, Germany. (Chemische Gesellschaft in der Deutschen Demokratischen Republik, Unter den Linden 68/70, Berlin W.8, Germany.)

*3–5.* Visual Communications, 3rd annual intern. conf., New York, N.Y. (E. Kaestner, Soc. of Reproductive Engineers, Bell Telephone Labs., New York, N.Y.)

*3–11.* Training and Education in Nutrition, European symp., Frankfurt am Main, Germany. (Food and Agricultural Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.)

*3–12.* International Confederation of Free Trade Unions, 7th world cong., Brussels, Belgium. (ICFTU, 24, rue du Lombard, Brussels.)

*4–6.* American Psychoanalytic Assoc., New York, N.Y. (D. Beres, 151 Central Park West, New York 23.)

*5–10.* American Acad. of Dermatology and Syphilology, Chicago, Ill. (R. R. Kierland, First National Bank Bldg., Rochester, Minn.)

*6.* American Acad. of Dental Medicine, mid-annual, New York, N.Y. (A. J. Cannistraci, 2152 Muliner Ave., New York 62.)

*6–10.* American Inst. of Chemical Engineers, annual, San Francisco, Calif. (F. J. Van Antwerpen, AICE, 25 W. 45 St., New York 36.)

*7–12.* Algology, UNESCO symp., New Delhi, India. (J. P. Correa, South Asia Cooperation Office, 21, Curzon Rd., New Delhi, India.)

*8–10.* Application of Electrical Insulation, 2nd natl. conf., Washington, D.C.) (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

*9–15.* American Acad. of Optometry, Chicago, Ill. (C. C. Koch, 1506–1508 Foshay Tower, Minneapolis 2, Minn.)

*11–12.* American Rheumatism Assoc., Detroit, Mich. (F. E. Demartini, Presbyterian Hospital, 622 W. 168 St., New York 32.)

*11–12.* Association for Research in

Nervous and Mental Disease, annual, New York, N.Y. (R. J. Masselink, 700 W. 168 St., New York 32.)

*25–27.* Indian Mathematical Soc., 25th conf., Allahabad, India. (B. N. Prasad, Allahabad Univ., Lakshmi Niwas, George Town, Allahabad 2.)

*26–30.* American Assoc. for the Advancement of Science, annual, Chicago, Ill. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., N.W, Washington 5.)

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The following 46 meetings are being held in conjunction with the AAAS annual meeting.

AAAS Committee on Science and the Promotion of Human Welfare (B. Commoner, School of Botany, Washington Univ., St. Louis 5, Mo.). 27 Dec.

AAAS Cooperative Committee on the Teaching of Science and Mathematics (Brother G. Nicholas, Dept. of Biology, Univ. of Notre Dame, Notre Dame, Ind.). 27 Dec.

Academy Conference (A. M. Winchester, Stetson Univ., De Land, Fla.). 27–28 Dec.

Alpha Epsilon Delta (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.). 29 Dec.

American Assoc. of Clinical Chemists (A. Dubin, Director of Biochemistry, Cook County Hospital, Chicago 12, Ill.). 26–27 Dec.

American Geophysical Union (W. C. Krumbein, Dept. of Geology, Northwestern Univ., Evanston, Ill.). 28 Dec.

American Meteorological Soc. (K. Spengler, 3 Joy St., Boston, Mass.).

American Nature Study Soc. (E. L. Will, State Univ. Teachers College, Oneonta, N.Y.). 26–30 Dec.

American Physiological Assoc. (F. A. Hitchcock, Ohio State Univ., Columbus). 28 Dec.

American Political Science Assoc. (J. Robinson, Dept. of Political Science, Northwestern Univ., Evanston, Ill.). 28 Dec.

American Psychiatric Assoc. (E. L. Bliss, General Hospital, Salt Lake City, Utah). 28–29 Dec.

American Soc. of Criminology (D. E. J. MacNamara, New York Inst. of Criminology, Inc., New York 36). 28–29 Dec.

American Soc. of Naturalists (A. D. Hasler, Dept. of Zoology, Univ. of Wisconsin, Madison). 27–28 Dec.

American Soc. of Plant Taxonomists (L. R. Heckard, Dept. of Botany, Univ. of Illinois, Urbana). 28–30 Dec.

American Sociological Soc. (J. S. Coleman, Dept. of Sociology, Univ. of Chicago, Chicago 37, Ill.). 28–29 Dec.

American Statistical Assoc. (R. F. Winch, Dept. of Sociology, Northwestern Univ., Evanston, Ill.). 29–30 Dec.

Association of American Geographers (A. Cutshall, Univ. of Illinois, Navy Pier, Chicago 11). 29 Dec.

Association for Computing Machinery (W. F. Cahill, Goddard Space Flight Center, Silver Spring, Md.). 29 Dec.

Astronomical League (E. Halbach, 2971 S. 52 St., Milwaukee 19, Wisc.). 26 Dec.

Beta Beta Beta (Mrs. F. G. Brooks, P.O. Box 515, Ansonia Station, New York 23). 27–28 Dec.

Chicago Acad. of Sciences (R. A. Edgren, Chicago Acad. of Sciences, 2001 N. Clark St., Chicago 14, Ill.). 29–30 Dec.

Conference on Scientific Communications (G. L. Seielstad, Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.). 28–29 Dec.

Conference on Scientific Manpower (T. J. Mills, National Science Foundation, Washington 25). 28 Dec.

Ecological Soc. of America (W. C. Ashby, Dept. of Botany, Univ. of Chicago, Chicago 37, Ill.). 28–30 Dec.

Honor Soc. of Phi Kappa Phi (L. R. Guild, 634 S. Western Ave., Los Angeles 5, Calif.). 30–31 Dec.

Illinois Geographical Soc. (Miss M. Grant, Morton Junior College, Cicero, Ill.). 28 Dec.

Institute of Management Sciences (M. M. Flood, College of Engineering, Univ. of Michigan, Ann Arbor). 29 Dec.

Metric Assoc. (J. T. Johnson, Ravenswood YMCA, 1725 Wilson Ave., Chicago 40, Ill.).

Mycological Soc. of America (D. P. Rogers, Dept. of Botany, Univ. of Illinois, Urbana).

National Assoc. of Biology Teachers (H. E. Weaver, 202 Men's Old Gym, Univ. of Illinois, Urbana). 26–30 Dec.

National Acad. of Economics and Political Science (J. Rothrock, Pan American Union, Washington 6). 29 Dec.

National Assoc. for Research in Science Teaching (J. C. Mayfield, Univ. of Chicago, Chicago 37, Ill.). 26–30 Dec.

National Assoc. of Science Writers (P. Fraley, Evening Bulletin, Philadelphia, Pa.). 27 Dec.

National Geographic Soc. (W. R. Gray, NGS, 16 and M Sts., NW, Washington 6). 30 Dec.

National Science Teachers Assoc. (R. H. Carleton, NSTA, 1201 16 St., NW, Washington, D.C.). 26–30 Dec.

National Soc. for Medical Research (R. A. Rohweder, NSMR, 920 S. Michigan Blvd., Chicago 5, Ill.). 29 Dec.

National Speleological Soc. (T. C. Barr, Jr., Tennessee Polytechnic Inst., Cookeville, Tenn.). 28 Dec.

Philosophy of Science Assoc. (W. A. R. Ley, Roosevelt College, Chicago, Ill.). 28 Dec.

Scientific Research Soc. of America (D. B. Prentice, 56 Hillhouse Ave., New Haven 11, Conn.). 29 Dec.

Sigma Delta Epsilon (Miss E. S. Anderson, Stratford Hotel, 25 E St., NW, Washington, D.C.). 26–30 Dec.

Society for General Systems Research (R. L. Meier, Mental Health Research Institute, Univ. of Michigan, Ann Arbor).

Society for the History of Technology (M. Kronzberg, Dept. of History, Case Inst. of Technology, Cleveland, Ohio).

Society of the Sigma Xi (T. T. Holme, 56 Hillhouse Ave., New Haven 11, Conn.). 29 Dec.

Society of Systematic Zoology (R. E. Blackwelder, Southern Illinois Univ., Carbondale). 26–30 Dec.

Tau Beta Pi Assoc. (R. H. Nagel, Univ. of Tennessee, Knoxville). 27 Dec.

United Chapters of Phi Beta Kappa (C. Billman, 1811 Q St., NW, Washington, D.C.). 29 Dec.

*(See issue of 16 October for comprehensive list)*