Echinococcus multilocularis in a Beef Cow from the Middle West

The report by Leiby and Olsen [*Science* **145**, 1066 (1964)] of finding the adult tapeworm *Echinococcus multilocularis* in red foxes in Ward County, North Dakota, stimulates me to record an observation made in May 1958. I received from the federal inspector at Mason City, Iowa, a shipment of beef livers from cattle slaughtered in that city and infected with *Echinococcus*. Among them was one with a typical alveolar cyst, which contained viable scolices of *E. multilocularis* (Fig. 1).

It is quite likely that other cysts and adult worms of this species have been encountered in this country but not recognized; it is again suggested that old material be re-examined for such occurrences. It is quite likely that *E. multilocularis* is not uncommon in wild and domestic animals in central northern United States and may also occur throughout the Mississippi Valley. With Thompson, I infected locally caught *Microtus cinnamomeus* with *E. multilocularis* from the fox; one of the necessary intermediate hosts is therefore present. Other species of voles, shrews, and field mice can act as intermediate hosts as well as can rats and house mice. Sylvatic hydatid infections with *E. granulosus* and *E. multilocularis* occur in other states besides Alaska and also in many parts of Canada.

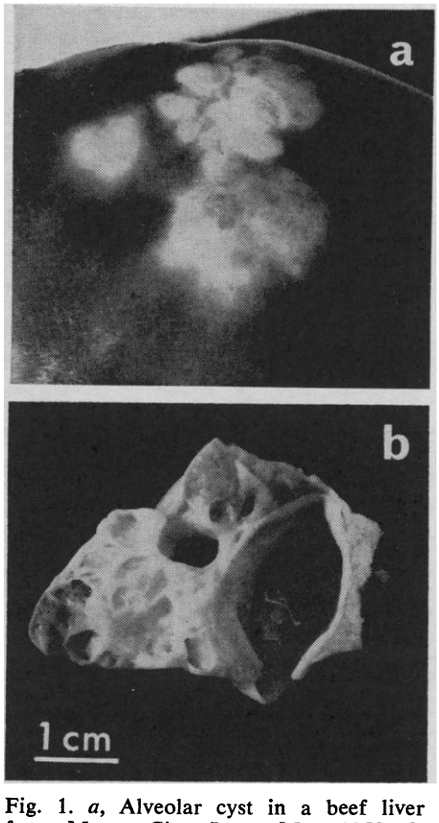

Fig. 1. *a*, Alveolar cyst in a beef liver from Mason City, Iowa, May 1958; *b*, cross section of a part of the cyst.

THOMAS B. MAGATH
Mayo Clinic, Rochester, Minnesota

21 October 1964

Pollen from Alaska and the Origin of Ice Ages

From a study of pollen evidence from the Seward Peninsula and the arctic coastal plain of Alaska, Colinvaux (*1*) recently concluded that the Arctic Ocean must have been frozen over as long ago as 14,000 and probably as long ago as 18,000 years. Because our ice age theory (*2*) postulated that the Arctic Ocean was open from the beginning of the Wisconsin stage to 11,000 years ago, when it froze, Colinvaux concluded that his evidence contradicted this theory.

However, in our modified theory (*3*) we recognize that continental glaciation culminated about 18,000 rather than 11,000 years ago. Further, on the basis of new and more complete data on the thermal history of the oceans (North Atlantic in particular) we conclude that the Arctic Ocean would have frozen over much earlier than the culmination date of a glacial stage and well before 18,000 years ago.

According to our modified model, the open Arctic Ocean is necessary as a source for the snow that initiates glaciation. After growth of the ice sheet to some critical size, the larger source of precipitation available from the south in North America would have been responsible for the spreading of the ice sheet to about the 40th parallel. Initiation of the ice sheet from the north and the importance of a large source of moisture from the south is illustrated by the Pleistocene history of Siberia where glaciation was restricted to the Arctic marginal area of the continent. The desert of central Asia and the mountain barriers to the west and south effectively throttled the flow of moist air from lower latitudes and restricted the growth of glaciers.

We note in our modified model that the decreasing interchange of Arctic with Atlantic waters because of lowering of sea level plus the global cooling resulting from the primary and secondary effects of widespread glaciation would prevent the Arctic from maintaining an ice-free surface throughout a glacial stage. We also note that once formed, the Arctic ice would quickly freeze to a much greater thickness than it has at present, because of the lowered temperatures of inflow from the Atlantic. Although it is not possible for us to give a precise timing to the sequence of events, the Arctic must have remained open long enough to establish an ice sheet large enough to draw upon moisture from the south. At present, rather than negate our theory, the data and conclusions of Colinvaux actually support it in its modified form.

There is some further question regarding the correlations of Colinvaux's pollen data. His use of pollen as an index fossil on the basis of similar climatic affinities seems questionable. Unless it is known that the climatic histories of the Alaskan coastal plain and the Seward Peninsula were very similar, there is some risk in correlating zones *J* and *K* of the coastal plain with zone *H* of Imuruk Lake on the Seward Peninsula.

We would prefer not to specify the glacial temperature levels for the Alaskan coastal plain. Colinvaux noted that a reasonable amount of time—at least 4000 years—must be allowed for a climatic change to affect vegetation. By the time the effect of an open Arctic might have become manifest, the edge of the coastal plain would have migrated a considerable distance seaward as sea level declined over the shallow Alaskan shelf. Any evidence of direct effects of an open ocean are probably submerged.

WILLIAM L. DONN
Lamont Geological Observatory and *City College of New York*
MAURICE EWING
Lamont Geological Observatory, Palisades, New York

References and Notes

1. P. Colinvaux, *Science* **145**, 707 (1964).
2. M. Ewing and W. L. Donn, *ibid.* **123**, 1061 (1956).
3. "A Theory of Ice Ages III," by W. L. Donn and M. Ewing, has been presented in lectures and seminars and distributed rather widely for prepublication criticism.
4. The U.S. Steel Foundation supported the research related to this report, which is Lamont Geological Observatory (Columbia University) Contribution No. 768.

14 September 1964.