earth sciences

Early dinosaur evolution

The two orders of dinosaur, Saurischia and Ornithischia, both made their appearance during the Triassic Period (180 million to 230 million years ago). The evolution of the Saurischia has been fairly well delineated. But because of a shortage of fossil evidence, the early history of ornithischian dinosaurs has been obscure.

In the last few years, however, knowledge of early ornithischians has increased considerably, with fossil finds in southern Africa, China, Argentina, Nova Scotia and possibly Europe. Richard A. Thulborn of the University of Birmingham, England, says this new wealth of information shows, among other things, that ornithischian dinosaurs were widely distributed by the late Triassic and so must have originated early in that period.

The ornithischians probably evolved from a single stock within an earlier reptile suborder, the pseudosuchians, Thulborn proproses in the Nov. 12 NATURE. The earliest ornithischians appear to have belonged to the family Hypsilophodontidae, and include *Fabrosaurus,* a bipedal herbivore about a yard long.

Thulborn then suggests a course of evolution for the ornithischians, showing how such forms as the horned *Triceratops* could have descended from hypsilophodonts.

Underwater mounds in the Beaufort Sea

In 1969 an icebreaker accompanying the S. S. Manhattan in its attempt to find a northwest passage to Alaskan oil fields encountered an abrupt shoal or mound in the Beaufort Sea north of Canada. Since then, data collected by a Canadian survey ship have revealed a total of 78 such underwater mounds in a 5,000-square-kilometer area. The mounds average about 400 meters in diameter and 30 meters high, report J. M. Shearer of the Geological Survey of Canada and three researchers from Nova Scotia's Bedford Institute. Discovery of similar features on other parts of the continental shelf indicate that they may represent a hazard to navigation.

The researchers suggest in the Nov. 19 SCIENCE that the mounds are pingos—hills with a central core of ice. They could have formed when rising sea levels after the last glacial maximum flooded lakes that had developed on exposed land and froze interstitial water trapped in the lake sediments. Freezing of this pore water would have produced pressures that uplifted the mounds.

Seismic discrimination

One of the hottest debates in seismology is over the ability to use seismic waves to discriminate between earthquakes and explosions (SN: 11/6/71, p. 307). Attempts to make the distinction are usually based on a comparison of long-period surface waves with short-period waves that travel through the body of the earth.

Lynn Sykes, J. Savino, R. C. Liebermann and Peter Molnar of the Lamont-Doherty Geological Observatory have found that discrimination is enhanced when Rayleigh surface waves with periods near 40 seconds or longer are used.

One of the hindrances to seismic detection is that surface waves of low magnitude may become lost in the background "noise" of the earth. There is a very stable minimum, or window, in this noise at periods between 30 and 40 seconds, the researchers point out in the Nov. 10 JOURNAL of GEOPHYSICAL RESEARCH.

environment

Ecology and foreign aid

In foreign aid programs, "the road to hell is paved with good intentions and bad ecology," says a University of California parasitologist writing in the Canadian journal SCIENCE FORUM.

Donald Heyneman of UC in San Francisco describes a number of aid programs that ultimately did more harm than good. In Malaya, for instance, house spraying with DDT eliminated a malaria vector mosquito; but then a new strain of *Anopheles* mosquito, a better transmitter of malaria, moved in from the jungles and afflicted people outside their homes. Mosquitoes then moved back into the jungle where they could not be controlled. There were new outbreaks of malaria.

But the most damaging foreign aid programs have been those that have built huge dams on the Volta, Zambesi and Nile Rivers. "In each project we have destroyed communities of man and animal alike; we have created social disruption; we have spread disease, and often unwittingly sacrificed the basic objectives for which the dam was built."

Thermodynamic thrift

A University of Chicago chemistry professor says greater savings in energy and resources might be realized through making cars last longer than through recycling junked cars.

R. Stephen Berry reported on a study he made of energy flows and levels of consumption in industrial processes; although he concedes that energy use is not the sole criterion of industrial efficiency, it is a key indicator. And "thermodynamic thrift," he says, is an important approach to solving many environmental problems.

Berry says his analyses indicate that extending the lives of automobiles and thus doing away with planned obsolescence could result in energy savings of 50 to 60 percent; recycling junked cars would yield a maximum energy savings of 20 percent.

Berry emphasizes that he is not arguing against recycling of junked autos; a total approach to reducing the consumption of energy by the automobile business would require a combination of all three approaches, he says.

Waste glass converted to foam

A serious aspect of the solid-waste problem is what to do with increasing amounts of glass from throwaway bottles. Glass is not biodegradable and it cannot be burned in incinerators, and, along with cans, it represents one of the most intractable parts of the solid-waste glut.

University of Utah students, working under a National Science Foundation grant, have found a way to convert waste glass into a competitively priced foam-like material which could be used as insulation and for other uses, says Harvey P. Cahoon, a graduate student in ceramics and director of the project.

In the process glass is crushed, then mixed with bentonite, calcium carbonate and water to make the foamed material that can be pressed into any desired mold. The finished material resembles styrofoam, except that it is rigid. It is easily workable, fireproof and resistant to water or acid damage. The estimated cost of large-scale production is 15 cents a board foot.