EARTH SCIENCES

Oldest North American metazoan fossils

Wormlike impressions on 620-million-year-old rock surfaces from North Carolina may represent the most ancient yet known metazoan animals in the United States, if not North America. Metazoa, as opposed to protozoa, are all animals having bodies composed of cells differentiated into tissues and organs, usually also with a digestive tract.

A dozen or more of the curving, wormlike impressions were found by geologists James Wright of the University of California at Santa Barbara and Lynn Glover III of Virginia Polytechnic Institute on a slab of 2 × 3 meter metasedimentary rock about 16 kilometers north and slightly west of Durham, N.C. They occur as interconnected J- and U-shaped impressions, some forming coils of loops. The markings are large—0.5 to 2 centimeters wide and up to 1.1 meters long.

In the July-August AMERICAN SCIENTIST, Wright, Glover and Preston Cloud of UCSB and the U.S. Geological Survey describe their detailed analyses of the impressions. They conclude that the traces were formed by large, soft-bodied wormlike marine animals that fed mostly on detritis. They also conclude that the animals represent a new genus and species. They call it *Vermiforma antiqua* Cloud.

The rocks containing the impressions were determined by zircon lead-uranium isotope dating to be 620 ±20 million years old. This makes them somewhat younger than metazoan fossils found in England and Russia but about the same age or older than ones in Newfoundland, the oldest previously known in North America.

Anomalies preceding Hollister quake

A 5.2-magnitude earthquake on Thanksgiving Day, 1974, near the highly instrumented area of Hollister, Calif., was preceded by the following effects, reported in the July 10 JOURNAL OF GEOPHYSICAL RESEARCH: A systematic increase in magnetic field of 0.9 gammas at the site in the early part of 1974. A more dramatic increase of 1.5 gammas about 7 weeks before the quake, lasting about 2 weeks. A return of the magnetic field to its initial value about 4 weeks prior to the quake. Tilt perturbations coinciding with the magnetic field anomaly were evident about 36 days prior to the quake.

The earthquake was the largest in the region since 1972. It produced the largest prequake tilt and magnetic anomalies since the present arrays of instruments began operation in 1973.

The magnetic data cannot be explained by ionospheric disturbances or so-called telluric currents, according to B.E. Smith and M.J.S. Johnston of the U.S. Geological Survey. They say the most probable source is a piezomagnetic effect, which implies that the magnetic field changes represent changes in stress in the rocks. More such data could help establish the usefulness of magnetic observations for predicting quakes.

Accuracy of carbon 14 dating

How reliable is carbon 14 dating? The question is of vast importance to earth scientists, historians and archaeologists. In the July 20 JOURNAL OF GEOPHYSICAL RESEARCH, William F. Cain and Hans E. Suess of the University of California at San Diego report results of a new analysis. They find that tree rings reflect radiocarbon content of the atmosphere accurately within several parts per thousand, but in rare cases deviations of up to 10 parts per thousand are possible. This means that a typical single radiocarbon date for wood or charcoal possesses an intrinsic uncertainty on the order of ±50 years. This intrinsic uncertainty is independent of the absolute age of the sample. The uncertainty is in addition to any other errors.

NATURAL SCIENCES

The invincible beetle meets the Namib

One standard ecodisaster scenario ends with black beetles becoming the dominant life form after nuclear Armaggedon. This is probably not too far-fetched, judging by the hostile environments to which beetles have nicely adapted. One such environment is the Namib Desert along the southwestern coast of Africa. Two recent papers, both by the same team of ecologists, report the adaptation of desert beetles to the Namib.

"Namib" is a fitting name for this cold, practically rainless strip of desert, 100 miles wide and 1,200 miles long: It means, in the Nama language, "land where there is nothing." Single sand dunes there can stretch for 20 miles and swell to 800 feet high, and the only available water is contained in the heavy fogs that form over cold ocean currents and descend in the middle of the night.

These dunes support a unique and surprisingly large set of desert animals, each with its own adaptation to the stark environs. Two ecologists—William J. Hamilton III of the University of California at Davis and Mary K. Seely of the Desert Ecological Research Unit in South West Africa, now report the water-gathering techniques of four tenebrionid (Darkling) beetle species found in the Namib desert.

They describe, in the August 6 SCIENCE, three beetles that dig trenches perpendicular to foggy winds (upper picture). They emerge from hiding places beneath the sand during the early part of fogs, and dig trenches with two parallel ridges that trap fog moisture. They walk along the trenches during the late stages of the fog, extracting water and flattening the ridges. By catching and weighing beetles before and after fogs, the team determined that the average water content of a beetle population increased by 13.9 percent.

A separate species, the team reports in the July 22 NATURE, assumes a strange ritual stance to collect its water. These beetles normally feed on blowing plant detritis during the day and bury themselves at night. But during the fogs, they dig out, face into the wind with head lowered, and wait for droplets to gather on their legs and bodies. The water trickles into their mouths as it collects, and the insects can gain an average of 12 percent body weight during a fog.

The team has seen fog gathering among spiders and other insects, too, and suggests that the vegetationless sand and cold foggy winds favored the evolution of such traits.

Plant hairs for crop defense

Agricultural researchers have studied many natural plant "pesticides" in their search for ecologically safe pest control agents. But, say two Cornell University researchers, little attention has been given to physical rather than biochemical defense barriers. Entomologists Ward M. Tingey and Eric A. Pillemer now report one—trichomes—in the Aug. 6 SCIENCE.

Trichomes are microscopic, hooked plant hairs. Tingey and Pillemer looked closely at some leafhoppers clinging steadfastly to garden bean *(Phaseolus vulgaris)* leaves, and found that they were impaled there by trichomes. Closer study revealed that the more hairs and the greater the angle from the leaf, the more insect capture and captive mortality took place. Breeding trichomes into bean and other crops might increase their resistance without adding chemical pesticides, the team says.