EARTH SCIENCES

Ancient animal microfossils

Scientists report in the Feb. 18 SCIENCE the discovery of a group of microfossils from Precambrian rocks in the Grand Canyon of Arizona that they say may begin to bridge an important gap in the known record of early evolution. The fossils are of a distinctive group of one-celled planktonic animals called chitinozoans. They were found in abundance in carbonaceous shales of the late Precambrian Chuar group and have an age of about 750 ± 100 million years.

"To the best of our knowledge," say the investigators, Bonnie Bloeser and J. William Schopf of the University of California at Los Angeles, Robert J. Horodyski of the University of Notre Dame and William J. Breed of the Museum of Northern Arizona, "these are the oldest chitinozoans yet discovered." They also appear to be among the oldest animal fossils now known.

One of the classic unsolved problems of paleobiology is the origin of the metazoa, the multicellular animals making up the majority of the animal kingdom and having cells organized in layers or groups as specialized tissues or organs. These animals first appeared around 650 million years ago, yet there has been a gap in the known fossil record between the microscopic unicellular autotrophs (organisms that must synthesize organic nutrients) of the earlier Precambrian and the much larger, multicellular hetereotrophs (organisms that injest and break down organic matter) of the latest Precambrian. In their degree of cellular organization, the Chuar chitinozoans may begin to bridge that gap, say the researchers.

Revising the Richter scale

Hiroo Kanamori of the California Institute of Technology has been exposing some faults in the Richter scale measurement of earthquake magnitudes to arrive at more precise indicators of earthquake energy. Last year, he found that the Richter scale didn't rate many significant movements of the Pacific crustal plate, and he proposed "silent earthquakes" to account for the discrepancy in the slippage and the plate's movements (SN: 4/3/76, p. 213).

Now Kanamori has suggested a revision in the Richter scale that would more accurately measure earthquakes of very high energy. Speaking before a conference in Pasadena on the Nature of Great Earthquakes, Kanamori said that the present scale did not measure very long shock waves (with long periods), the kind associated with quakes of unusually large magnitude. According to Kanamori, these strong quakes occurring along extensive fault lines release their energy in much longer wavelengths which only recently have been detectable by seismic instruments. The present scale, then, underestimates higher energy quakes by a factor of 60. Thus, the 1964 Alaska earthquake, originally given a rating of 6.4, would be revised upwards to 9.2, and the 1960 Chilean quake would be revised from 8.3 to 9.5. Earthquake ratings of smaller magnitude, however, would not be affected by the revised rating since those quakes do not characteristically release long waves.

Brrr. Yes, it's a record cold U.S. winter

All those who have been shivering through it probably won't be surprised: According to results of a preliminary study under way at NOAA's National Climatic Center in Asheville, N.C., last month was the coldest January since at least the year 1800 in most of the plains states and the East. Furthermore, says NOAA, "If February temperatures are below average as expected and March is near normal or colder, this winter may well wind up being the coldest since the founding of the Republic."

ZOOLOGY

Coral snake mimics

Three major forms of mimicry have been observed, or at least are thought to exist, in nature—Batesian mimicry, in which a defenseless organism bears a close resemblance to a noxious one; Mullerian mimicry, in which noxious species tend to resemble each other, and Mertensian mimicry, in which a mimic is more strongly protected than its model. Which of these forms of mimicry is involved in the case of nonvenemous and moderately venemous snakes resembling the red, yellow and black ringed pattern of the deadly coral snake?

Susan M. Smith of the Universidad Nacional in Heredia, Costa Rica, attempted to find out by studying the behavior of great kiskadees, birds that live off snakes. She raised six of these birds in the lab, and as soon as they were able to catch their own prey, placed dummy snake models in their presence. The colors and color patterns of the models varied and included those of a coral snake and of a snake with a similar color pattern. The birds pecked at all the models except for those of the coral snake and its mimic, and their aversion was greater against the coral snake model than against the model of the mimic.

Smith concludes in the Feb. 10 NATURE that the birds' avoidance of the coral snake is thus innate rather than learned and that this innate knowledge then leads them to generalize to avoid similar patterns. Since pattern generalization by predators has been shown essential for the functioning and evolution of both Batesian and Mullerian mimicry, either kind, or perhaps both, are involved in coral snake mimicry. Mertensian mimicry appears to be ruled out.

Butterfly mimics

Numerous studies have shown that Batesian mimicry—the close resemblance of a defenseless organism to a noxious one—exists among butterflies, and that such mimicry offers the mimicking butterflies protection from predators in the laboratory setting. The survival advantages of mimicry have now been shown in the wild as well, according to a report in the Feb. 18 SCIENCE.

J. G. Sternburg and his colleagues at the University of Illinois painted some moths yellow and black to resemble the edible tiger swallowtail butterfly and other moths black to resemble a toxic species of swallowtail butterfly. They released the moths in the field and then attempted to recapture them. Daily trappings showed that the black moths survived longer than the yellow and black ones, and that the yellow and black moths were attacked more often, more vigorously and more persistently than the black moths and that most of the attacks came from various types of birds.

The results show greater predation pressures on the yellow-black painted moths than on the black moths, hence underscoring the survival advantages of Batesian mimicry among butterflies in nature.

How grass turns animals on

A connection between field grass and animal fertility has long been suspected. For instance, people have observed twinning in deer in response to good pasture and that mares will not hold a foal until the grass is green. So Norman C. Negus of the University of Utah started looking for a chemical in grass that stimulates mouse reproduction.

In trying to isolate such a chemical, however, Negus and his co-workers came up with something even better—chemicals that inhibit mouse reproduction. They are now trying to see whether such inhibitors, natural cinnamic acids and derivative compounds called vinylphenols, work as rat contraceptives.