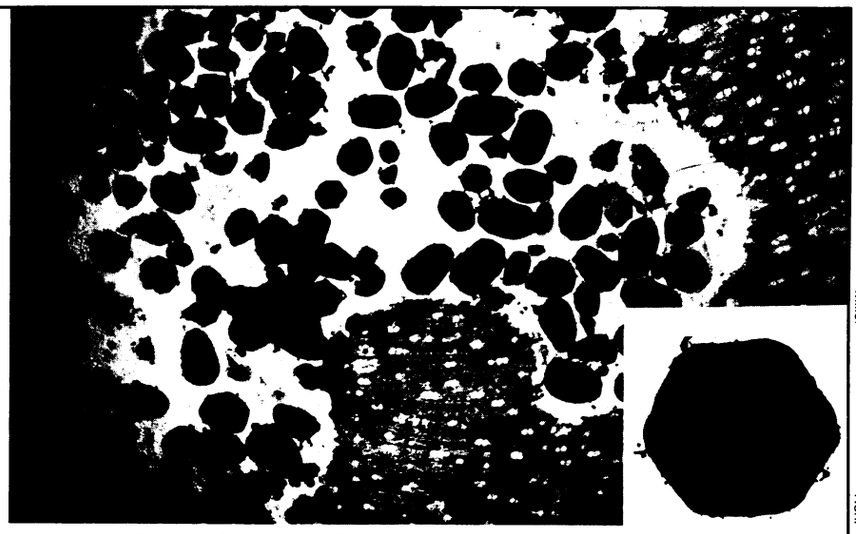
Oldest nest of household pest



The termites that devour the wood in your home have had millions of years of evolution to sharpen their excavating skills. In the January GEOLOGY, scientists report the oldest known evidence of termites' feasting on wood: a termite nest preserved in petrified wood, dating from the Late Cretaceous epoch (65 million to 97 million years ago). While it's not as old as the earliest known termite fossil, the nest, part of which is shown at right magnified 10 times, is "one of the earliest lines of evidence indicating the social behavior of termites," says paleontologist David M. Rohr. The recent paper was written by Rohr, John Miller and Maxine Abbott (now deceased) at Sul Ross State University in Alpine, Texas, and A. J. Boucot at Oregon State University in Corvallis.

The petrified wood containing the nest was originally discovered by Abbott last decade in Big Bend National Park in southwest Texas. According to Rohr, Abbott had noticed the small grainlike structures appearing in the wood and labeled them insect eggs. But upon closer inspection Rohr, Miller and Boucot found that most of the structures were hexagonal in shape (the photomicrograph inset at bottom right has a magnification of 47). From this distinctive shape they concluded that the structures were trace fossils of fecal pellets that had been produced by termites – probably the forerunners of modern termites that also create hexagonal fecal pellets. Termites are the only known insects with the anatomy necessary to produce hexagonal fecal pellets, says Rohr.

Another clue that termites had done the excavation is that the nest was made in the center of the wood and the fecal pellets were distributed around the edges of the nest in the same way that modern termites use fecal pellets to plug up the edges of their excavation in order to prevent air currents from moving through the cavity. –S. Weisburd

Nova Scotia fossils illuminate 200-million-year-old changes

A fossil find on the shores and cliffs of northwestern Nova Scotia has yielded the biggest North American collection of animal remains from 200 million years ago – a pivotal time in evolution when many reptile groups disappeared and the direct ancestors of modern animals emerged.

"These fossils are the only well-dated land assemblage from this time period in the world," says geologist Paul E. Olsen of Columbia University's Lamont-Doherty Geological Observatory in Palisades, N.Y., who directed fieldwork last summer with biologist Neil H. Shubin of Harvard University. Olsen and Shubin described the find last week in Washington, D.C., at the National Geographic Society, which funded the project.

More than 100,000 pieces of fossilized skulls, teeth, jaws and bones from dinosaurs, ancestral crocodiles, lizards, sharks and primitive fish were found. A series of dinosaur footprints, each about the size of a penny – the smallest known anywhere – have also been identified.

The scientists say the most significant discoveries among the 3 tons of rock trucked from the Canadian site to Columbia and Harvard are 12 skulls and jaws of mammal-like reptiles known as Tritheledonts. Remains of these foot-long creatures represent the largest single collection in the world and the first found in North America.

Penny-sized dinosaur footprint at Nova Scotia fossil site.

The Tritheledont fossils may provide answers to two thorny evolutionary questions, says Shubin. First, where do mammals come from – did they arise from Tritheledonts or a common earlier ancestor? Furthermore, where can the line be drawn between mammals and reptiles? Tritheledont teeth, for example, show some mammalian characteristics but lack others.

The more than 50 crocodile skulls and jaws uncovered in Nova Scotia, adds Shubin, will reveal much about the groups that gave rise to modern crocodiles. "At that time," he notes, "crocodile families were diversifying."

Only a small portion of recovered rock has been examined with microscopes, add the scientists. Subjecting more rocks to microscopic examination should turn up more fossils.

Olsen says creatures at the site were survivors of a period of mass extinctions that occurred less than 500,000 years earlier. An asteroid may have triggered the extinctions, he points out; a crater created by an asteroid is located 500 miles northwest of the fossil area and has been dated to around that time. About 43 percent of reptile families, explains Olsen, did not make it across the boundary of the Triassic and Jurassic periods. The Triassic period began about 240 million years ago, and the Jurassic period began 210 million years ago. Reptiles dominated the Triassic period; dinosaurs proliferated during the Jurassic period.

"The [Nova Scotia] site will be a sort of Rosetta Stone for understanding extinctions of the Triassic-Jurassic boundary," says Olsen. If, for example, an asteroid hit at about that time, there should be evidence of a fireball that would have spread over the area and caused rocks and debris to rain on the site.

Finding the cache of bones in a rock formation known as the Newark Supergroup, add the scientists, opens up new fossil-hunting possibilities. These sedimentary rocks, between 225 million and 175 million years old, run intermittently from Massachusetts to South Carolina. Long considered a meager source of fossils, the rocks filled in rift valleys created when the North American and African continental plates started to pull apart.

– B. Bower