SMALL CLUES SOLVE 'CASE OF THE INCONSPICUOUS GIANT'

By EUGENE S. RICHARDSON, Jr.
CURATOR OF FOSSIL INVERTEBRATES

THE INVERTEBRATES are, on the whole, rather inconspicuous animals, probably because they live on the wrong side of the tracks and don't have backbones like all the respectable vertebrates that we commonly associate with. If you ask a friend to mention a lot of animal names, he'll undoubtedly run through cows, tigers, wombats, elephants, mice, and such familiar creatures before he'll shift gears and even think of mentioning the mosquitoes, clams, amoebas, earthworms, or shrimps that actually far outnumber them.

Thus it is likely to come as a surprise to find that in some times and places the

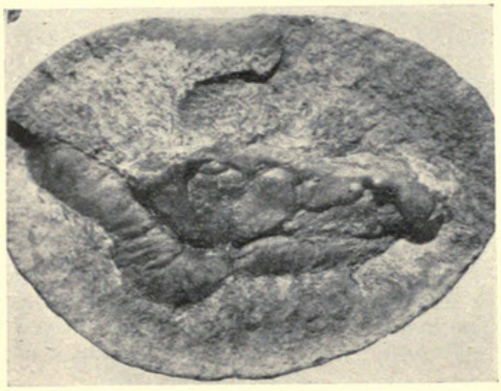

Figure 1. An unknown organ—is it plant or animal? Museum fossil-hunters found two of these one day and started on the trail of an inconspicuous giant.

invertebrates have included in their ranks animals larger than the contemporary vertebrates. Of course, this was the case in the early part of the Paleozoic era before there were any vertebrates at all. But the invertebrates won that round by default and we won't even mention it. Also, there are tales and shreds of evidence of the mysterious *Kraken* of today's oceans, a squid that may be larger than a whale. But we won't mention that either because we aren't very sure of it.

But another giant invertebrate has recently turned up in our own back yard, among the familiar fossil ferns and crab-like animals of the strip mines near Chicago. These strip mines, in Will and Grundy counties, are only about fifty miles from the heart of the city and have for years attracted not only Museum staff members but also hundreds of other collectors from near and far. The fossils lie in the heaps of clay, or spoil, removed from the mines when the coal was scooped out, and collecting fossils is simply a matter of walking around and picking them up. People have been collecting them from the strip mines since the early '20's, and from the banks of Mazon Creek, where the same bed is exposed along the stream, since 1857, almost a century.

In spite of the long and intense interest in these areas and in spite of the thousands of fossils that have been removed and examined, every collecting season yields some hitherto unknown fossil forms. Thus, during the summer of 1952, when I was collecting fossils with George Langford, Curator of Fossil Plants, we were not surprised to find two specimens that looked like something new (*see Figure 1*).

We tucked them into our collecting bags and brought them back to the Museum, where Curator Langford washed them and carefully cleaned off a small amount of mineral deposit. Then we examined them and tried to think what they could be. At first glance the pattern of triangular bosses reminded us of the leg-bases of ancient spider-like arachnids that we sometimes find in the spoil heaps. But these specimens were far bigger than any arachnids that we had ever encountered, and, more important, they lacked a right-left symmetry that arachnids must have. We remarked on the texture of the surface of the triangular bosses, closely resembling the texture of an arthropod shell.

If you examine the shell of a crayfish or crab with a magnifying glass, you can easily see the irregularly spaced pits, pores, and bumps that almost all arthropod shells have. But, again, all arthropods have a right-left symmetry. Although we were ready to admit that these might be arthropod specimens, we couldn't think of any Coal Age arthropod large enough to use these pieces and still have room for a matching piece on the other side to make up the symmetry. Neither could we recognize these pieces as resembling any known arthropod by itself.

At that point, Curator Langford brought out some specimens of seed-fern fruits from the same deposits. Although the new unknowns didn't look just like any of his fruit specimens, the resemblance was close enough in some respects that we decided that we had picked up some unknown plant parts.

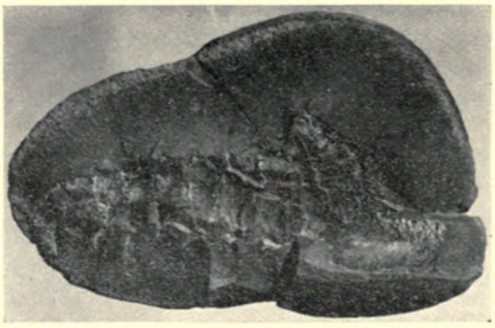

Figure 2. The leg of an unknown giant animal, with duplicate of unknown organ joined to inner end.

So we agreed that they should be put in the fossil plant collection, in a drawer with other unknowns waiting for further information. They might well have stayed there for some time to come, for new information would have to be in the form of new and more complete specimens, as we could be sure that Curator Langford had not overlooked any published pictures of fossil plants that might resemble them.

NEW EVIDENCE FOUND

But they stayed tucked away for less than a year. In 1953, Mr. and Mrs. John McLuckie, of Coal City, were collecting fossils in the spoil heaps when, at the end of the day, Mrs. McLuckie picked up "one more for luck" and found what seemed to be a complete shrimp about six inches long, more than twice the size of any of the shrimp-like animals commonly found in the strip mine deposits (*see Figure 2*). Mrs. McLuckie very kindly allowed us to bring her specimen to the Museum to be photographed and studied, and in it we found the answer to the two specimens among the unknown plants.

The supposed shrimp had what seemed to be a perfectly good jointed abdomen with little legs projecting from each segment, but the front end didn't fit with any shrimp

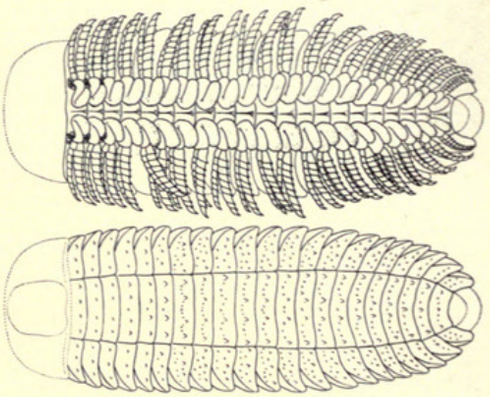

Figure 3. This is the newly identified animal itself, Arthropleura by name, as reconstructed from fragments found in the Saar Basin in Europe.

that ever lived. Rising like a comb from its back, where there should have been just a rounded armored thorax, was a duplicate of one of those unknown organs with the triangular bumps.

Mrs. McLuckie's "shrimp" thus brought the two unknown specimens out of the plant drawer again and into my hands, for the task of comparing them with other fossil invertebrates was within my province.

Examining the new large specimen under the microscope, I noted that the supposed legs projecting from the joints of the abdomen were actually spines attached to those joints. But since the specimen was clearly some kind of arthropod, with the typical surface texture and with a jointed armor, it became clear that the entire specimen was not an animal, but merely the leg of an animal. But what a tremendous animal it must have been, compared with

ary fossils from that locality! An with a leg six inches long must a body several feet long.

IRST AMERICAN SPECIMEN

he procedure of identifying fossils first of all, on looking at pictures in various journals. So I disap- to the Museum's fine research li- l soon found that our specimens n a large but primitive creature *thropleura*, never before found in nerica, though not uncommon in he European coal basins.

unately, no complete specimen of *pleura* has ever been discovered, gh specimens of various pieces found so that Professor Waterlot, niversity of Lille in France, has to make a drawing of what it must ed like (*see Figure 3*).

, our inconspicuous giant must about five feet long. Compared other invertebrates among which t was an imposing monster, but it ing to find that it was also tre- y larger than the little vertebrates occasionally found in the spoil hose were less than a foot in length, the same Coal Age there were rtebrates, approaching the length *pleura*, in other places.

e organ with the triangular bosses rofessor Waterlot, who has seen a y specimens, including some with gs, reports that it is an attachment hich holds the leg flexibly but the body.

GOURMETS THRIVE N DIET OF SNAILS

By AUSTIN L. RAND
CURATOR OF BIRDS

LARMED SNAIL withdraws its , succulent body into the protec- s hard, coiled shell and pulls tight culum that covers the opening. the equivalent of the duke in his h the drawbridge up and the port- n, or the cottager with his doors ows barred. It has a measure of . But where there is an elaborate of protection for some desirable , it usually happens there is a ent for overcoming it in some at wants the food.

ail is only moderately safe. To course, the snail is "his oyster." rly in Latin countries it is a gour- ght. Dropped into boiling water, ew minutes, drenched with a butter d served in groups of six to eight plate, the snail can be tipped or t of its shell without trouble, or a e used to twitch it out of its shell

snails may be delicacies, eaten only on occasion by civilized man, to a few birds they are the staff of life. Naturally it is mostly in the tropics and the subtropics that snails are most numerous and grow to large size. In Florida the Everglade kite and the limpkin, eating nothing but snails, are limited in their distribution by that of the large snails on which they subsist. A few other birds in the Old World tropics—certain storks and one species of kingfisher—live largely on snails. One temperate-zone bird, a thrush of Europe, is a confirmed snail-eater.

Special techniques must be used to get snails out of their shells, and only a few birds have solved the problem. The availability of a supply of snails does not necessarily mean that birds will learn to eat them, for the Hawaiian Islands have an abundance of large land snails, but none of the Hawaiian birds, despite their many adaptations in their island environment, have "learned" to open snails.

SOME BIRDS ARE 'SPECIALISTS'

The birds that have "learned" to open snails belong to quite diversified groups. One is a kingfisher, one a thrush, one a relative of rails; two are storks, and several are kites. Obviously each evolved its specialized technique independently and became the snail specialist among its near relatives.

These birds didn't all solve the problem the same way either. Some evolved special physical structures for this, like the open-billed stork with nutcracker-like bill and the snail-kites with elongated slender hooked bills for "snail hooks." Others, without special physical equipment, utilized certain aspects of their environment to help them, like the kingfisher and the thrush that pound the snails on a favorite anvil and the limpkin that places a snail so the mud will hold it while it uses its bill like a pair of tweezers.

A fresh-water snail that may be as large as a hen's egg is one of the favorite foods of the open-billed storks of Africa and India. These birds simply crush the snail in their six-inch bills and swallow the flesh without the shell.

To separate the flesh from the crushed shell the open-bill sometimes at least crushes the shell in the water and, holding the body in its beak, shakes it and washes it until free of the shell, according to Sir Frederick Jackson of East Africa. The bill has a big gap in it, just back of the tip, which seems to make it easier to hold the snail, as the notches in a nutcracker help hold a nut. But there is some disagreement about this gap. Some observers claim that the gap is the result of wear, being caused by the continual cracking of snails; others that it is a natural condition, presumably evolved for this special job. More observations in the Old World tropics are needed to reconcile these two viewpoints.

Visiting Hours Extended for Summer Season

Effective May 1 and continuing through September 6 (Labor Day) visiting hours at the Museum are extended by one hour. The Museum will be open daily, including Sundays and holidays, from 9 A.M. to 6 P.M. At the end of this period, hours will revert to 9 A.M.–5 P.M.

The ruddy kingfisher of the Philippines, like the song thrush of Europe, also breaks open snails. But these birds do not have powerful enough bills to crush a snail. Rather, they hold the snails in their bills and pound the snails on rocks that they have found especially suitable for the purpose and to which they return time after time. A heap of empty broken snail shells accumulates around these favorite rocks, which could well be called anvils. Of course many an insect-eating bird beats its prey on the ground or on a perch to batter and subdue it. But the ruddy kingfisher has gone a bit further and selects a specially suitable stone and uses it repeatedly. They have become specialists.

Also without any special physical equipment, the limpkin of Florida lives exclusively on snails. It simply plucks the snails out of their shells. To do this the limpkin, a fowl-sized, rail-like bird with a four-inch slender bill, uses the mud to hold the snail in position for the operation. As Dr. Alexander Wetmore describes it, the limpkin picks up the snail in its bill and seats it in the mud with the opening up. Then like a pair of tweezers the mandibles are pushed down, one on each side of the operculum, and this protective cover is twitched off. Again the tweezer-like bill is pushed into the shell, this time into the snail's flesh and, with a flick, the shell, unbroken, is shaken off the body and the latter swallowed.

A bill with a much longer and more slender hook than that of most birds of prey is the special equipment with which Everglade kites of Florida get snails out of their shells. The Everglades kite and several of its close relatives are medium-sized hawks of the American tropics that subsist exclusively on snails. Their method is to pick up the snail in their talons, carry it to a favorite perch, and hold it there in their feet with the opening upward until the snail, thinking perhaps to effect an escape, opens the operculum cover and pushes out its "foot." This is what the hawk has been waiting for. The long "snail hook" is driven into the body of the snail, the flesh is pulled out, and the empty, unbroken shell discarded. Some observers have said the snail comes out in one piece; others that it is torn out piecemeal. Perhaps both opinions are right, the birds doing one or the other depending on varying conditions, such as the tenacity of the snail.

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