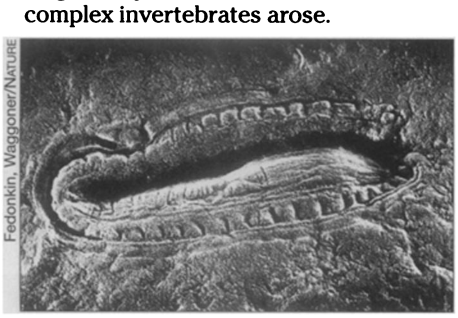
SCIENCE NEWS of the week

Ancient Animal Sheds False Identity

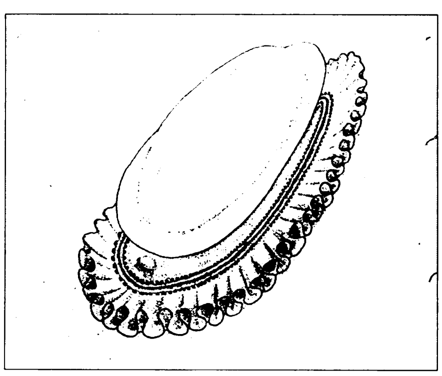
Call it a case of fossil duplicity. For decades, a group of ancient oval impressions has bamboozled paleontologists by masquerading as the squashed remains of jellyfish. Now, a treasure trove of finds in northern Russia has exposed the true identity of the fossil as one of the earliest complex animals to appear on the planet, report two scientists.

The fossil, with the lyrical name of *Kimberella*, is preserved in 550-million-year-old rocks from the late Precambrian era, which immediately preceded the burst of animal evolution known as the Cambrian explosion. When paleontologists first found Precambrian fossils at a site called Ediacara in Australia in the 1940s and 1950s, they interpreted *Kimberella* and many others as jellyfish, one of the simplest types of animals.

The new vision of *Kimberella* arises from more than 35 specimens recently unearthed along the White Sea in Russia and described by Mikhail A. Fedonkin of the Russian Academy of Sciences in Moscow and Benjamin M. Waggoner of the University of Central Arkansas in Conway. In the Aug. 28 NATURE, the authors provide evidence that *Kimberella* had a strong, limpetlike shell, crept along the seafloor, and resembled a mollusk—the phylum that includes snails, clams, and squids. *Kimberella* lacks key characteristics, such as a radula, or raspy, tonguelike organ, that would classify it as a true mollusk. Yet the fossils, which range from 3 to 105 millimeters in length, may offer information about how complex invertebrates arose.



Fedonkin, Waggoner/NATURE



Kimberella *fossil and reconstruction.*

"This may be our first good look at what was going on before the Cambrian explosion, because the mollusks in the Cambrian didn't come out of nowhere. *Kimberella* may be a look at what those ancestors were like," says Waggoner.

The fossils of the late Precambrian represent the first large organisms to appear after nearly 3 billion years of microscopic life. Despite the importance of these fossils, paleontologists have made little headway in understanding how they relate to later creatures. Researchers today have abandoned most of the original interpretations, leaving little agreement over what these fossils were. In the 1980s, Adolf Seilacher of Tübingen University in Germany suggested they were not animals, but an extinct kingdom of organisms built like fluid-filled air mattresses. Others identified them as lichens (SN: 7/8/95, p. 28).

"It's hard to use these fossils in evolutionary studies if you can't figure out what the darn things were. *Kimberella* is pretty unambiguously an animal and a fairly complex one—more complex than a jellyfish or a flatworm," says Waggoner.

Douglas Erwin, a paleontologist at the Smithsonian Institution in Washington, D.C., agrees with the new interpretation of *Kimberella* as something that crept along the seafloor, using a muscular foot like that on the underside of snails. "To me, it's the first animal that you can convincingly demonstrate is more complicated than a flatworm," he says.

The distinction is important, he explains, because flatworms and the simpler jellyfish lack a coelom—an internal body cavity that houses organs and makes possible a complex repertoire of movement. *Kimberella* is the first known animal that paleontologists can be sure had a coelom, he says.

Guy M. Narbonne of Queen's University in Kingston, Ontario, welcomes the reinterpretation of *Kimberella*. While studying Precambrian sediments in northwest Canada in the 1980s, Narbonne found tracks in the ancient seafloor that he attributed to mollusks. Australian researchers now have Precambrian seafloor tracks with radula-style scratches. Both suggest that large mollusks lived before the Cambrian. —*R. Monastersky*

Imaging shock waves via proton snapshots

Obtaining an X ray of a decayed tooth is a routine procedure available at any dentist's office. In contrast, imaging the shock waves produced within an explosion requires a special type of radiography involving high-energy protons.

Researchers at the Los Alamos (N.M.) National Laboratory have demonstrated for the first time that proton radiography can be used to probe the interior of not only a static object but also a turbulent, rapidly evolving system.

According to Los Alamos scientists, proton radiography represents a potentially useful technology in a broad program aimed at ensuring the safety and reliability of the U.S. nuclear weapons stockpile, particularly as weapons components get older (SN: 10/19/96, p. 254).

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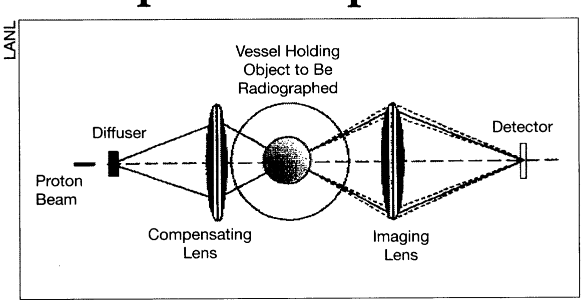

In proton radiography, a diffuser spreads out an incoming proton beam. The beam is then focused by a magnetic lens that helps compensate for blurring caused by interactions between the electrically charged protons and the material through which they travel. Protons that pass through the object are refocused by an imaging lens onto a detector that generates the snapshot.

In conventional radiography, X rays traverse an object and leave on film a pattern of light and dark areas that corresponds to the composition, density, and thickness of the object. However, X rays tend to bounce around within a material, making it difficult to obtain a sharp image in a brief time. Protons don't scatter as much and can be generated more efficiently than X rays.

Last April, the team detonated about 3 ounces of a powerful explosive inside a chamber 4 feet across and obtained an image of the shock wave generated a few millionths of a second after ignition. Earlier this month, the researchers used a new electronic camera to capture a sequence of images, which they combined into a short movie, says James E. Rickman of Los Alamos. —*I. Peterson*