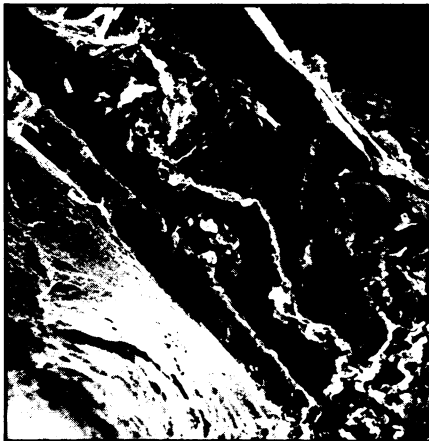


## The oldest fish: A Cambrian find

By aesthetic standards, it probably wasn't one of nature's most attractive creatures. It lacked movable jaws and groveled more than swam along the ocean bottom mud searching for food. But *Anatolepis* did exist about 510 million years ago, according to the newly reported evidence, making it the oldest vertebrate to be discovered. Until now, the oldest known specimens of fish, discovered two years ago in islands north of Scandinavia, were believed to have lived 470 million years ago.

The new find was pinpointed in the Deadwood Formation in Crook County, Wyo., by John E. Repetski of the U.S. Geological Survey. Repetski, a paleontologist, recovered about two dozen fragments of what turned out to be *Anatolepis*'s scaly, external plates. X-ray analysis showed the plates to have a bony composition, strongly indicating that they came from a vertebrate. Dating of the sedimentary rocks containing the fragments "show[s] that this occurrence is of Middle Late Cambrian age, about 510 million years before the present," Repetski says.

The primitive fish probably was no longer than one to three inches, according to the researcher. The fragments reveal that *Anatolepis* had a protective armor or shield to which the scales were attached.



Fossil fragment of primitive jawless fish.

The middle and rear parts of the body were probably covered with somewhat smaller plates to allow for locomotion. *Anatolepis* existed primarily in tropical and subtropical waters, of the type that occupied what is now Wyoming.

Since the Wyoming find (*SCIENCE*, Vol. 200, No. 4341), Repetski has reexamined his collections and established the existence of additional *Anatolepis* of Late Cambrian age in southwestern Oklahoma, northeastern Washington, Idaho and eastern Alaska. All of these occurrences are in rocks of "undoubted marine origin," Repetski says, "so that the previously widely held theory that the earliest vertebrates originated in freshwater habitats is dealt a serious blow." □

high. Once the sludge is spread, cadmium can either accumulate in the soil or be taken up by plants. The cadmium reaches humans through those plants or through animals who eat those plants. The main source of cadmium in the diet is cereal or meat, especially liver and kidney. Unfortunately, tobacco also avidly accumulates cadmium and a major source of cadmium exposure is cigarette smoking.

Les Otte of the EPA told *SCIENCE NEWS* that the first guidelines for acceptable levels of cadmium in sludge have been drawn up, are being revised for public comment and will be released soon, perhaps in the fall. □

## Secrecy order lifted

The secrecy order imposed on George Davida's research into safeguarding computer data (SN: 6/10/78, p. 373) was withdrawn by the Commerce Department on behalf of the same, yet unnamed, federal defense agency that initially requested it. But Davida's employer, the University of Wisconsin at Milwaukee, is still concerned about the principle that the action posed. "We think at a minimum that there is a procedural flaw," said assistant chancellor Frank Cassell, when the government can "strip an individual of his very basic First Amendment rights" by simply mailing out a three-page warning.

In a letter to the university's chancellor, National Science Foundation Director Richard Atkinson said that he shared the university's concern while conceding that in some cases "freedom of scientific inquiry must bow to serious national security implications." Cassell said the university agreed, but thought the government should first have to "prove" to some outside authority that national security was indeed in jeopardy. □

## Thomas gene splicing OK

The National Institutes of Health have agreed to allow Charles A. Thomas to again use NIH funds for recombinant DNA experiments. Last December Thomas was prohibited from doing federally funded gene-splicing research when NIH officials discovered he did not have the required description of safety facilities on file (SN: 12/31/77, p. 420; 4/29/78, p. 279). In a letter to Thomas, now at Scripps Clinic and Research Foundation in La Jolla, Calif., DeWitt Stetton Jr., Deputy Director for Science at NIH, says that the recombinant DNA committee believes, given the confusion surrounding implementation of the guidelines, that Thomas, Harvard Medical School and NIH share blame for the missing memorandum. The letter states that the committee finds no evidence of faulty practices in Thomas's laboratory at Harvard. Thomas tells his side of the story in a letter in the June 30 *SCIENCE*. □

## Focusing in on cadmium pollution

The toxicity of cadmium is not in question, but the extent of the threat posed by slowly accumulating levels of the heavy metal in the environment is. Spurred by the requirements of the 1976 Resources Conservation and Recovery Act and the 1977 Clean Air Act, numerous researchers are tracking the sources and the extent of cadmium pollution in the environment and documenting the extent of cadmium-caused damage to humans and other animals.

A recent international conference on environmental cadmium at the National Institutes of Health in Bethesda, Md., focused on some findings of the ongoing research. Lars Friberg of the Karolinska Institute in Sweden explained at a press conference that cadmium pollution of air, water and land is widespread; virtually every American is exposed to it. More alarming, Richard Jackson of the Environmental Protection Agency told *SCIENCE NEWS* that the level of pollution may be uncomfortably close to toxic levels, perhaps one-half as high in some areas.

Cadmium lodges in the body and steadily accumulates over a lifetime. Friberg said that after 20 to 30 years half of a dose of cadmium will still be left in the body.

The chief damage is to the kidney. Long-term exposure to the heavy metal results in what the Japanese call the *itai-itai* or ouch-ouch disease. In this disease the kidneys are damaged, which impedes vitamin D metabolism, which in turn affects the bones. Bones become brittle and crack, causing a slow, painful death. Cadmium also damages the lungs, accumulates in the liver and may cause hypertension. Moreover, Friberg reported that Swedish factory workers exposed to cadmium were 2.4 times more likely to develop prostate cancer than factory workers in the same plant not exposed to cadmium.

The seminal source of cadmium pollution is industry and heavy metal mining. In industry, cadmium is used chiefly in electroplating, nickel-cadmium batteries, pigment production, and the making of plastics. From these products and their product wastes cadmium escapes into land, water and air, where it accumulates.

One of the chief sources of land pollution that is being scrutinized is sewage sludge. Cadmium concentration in sludge varies tremendously depending on where, how and when it is produced. If influent from cadmium-using industries is part of the sewage, levels can be dangerously