

Osmium ratios boost impact hypothesis

The hypothesis that an asteroid or meteorite struck the earth about 65 million years ago, causing one of the greatest mass extinctions in earth history, received a boost recently when scientists from Yale University in New Haven, Conn., analyzed isotopes of a rare element called osmium. (Isotopes of the same element differ in the number of neutrons in each atom's nucleus.) The original hypothesis focused on the element iridium, which is relatively rare on earth, but is found in high concentrations in extraterrestrial bodies such as meteorites, asteroids and comets. In many sections of marine sediments, and in some samples of continental material, the boundary between the Cretaceous period, which ended 65 million years ago, and the subsequent Tertiary period is enriched in iridium. Many scientists believe that the high iridium levels are a sign that an asteroid hit the earth. An impact by a large body, they say, not only would deposit iridium, but also would shock the earth and its atmosphere so dramatically that the results well could cause widespread, possibly terminal, damage to many species (SN: 1/2/80, p. 22; 10/14/81, p. 314). Other researchers, however, contend that the behavior of trace elements in water is too poorly known to justify ruling out terrestrial processes as a cause for the high iridium concentrations.

Jean-Marc Luck and Karl Turekian of Yale reasoned that measuring isotopes of osmium, another element abundant in extraterrestrial bodies, might provide an independent test. Their findings are reported in the Nov. 11 *SCIENCE*. They conclude that the ratios of two isotopes of osmium found in the boundary layer are more similar to those in meteoritic material than to isotope ratios of osmium from the earth's crust.

The researchers measured the ratios of osmium-187 to osmium-186. They found that the ratios of osmium isotopes in manganese nodules, which concentrate elements from seawater, are consistent with the ratios of osmium derived from the earth's crust. The osmium ratios in boundary material from marine sediments from Stevns Klint, Denmark, and from crustal rocks from the Raton Basin in Colorado, however, are more consistent with meteoritic deposits than crustal origin. The two boundary samples do differ slightly in the amounts of the osmium isotopes they contain, leading the researchers to suggest either that different meteorites were involved or that for some reason, different amounts of osmium from the crust contaminated the material the asteroid or meteorite deposited.

The researchers considered the possibility that the unusual osmium ratios in the boundary layer are due to material ejected during volcanic eruptions. (Other scientists recently have found that some volcanic emissions are high in iridium and other rare elements.) Luck and Turekian write that while a volcanic origin is possible, an eruption of the magnitude necessary to deposit an amount of rare-element enriched material equivalent to that found at the Cretaceous-Tertiary boundary "would be less likely than a large impact." They conclude that the "simplest explanation" is that the high concentrations of iridium and osmium originated with a foreign body.

Predicting geomagnetic storms

Researchers at the National Oceanic and Atmospheric Administration in Boulder, Colo., are working to improve forecasts of geomagnetic storms, temporary disturbances of the earth's magnetic field thought to be related to sunspot activity. Such storms can disrupt electronic systems on spacecraft orbiting the earth. By devising computer models of solar activities, researchers hope to improve their ability to recognize that a geomagnetic storm is beginning, giving satellite operators more time to protect the satellite systems. The models will incorporate observations of the sun, satellite measurements of solar wind, and computer simulations of solar wind disturbances.

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Out of the pork barrel into the fire

When the Catholic University of America in Washington, D.C., and Columbia University in New York succeeded in obtaining funding for the construction of new laboratory facilities by going directly to Congress, many university officials and scientists were upset (SN: 7/23/83, p. 52). Particularly bothersome was the fact that neither of the projects had gone through an external review process, and money for the two universities was taken out of the budgets for other projects that had gone through some form of peer review. Now, several academic and scientific organizations have responded.

The National Academy of Sciences governing council passed a resolution announcing to the academic community and public officials that "informed peer judgments on the scientific merits of specific proposals, in open competition, should be a central element in the awarding of all federal funds for science." This should apply not only to scientific research proposals but also to major scientific facilities and large scientific instruments, the resolution stated.

The Association of American Universities (AAU), which represents many of the country's largest research universities, adopted a similar, but more cautiously worded, resolution. Several of AAU's members have benefited from special-interest amendments to funding legislation. Robert E. Marshak, American Physical Society president, asked in a strongly worded letter to each member of Congress, "that this recent trend toward special interest funding of major scientific projects be reversed."

Financial woes and legal problems

- A federal grand jury has charged the former operators of the Three Mile Island Unit 2 nuclear reactor with criminal misconduct in the operation of the plant during the months before the 1979 accident. The grand jury alleges that the Metropolitan Edison Co. falsified test results involving leaks from the reactor's cooling system and concealed the problem from the Nuclear Regulatory Commission.
- After 12 controversial years, the U.S. Senate has joined the House of Representatives in voting against funding further work on the Clinch River breeder reactor project in Tennessee (SN: 7/23/83, p. 52). Faced by rapidly escalating costs, Congress rejected a last-ditch financing scheme proposed by an industry group and enthusiastically endorsed by the Department of Energy and the White House (SN: 8/20/83, p. 126).
- After four studies commissioned by Congress and the Department of Energy questioned whether the massive Great Plains coal gasification project in North Dakota was in danger of being abandoned because of potential future financial problems (SN: 4/21/83, p. 329), the U.S. Synthetic Fuels Corp. (SFC) conducted its own study and concluded that the project was still economically viable. Last month, the SFC announced that it would not provide the additional financial aid that the project sponsors had asked for and pointed out that the project's investors could take advantage of substantial tax benefits available to them to make the project more attractive.

Secrecy and openness in science

The American Association for the Advancement of Science has begun a project on secrecy and openness in scientific and technical communication. The project, which will consist of a series of 10 background papers and five regional seminars to be organized in 1984, is a response to the continuing debate about attempts to limit access to scientific information, whether for reasons of national security (SN: 6/4/83, p. 357; 4/2/83, p. 218) or because of economic competition. Rosemary Chalk, project head, notes, "Very little is known about the ways in which secrecy or openness influence the conduct of scientific research."

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