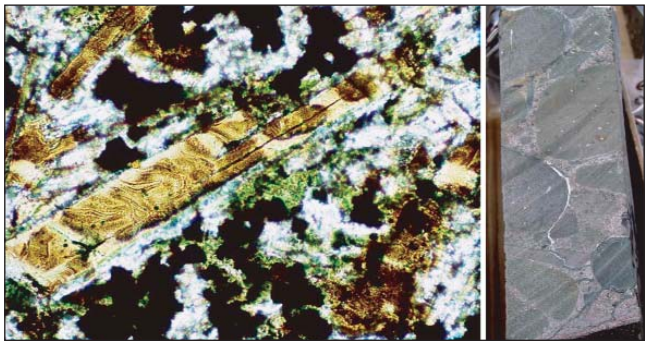
PALEONTOLOGY

Evidence of Huge, Deadly Impact Found Off Australian Coast?

Seven geoscientists report online this week in *Science* (www.sciencemag.org/cgi/content/abstract/1093925) that they have found the scar of a large asteroid or comet impact just off the northwest coast of Australia that could have trigged the largest mass extinction ever, 250 million years ago. The proposed Bedout (pronounced "Bedoo") impact could have triggered the Permian-Triassic (P-T) extinction, they say, the way the Chicxulub impact on the Yucatán Peninsula caused the death of the dinosaurs.

Not so fast, say some researchers who specialize in deciphering signs of impact lingering in rock. "There's no convincing evidence for an impact origin" in the studied rocks, says impact petrographer Bevan French of the National Museum of Natural History in Washington, D.C. "Everything they're arguing was shocked [by impact] can have nonshock origins," such as volcanic activity, he argues. Despite the variety of evidence presented in this and two earlier *Science* papers by the same principal authors (*Science*, 21 November 2003, pp. 1388 and 1392), impact-triggered extinction at the P-T has yet to meet broad acceptance.



Impact debris? Microscopic details (*left*) from a sea-floor rock core (*right*) suggest the shock of a large impact.

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This search for a P-T impact crater started with oil exploration. On the basis of oil companies' seismic probing beneath the sea floor, oil explorationist John Gorter, now at ENI Australia Ltd. in West Perth, proposed in 1996 that the submerged Bedout High is the central peak of a large impact crater formed at the end of the Permian. Since that time, geochemist Luann Becker of the University of California, Santa Barbara, and colleagues have been trying to explain the apparent impact debris they were finding in Antarctica. They took a closer look at the oil exploration data and samples. A map of subtle gravity variations across the region reveals a ring reminiscent of Chicxulub's, they say. And radiometric dating of a Bedout High mineral grain recovered from the bottom of an oil exploration well puts its formation in the neighborhood of the 251-million-year age of the P-T.

But central to their argument are rocks from Bedout High. The shock waves racing away from a large impact are powerful enough to alter mineral crystals profoundly. Shock can rearrange the crystal structure of minerals into distinctive patterns, obliterate crystallinity entirely to produce the glassy product maskelynite, and even melt the mineral. Becker and her colleagues point to examples of maskelynite in their samples. They also cite many examples of melted crystals. In one case, a crystal encloses a melted core of the same chemical composition as the crystal. "It's nigh unto impossible to get that in a volcanic process," says geochemist Robert Poreda of the University of Rochester in New York, who did much of the mineral analyses. "The only way you can do that is to shock melt it."

Some experts on shock effects on minerals are not persuaded. "I see nothing that would convince me there was an impact," says Christian Köberl of the University of Vienna, Austria. At Chicxulub, the buried layer of jumbled and melted rock fragments always contains microscopic bits of minerals such as quartz riddled with distinctive banding due to shock, he says. "Where are all the shocked minerals?" he asks.

Impact geologist Richard Grieve of the Canadian Geological Survey in Ottawa would also expect to see signs of flow frozen into the once-molten material. An impact's debris is deposited so violently that the molten rock should have been pulled like taffy as it suddenly cooled, he says. And he questions the paper's identification of shock-formed maskelynite. "I've never seen maskelynite look like this," says Grieve. "I could be wrong, but I wouldn't add [Bedout] to the list" of proven impact craters he helps maintain. To make the list, say Grieve and the others, Becker and her colleagues need to apply some more powerful analytical tools, such as micro-Raman spectroscopy, to targets such as the putative maskelynite. Then perhaps Bedout can join the club.

–RICHARD A. KERR

ScienceScope

Cutting NASA Down to Size

The U.S. Defense Department is bracing for another round of base closings (*Science*, 30 May 2003, p. 1361), and NASA may be laying the groundwork for a similar exercise involving its research labs. This winter NASA Administrator Sean O'Keefe appointed Washington, D.C., consultant and former Navy official William Cassidy to chair a panel looking at ways the agency can save money by streamlining operations. Dubbed the Real Property Mission Analysis team, the group will produce an interim report this summer and a final report by the end of the year. One target will be the research labs and equipment scattered throughout NASA's nine centers. "While scientists are worrying about Hubble, a dozen of us are looking at these science facilities," says one committee member. –ANDREW LAWLER

Trickle, Not Flood, of Data Quality Requests

A new law allowing anyone to challenge the quality of federal science documents has so far not been the disaster that some critics predicted, the White House suggests in a new report.

The Data Quality Act, which requires that agencies ensure the "quality" of information they disseminate, was slipped into a 2001 spending bill at the urging of an antiregulatory group (*Science*, 21 March 2003, p. 1837). Opponents said it would be used to swamp agencies with requests and slow the implementation of rules. But the Office of Management and Budget (OMB) says in a 30 April report that only 35 requests had been filed by January 2004. Agencies rejected at least nine filings but revised some documents in response to other challenges.

The requests, from both environmental groups and industry, cover topics ranging from nickel carcinogenicity to protection of trumpeter swans. So far they don't seem to be delaying agency actions, OMB concludes, adding that the requests have provided its officials with insight into research debates: "OMB also has learned [that] with uncertain scientific issues ... more than one plausible answer or methodology may exist."

But Sean Moulton of the citizens' group OMB Watch warns that the law may be "a Trojan horse." OMB "doesn't seem to want to talk about" the costs of the act, which requires agencies to track requests and have senior staffers or panels examine appeals, he says. And it faces three lawsuits on whether the law can be used to override an agency's decisions.

–JOCELYN KAISER