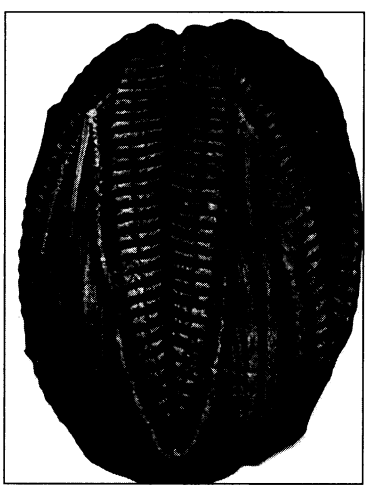
started their analysis with a listing of fossil marine genera compiled by John Sepkoski, who died in 1999 at age 50. It was Sepkoski and paleontologist David Raup, retired from the University of Chicago, who in the early 1980s drew attention to the Big Five as the largest extinction events since the Cambrian explosion of life 540 million years ago.

Bambach and Knoll used Sepkoski's last compilation—genera of marine fossils arranged by their first and last appearances in the fossil record—and crunched numbers to see whether the extinctions were indeed large, sudden, and unusual enough to qualify as distinctly different from the multitude of lesser extinctions that mark the fossil record. To start, they dropped the entire Cambrian period and the early part of the subsequent Ordovician from their analysis. Extinction rates were high and varied wildly in those early days, prompting exclusion of the whole 60 million years from the analysis as too atypical.

With the early days dropped, four intervals of extinction stood out as exceptionally intense. The extinction in the late Devonian 364 million years ago, however, did not. "It fails the first criterion for a mass extinction interval: It isn't unusual," says Bambach. Several intervals in a row, including the interval in question, have higher-than-normal extinction rates, but none of them is high enough to be called "big."

The next to go was the end Triassic extinction of 200 million years ago. When Bambach and Knoll compared its extinction rate with those of intervals coming before and after, the end Triassic did not stand out as bigger than its neighbors. "It's not an outlier," says Bambach. "All of the Triassic has high extinction rates." What's more, Bambach says, although all five events are marked by large losses in the diversity of genera, the end Triassic and late Devonian intervals lose more of their diversity through a failure to produce new genera than through extinction. "Normal extinction was high," says Bambach, "and there wasn't much origination" of new genera to replace losses due to extinction. He calls these two events "mass depletions" rather than mass extinctions.



**Winners.** Reports of extinctions of blastoids were greatly exaggerated.

CREDIT: J. A. WATERS/STATE UNIVERSITY OF WEST GEORGIA

Paleontologists who specialize in the demoted intervals are taking the losses well. "I wouldn't argue too strongly" with the end Triassic's being dropped, says Anthony Hallam of the University of Birmingham, U.K. "I've been challenging the idea [that] there was a catastrophic event at the time. It was more gradual. Its magnitude was certainly less than [Bambach's] three big ones."

The late Devonian doesn't have many adamant defenders, either. "We agree with Bambach and Knoll," paleontologist Johnny A. Waters of the State University of West Georgia in Carrollton told the GSA meeting. "We believe the late Devonian 'mass extinction' should go away." Waters and his colleagues argue that the late Devonian has been overblown in much the way the lesser extinction at the Cenomanian-Turonian boundary has been (*Science*, 10 August, p. 1037). In the case of the late Devonian, says Waters, paleontologists have tended to collect fossils close to their labs in Western Europe and North America. But during the late Devonian, sediment-laden waters flushed those areas, altering the local marine ecology and skewing the fossil counts. As paleontologists look farther afield, as Waters and colleagues have done in northwest China, more species turn up, lessening the apparent magnitude of the extinction.

Other paleontologists are taking the demotions in stride because they believe there are better ways to gauge evolutionary events. "We've gone as far as we can playing number games with taxonomic diversity," says paleontologist George McGhee of Rutgers University in New Brunswick, New Jersey. "We need to look now at analyzing the ecological impact of the big events."

By the reckoning of McGhee and his colleagues, the end Permian extinction retains its position as the number one crisis in the history of life, followed by the end Cretaceous extinction that led to the replacement of dinosaur-dominated ecosystems by mammal-dominated ones. But in McGhee's ecological ranking, the late Devonian overtakes the late Ordovician extinction of 450 million years ago—the third of extinction's Big Three. Although plenty of new creatures appeared after the Ordovician extinction, he says, ecosystems worked much the way they had before; in contrast, after the Devonian extinction, reef communities did not fully recover for a couple hundred million years. A mass depletion may never have the cachet of a mass extinction, but perhaps it can trigger crises in the history of life just as well. **–RICHARD A. KERR**

DEVELOPING NATIONS

## Web Site Aims to Bridge North-South Divide

The Internet has been billed as the great democratizer, providing cheap and easy access to information for all. In many developing countries, however, the reality is very different: Computers and decent phone lines are scarce, and subscriber-only Web sites bar people from the best data. Now a new Web site, officially launched in London this week, aims to bridge the gap with scientific news and information relevant to developing nations (see Editorial on p. 2053). The site is also intended to help foster scientific cooperation.

Journalists, scientists, and development agencies conceived the site, known as SciDev.Net (www.scidev.net), 3 years ago and drummed up funding from international bodies. With a budget of $2 million over the first two and a half years, a staff of six journalists and several foreign correspondents will provide daily news, in-depth features by scientists and officials, and a selection of articles from *Science* and *Nature*. The site also features a database of scientific organizations, the first stage of a regional network of scientists designed to promote "North-South and South-South collaboration," says Mohamed Hassan, executive director of the Third World Academy of Sciences (TWAS) in Trieste, Italy, which helped conceptualize SciDev.Net.

Part of SciDev.Net's mission will be to separate the wheat from the chaff: It is often hard to find accurate and useful information on the Web when many appealing sites are promoting questionable assertions, such as the claim that HIV does not cause AIDS. "Some of these sites that are trying to undermine scientific ideas are really very user-friendly," says David Dickson, SciDev.Net's director and *Nature*'s former news editor.

The site's success will depend on access, which is severely lacking in some developing countries. Only the best Indian universities, for example, have reliable access to the Web. "The Internet has the potential to transform research in the developing countries. But the potential will remain just that if we do not take care of several other factors," says Subbiah Arunachalam, an information consultant in Chennai, India, and a former officer of the Indian Academy of Sciences.

Several agencies are already hard at work providing access, some sponsoring telecenters in poorer countries, and some, such as TWAS, developing networks of research academies and science ministries across the North-South divide. SciDev.Net complements these efforts, Hassan says: "This is really confidence building for scientists in the developing countries." **–BEN SHOUSE**