

Web links leave abstracts going nowhere

John Whitfield, London

The Digital Libraries Initiative is a major US research project into electronic archiving. But when you click to its homepage from the website of one of its sponsors, the US National Library of Medicine, you get a message that's increasingly familiar to researchers: "URL not found".

Now a study by Jonathan Wren, a bioinformatician at the University of Oklahoma in Norman, has revealed the scale of the problem (J.D. Wren *Bioinformatics* 20, 668–672; 2004). He found that nearly one-fifth of the websites mentioned over the past decade in abstracts on Medline, the clearing-house of papers used by biomedical researchers, have disappeared.

"The web is becoming a more prevalent source of support for research," says Wren. "If that support is lost, it can make the work impossible to replicate."

Wren was prompted to study the problem after noticing a misspelt web address in the Medline abstract for one of his papers. In addition to the missing websites, Wren found that a fifth of the URLs in abstracts published between 1994 and April 2003 are available only intermittently. He also checked 33 FTP sites, of which only 12 still work. Wren hasn't quantified how important the dead links are, but he feels that they are probably significant as they were mentioned in the abstract.

And Robert Dellavalle, a dermatologist at the University of Colorado in Denver who is

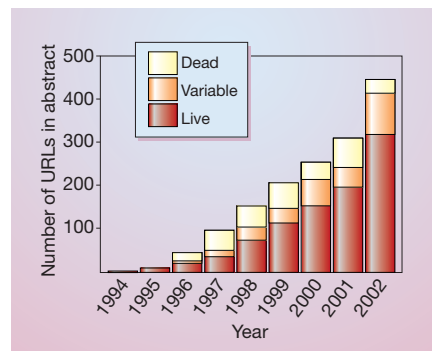
campaigning for better electronic archives, says that publishers' responses to the problem are inadequate. "Journals aren't doing anything to address the potential for electronic resources to disappear," he says. "It's amazing what doesn't exist — one of my own articles on digital preservation isn't there any more!"

Last year, Dellavalle's own survey found that about 12% of the Internet addresses cited in *The New England Journal of Medicine*, *The Journal of the American Medical Association* and *Science* were extinct two years after publication (R. P. Dellavalle *et al. Science* 302, 787–788; 2003).

Electronic resources in the physical sciences can be just as unstable, says Paul Ginsparg, a physicist at Cornell University in New York state, who runs the arXiv preprint service. "We've always insisted that arXiv submissions be complete and self-contained, and that external links be only to non-essential materials," Ginsparg says.

Dellavalle believes that journals should compel authors to archive the electronic resources they cite. As a minimum, he says, they should be required to print them out, and submit and keep copies. Additionally, he thinks, journals should require authors to submit online references to the Internet Archive (www.archive.org), a non-profit digital library project that has links to the world's largest library, the US Library of Congress.

One journal, *PLoS Biology*, is asking



Dead or alive? The availability of websites listed in Medline abstracts over the past decade.

authors to use the Internet Archive. Others are unsure how archives will be kept in the long term. "I don't think publishers have the resources to put everything somewhere it's going to last for ever," says Tony Delamothe, web editor of the *BMJ*. "If links die or get lost over time, that's just tough."

Maxine Clarke, publishing executive editor of *Nature*, says: "We do what we can to ensure that formal citations will stand the test of time, and we wouldn't let a significant part of a paper depend on a website."

Many commercial publishers, working through a collaboration called CrossRef, want to give electronic documents permanent code numbers that will prevent them from getting lost, even when URLs change. ■

Election promise gives hope to Spanish scientists

Laura Nelson, London

Researchers in Spain are optimistic that the newly elected government there will implement a bold pledge to double research spending. And they hope that it will also address problems that have fostered growing discontent on the nation's university campuses.

The socialist party of José Luis Rodríguez Zapatero, which scored a surprise election win on 14 March, promised in its manifesto to double Spain's €4-billion (US\$4.8-billion) annual research and development budget by 2008. It also said that it would recombine the science and technology ministry with the education ministry, and set up a research council to distribute grants on the basis of scientific merit.

Jaime Díez Lissavetzky, a chemist and socialist party member of parliament, who is helping to formulate the incoming government's science policy, says that the pledges will be implemented quickly.

In budget terms, science did not fare badly under the previous, conservative

government led by José Aznar. Its total research and development budget surged by an average of 13% each year from 1997 to 2003, according to European Commission figures — the second-fastest growth rate in the European Union.



Surprise victor: José Luis Rodríguez Zapatero (right) with outgoing prime minister José Aznar.

But scientists have been concerned about the low proportion of public money going into basic research and have protested over funding and the career prospects of young people.

The plan to merge the science and technology ministry back into the education department — the two were separated in 2000 — has drawn mixed responses from researchers, some of whom have been disappointed by what they regard as the ministry's focus on technology.

Emilio Gelpi, director of the Spanish research council's institute for biomedical research in Barcelona, says that the previous ministry was too involved in technological issues, such as telecommunications, to do much for science. Juan Belmonte, a geneticist at the Salk Institute in La Jolla, California, who collaborates closely with stem-cell researchers in Spain, says that he has mixed feelings about the combined ministry. But he adds that it has the potential to strengthen science in the universities, as well its ties with industry. ■