## nature

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## Dangers of over-dependence on peer-reviewed publication

A number of independent trends are increasing the significance of journals' roles in providing high-quality information. Other sources need to be strengthened.

ike it or not, the days of ink on paper are numbered — and the number is smaller than many people imagine. This may sound regrettable: no one can comfortably read even a laptop computer in bed, whereas *Nature*'s Millennium Essays, for example, are just the sort of erudite relief that hard-driven scientists deserve as they drift towards sleep. But lightweight, flexible screens with print-like quality, instant page upload, high-speed connectivity and large memories will arrive, and such nocturnal browsing could then include the opportunity, with this week's essay (see page 745), to hop directly to digitized versions of the works of Henri Poincaré and others who so variously interpreted Heinrich Hertz's sparks. If the benefits were for scientists alone, that technology would take decades to arrive. The fact that everybody will want it explains why Bill Gates is spending so much of his time with telecommunications companies.

Preprint servers have prompted suggestions that electronic networks could liberate researchers from the stranglehold of publishers. Yet the dependence on established gatekeepers is increasing. Electronic communications are just one of several reasons.

As access to scientific information becomes either free or readily purchasable per view, rather than by annual subscription, the Internet will make primary scientific information easily available not only to scientists but also to the many other stakeholders in science. That is all to the good given the intrinsic desirability of openness as well as the increasingly accepted need to involve (rather than merely inform) various publics in technology regulation and risk assessment.

## Dangers of the Internet

But the risks with such access are clear too. The results of Arpad Pusztai published by *The Lancet* last week (see page 731) provide a timely example. Given that Pusztai's initial claims on a television programme were welcomed and exploited by lobby groups, and that the Royal Society felt it necessary to set up a committee to investigate them in the absence of a peer-reviewed publication, one can only assume that such claims announced on a scientific preprint server would have been equally open to burdensome contention. Preprints are ripe for misappropriation in such public controversies. The dangers with biomedical research are also obvious, as is the risk of exploitation of a preprint server to establish premature claims for priority, whether for research competitiveness or commercial interests.

With such concerns in mind, the announcement last week of an agreement between the proposed electronic publication server PubMed Central and the US National Academy of Sciences has the merit of distancing itself from preprints (see page 733). In contrast, there was a joint proposal in Frankfurt last week by the American Association for the Advancement of Science and the International Council of Scientific Unions to the Association of Science, Technical and Medical publishers that should set off alarm bells. Responding to developments in electronic networks, it proposes the recognition of two stages of publication: "first publication" — exposure in some permanent form allowing an establishment of priority — and the

"definitive publication" — a refereed version. In the light of the above concerns, that blurring of the concept of "publication" is exactly what the world does not need.

## Media reliance

The mass media provide another example — and a worrying one of the increasing significance of peer-reviewed publication. Their coverage of research provides no guarantee of the science's quality but is nevertheless much valued by scientifically fascinated readers, listeners and viewers, as well as by the scientists whose work is highlighted and (Pusztai apart) their employers. Accordingly, journalists increasingly find themselves supplied with press releases by journals. But, especially with the pressures associated with the mass media's own electronic networks, they have less and less time to research the stories in depth. In television, above all, the drive to cut costs in filling air time is ever more intense, and can only undermine the quality of broadcast coverage. The implication is that scientific journals should supply journalists not only with a balanced lead to every story but with details of its context too, comprehensibly presented. That is a tall order.

Dependence on the journals, especially those with high impact factors, has seemingly never been greater within the scientific community itself, in the assessment of staff and their institutions. In some countries this is taken to extremes: in order to encourage an outwardlooking approach, some universities in China and Taiwan pay their staffbonuses following publication in journals tracked by the Institute for Scientific Information — the more important the journals, the higher the bonus, in some cases. Government grants can automatically follow publication in the top journals. In the United States, the award of tenure can be strongly influenced by such publication. Despite the avoidance of crude paper counting in quality assessment, the pressure on assessors' time as well as that of institutions and individual academics means that publication in a prestigious journal becomes ever more convenient as a shorthand indicator of achievement.

Peer-reviewed publications, as everybody in the business knows, include papers that are definitive and papers that are highly controversial. The editor of *The Lancet* has attracted vehement criticism not only because Pusztai's work has demonstrable technical shortcomings and thus falls below the normally high standards that he maintains, but also because he is perceived to be undermining the growing dependence on journals like his in an increasingly controversial arena.

Scientists and their institutions are in for a more turbulent future as access to their information becomes ever wider. The journals should be expected to maintain their standards in publishing valid, if occasionally credibility-stretching, science. But the ever-increasing reliance on them for quality control has disadvantages that should be countered by adequate provision of time and resources for independent assessment and, in the midst of controversies, publicly funded agencies providing comprehensible, reliable and prompt complementary information over the networks.