nuclear waste using both accelerators and reactors. Los Alamos has recently also proposed using an accelerator to transmute waste in a target. Argonne National Laboratory has proposed to burn the activides in the Integrated Fast Breeder Reactor, which is under development. The Russians also want to join an international effort for the development of partitioning, recycling, and transmutation of fission products. The time has come to divert some of the repository funds in order to mount a concerted effort to avoid thousands of years of geological storage, or at least to minimize storage to several hundred years.

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Proton Microprobe Development

I have just read a fabulous article by Jeremy Cherfas in the Research News section of *Science*. The fable (a narrative or statement not founded on fact) was headed, "Proton microbeam probes the elements" (28 Sept., p. 1500). The article is enthusiastic about technology but weak on history.

The "remarkable new instrument devised at Oxford University" is not new and was not devised at Oxford. The scanning proton microprobe was developed at the U.K. Atomic Energy Research Establishment, Harwell, by J. A. Cookson, A. T. G. Ferguson, and F. D. Pilling in 1970 (*1*).

The men largely responsible for putting proton-induced x-ray emission, Rutherford scattering, and microprobes together were again those at Harwell, not those at Oxford (*1*).

The problems of funding multidisciplinary research on proton microprobes are common ones, faced by all proton microprobe groups, of which Oxford was about the twelfth to commence operation, in 1980.

The techniques of computer-generated multi-elemental mapping and associated high-efficiency quantitative data extraction were developed at the University of Melbourne in 1977 (*2*).

The techniques required for the application of scanning proton microprobes to biological tissues were largely worked out in the 1970s at Melbourne, Heidelberg, and Uppsala universities; warning was given then about use of the preparative techniques later used in the Alzheimer's work (*3*).

The final paragraph of the article speaks of new possibilities of proton microscopy—an area in which Oxford has little experience. Secondary electron imaging was first used with the proton microprobe at Harwell; channeling contrast microscopy was developed at Melbourne; scanning transmission ion microscopy (STIM) at these energies was developed at the universities of Oregon and Melbourne, as was stereo-STIM. STIM tomography was developed at Tokyo, Oregon, Darmstadt, and Melbourne universities, 3-D STIM tomography at Sandia and Lawrence Livermore laboratories, and channeling STIM at the University of Melbourne. I apologize if I have left out contributions from other groups—there are approximately 40 proton microprobe groups around the world, many of whom have made important contributions.

The group at Oxford does good work, and they have contributed much to ion optics in particular; but they have not pioneered the techniques mentioned in the article, and doubtless they would not make such claims.

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REFERENCES

1. J. A. Cookson, A. T. G. Ferguson, F. D. Pilling, *J. Radioanal. Chem.* **12**, 39 (1972).
2. G. J. F. Legge and I. Hammond, *J. Microsc.* **117**, 201 (1979).
3. G. J. F. Legge and A. P. Mazzolini, *Nucl. Instr. Meth.* **168**, 563 (1980).

Response: Legge is correct in noting that an error was introduced (during the production process) into the subtitle of an article on the Oxford proton microbeam by Jeremy Cherfas. Indeed, there are about two score proton microprobes around the world, so the Oxford instrument is not alone in its class. However, the Oxford group claim the distinction of being, as Frank Watt puts it, "the first group to achieve 1-μm spot sizes and currently hold the state-of-the-art performance of 300-mm beam spot for 100 pA of beam."

It was in part because of these claims that *Science*'s European correspondent Cherfas chose to describe the Oxford group's work, and in part because of the remarkable range of applications their work was finding. It was not Cherfas's intent to denigrate by omission the efforts of other groups around the world, nor did the piece claim to be a review of the field.

As for Legge's assertion concerning the origin of the key technique—proton-induced x-ray emission (PIXE)—Oxford's Watt credits neither his own group nor that at Harwell. Rather, he contends that "PIXE was in fact started at Lund, Sweden." He adds that "Harwell developed the first probe utilizing PIXE."

Watt also takes issue with Legge's remarks about the Alzheimer's application. He told *Science*, "The proton microprobe community is well aware of the problems introduced by preparation techniques in medical samples. There are special problems associated with Alzheimer's tissue, and we are trying to address these problems. If George Legge wishes to know about these problems, then he should contact us directly!"

—EDS.

Indirect Costs and Merit Review

Joseph Palca's article "NIH urged to be a smart shopper" (News & Comment, 28 Sept., p. 1496) contains the incorrect statement that study sections "do not even see the indirect costs." Such costs are, by congressional mandate of many years, displayed on the face sheet of grants. This requirement was inserted in Senate report language approximately 8 years ago. The committee wanted reviewers to have a sense of total costs, but it did not want these costs factored into merit review. To ensure that this did not happen, the National Institutes of Health was specifically directed by the congressional staff to educate study section members and to direct them not to consider indirect costs in the determination of merit. It is this policy that is explicitly reversed by the current appropriations report language. It is also important to note that the costs of proposals are among the factors considered by advisory councils in their review of proposals and their guidance to the institute.

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Erratum: The last sentence of reference 3 (p. 801) of the response by B. T. Mossman *et al.* (Letters, 18 May, p. 799) to a letter by A. R. Brody was incorrectly printed. It should have read, "Brody's experiments were done at 4, 10, and 13 milligrams of chrysotile per cubic meter of air."

Erratum: In Bernard M. Oliver's letter "Metrification oversold?" (2 Nov., p. 611), William (Ed) Deming's name was misspelled.