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COVER: In a chamber lined with spikes of absorptive insulating foam, John D'Andrea examines rats being used in studies of low-level radiation. Animal experiments on microwave effects and computer techniques to accurately extrapolate the results to humans are among the many projects in bioengineering at the University of Utah. See p. 154. (Photo: University of Utah)

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LETTERS

Don't strain your eyes

In the article "The Supernova Remnant," (SN: 7/16/77, p. 33), please notice that you said that the Crab nebula is visible to the naked eye. So as not to strain anyone's vision I would like to inform you that it is definitely not visible in less than a 6-inch telescope. It has a low surface brightness due to its size and integrated magnitude of 8.4, which means if the entire light output of this object were condensed into a point it would still be six times fainter than most eyes can see on a clear moonless night. It is interesting to also note that the central star, the famous Crab pulsar, has a mean magnitude of 15.9. One would need sharp eyes, a good sky, and a telescope of at least 12 inches to see this.

Richard E. Hill
Midland, Mich.

Direct C-14 detection

More than a quarter of a century ago, Luis W. Alvarez independently invented the tandem accelerator. It was therefore surprising to us that in a recent letter to the editor in SCIENCE NEWS (SN: 7/16/77, p. 34) he did not mention the fact that there are often great advantages in the use of tandems as ultrasensitive mass spectrometers. The direct measurement of carbon 14 for dating purposes is certainly a good example because the inevitable background of nitrogen 14, which is often crippling with positive ion accelerators, can be eliminated by using negative ion technology.

Questions of priority raised by Alvarez in his letter are traditionally decided on the basis of refereed scientific publications and patents. He chided the editors of SCIENCE NEWS for ignoring the Berkeley proposal for direct carbon 14 detection. Certainly Muller's article was of help to us in appreciating the potentialities of the cyclotron. However, the notion of using mass spectrometric techniques to directly measure carbon 14 is not new (see, for example, Oeschger and Wahlen, *Annual Reviews of Nuclear Science* 25, [1975] 423) and was certainly not invented at Rochester or at Berkeley. Physicists have for many years used accelerators to separate beams of particles of the different masses and Alvarez himself demonstrated the principle of using a cyclotron as a mass analyzer when he identified He³ in the presence of ⁴He before the War.

Our contribution was to show how one such device, the tandem, could be converted to an ultrasensitive mass spectrometer with measured sensitivities of the order of four parts in 10¹⁶ of carbon 14. We did not need to

use enriched samples to see the carbon 14 counts from natural charcoal. The use of a high-energy accelerator at Rochester was not an essential feature of the idea, although for practical reasons it was the most suitable device for us to use at the time. We are now actively designing the smallest instrument capable of being used for direct carbon 14 detection.

The use of this new technology has allowed us to directly measure the carbon 14 in contemporary and ancient samples and more recently to actually date samples. We have further demonstrated that the minuscule background that is present comes from the ion source and is not a machine-generated artifact. No other group has accomplished this to the best of our knowledge. We hope that Muller will soon show that their method can also be used for carbon dating.

H. E. Gove (University of Rochester)
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More from Ralph Nader not less

I am a faithful reader of your magazine, and I strongly object to the statements in Leonard Shapiro's letter (SN: 7/30/77, p. 67). Shapiro claimed that the opinions of Ralph Nader are unworthy of a journal like SCIENCE NEWS and that Nader should not have been quoted by Julie Miller. I found Miller's article "Are Rats Relevant?" highly informative and accurate and the use of Ralph Nader as a source of information quite appropriate. Nader usually backs up his statements with solid scientific information and has done more than most for the improvement of our quality of life. To imply that Nader's activities can best serve "the public taste for nonsense" is absurd.

I would think that what we need is "more Naders and fewer Shapiros!"

Jose Barbosa, M.D.
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Nuclear stockpiling

The article describing neutron bombs and cruise missiles (SN: 7/23/77, p. 60) outlines our self-made path to Armageddon. The proliferation of nuclear weapons among an increasing number of nations, plus recent U.S. tactical "superiority," will lead inevitably to a Soviet response and an acceleration of the arms race. This additional stockpiling will certainly increase the risk of a brutal, hideous war prompted by the United States.

R. Johnson
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