LETTERS

Deep-Sea Drilling

Deborah Shapley's report "Law of the sea meeting: A wet blanket for ocean research" (News and Comment, 14 Sept., p. 1024) was most interesting but told only part of the story.

The spokesmen for the American scientific community have weakened their prospects for a sensible regime for ocean research by their insistence on unlimited freedom. There is nothing sacrosanct about a research vessel. It is just as capable of polluting the seas or creating a hazard to navigation as any ordinary vessel. Moreover, the *Glomar Challenger* has demonstrated a capability to reenter the drill hole in the ocean floor with fresh drill bits that would enable it to strike oil or gas in deep waters. At the same time it has no capability to prevent blowouts comparable to that required of commercial operators. This means that a research vessel could possibly cause a blowout of such disastrous proportions as to pale the Santa Barbara blowout by comparison. Yet, the spokesmen for the American scientific community have persisted in their quest for total freedom from coastal nation control over scientific research beyond a narrow territorial sea.

The U.S. government, in its initial position in the United Nations Seabed Committee, went along with this view and worded its proposed draft of an international seabed treaty of 3 August 1970 accordingly. One need only visualize the reaction of the good citizens of Santa Barbara to word from Washington that neither the federal government nor their own local or state government had any power whatever to prevent a foreign counterpart of the *Glomar Challenger* from proceeding with a deep-sea drilling experiment in the Santa Barbara Channel just beyond the 12-mile limit to appreciate that this position had to be modified—as the U.S. delegation has now done—in the light of our own national interest and that of other coastal nations.

The 1958 Geneva Convention on the Continental Shelf, in a clause incorporated into article 5 of the treaty, reportedly with the active support of the United States, prescribes that

> 8. The consent of the coastal State shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless, the coastal State shall not normally withhold its consent if the request is submitted by a qualified institution with a view to purely scientific research into the physical or biological characteristics of the continental shelf, subject to the proviso that the coastal State shall have the right, if it so desires, to participate or to be represented in the research, and that in any event the results shall be published.

The scientific community has, at times, admittedly had serious difficulties obtaining the consent required by this clause or the comparable consent required by nonadherents to the Geneva convention under customary international law. These difficulties provide a solid basis for seeking meaningful modification of the quoted language. They do not, however, provide a basis for its complete elimination.

The American Bar Association (ABA) has taken a constructive approach to this important problem in the resolution on the natural resources of the sea adopted at its last annual meeting on 6 August 1973. In the portion of this resolution dealing with scientific research, the ABA

> (12) SUPPORTS the general principle of freedom of scientific research, but recognizes the right of coastal States, within internationally agreed guidelines designed to provide the maximum practicable application of this principle, to impose reasonable restrictions on activities on their continental margins which will entail threats to their national security or hazards to the environment, as by drilling into the seabed.

The end result of the international negotiations now under way is much more likely to be palatable to the American scientific community if its spokesmen will support this sensible approach to the problem and work with the U.S. delegation for its effective implementation.

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Nitrites in Foods

A. E. Wasserman and I. A. Wolff, who discuss the use of nitrate in their reply to P. H. Schuck and H. Wellford (Letters, 29 June, p. 1322), do not deal adequately with the question of the use of nitrite in cured meat and fish products, which Schuck and Wellford suggest is an unnecessary hazard to health. Wasserman and Wolff also ignore the problem of formation of carcinogenic nitrosamines in vivo (*1*), which Schuck and Wellford address in their letter. It is this amply

demonstrated possibility which poses the greatest hazard to the public, and is the major reason for the proposal to eliminate nitrite from our food whenever possible.

A limit of 200 parts per million (ppm) of *residual* nitrite in food (meat) set in 1926 is arbitrary and has no scientific basis. The preservative effect depends on the amount of nitrite added to the food before processing (a minimum, so it is said, of 150 ppm). After processing, the residual nitrite can be, and often is, as little as 10 ppm in, for example, ham or canned luncheon meat. It is this residual nitrite which takes part in nitrosamine formation in vivo, and it would seem that an upper limit of 200 ppm is far higher than indicated by good manufacturing practice, and high enough to be a threat to health.

Wasserman and Wolff state that there is a long history of usage of nitrate (and, by implication, of nitrite) with apparent safety. This is an unwarranted conclusion, since cancer is a widespread and common affliction, the cause of which is unknown. Evidence is accumulating about the formation of nitrosamines from nitrite and secondary or tertiary amines (agrichemical residues, drugs, and so forth), both in food and in vivo, which suggests that nitrosamines formed in this way are a cause of cancer (*2*), perhaps the major one. If, as Wasserman and Wolff suggest, the avoidance of botulinus poisoning takes precedence over the possible carcinogenic hazard from nitrosamine formation, consistency would demand that food manufacturers add nitrite to all products in which a botulism hazard exists. One can assume that this is their recommendation for vichyssoise soup and processed mushrooms, large batches of which have been recalled in the past year or so because of the finding of *Clostridium botulinum* contamination in some samples. The feeding study of Van Logten *et al.* (*3*), cited by Wasserman and Wolff, is irrelevant, as the usually accepted practice in toxicology was not followed, namely the administration of greatly exaggerated doses (often 100 times or more the human exposure) to compensate for the small number of animals (180) in the experiment. The results of this 2-year feeding test (in which *nitrite* was added to the meat), cannot possibly be extrapolated to the experience of millions of humans who might consume proportionate doses of nitrite for 50 years or more. Moreover, this experiment did not test the possibility of

formation of nitrosamines in the stomach.

Wasserman and Wolff state that there is no correlation of the amounts of nitrosamines that might be ingested under normal conditions with development of harmful effects, in man or animals. I draw their attention to the philosophy behind the Delaney Amendment—any amount of a known carcinogen is a hazard. To talk of the *potential* hazard of nitrosamines found in food is obfuscation, since these are carcinogens several orders of magnitude more potent than aminotriazole or cyclamates, which have been banned by the government. The benefit of the doubt should be given to the public rather than to the food processors. Surely it is time that nitrites (and nitrates) were removed from the GRAS (generally regarded as safe) list, as were cyclamates, until such time as they are proved safe for human consumption beyond a reasonable doubt.

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References

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2. W. Lijinsky, H. W. Taylor, C. Snyder, P. Nettesheim, *ibid.* **224**, 176 (1973).
3. M. J. Van Logten, E. M. den Tonkelaar, P. Kroes, J. M. Berkvens, G. J. van Esch, *Food Cosmet. Toxicol.* **10**, 475 (1972).

Journal Evaluation

Garfield, in his empirical study "Citation analysis as a tool in journal evaluation" (3 Nov. 1972, p. 471) compares *Solid State Physics, Immunology, Journal of Experimental Analysis of Behavior, Chemical Review*, and other journals with small intersections of common interest. This seems strange, but acceptable, as long as the data are used carefully. However, because I wondered why there were no general geology journals listed in the 152 most frequently cited journals ranked by impact factor (figure 8, p. 477), I talked to a science and technology librarian and was struck with the potential for misuse of this article. Garfield's study can, and probably will, be misused by library administrators who want to cut back on periodicals. After all, Garfield does say (p. 474), "It is apparent, even from the makeup of this partial listing, that a good multi-