LETTERS

Alcohol and Pregnancy

Gina Kolata, in her article "Fetal alcohol advisory debated" (Research News, 6 Nov., p. 642) discusses our study on the effects of moderate drinking during pregnancy and includes the statement, "Kline stands by her conclusions but does note that the results of a more recent, unpublished, study by her group [do] not confirm [the] initial results." I am writing to affirm that I in no way wish to retract or amend our published results (*1*). Kolata's report suggests that two studies have been carried out; in fact, there is a single study comprised of a heterogeneous population. There are many good reasons why our confidence in our early inferences remains. Perhaps the most persuasive, and one which Kolata does not report, is our observation that the effect of alcohol drinking on spontaneous abortion is confined to chromosomally normal conceptions. The specificity of the effect for a portion of all spontaneously aborted conceptions makes it unlikely that our results arise from bias in recall or other sources of confounding.

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References

1. J. Kline, P. Shrout, Z. Stein, M. Susser, D. Warburton, *Lancet* **1980-II**, 176 (1980); J. Kline, Z. Stein, M. Susser, D. Warburton, in *Human Embryonic and Fetal Death*, I. H. Porter and E. B. Hook, Eds. (Academic Press, New York, 1980), pp. 225–240.

Nuclear Waste Disposal

We warmly support the proposal of C. D. Hollister, D. R. Anderson, and G. R. Heath (18 Sept., p. 1321) that the feasibility of subseabed disposal of high-level nuclear wastes be thoroughly discussed, explored, and assessed. We believe, as they do, that this is a most promising avenue by which to avoid placing on future generations the hazards of this generation's nuclear wastes.

However, one danger of disposal in deep-sea sediments is not adequately confronted by Hollister *et al.* Experimental and observational evidence against active natural advection of pore waters driven through the entire sedimentary column by an underlying oceanic crustal convection system is not one of the site selection criteria they propose for a U.S. seabed waste disposal program. If high-level nuclear wastes were to be deposited in an actively advecting natural system, any leakage might be rapidly transported to the biosphere. Consequently, Canada, the United Kingdom, and the Netherlands all include in their site evaluation programs experiments designed to detect such advection in sediments. While Hollister *et al.* do consider this problem obliquely, they place a low priority on experimental verification of presence or absence of advection (for example, their reference 21).

There is now considerable chemical evidence, beyond the geothermal evidence noted by Hollister *et al.*, that active upward advection, on the order of 1 to 10 centimeters per year, of pore water through marine sediments occurs over wide areas of the pelagic ocean. At present such advection can be confidently ruled out *only* where deep chemical diffusion gradients can be demonstrated. In a typical deep diffusion gradient, extending to an underlying basalt basement, dissolved magnesium diminishes continuously with depth, usually vanishing at the basalt contact, while dissolved calcium increases continuously with depth by an amount comparable to the magnesium deficit (*1*). Such a diffusion gradient contrasts markedly with advection-produced pore water chemistry, since advection, at 10 centimeters per year, would transport ions at least two orders of magnitude faster than diffusion. Upward advection would produce a shallow, distinctly nonlinear chemical gradient confined to the sediment boundary layer near the sea floor.

McDuff (*1*) has shown that deep gradients are especially apt to be missing where total sediment thickness is less than 300 meters. From the Deep Sea Drilling Project data reviewed by Lawrence and Gieskes (*2*) we can estimate that deep gradients are absent over perhaps 20 to 40 percent of the ocean floor. The criterion of Hollister *et al.* that the sediments should be oxidized may well tend to favor sediment columns subject to advection. Sayles and Manheim (*3*) have observed that absence of chemical gradients is especially characteristic of slowly deposited pelagic clays.

The regional absence of nonlinear temperature gradients in sediments, as determined by standard oceanographic methods, is not necessarily a sufficient criterion to exclude vertical pore water advection. Measurements over most of the past three decades in all the world's oceans (*4*), including some which extend to a depth of hundreds of meters (*5*), do not generally show systematically nonlinear gradients. Only with the recent development of instrumentation to obtain precise and detailed temperatures with depth in the uppermost sediments have nonlinear thermal gradients been measured to permit the inference of significant vertical advection (*6*). However, such nonlinearity has now been found even in relatively impermeable clays (*7*).

Although the laboratory permeability values referred to by Hollister *et al.* do seem to rule out such advection in the sediments they have studied, we are concerned that either the laboratory measurements do not reflect the in situ permeability (*8*), or that the net hydrostatic pressure "head" driving upward advection through the sediment column may often be much greater than expected (*9*). It seems possible that a fine sediment deposited very slowly in the presence of a steady upward advective flow might develop an exceptionally permeable fabric that would not be apparent in laboratory measurements made on molded core samples. In any case, the presence of deep continuous chemical diffusion gradients would ensure that such advection is negligible.

We therefore urge an additional criterion for site selection: there should be clear evidence, both from chemical gradients and from the thermal gradient, that there is no significant advection of the sediment pore waters at any proposed disposal site.

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References and Notes

1. R. E. McDuff, *Geochim. Cosmochim. Acta* **45**, 1705 (1981).
2. J. R. Lawrence and J. M. Gieskes, *J. Geophys. Res.* **86**, 7924 (1981).
3. F. L. Sayles and F. T. Manheim, *Geochim. Cosmochim. Acta* **39**, 103 (1975).