print. I've tried to corroborate his figures but can't. Not because no one will give me the data, but because no one appears to have them. Yet they are, thanks to Jacobson, now part of the public record—to be quoted and requoted.

I suspect it will take more than one or even a series of editorials in *Science* to change the public image of our food supply—a potpourri of carcinogens.

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1. Philadelphia *Bulletin*, 21 October 1979, p. 10.

Biotechnology and Profit

There is one aspect which I thought was omitted from the otherwise complete factual account by Nicholas Wade (News and Comment, 9 Nov., p. 663) of the founding, funding, and management of research of the smaller new biotechnological companies. Much of what these companies are doing is based on fundamental research, mostly the use of restriction enzymes in recombinant DNA work, research funded by public moneys, some of it I am sure in direct grants to some of the biologists who are now so involved with these companies. This is how it has been with pharmaceutical companies; there is no bar against this, but it seems to me that there is an ethical principle being violated. That principle has to do with the reason why public money is being spent on biological research; namely, that the fruits of this research will be available to the public who has supported it. Of course it will be available, but in the process, there will be profits, great and small, for the companies involved and, I gather, for some of the individual scientists involved. Of course the public will eventually benefit if, for example, a large supply of insulin is available; but at what price?

Now that these companies are set up and are going concerns, may I suggest to those scientists who either manage the companies, sit on their boards, or advise them, that they see to it that the profit margins to the investors are small; and that if large profits accrue, that these be placed in research funds to be plowed back into basic research, preferably to support young scientists who have not had the opportunity to dip into the public trough for private gain.

Finally, a debatable question must be raised based on the premise that there must be some avocations in a capitalistic society that are not tied in to the profit motive, and that scientific research, based on the socialistic principle of funding for the public good, must be one of them.

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Cancer Risk Assessment

The controversy over the appropriate method for assessing cancer risks, as described in *Science* (News and Comment, 25 May, p. 811), cannot be resolved satisfactorily without considering the diverse causes that can lead to an apparent positive result in a bioassay for carcinogenicity. Indeed, the very term "bioassay" is unfortunate, in that it implies that chemicals which are "active" share one particular characteristic that can be quantified and mechanically extrapolated to yield an estimate of risk. Such interpretations, though possibly appealing to the decision-maker, lack credibility. If experiments were perceived as "investigations" of biological activities, rather than as "bioassays," studies would be designed differently and would yield information more meaningful to risk assessment. The resulting estimates, based on recognition of the differing kinds of effects chemicals can exert on the whole animal, would appear more believable than the rigid mathematical interpretations currently proposed.

A helpful perspective on the issue is afforded by considering certain analogies to infectious disease. Bacteriologists distinguish between pathogenic organisms and those incapable of causing illness. They also recognize "opportunistic" pathogens, those capable of infecting a host only if the defense of the host has been weakened. Virulence depends upon several factors, including the host species, and bacteriologists will pause before concluding that the risk to humans is the same as that observed for another mammal. They certainly do not view all pathogens as representing an equal health hazard and know that the progression of an infection depends upon more factors than just the size of the inoculum (exposure). Death associated with infectious disease, just as death from cancer, frequently occurs under conditions (impaired defenses) which indicate that such infection should be viewed as a symptom rather than the cause of an organism's failing. Nobody