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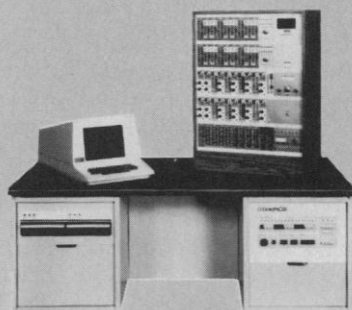
LETTERS

Recombinant DNA Research: A Faustian Bargain?

In all the controversy over recombinant DNA research, no one seems to have come to grips with what I think is the major issue: Should the acquisition of new knowledge, for whatever purpose, be the ultimate and sole criterion in the pursuits of biological research? If the answer is "Yes," then it should be incumbent upon those who advocate this position to expound to society the grounds—philosophical, ethical, social, or legal—upon which they base their conclusions. If the answer is "No," it should be incumbent upon those advocates to clearly delineate what they think are the limits to the freedom to conduct research, and also to define these limits in philosophical, ethical, social, or legal terms. In the case of the present controversy, those who would answer, "Yes" have really limited their discussion to what may be called cost-benefit analysis and have not spelled out the reasons for their beliefs; this absence has led to a degeneration of the arguments so that personalities and motives have replaced rational discussion.

Therefore, I would like briefly to state the case against untrammelled freedom to do research, and I hope that further arguments, for or against, can be based on this discussion. I base my arguments on two grounds, one ethical-social and the other scientific. No one should have the absolute right to do anything he or she wants; I think this is self-evident no matter what the political organization of the society. But here too there are limits to this statement; one can shout "Fire" in one context and yet should not shout "Fire" in another context. In biological research, one can conduct drug trials on humans, a form of research, under certain conditions, and yet may not use human beings as research subjects in another context. The fact that biological researchers now have to sign statements regarding research on humans should be a clear indication that the freedom to do research is not absolute, and the observation that no disavowals to this obstacle have been registered is to me clear indication that biological researchers explicitly recognize this action as a restraint on their research freedom. In other words, what goes on in our laboratories is, and I believe should be, modified by ethical and social consideration of the society in which we live, as pursuant to the laws of our society. This being the case, then it should come as no surprise that biological scientists cannot set them-

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selves up as being the sole judges of the kinds of research they do. This is implied in our country, for most of us attain our research funding through the cooperative endeavor of our scientific peers and of publicly responsible legislators. To state otherwise, and I get the strong impression that this is what the advocates of recombinant DNA research state, is to go against the historical precedents already legalized in our country.

My scientific argument can be stated within the context of a few questions. Do we really know that much more about the world that we can definitely state, or even state with reasonable doubt, what scientific research will lead to? Are we really that much further along on the path to comprehensive knowledge that we can forget the overwhelming pride with which Dr. Frankenstein made his monster and the Rabbi of Prague made his Golem? Those who would answer "Yes," I would accuse of harboring that sin which the Greeks held to be one of the greatest, that of hubris, of overweening pride, even of arrogance. Like the physicists before us, we have entered the realm of the Faustian bargain, and it behooves all of us biologists to think very carefully about the conditions of these agreements before we plunge ahead into the darkness.

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Computers: Minis and Maxis

Arthur L. Robinson's article discussing the increasing use and apparent cost advantage of minicomputers for chemistry computation (Research News, 6 Aug., p. 470) is an incomplete report on trends in computing support for American science. Some time ago the issue passed beyond a simple competition between minis and maxis. The problem now is how universities and research laboratories can best enable scientists to conveniently and economically exploit a rapidly developing technology. The complete story includes considerations raised by Robinson but also the following.

1) Minicomputers can be brought into production by their manufacturers with a development cycle of less than 2 years, compared with the 5 to 6 years required for large, full-range systems. This means that, on the average, manufacturers of minis can make use of components and fabrication techniques 3 years newer than those for large-scale computers.

2) There is no dichotomy between minis and large-scale machines. Some

C&EN May 3, 1976

Heart disease, cancer linked to trace metals

The possibility that variations in dietary and environmental levels of selenium, copper, zinc, and perhaps other metals influence the rate of heart disease in various parts of the world was raised in a series of studies.

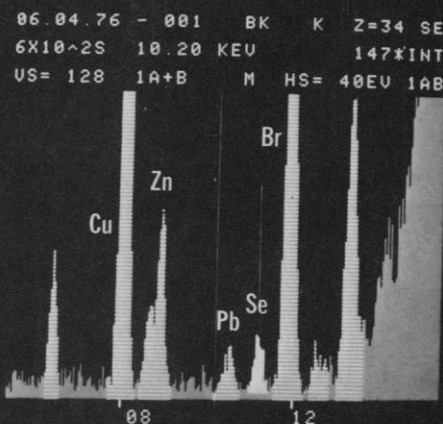
The rapid nondestructive ability to analyze many trace elements simultaneously is what X-ray energy spectrometry is all about. Now, new developments by KEVEX provide medical researchers, the pharmaceutical industry and process control people with analytical capabilities that offer far more potential than traditional techniques such as AA.

In this instance, the Kevex X-ray energy spectrometer measured the zinc-to-copper ratio and selenium concentration in two microliters of human breast fluid. A recent study shows a positive correlation between coronary mortality in 47 U.S. cities and the ratio of zinc-to-copper in cow milk of those areas. The connection between low cancer rate and high selenium diet was also reported for both cancer of the colon and breast cancer. (C & E News May 3, 1976.)

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