

# correspondence

## Genetic engineering

SIR,—In recent months, molecular biologists have discussed the dangers which can arise from careless or ill-advised experiments in genetic engineering, and have attempted, at various meetings, to lay down guidelines as safeguards against these dangers. Since experiments in this field will, for some years to come, be possible only at specialised centres associated with drawing up these guidelines, their voluntary observation provides a degree of protection against dangerous experiments. The reports of such conferences, however, suggest an air of complacency, doubtless unintentional, giving the layman, or the scientist in other disciplines, an impression that all is under control. This is dangerous.

Experience shows that it would be utopian to expect that such safeguards will continue to be accepted by all workers in the field. If it appears possible to use genetic engineering to cause damage or disruption for military purposes (several such possibilities can be envisaged), there will be organisations and states willing to sponsor and scientists willing to undertake such research, motivated by intellectual curiosity, or mistaken patriotism, or even a desire for gain and power. Under the circumstances of secrecy which would almost certainly be imposed, voluntary controls would be ineffective.

Fortunately secrecy in research is rarely absolute and is difficult to maintain in the face of informed vigilance. If the dangers of biological warfare appear to have receded in recent years, it is largely because of the vigilance of organisations like SIPRI, and the discussions stimulated by their reports. When everyone can recognise a danger and can work on counter measures, the danger becomes less acute.

It would thus appear to be an opportune time for molecular biologists to set up their own vigilance machinery, not as a police activity which would be repugnant to most scientists, but as information groups, which collect information on all known ongoing research, and can discuss and publicise the implications and the dangers of such work. Periodical publication of such reports in journals of general scientific interest would create an awareness and interest in these problems, and the publicity might discourage many persons who might

otherwise be tempted into clandestine research.

In the present situation, the scientists' only safeguard against misuse of knowledge is the development of informed public opinion. Creation of such opinion should therefore be accepted as a responsibility of those who are exploring newer fields of research.

Yours faithfully,

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## Superstar technologies

SIR—I am very pleased that you considered our report on "Superstar Technologies" worthy of serious attention. Such constructive criticism as yours is important for any subsequent discussion of the report and its recommendations, and also helps improve our work.

The main point at issue between us is this: does technology, like science, need peer-review and mutual criticism? We think so; you doubt it. What is our alternative? Apparently not very much, since you are suspicious of any serious restraint (even if only moral) on a technologist's freedom of action, lest he emigrate or his enthusiasm be snuffed out.

The working party was well aware of this point; you will find a reference (No. 27) to the paper by Freeman Dyson where it is argued eloquently. But they and the Council felt that the scope and power of modern technologies are so enormous, particularly in their political, economic and social factors, that self-monitoring by enthusiastic experts is simply not good enough. Hence our introducing the idea of "Superstar Technologies" and hence our advocacy of a Technology Implications Commission with its carefully delineated functions.

Yours faithfully,

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## Isolative sound-change

SIR,—It may be suggested that the most important unsolved problem of Historical Linguistics is: why do isolative sound-changes take place? The nature of isolative sound-change is best explained by an example. Anglo-Saxon *bāt* changed into Middle English *bōt*

(to rhyme with *fort*), which changed into Modern English *boat*; Anglo-Saxon *hām* changed into Middle English *hōm*, which changed into Modern English *home*. It is possible to add very many examples with Anglo-Saxon *ā* to these two, and, on the basis of these examples, we formulate the sound-changes "Anglo-Saxon *ā* changes to Middle English *ō*, which changes to Modern English [ou]" (where [ou] is the vowel-sound in *boat* and *home*, spelt in different ways). This change is not affected by surrounding consonants—some changes are—that is why it is called "isolative".

The reason for sound-changes of this nature is entirely unknown. In fact, rather few suggestions as to a reason have been made; there was, perhaps, more interest in the subject in the nineteenth century than there is to-day. It may be that the problem, if it ever is solved, will be solved from disciplines other than Historical Linguistics—Psychology comes to mind. It seems that self-analysis is unlikely to help. I have an example of my own speech: I pronounce the word *fire* identically with *far* (and so do some other people), whereas many people pronounce it almost to rhyme with *buyer*. And so for all the rhyme-words (*tyre*, *mire*, etc.). This change—[aiə] to [a:] in phonetic terms—has certainly taken place in my speech during my lifetime. But I am not able to say why.

Yours faithfully,

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## A hundred years ago

THE Rhind Lectures on Archaeology, in connection with the Society of Antiquaries of Scotland, will be given by Dr Arthur Mitchell, commencing on Tuesday last, and continued on the following Fridays and Tuesdays. There will be six in all, and the subject is, "Do we possess the means of determining scientifically the condition of Primaevial Man and his Age on the Earth?"

from *Nature*, 13, 495; April 20, 1876