

## E D I T O R I A L

When the last rider in the Light Brigade looked over his shoulder at Balaclava, he was surely alarmed to find nobody following in support, but too fully occupied to do anything about it. Are those of us who are so involved in the onward-and-upward career of biotechnology likely to find ourselves in the same uncomfortable situation? To judge from the length of time some advertised posts remain vacant, the danger may be on us already.

Within biotechnology the existing availability of training for new recruits is probably adequate, and there is certainly no lack of discussion as to the best framework for training courses, sometimes at first degree level but more often through various kinds of supplementation or even 'conversion' courses at postgraduate level. From that discussion it is at least clear that both the goodwill and the capacity to do what is needed are there, and even if those involved were to become for a time over-employed such a situation would be self-correcting. A more serious problem and one not within our direct control, is that of recruiting the students whose availability such courses presumes.

In the English-speaking countries at least, there is no serious shortage of clever and interested young persons with a training in biological science and an interest in its practical applications. The problem - perhaps peculiar to our present culture - is the shortage of suitably-inclined engineering graduates, and particularly of good graduates willing to defer immediate employment for the supposed rewards of further training. At this point our problem becomes part of a wider one indeed, but it is still in our own best interests to consider and if possible to speak to that problem. Here in Britain there has been much debate centred upon an alleged lack of esteem (or status, or pay) accorded to qualified engineers in our admittedly languid industries. That may well be true, but our particular problem centres upon the further fact that, of the insufficient total who now qualify, nearly all are recruited directly into those same industries without feeling a need to qualify themselves further, even in aspects which are admittedly developing rapidly, and fruitfully, and contain so much that must be new to most of them. Do we perhaps need to try to raise the standing of these special branches, of engineering combined with particular science inputs (in our case, biology), even more than that of engineering in general? Or is university already too late; does the problem not start in the schools, where as many as one in three of those teaching, say, physics, may be quite unqualified to do so?

For the British universities in particular, the problems of recruiting good students is all the more serious since current government policies seem almost certain to hit the engineering schools particularly hard. However we may find some vicarious ease in reports that the problems in question are raising themselves in North America too.

Contrary to popular expectation, the transfer of innovatory technology into productive industry is running into difficulties even in the U.S.A. - though we can only be pleased that a recent study notes biotechnology as one of the few apparent exceptions. And meantime the steady fall in the number of U.S. students receiving Ph.D.'s in engineering - declining by 7% per year since 1972 (Science, 206, 149) is giving rise to the same alarm ('serious manpower problems') and seems likely to provoke similar discussions ('initiate corrective action now rather than wait for a crisis') as we have noted in Britain. At least if the disease occurs more widely, we shall be less liable to ascribe it to purely local causes.

The pity is that as we see it, those same attitudes amongst intelligent and thoughtful young people that may be turning them against 'hard' science and technology are ones which, viewed in a clearer light, might be seen as intrinsically sympathetic to the aims, and even the methods, of biotechnology - for whose practical realization that same 'hard' science is of course essential. Nothing damns the approach more than its half-baked advocacy. It will be a pity if the hands are unable to bring about what the mind has conceived - and the heart desired.

Manchester November 1979