PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

Introductory Remarks to the First Session

William Paton

Phil. Trans. R. Soc. Lond. B 1984 **304**, 3-4
doi: 10.1098/rstb.1984.0003

Phil. Trans. R. Soc. Lond. B **304**, 3–4 (1984)
Printed in Great Britain

Introductory remarks to the first session

By Sir William Paton, F.R.S.
University Department of Pharmacology, South Parks Road, Oxford OX1 3QT

The Royal Society has held, in recent years, a number of discussion meetings concerned with our environment – land, sea and air. One held in March 1982, entitled *Technology in the 1990s: the sea*, touched on our subject today. As part of that meeting, P. R. Christopher surveyed the capacity of techniques using divers, and of other techniques, in performing a particular hypothetical task, imagined to be the result of damage to a seabed manifold through a fall from a platform of a 15 ton container holding tools and some explosive. The task was to remove the container, recover the explosive, survey the damage, detect the cracks in the manifold, and report on methods of repair and cost involved – all this at two depths, 140 m and 480 m. I will not recapitulate his conclusions, which reflect, of course, the old debate of 'man versus machine'. What struck me, however, was the central place that human physiology holds. Man's versatility and his capacity for skilled work, and for response to the unexpected, are unrivalled. As a result, for most of the task, the machine is more suitable only when the limits to human physiology are reached. Anything that extends those human limits constitutes an advance.

But that thought was not the only, or even the main stimulus to my proposal for this meeting to the Society two years ago; rather it was Lord Florey's last Presidential address here, in November 1965, when, after referring to the boost to scientific morale given to the United States and Soviet Union by the recent triumphs in space exploration, he asked why this country could not channel its activities into some great enterprise; why not in oceanography and the exploration of the possibilities of the sea, its waters, and what is beneath them, an enterprise that could become a 'pride and joy'. The question, put by him nationally, remained in my mind as a general one, for international science, for which physiology and medicine would have to play a vital part.

Most of us are, I think, in the hyperbaric field, either in work or at play. But I would like to suggest that this is not simply another hyperbaric meeting. The discussion meetings review lectures, conversaziones, and publications of the Royal Society have a function, that of presenting an account of some area of science to the scientific community as a whole. One can feel that there is some timeliness in such a meeting on hyperbaric physiology and medicine here. I am not referring to the long association of the Royal Society with this field, from Robert Boyle and Edmund Halley in the seventeeth century, through engineers such as I. K. Brunel, Smeaton and Rennie exploiting the practical use, to more recent names like the Haldanes, father and son, and Leonard Hill. It is rather that the subject is entering a critical zone. If I think back to the state of knowledge at the time, nearly 40 years ago, when I joined the Hampstead laboratory under the then Dr G. L. Brown (testing British and German submarine escape and diving equipment for respiratory characteristics and CO_2 removal, and working on CO_2 intoxication), and if I compare it with what can be done today, the achievement seems, to me, astonishing. Then, diving around 250–300 ft (75–90 m) was near the limit; today, men have been able to do work at pressures of 70 atm, equivalent to over 2000 ft (609.3 m) of water,

or about 0.5 ton per square inch. Yet, despite such an advance, and the openings created for further progress, one is now learning that the demands of the navies and of the oil industry, which so greatly catalysed the advance, are now waning. If that continues, what strong motives for further work will remain? Perhaps only the solution of scientific problems still outstanding, the need for greater safety for the hundreds of thousands of recreational divers, and man's persistent wish to explore, to extend his limits.

With this disparity between past achievement and future outlook in mind, we have arranged that in the last session we might try to stand back and look at the field as a whole – its possible new directions, and the priorities attached to them. It is unfortunate that time allows us only to discuss some of it in detail, and we had, reluctantly, to omit oxygen poisoning, respiratory problems, thermal balance, communications, and other important matters. Nevertheless I hope it will be possible to address some general questions: Is hyperbaric physiology and medicine a subject – or a collection of *ad hoc* problems? By 'subject', I mean something that catches the scientific imagination, is useful but is not driven solely by practical need, and somehow always attracts new recruits to its work. What are the scientific growth points? What practical benefits can flow? Here, viewing diving as hedged about with constraints, one might be allowed to dream a little, and ask: if one could find the way, which would be the most worth removing: oxygen toxicity, separation in the body of inert gas, the effects of pressure, or some other? Finally, where is such work best done? Such questions are strategic, perhaps too philosophical, and I would not want them to distract from the hard science of the intervening papers. But whether we can start on them here, or must leave them for further thought, I believe it is important that they be answered.

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES