

effort is interlocked with research effort in Britain generally. What is lacking appears to be the authority or the will. If the Minister for Science is indisposed to accept responsibility which appears to arise directly out of his responsibility for the Overseas Research Council and the other Research Councils, the inquiry already set on foot by the Colonial

Secretary into the organization of technical assistance can scarcely fail to shatter the present complacency. It may stimulate something of the reappraisal and oversight of the whole of this research effort and its adequacy in relation to existing and future needs and to available resources of man-power as well as of finance that is overdue.

THE PORTUGUESE MAN-OF-WAR

IN a well-produced report on the Portuguese man-of-war*, Mr. A. K. Totton and Dr. G. O. Mackie have written complementary accounts, natural history and morphology by the former, and behaviour and histology by the latter. The two sections are based, partly on material from the *Discovery* collections, and partly on the results of a three-months trip to the Canaries.

Mr. Totton provides a non-technical description of *Physalia* for the layman and goes on to describe its habits, somersaulting behaviour, flotation and motion in relation to wind and water. From experiments at Arrecife he finds that the animal floats with its long axis at an angle of about 45° from the down-wind direction. He does not accept Woodcock's hypothesis that specimens from the southern hemisphere are nearly always mirror images of those from north of the equator, and the following explanation advanced by Mr. Totton appears to be much more satisfactory: "I think that left or right-handedness in a particular individual must be established on the first windy day that the larva keeps to the surface. The larval tentacle would cause a drag on the windward side, so that the float would be blown (so to speak) to leeward. As new tentacles grow. . . this drag would be increased and the part of the float from which they are budded would become bowed out to windward as a bulge, resulting fortuitously in a left- or right-handed individual".

The main part of Mr. Totton's report, however, is a detailed re-investigation of the complex budding pattern in the cormidial groups of appendages, in which he has been able to substantiate and amplify the basic work of Huxley, Lens and van Riemsdijk, Steche and Okada. These structures are described in great detail, and there are many excellent photographs; but this morphological section would have been easier to understand if more stylized drawings (like text-figure 26), as well as stereo-diagrams, had been used to clarify the complicated pattern of budding.

On origins, the author accepts the well-known idea that the ancestral form was a kind of actinula with an apical float and that this became colonial, as implied by Delage and Hérouard (1901, pl. 23). It is further suggested that "the evolution of *Physalia* and the other siphonophores seems to be linked with that of certain corymorphine, myriotheline and margelopsine hydroids; with *Pelagohydra* and with the so-called Disconantha (*Veleva*, *Porpema*, *Porpita*)". This is a curious assemblage of forms because the tubularoids (including, *inter alia*, corymorphines and margelopsines), the myriothelines and

the so-called Disconantha (Chondrophores) are very distinct hydroid groups. In particular, the Chondrophores have been conclusively shown to be 'pteronemid' hydroids (that is, allied to *Zanclaea* rather than *Tubularia*) by Picard, but the author seems to have overlooked this and much other recent work bearing on his problem. Nor does he discuss the possibility of siphonophore evolution from a group other than capitate hydroids, and, in this connexion, the Actinulida have a strong claim for consideration.

There is some confusion in terminology, there being, for example, no distinction drawn between a hydromedusan gonozooid (medusa or medusa bud) and a disconanth gonozooid (reproductive hydranth bearing medusa buds). It is also surprising to find that the author equates "an asexual replicated gonozooid of *Veleva*" with a blastostyle of *Climacocodon*. Dr. Mackie (p. 372) also promotes this same view that the blastostyles of *Corymorpha* and the reproductive polyps of *Veleva* "are alike and homologous in every respect", but this interpretation is unlikely to be acceptable to hydroid specialists.

On the association of the fish *Nomeus* with *Physalia*, Mr. Totton does not discuss a new interpretation of the immunity of some fish to celerentate stings put forward by Davenport and Norris. These authors, working on *Amphiprion* and the sea anemone *Stoichactis*, demonstrated that while the thick mucus covering of the fish remains intact, the nematocysts are not stimulated, but once this is removed (as with contact with a net) the fish is vulnerable. Some such mechanism may protect *Nomeus*.

Dr. Mackie's plan to investigate the behaviour and reactions of *Physalia* was broadened to include also histology in order to establish, in particular, the extent of the nervous co-ordination between the different parts of a siphonophore colony. He was able to examine the muscular and nervous systems, the mesogloea, the gas gland, the nematocysts and the histology of the digestive regions, the whole being a valuable contribution to siphonophore biology.

In specimens of *Physalia* exposed to the wind, the crest or sail is erected, and, although the way in which the wind acts has not been determined, any stimulus causing an overall tightening of the float musculature will normally result in crest erection. Dr. Mackie aptly describes the mechanism as reminiscent of a pneumatic tyre with an inflatable rubber tube—the tube corresponding, of course, to the pneumosaccus inside the float.

Space does not allow full consideration of these exceptionally well-illustrated reports, but the fate of the gonophores, the great puzzle in *Physalia*, remains unsolved; it is suggested that the eggs undergo development in the depths.

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* *Discovery Reports*: Vol. 30, Pp. 301-408, Plates 7-28, August 1960: Studies on *Physalia physalis* (L.). Part 1: Natural History and Morphology. Part 2: Behaviour and Histology. By A. K. Totton and G. O. Mackie. (Cambridge: At the University Press, 1960.) 70s. net.