

chemicals, mortality on fast highways, the burning of heathland and the sprawling out of cities. Isolation was becoming increasingly difficult to find and the time might well be coming when it would have to be administratively regulated. Referring to the work of conservancy in managing and studying what he hoped would eventually be some 150 reserves in Britain, a number representing the full spectrum of the country's natural habitats, Mr. Nicholson said that people were getting away from the sentimental idea that reserves were places where nothing was killed. The cropping of vertebrate resources might prove to be the best form of land management.

Dr. L. Harrison Matthews (scientific director of the Zoological Society of London) said that of the three orders of marine mammals, the Cetacea, the Pinnipedia and the Sirenia, the future of the whales was unquestionably precarious, but as the future of whaling was precarious too, the two facts might cancel each other out. There had been a virtual break-down in the international control of the situation; populations of the blue whale might be at a minimum for recovery and the overall length of the fin-whale was getting smaller. However, with the advent of pelagic factory-ships, whaling as an economic proposition might stop long before the whales were killed off, although the Japanese, who hunted for meat, might well go on. He thought that if carefully managed the future of the seals was reasonably secure; the elephant seal was now re-colonizing its former haunts in the Antarctic and the walrus seemed to be holding its own. Less, however, could be said about the future of the sirenids, the dugongs and manatees. The latter were now less common than they were in the Caribbean, but were reasonably plentiful in northern South America. Recent trials had shown that the manatee had an unusual appetite for grasses and aquatic herbs, and if it could be successfully introduced into weed-choked waterways it might become a useful and important animal in the ecology of the tropics.

Mr. P. H. Greenwood (British Museum (Natural History)) said that the freshwater fauna of tropical Africa, particularly the fishes, posed numerous evolutionary, zoogeographical and ecological problems. Each lake was characterized by a high degree of endemism, especially among the Cichlidae, which had undergone extensive adaptive radiation in the past ten million years. Likewise, each river

system was characterized by its own assemblage of species co-existing with others of a more general distribution. The danger, he thought, was in the widespread introduction of species from one system or lake to another where it was not endemic. These actions were partly the consequence of steps taken to counter-balance the threat or the fact of the over-fishing of the endemic species. The results were unpredictable because so little was known about the overall ecology of the waters, but they might well upset the bionomy of the lakes. Mr. Greenwood pointed out that some species were known to run up rivers and temporary flood streams to spawn in areas inundated during the biannual rains. Such species were particularly vulnerable to the effects of flood control and irrigation projects. As the future of the two British freshwater stations in Uganda and Rhodesia was by no means assured, he hoped that every effort would be made to ensure their continued existence.

Dr. Peter Crowcroft (British Museum, (Natural History)) reviewed what little information was available about changes in the status of Australian mammals, particularly the small marsupials and native rodents which had been replaced over immense areas by the introduced house mouse and ship rat. The introduction of the European fox constituted one of the greatest threats to many terrestrial forms, but the available evidence suggested that the arboreal marsupials were in no danger. It was noteworthy, too, that both the Monotremes, the spiny anteater (*Tachyglossus*) and the duck-billed platypus (*Ornithorhynchus*) were widespread and abundant in the eastern States. Although Tasmania possessed less species, it appeared to have a better chance of preserving them, particularly as the fox had not been introduced. The fate of the thylacine or Tasmanian 'tiger' remained in doubt, but the Tasmanian devil (*Sarcophilus*) was abundant. An important new factor in conservation was the recently formed Australian Mammal Society, which was stimulating research and co-ordinating survey work. This should enable further changes to be assessed with far greater accuracy. The paucity of information about the distribution and numbers of Australian mammals in the last century made it difficult to distinguish between those changes caused by settlement and those which were already proceeding naturally, perhaps as a consequence of climatic changes.

JOHN HILLARY

COLONIAL RESEARCH, 1959-60

COLONIAL RESEARCH, 1959-60*, follows the pattern of recent reports. It is slightly shorter, due in part to the disappearance of a report from the disbanded Colonial Products Council, which is replaced by a brief report from the Tropical Products Institute of the Department of Scientific and Industrial Research on work done on behalf of Colonial territories. It also includes the fifteenth annual reports of the Committee for Colonial Agricultural, Animal Health and Forestry Research and the Colonial Medical Research Council, the sixteenth annual report of the Colonial Social Science Research

Council, the thirteenth annual reports of the Colonial Economic Research Committee and the Colonial Pesticides Research Committee, the fifth annual report of the Colonial Road Research Committee, the annual report on fisheries research of the Colonial Fisheries Advisory Committee and reports from the Tsetse Fly and Trypanosomiasis Committee and the Director of the Anti-Locust Research Centre. Besides the annual report on Colonial research, there is a section dealing with research matters not covered by the reports of the specialist advisory bodies, and this refers to building and housing research, industrial and engineering research, meteorology, and geological surveys, as well as to the work of the Falkland

* Colonial Office. *Colonial Research, 1959-60*: Pp. 381. (Cmnd. 1215.) (London: H.M. Stationery Office, 1960.) 17s. net.

Islands Dependencies Survey and of the Man-power Research Unit, Jamaica.

The annual report on Colonial research notes the dissolution of the Colonial Research Council, and afterwards of the Colonial Road Research Committee, in June 1960, and of the Colonial Medical Research Committee, in July 1960. The functions of the former have been absorbed by the new Committee on Overseas Road Research, which will advise the Road Research Board of the Department of Scientific and Industrial Research, and also the Colonial Secretary, on Colonial road research. Those of the latter have been absorbed by the new Tropical Medicine Research Board set up by the Medical Research Council, and the new Board will advise the Colonial Secretary, through the Medical Research Council, on all medical research in and for the Colonies financed from Colonial Development and Welfare Funds. To the work of the Overseas Research Council there is only the slightest reference: the Council is said to be considering the retention and recruitment of scientific staff for work overseas, and it is stated that the Council will be able to call for advice on existing research organizations, including the Colonial Research Advisory Committee; but it is apparent that, while these bodies are to keep the Overseas Research Council informed of their activities, they are to report direct to the Colonial Secretary.

There is, in fact, nothing in *Colonial Research, 1959-60*, to provide the conspectus of overseas research which the establishment of the new Overseas Research Council might be expected to provide, or to indicate that the new Council is likely to be in a position to provide such a conspectus in the near future. Nor can any justification be found in its pages for the change of name, and the dropping of a honoured term to which the Colonial Secretary paid a timely and handsome tribute in the House of Commons in December. It would appear that activities will continue much as before, and there is no hint of the vision and imagination that are required to seize the opportunities that overseas research and technical assistance generally now present.

These opportunities are, in fact, stressed by the substantial increase in Colonial Development and Welfare Research Schemes made during the year. The 134 new schemes and 82 supplementary schemes, involving grants totalling £2,370,261, compare with 71 new schemes and 63 supplementary schemes, totalling £798,974 in the previous year, and brought the total allocation to research schemes since 1940 to £21,864,193. About 42.6 per cent of the £2.37 million granted in 1959-60 was for agricultural, animal health and forestry schemes, 15.8 per cent for medical research, 2.6 per cent for fisheries research, 1.9 per cent for tsetse and trypanosomiasis research, 2.1 per cent for social science economic research, 23.7 per cent for pesticides research, 2.4 per cent for products research, and 7.1 per cent for anti-locust research. About 33.5 per cent of the gross allocation was for schemes to benefit the East African territories, 7 per cent for the West African group, 15.5 per cent for South-East Asian territories and Hong Kong, 12.5 per cent for the West Indian Colonies, British Guinea and British Honduras, 1 per cent for the Central African territories and 30.5 per cent for other territories or for schemes of general interest.

Twenty-four new appointments were made during the year to the Research Branch of the Overseas Civil Service; but the total complement in March

1960 was 199 compared with 207 in March 1959. Two Research Fellows, one studying human trypanosomiasis at the West African Institute for Trypanosomiasis Research, and the other investigating arterial hypertension in Jamaica at the University College of the West Indies, completed their investigations during the year; a third Research Fellow, studying the effect of diet on the levels of various co-factors and enzymes concerned with carbohydrate and fat metabolism at the University College of the West Indies was released from his fellowship for other research work. Two further research fellowships and six research studentships were awarded during the year.

Although, as already stated, *Colonial Research* does not provide the conspectus of overseas research that might be expected and that indeed is essential, the reports of the several specialist advisory committees, besides including a list of publications during the year, contain much information on research activities outside the direct responsibility of the particular committees. That of the Committee for Colonial Agricultural, Animal Health and Forestry Research—much the longest—includes accounts of the work of the several regional research organizations in that field in East and West Africa, and the West Indies and of the Imperial College of Tropical Agriculture, and also accounts of research carried out by the Colonial Departments of Agriculture, Forestry and Animal Health. Similarly, the Colonial Fisheries Advisory Committee reports on the work of the Sierra Leone Fisheries Research and Development Unit, the East African Fisheries Research Organization, Jingo, the East African Marine Fisheries Organization, Zanzibar, the Northern Rhodesian-Nyasaland Joint Fisheries Research Organization, the Tropical Fish Culture Research Institute, Malacca, and the Fisheries Research Unit of the University of Hong Kong. The Colonial Medical Research Committee likewise reports on the work of the regional organizations for medical research, and a research undertaken and financed by the Medical Departments of Colonial Territories, while that of the Colonial Pesticides Research Committee, besides reviewing the work done for the Committee by its research units at Porton and in East Africa, by the Agricultural Research Council's Unit of Experimental Agronomy, Oxford, at Long Ashton Research Station, at Rothamsted Experimental Station, at the Imperial College Field Station, Silwood Park, and by the Herbicide Unit of the Regional Research Centre, Trinidad, gives more than half its space to research not under the aegis of the Committee. The report of the Colonial Social Science Research Council has appended to it the annual reports of the East African Institute of Social Research, the Nigerian Institute of Social and Economic Research, the Institute of Social and Economic Research, the University College of the West Indies and of the Rhodes-Livingstone Institute. The report of the Tsetse Fly and Trypanosomiasis Committee is essentially an account of the work of the regional research organizations in East and West Africa, supplemented by a review of activities of territorial departments, and that of the Director of the Anti-Locust Research Centre on Locust Research and Control is no less essentially an account of regional and co-operative effort.

The material is thus largely available for some authoritative conspectus of research effort overseas and also much evidence of the extent to which that

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.

W. J. REES

* *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.