FISH CULTURE

Traité de Pisciculture

Par Prof. Marcel Huet. Troisième édition. Pp. xii+369. (Bruxelles: Éditions Ch. de Wyngaert, 1960.) 450 francs; 9 dollars.

IT is a pleasure to welcome the third edition of Huet's treatise on fish culture. The new material in this edition consists of some expansion of the section on the culture of *Tilapia* in tropical Africa, and new methods (using new synthetic herbicides) for controlling excessive vegetation in ponds.

The book is written for fish culturists in temperate climates, and this in effect means largely carp culture and trout culture. Carp culture has had adequate treatment elsewhere, for example in Wunder's *Fortschrittliche Karpfenteichwirtschaft*, (reviewed in *Nature*, July 8, 1950), so Huet is right in giving the most detailed treatment to trout culture. He devotes 63 pages of text and 62 plates to the subject—the largest section in the book. But he has by no means neglected other fish which are cultured, and has chapters or sections on carp, on tench and other fish which can be cultured with the carp, and on the culture of the pike, of coregonids, black bass, eel, and of *Tilapias* in tropical Africa. Huet interprets 'fish culture' in the wide sense, dealing with the raising of fry and fingerlings for the stocking of natural waters, as well as for raising to table size in ponds. Only the fancy-fish trade is omitted, and this has its own extensive literature.

The sections on general principles are useful and well illustrated. Chapter 1 deals with the construction and management of fishponds, on the choice of site, the levelling to be done, the sources and quality of the water, the soil, and the engineering work needed. The diagrams are especially useful. This theme is continued in Chapter 7, with accounts of pond maintenance and improvement, including the control of weed-growth, which may not only much diminish fish production, but can also lead to complete filling up of the pond.

There follow accounts of the 'dry period' and alternative crops, the use of lime and the reasons for it, and the use of fertilizers to increase production. In my opinion, these sections could have been expanded; for at a time when labour costs are rising, and suitable fish-fodders are in many cases becoming more costly, the correct use of fertilizer is still the cheapest way of securing a large increase in the fish crop, and the possibilities are by no means fully explored.

Chapter 2 covers the food of fish in ponds, with some good illustrations of the most important food organisms. The treatment includes a brief account of the ecology of a pond and the nutritive cycle, and ends with the practice of supplementary feeding and a list of the most important supplementary fodders, their preparation and their nutritive quotients. Huet repeats the view that at least 50 per cent of the food of carp in ponds must consist of natural food, because the latter contains enzymes which assist the fish in the digestion of the supplementary food; but this is surely no longer accepted. The stomach-less carp nevertheless possesses a very effective range of digestive enzymes; in fact, recent work in Israel suggests that the carp is as efficient a digester of fodder as cattle. The unquestioned value of a high proportion of natural food lies partly in its high protein content, which means that supplementary fodder can consist largely of cheap carbohydrates, and partly in something resembling the 'animal protein factor' of the stock-raisers and poultry farmers, which may well be associated with vitamin B_{12}.

Chapter 3 deals with carp culture, Chapter 4 with trout culture, and Chapter 5 with the culture of other fish. Chapter 6 deals with rates of stocking and productivity, and emphasizes, among other things, the difficulty in assessing the probable natural rate of productivity of newly constructed ponds. A final Chapter, 8, covers the methods of fishing out of a pond, and the handling and transport of the fish.

This is a lot of ground to cover in 270 pages of by no means closely printed text (there are 93 pages of photographs), and I have no doubt that Huet has been obliged to exert rigorous selection of his material. The obvious success of the book has justified his treatment. The paper and format are excellent, and the 280 photographs are very well done. It is regrettable that the book has no index, and that the references to the literature are inadequately given. Perhaps these could be supplied in the next edition.

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ECOLOGY OF SOIL FUNGI

The Ecology of Soil Fungi

An International Symposium. Edited by D. Parkinson and J. S. Waid. Pp. xi+324. (Liverpool: The University Press, 1960.) 42*s*. 6*d*. net.

NEARLY fifty years ago Waksman raised the problem of whether the soil is the home of an indigenous mycoflora, or merely the sink for fungus spores floating in the atmosphere. The answer, which he and subsequent workers gave, has been so clear that it has even been suggested that the fungal load of the atmosphere is largely derived from the soil population. The next phase of research on the soil fungi was largely floristic: the components of the mycoflora were identified and enumerated; the world-wide distribution of many species was established; floras characteristic of different soils and also of environments within soils (especially the rhizosphere and the roots of hosts susceptible to pathogenic fungi) were recognized. More recently, attention has been directed to research on the activity of fungi in the soil, and during 1958 a small group of workers was convened at the University of Liverpool for a symposium on the ecology of soil fungi. The publication of the proceedings of the symposium in this book emphasizes the value of such specialized meetings, although the value of including verbatim reports of the discussions is doubtful, as such matter is impermanent and often inconsequential.

The general picture of the soil fungi emerging from this symposium is one of populations consisting largely of resting organisms in a mosaic of micro-environments with micro-zones of antagonism, making little mycelial growth, but bursting into activity when some event brings fresh nutrient to resting cells able to exploit it. Small soil animals, root growth and litter accumulation play an important part in producing such events. Much of our present