

consisted of smaller species of crustaceans and rotifers, the latter numerically dominant. The fishes in Poltruba were removed by rotenone in two steps. On recovery the larger species of planktonic crustaceans came in, rotifers declined in abundance, and the transparency increased by several times. These studies agree with those previously reported by Hrbáček that numbers and kinds of fishes control the biological (plankton), chemical (O_2 , pH), and physical (transparency) properties of water bodies. Several earlier studies in the literature could be explained on this basis.

J. Lellák studied the effects of fish removal on the benthos of five Elbe ponds, including Poltruba. The fish were killed variously with rotenone, $CuSO_4$, Fish-tox, and DDT-HCH. In all instances there was a rapid decline in the benthos and subsequently a marked expansion over poisoning levels. As there was little correlation between productivity of the benthos and the nitrogen and carbon content of the sediments, Lellák concluded that the chief nutrition of the benthos is not the sediments themselves but rather the plankton rain from above. Lellák believes that the benthos is dependent "on the biological regime in the water column above the bottom." Poisoning transferred a large amount of food to the bottom, which stimulated large populations of benthos. Chironomids came in first because of their continual supply of eggs during the summer. These organisms seem to depend rather directly on algae. As the filter-feeding cladocerans developed, the populations of algae were reduced, which curtailed the plankton rain and thereby caused a decline of the midges. Oligochaetes increased in abundance as the midges declined. This interesting postulated succession seems borne out by the data.

The three remaining contributions in the volume include one by J. Hrbáček on a procedure for calculating the number of samples from each depth of a pond to obtain a composited sample representative of the entire pond. The bathymetric surveys were made through the ice by sampling at the intersections of a rectangular grid. In an appendix to this paper, C. O. Junge analyzed the depth distribution of ponds and backwaters in Czechoslovakia and of 107 lakes in other parts of the world. The volume distribution with respect to depth varied from a cone for shallow ponds, through a hyperboloid for typical ponds, to an ellipsoid for deep backwaters.

V. Straškrabová-Prokešová did an experimental study on the effect of turbulence and aeration on BOD, and P. Blažka has a short but significant study of crude protein, glycogen, and fat in algae, zooplankton, benthos, and fishes. The percentage of protein increases from algae to zooplankton to fish. Assuming a 20% transformation coefficient, Blažka calculated that cladocerans obtain about 50% of their total energy from proteins, and fish obtain about 65%.

These papers are good to have published because of their overall significance and because of

the fact that they are documented by a more extensive presentation of data than is customarily allowed by the average national or international journal. The papers have been well edited, and for the most part the English is clear and correct. There is a fair number of typographical errors, but these, although bothersome, can be disregarded. Hrbáček is to be congratulated for a job well done, both for his part in stimulating, directing, or personally conducting the various research projects and for bringing these diverse, yet interrelated studies, to publication.

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"Meteor" Forschungsergebnisse. 1967. (Issued by Deutsche Forschungsgemeinschaft.) Reihe D, No. 1, 88 p. To subscribers, DM 68.40; to nonsubscribers, DM 95. No. 2, 98 p. To subscribers, DM 66.60; to nonsubscribers, DM 92.50. Gebriider Bornträger, Berlin-Nikolassee.

A list of 102 stations where fishes or fish larvae have been collected in the Red and Arabian Seas during November 1964 to March 1965 introduces two papers in the first issue by A. Kotthaus. Bottom trawls (to 290 m) and midwater trawls (to 1,100 m) were used on slightly more than half of the stations. The orders Isospondyli and Giganturoidei are treated on p. 7 to 70, and the order Iniomi is dealt with on p. 71-84. Illustration is primarily by photographs and X-ray pictures. Other orders and an ecological evaluation of the observations are to follow.

A magazin-net for collecting small plankton, primarily to be towed vertically, is described by R. Simonsen on p. 85-88. Six buckets at the cod end are successively changed by a spring action activated with an electromagnet through a single-conductor cable. The mechanism is pressure-compensated. The cod end is flushed briefly during bucket changing. There is no provision to measure flow or depth of closure, but jerks during bucket changing may show on a depth-distance record. Seven failures on 103 stations were caused by an easily remedied flaw of the original design.

The second issue contains results of a two-week visit to the Sarso Islands (Farasan Archipelago), about 50 km from the southern Saudi-Arabian coast approximately at 17° N lat, 42° E long. An introduction (p. 1-6) is given by S. Gerlach who then describes the interstitial fauna of the coastal groundwater on p. 7-18. Freelifving marine nematodes that are characteristic species of the groundwater community elsewhere were found in the zone of brownish water that is removed from immediate contact with the sea. The salinity of this water during the visit was mostly above that of the adjacent seawater. Since the low rainfall of the region will have little if any influence on the interstitial salinity in other seasons, Gerlach suggests dropping the term "brackish water fauna"

for the coastal groundwater community. The same author discusses the observed freeliving marine nematodes on p. 19-43.

The zonation of the fringing coral reefs of the two principal islands, which are raised coral reefs themselves, is described by W. Klausewitz on p. 44-68. The morphology along three profiles (one across a sandy-muddy area) reaching roughly the 5-m depth is presented, and the most conspicuous and characteristic corals and fishes are listed with remarks on some other invertebrates and algae. Possible changes of sea level between -4 m and the present level are described. The ecology and biology of five species of Salariidae and three Gobiidae (fishes) down to about 1 m below the low water line is treated by C. D. Zander for four beach profiles (p. 69-84). On rocky shores, the Salariidae that feed on algae seem to adapt more easily to amphibian life than the predatory Gobiidae that have been more successful in the mangrove region. One of the Gobiidae involved, *Acentrogobius meteori*, n. sp., is described by Klausewitz and Zander on p. 84-87.

Observations, particularly on breeding and hunting of the osprey (*Pandion haliaetus* L.), from the Red Sea and the Gulf of Aden during the mating season are given by W. Kost (p. 88-98). The bird feeds exclusively on fish, breeds on the ground, and shows only weak territorial behavior.

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GERKING, S. D. [ED.]. 1967. **The Biological Basis of Freshwater Fish Production.** Wiley and Sons, New York. xiv + 495 p.

This volume is a collection of original papers which attest anew that aquatic science has left its descriptive phase far behind and has passed to a dynamic, theoretical, and experimental phase that augers well for man's ultimate control of aquacultural production in the broadest sense. The papers were presented at a symposium that was part of a technical meeting sponsored by the International Biological Program (IBP) at the University of Reading, U.K., in September 1966. The editor, S. D. Gerking, chaired the meeting and was also key organizer of the symposium. The book contains 20 papers by authors from 13 countries and is arranged, like the symposium, along five major lines: vital statistics of fish populations (five papers); the relation of fish populations to food supply (five papers); competitive and behavioral factors influencing production (four papers); predation and exploitation by man (five papers); and the contribution of freshwater fish production to human nutrition and well-being (one paper).

Also included in the book is an excellent introduction by the editor, a useful address list of participants, and indices to species, authors, and subjects. Each paper has a list of references that

reflects the nationality of the author and, in so doing, bears witness once again to problems of communication in international science. The lists clearly demonstrate the opportunities and need for improvement of efficiency in research and thinking that may result from improved communication. The symposium, the technical meeting of which it was a part, and the IBP itself are in themselves, of course, evidence of such improvement.

Technically the symposium centers on fish *production*, defined as "the total quantity elaborated over a stated period of time regardless of whether or not all of it survives to the end of that time . . ." (p. xii). Although production and yield can be synonymous in certain forms of intensive aquaculture, in natural waters they are distinct. In such waters, yield is simply the catch and thus typically only a part of the production, say, of a year. Obviously, in natural waters, for the on-going process of production and the quantity of fish produced, indirect methods of measurement and estimation must be employed and experimental procedures must be used to gain understanding of the underlying processes. It is to these matters and finally to the ultimate benefits to be derived from increased human control of aquatic production that the papers are addressed. In terms of Gerking's introduction (p. xii): the first part of the symposium "deals with various subjects which enter directly into the calculation of production, such as recruitment, growth, survival and population abundance." The next three sections "are secondary in the sense that they represent a variety of factors tending to limit one or more of these basic measurements."

The state of knowledge on production will hardly make it possible for anyone using this book to solve completely the problems of production or to regulate production easily in natural waters. However, the papers set the stage for a vast number of studies that may now go forward at an accelerated rate because of the investigative platform of information that is established—information that is sometimes contradictory but is persistently challenging.

No one should be misled by the adjective "freshwater" in the title. The principles of production that are considered have a vast commonness with those of salt-water production. In fact, to add to the attestations of this volume, it bespeaks anew the oneness of *aquatic science* be it called freshwater biology, marine biology, fishery biology, or, for that matter, be it called limnology or oceanography.

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BARDACH, J. 1968. **Harvest of the Sea.** Harper and Row, New York. 301 p. \$6.95.

"For men, taken weight for weight and volume for volume, arc and will remain the best circuit