

on a limited basis"; "... few studies on the effect of pH. . ."; "Little attention has been paid to the osmotic pressure of the culture media"; and so on. One of the few parameters which have been investigated quite extensively and subsequently incorporated into culture media is the Na/K ratio in the hemolymphs of the intact animals. Possibly to atone for the lack of quantitation noted above, the authors of the various chapters have seized upon this one parameter with fervor, and the hapless reader is subjected to a seemingly endless barrage of Na/K ratios.

Yet despite the inadequacies of the culture media employed, prolonged survival as well as differentiation has often taken place in organ cultures, as has growth for varying lengths of time in cell cultures. N. Le Douarin discusses organ culture methods and media, both liquid and gel, for explants ranging from the eye-antennal disks of *Drosophila* larvae to fragments of gills and intestine from a bivalve, *Barnea candida*. Five chapters are devoted to cell cultures obtained from representatives of the various insect orders and one chapter each to crustaceans, mollusks, and the lower invertebrates (sponges, *Hydra*, and so forth).

The authors of these chapters should be commended on two counts. The references amassed, dating back to the early 1900's, are truly impressive and can well serve as a complete bibliography for the entire field up to the year 1968. Second, technical details for surface sterilization, microsurgery, and the isolation and explantation of cells and organs, given merely a nod in most articles, are quite explicit and readily followed.

On the other hand, most of the authors appear content simply to summarize the results obtained in their particular areas and make little attempt to laud the good and expose the bad. Prior to 1965, there was an unfortunate tendency for investigators to make rather dogmatic statements as well as use considerable imagination in describing their results. Much of this hyperbole has not withstood the test of time, yet the authors voice no word of caution to the unsuspecting reader. Moreover, some rigorous editing could have eliminated much of the redundancy in this book. For instance, almost every chapter has some paragraphs discussing culture media in general before turning to specific media for a particular group of invertebrates.

Three other chapters, devoted to the

disparate subjects of aseptic rearing of insects, electron microscopy, and the morphology and physiology of the cultured cells are all quite thorough and merit attentive reading.

Some one hundred tables are included in the book, most of them listing the components of culture media devised throughout the years and used with varying degrees of success. The photographs are numerous and, on the whole, excellent in quality.

The lag between submission of manuscripts and the date of publication seems to have been inordinately long for this volume. The most recent references are two or three years old, with the exception of one footnote which dates to 1970. Hence readers may well obtain an erroneous impression of the extent of progress in the field. This is particularly true with respect to the establishment of bona fide invertebrate cell lines, a feat once considered remarkable but now becoming increasingly common.

To my knowledge, this is the first treatise devoted solely to a review of invertebrate tissue culture, and I suspect both laymen and specialists in the field will be surprised at the sheer volume of studies involved. But it would have been a much better book had more emphasis been placed on critically assessing these studies.

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Productivity

Fertility of the Sea. A symposium, São Paulo, Dec. 1969. JOHN D. COSTLOW, JR., Ed. Gordon and Breach, New York, 1971. In two volumes. Vol. 1, xii pp. + pp. 1-308, illus. \$19.50. Vol. 2, xii pp. + pp. 309-622, illus. \$14.50.

This collection of symposium papers includes a broad spectrum of topics connected with problems of fertility of the sea: primary plant productivity, food web relations, the inorganic nutrients which in many cases control the level of fertility, and physical oceanographic processes which affect the availability of the nutrient supply. There are also a few papers on pollution, the effects of land drainage on coastal fertility, and possibilities for artificial fertilization.

A large proportion of the symposium consists of reports of original work rather than review articles and is es-

sential information for oceanographers who are working with this kind of problem. Inevitably, however, the papers are quite specific in content and do not cover the whole spectrum of fertility problems as completely as might be desired by the general reader or the beginning student.

Oceanic circulation and processes of vertical mixing and upwelling receive considerable attention. These processes are essential for bringing nutrient-rich deep water up to the surface layer, thus fertilizing plant growth. There are other papers on nutrient-plant relations and primary productivity. Together this group of interrelated topics constitutes about half the book.

The intricate relations of the remainder of the food web receive much less comprehensive attention. There is documentation of cases in which fertile regions, particularly in areas of upwelling, support a large biomass of herbivores and carnivores, including bottom fauna in deep water, but the details of the relationships are not spelled out. There are few papers devoted specifically to fishes or other pelagic carnivores or to bathypelagic food webs. The knotty problem of animal productivity is largely neglected.

This is not intended to be a critical comment, but merely an account of what the reader can expect to find. A volume of original papers is not expected to be a comprehensive treatment of a topic as broad as this one, and the papers that are here will stand as a worthwhile contribution to science. The fact that two years elapsed between the symposium and publication is unfortunate but not as serious a flaw as it would be in a volume of reviews, and in the meantime the collection profited from excellent editorial work.

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Books Received

Annual Review of Pharmacology. Vol. 12. Henry W. Elliott, Ronald Okun, and Robert George, Eds. Annual Reviews, Palo Alto, Calif., 1972. xii, 528 pp. \$10.

Aphasia, Apraxia and Agnosia. Clinical and Theoretical Aspects. Jason W. Brown. Thomas, Springfield, Ill., 1972. x, 310 pp., illus. \$14.50.

Atlas of Protein Spectra in the Ultraviolet and Visible Regions. Donald M. Kirschenbaum, Ed. IFI/Plenum, New York, 1972. xii, 290 pp. \$25.