ica also constitutes a region, apparently coordinate with the Indo-Pacific. The emphasis on endemism at the species level also leads to a multiplicity of island provinces. For example, the tiny south Indian Ocean islands of Amsterdam and St. Paul constitute a province, presumably because four of the 14 known fish species (or about 28 percent) appear to be endemic.

The faunas themselves are described sketchily, and relationships are not emphasized. Often the percentage endemism is almost the only information offered. This is particularly conspicuous in the case of Hawaii, with its intensively studied fauna. Nothing is said of the distribution of endemics among the fish families there, of the lack of certain characteristic Indo-Pacific groups, or of the history of recent introductions, successful or unsuccessful. I have emphasized the matter of endemism because a preoccupation with species counting is one of the weaknesses of the approach utilized here. It breaks patterns into mosaics and obscures relationships between faunas. It has, for example, led Briggs to misinterpret (p. 106) Ekman's emphasis on the East Pacific barrier as responsible for the most pronounced break in the circumtropical shelf fauna. Briggs is correct that there are few species common to the Atlantic and the Pacific in the New World tropics, and there is a larger number of species common to the two sides of the Pacific. (Land is indeed an effective barrier to gene flow between marine populations.) However, this obscures for him the importance of the number of amphi-American higher taxa and long common evolutionary history of the faunas of the New World tropics. It is ironic that one family cited as having no amphi-American species is one that is found only in the New World tropics, exemplifying the close relationships between the faunas of the two sides of tropical America.

Another point on which I believe many will disagree with Briggs is his designation of a warm-temperate California region to contain the Californian fauna between Point Conception and Magdalena Bay, Lower California (San Diego Province), and that of the Gulf of California (Cortez Province). These faunas are almost completely dissimilar. Most of the nonendemic species of the Gulf of California are tropical, and the endemic species belong to tropical genera. Yet because winter temperatures may fall below 20°C the tropical fauna of the gulf is to be considered warm-temperate and must be placed in the same faunal region as the very different California coast. Zoogeography would be a much simpler art if it could indeed be practiced with a thermometer.

One of the weakest parts of Ekman's treatment was his account of the pelagic, for which reliable studies were lacking. Briggs's extensive literature list, although ending in the 1960's, is indicative of the recent information explosion concerning that environment. The classification presented here, paralleling that adopted for the shelf, is less than completely successful. The influence of surface currents, water masses, and surface productivity, which are much more important than latitudinality, is given little attention, and I can find no mention of the central oceanic gyres or of the presence of oxygen minimum layers in the North Pacific and Indian oceans.

The illustrations are mainly full-page depictions of species, usually fishes. They are decorative but do not contribute much to understanding. The remaining illustrations are small-scale maps with shaded-in provinces and diagrammatic current arrows. It is curious that nowhere in a treatise on distributions is there a map with the distribution of a taxon plotted.

Marine Zoogeography is a valuable book in that it brings together much of the literature published in the field in the past 20 years and presents descriptions (necessarily brief) of the physical environments and faunas of the coastal waters. As a compendium it will be much used. As an ecological and evolutionary synthesis, however, it leaves the field open.

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Cyclic Nucleotides

Cyclic AMP, Cell Growth, and the Immune Response. Proceedings of a symposium, Marco Island, Fla., Jan. 1973. WERNER BRAUN, LAWRENCE M. LICHTENSTEIN, and CHARLES W. PARKER, Eds. Springer-Verlag, New York, 1974. xviii, 416 pp., illus. $23.80.

This book, the proceedings of a symposium conceived and organized by the late Werner Braun, focuses mainly upon the involvement of cyclic nucleotides in the immune response and in inflammation and cell proliferation. It contains a nice chapter by Joel Hardman, Günter Schultz, and the late Earl Sutherland that is a probing analysis of the possible role of cyclic GMP (guanosine 3′,5′-monophosphate) as an intracellular messenger. Along the same lines, Nelson Goldberg and his associates clearly set forth the dualistic or yin-yang hypothesis of biological control, according to which cyclic AMP (adenosine 3′,5′-monophosphate) and cyclic GMP are the key regulatory agents. In addition, they suggest that insulin-induced mitogenesis is mediated by cyclic GMP.

Braun presents a strong case for the involvement of cyclic AMP in the immune response and in tumor development. He reviews data on the stimulation of the immune system by polynucleotides and presents evidence that immunocompetent cells respond to polynucleotides by increasing cyclic AMP. He suggests that the antitumor activity of interferon preparations could be due to an adenylate-cyclase-stimulating factor in the interferon preparations. Barry Bloom follows with a well-written and easily understood description of the cellular basis of the immune response. Charles Parker describes immunofluorescent studies which indicate that elevations in lymphocyte cyclic AMP stimulated by prostaglandin E_1, isoproterenol, and PHA (phytohemagglutinin) show different localization patterns of cellular cyclic AMP and suggest that each agent might activate different cellular adenylate cyclases. He demonstrates that mitogens can either raise or lower cyclic AMP and concludes that the relationship between cyclic AMP and mitogenesis is still not clear unless cell compartmentation of cyclic AMP is brought into the picture. In later discussions with Gerald Weissman, however, it is apparent that he believes that the fall in cyclic AMP is related to PHA-induced cell proliferation since elevations in cellular cyclic AMP shown by Rochelle Hirschhorn inhibited PHA- and concanavalin-A-induced lymphocyte proliferation.

Three chapters from the clinical pharmacology group at San Francisco (Kenneth Melmon, Henry Bourne, and Yacob Weinstein), with Eugene Shearer at the National Institutes of Health, critically review: evidence that cyclic AMP mediates the inhibitory actions of vasoactive amines and the actions of other agents upon lymphocyte cytolytic activity; the isolation of leukocytes with specific catecholamine, histamine,

or prostaglandin receptors after passage through Sepharose columns of the agonists; and the enhanced immunocompetence of a population of spleen cells in which histamine-receptive cells were removed by histamine Sepharose columns. Lawrence Lichtenstein goes on to discuss evidence for and against the role of cyclic nucleotides in inflammation. Michael Kaliner and K. Frank Austen demonstrate that antigen-induced secretion of histamine and slow-reacting substance of anaphylaxis were decreased by agents that elevate cyclic AMP and increased where cyclic AMP concentrations were depressed.

The final chapters and discussions concern the role of cyclic AMP in cell division and the effects of exogenously added cyclic nucleotides upon cell morphology and tumor kinetics.

Each chapter is followed by discussion that in many cases is critical, speculative, and probing. The last chapter is the transcript of the final discussion, led by Alan Robison, on the role of cyclic AMP and cyclic GMP in cell replication, the role of cyclic AMP in contact inhibition of cell growth, and the persistent changes in cell function that appear to be mediated by rather transient alterations in cellular metabolism.

The book has been well edited, contains many useful references, and should be a valuable reference for those peripherally or directly interested in the relationships between cyclic nucleotides, immunology, and cell growth.

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Mass Spectrometry

Metastable Ions. R. G. COOKS, J. H. BEYNON, R. M. CAPRIOLO, and G. R. LESTER. Elsevier, New York, 1973. xii, 296 pp., illus. $29.50.

In the jargon of mass spectrometrists a metastable ion is one that is formed by fragmentation in the field-free region of the analyzer. In magnetic-focusing instruments such ions appear in the spectrum as broad peaks, usually at nonintegral masses. Their apparent masses are related by a simple equation to the true masses of the precursor and daughter ions, and the width of the mass peak is related to the translational energy release in the fragmentation process. These properties make the metastable ions invaluable in the identification of the various decomposition paths. Thus by taking maximum advantage of the metastable ions in conjunction with normal mass spectral peaks it is often possible to establish which isomers are present in a mixture of them, to identify various compounds present in a complex mixture, and to establish isotope distribution in the product ions, and in some instances it is possible to establish the structure of ions as well as molecules.

This book presents a concise and lucid discussion of metastable ions. The authors limit their consideration to positive ions and, with minor exceptions, to magnetic-deflection instruments, since these are of especial use in organic mass spectrometry. Within these limits the subject is quite completely covered. There are valuable discussions of the origin of metastable ions and of the techniques employed in their detection. There are especially useful descriptions of the techniques of obtaining and making use of ion kinetic-energy spectra. The equations for various metastable processes are developed and examples of the various processes and their uses are given. Magnetic-deflection instruments are described briefly and some background discussion of the processes by which positive ions are formed is given. There is in addition, in an appendix, a useful presentation of the rate theory of mass spectra.

For any scientist interested in the detection and elucidation of the structures of complex molecules this book will serve as a useful text as well as a handy reference. It will also be of value to those interested in the rates of unimolecular reactions and the distribution of energy in the reaction products. The writing throughout is characterized by exceptional clarity and grace, and the book is a pleasure to read.

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Determination of Gaseous Elements in

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