discussion of "algebraic numbers" should open vistas. Haag's exposition of the relationship between points on a line and real numbers should clarify a "take-for-granted" set of concepts.

All in all, this is a well-constructed, well-written book. It has ample sets of problems, the problems being nontrivial, nonstandard, and integrated into the flow of textual material. It is unusually free of errors, typographical and otherwise. My criticisms are minor: the statement that essentially there is only one model of a complete ordered field is delayed almost to the point of missed impact; the 1-1 relationship between points on a line and real numbers is stated, "to every point there corresponds a unique real number" is proved, but the status of the converse of this last theorem does not seem to be covered.

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Chemical Technology

The Properties of Glass Surfaces. L. Holland. Wiley, New York, 1964. xvi + 546 pp. Illus. $15.

Because scientists working in different fields use glassware, in a variety of shapes and at different temperatures, in contact with gases and liquids, there is a need for reliable information about the surface properties of glasses. Much work has been done on this subject, but the data are scattered, frequently in journals not readily available. Thus, Holland's book will be welcomed by chemists, physicists, and engineers.

The author's many years in research concerned with the deposition of films on glasses in high vacuums has given him wide experience in the field. Experimentation with high vacuums requires a thorough understanding of the properties of glass surfaces, of the methods of cleaning glass, and of the phenomena of adhesion and friction. One of the major difficulties is that glass surfaces are not defined by the composition of a glass but depend strongly on the way they are obtained. Polishing an optical glass changes its chemical and physical properties, and the phenomena that occur during this process are not yet fully understood. A short discussion of the composition and the structure of glasses precedes the author's excellent description of the methods used in polishing optical glasses and the different chemical and physical methods used in cleaning the surface of a glass. He also discusses the various sources of contamination.

The physical properties of glass surfaces are divided into chapters on optical, electrical, and mechanical properties involving friction of glasses in contact with liquids and metals. Among the chemical properties of glass surfaces, corrosion phenomena are of greatest importance to those who use glass. The chemical interaction between glass surfaces and gases and vapors is discussed from several points of view. Those who use glass for vacuum equipment will find much valuable information on the sorption and desorption of gases, especially water vapor, on the diffusion of helium through different glasses, and on the effects of electrical discharges on these interactions.

Surface chemistry encompasses several processes that improve the surface properties of glass or make the surface an electrical conductor. The wetting properties of glasses by different liquids and the adhesion of metals and organic polymers are thoroughly discussed. In all cases the author has balanced practical and theoretical aspects so well that his book is most stimulating to anyone interested in the behavior of surfaces.

The reader can easily follow the progress made in this field and obtain a good picture of the present status of theory. Workers in the field of glass will welcome the numerous well-chosen references that enable one to follow up details.

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Research Résumé

Osmotic and Ionic Regulation in Animals. W. T. W. Potts and Gwyneth Parry. Pergamon, London; Macmillan, New York, 1964. xiv + 423 pp. Illus. $9.

This is the first monograph devoted to the broad subject of osmotic and ionic regulation in animals since Krogh's book in 1939. Potts and Parry review this rapidly advancing field from the viewpoint of general biology. The first chapter is an excellent summary of the physical principles necessary for understanding the mechanisms of osmotic and ionic balance. This chapter will be particularly useful to students of zoology who lack background in physical chemistry and cellular physiology. Chapter 2 deals with excretory organs in general and includes some useful new figures of the excretory systems of various animals. Unfortunately, there is little mention of the extensive information afforded by electron microscopy, particularly of Malpighian tubules, flame cells, and vertebrate kidney, and no mention of Bodil Schmidt-Nielsen's useful correlations of ultrastructure with the direction of active transport.

Then follow chapters in which the authors survey osmotic and ionic conformity and regulation in animals from marine, brackish, and freshwater environments. After initial statements of the problems associated with each habitat, specific animal groups are discussed. However, the physical principles developed in the first chapter are scarcely used in these three important chapters. For example, the numerous papers on *Necturus* kidney tubules (by Solomon, Whittenbury, and others) are not much discussed, and much new information on the cellular mechanisms of frog-skin and toad-bladder potentials is omitted. Evidence for volume regulation in supunculids (Gross) is omitted in favor of the older idea of lack of such regulation (Adolph).

Chapters 6 and 7 consist of very good surveys of regulation in terrestrial animals and in hypo-osmotic regulators. In few areas of the subject has there been so much change with respect to basic concepts as in mammalian renal physiology, and zoologists will find here a clear and concise discussion of these advances. Cellular mechanisms are described, particularly concerning ionic fluxes, and some of the unanswered questions are presented. One fails to find any new explanation of the meaning of hypo-osmotic regulation in certain marine crustaceans.

The final two chapters deal with the relation between respiration and electrolyte metabolism and with control of electrolyte balance. The interesting facts are that the total oxygen consumption of many osmoregulators increases in dilute media but isolated tissues often show reverse effects, and that the increase in organismic respiration is too great to be due to the regulating tissues alone but some regulators fail to show the increase. No explanations of these paradoxical observations are available.

Control mechanisms are reasonably well known only in mammals, and much remains to be learned about control in lower vertebrates and invertebrates. However, evidence concerning the function of the urohypophysis and related structures (Bern), and concerning water taste in amphibians and fishes (Zotterman), might well have been included.

The bibliography has nearly 700 references, well selected with emphasis on recent work but with many older citations as well. There are both author and subject indexes. The monograph well shows the unevenness of our knowledge about osmotic and ionic regulation. The viewpoint of the book is biological rather than physicochemical, but cellular mechanisms are considered in many cases where good evidence is available. This book is clearly written, and it is highly recommended to graduate students in zoology and physiology, as well as to teachers and researchers who wish a general survey of current literature on the interesting subject of osmotic and ionic regulation.

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What's in a Name?

Generic Names of Orchids. Their origin and meaning. Richard Evans Schultes and Arthur Stanley Pease. Academic Press, New York, 1963. xvi + 331 pp. Illus. $12.

This book was written for the fun of it; it should be picked up and read in the same spirit. As a book it is a rather singular bouquet, with definitions, etymologies, and histories of names featured but with a variety of accessories too. There is a map showing the chief distribution centers of orchid genera (11 in all) over the globe. Discussion of botanical nomenclature is followed by a summary of the morphology of the orchid flower and then by a section of the economics of the family. The beginnings of the use of vanilla is not easy to explain, for the fully ripened capsules are devoid of the active principle and the immature pod must be used. It is much easier to imagine the suggestive potency of the testiculate roots of many terrestrial orchids.

Thirty pages of diversions precede the dictionary of generic names. The authors gathered information for some 7 years on 1250 generic names. Naturally they might have continued the search, for many stories associated with orchid names have not been told in these pages. Bateman's *Orchids of Mexico and Guatemala* is more than "outstanding," it is elephantine! (A match for Audubon's *Birds*.) Who can forget the cartoon of the orchidist, teetering on the stepladder in his "stove" and peering at the gymnostenium of a choice bloom while he balances Bateman opened at the description? Almost as amusing as the orchid names are the men who named them, and their idiosyncrasies. Thouars favored names with the suffix "orkis" (*Hipporkis, Erporkis*, and the like). John Lindley was endeared of the muses and Greek nymphs. Rafinesque is accused of forming generic names incorrectly, but he stated on one occasion at least that he had willfully "mangled" orthography in favor of euphony.

The year 1837 was the *annuus mirabilis* of orchidology. Then came the orchidomania of Victorian England. That an orchidist will always be remembered with a commemorative generic name is not assured. The "orchid worthy" George Ure Skinner (1804–1867) was never so immortalized. The authors' next book must be on the stories behind the specific names of orchids—they must tell us the incidents in the lives of the worthies and amateurs of the past. Then we shall learn about *Lycaste skinneri*.

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New Books

General

Atlantic Crisis. American diplomacy confronts a resurgent Europe. Robert Kleiman. Norton, New York, 1964. 158 pp. $2.95.

A Checklist of the Birds of Arizona. Gale Monson and Allan R. Phillips. Univ. of Arizona Press, Tucson, 1964. 78 pp. Illus. Paper, $1.75.

Circulation of the Blood: Men and Ideas. Alfred P. Fishman and Dickinson W. Richards Ed. Oxford Univ. Press, New York, 1964. 873 pp. Illus. $18.

Curare: Its History and Usage. K. Bryn Thomas. Lippincott, Philadelphia, 1964. 144 pp. Illus. $6.50.

Cybernetics and Management. Stafford Beer. Wiley, New York, 1964 (© 1959). 232 pp. $5.25.

Drugs in Our Society. Based on a conference (Baltimore, Md.), November 1963. Paul Talalay, Ed. Johns Hopkins Press, Baltimore, 1964. 319 pp. Illus. $6.50.

Efficiency and Uplift. Scientific management in the progressive era, 1890–1920. Samuel Haber. Univ. of Chicago Press, Chicago, 1964. 195 pp. $5.

Emotional Health: In the World of Work. Harry Levinson. Harper and Row, New York, 1964. 314 pp. $6.95.

Essays 1958–1962 on Atomic Physics and Human Knowledge. Niels Bohr. Wiley, New York, 1964. 110 pp. $5.

The Evolution of Biology. M. J. Sirks and Conway Zirkle. Ronald, New York, 1964. 382 pp. Illus. $6.

The Experimental Earthwork on Overton Down, Wiltshire, 1960. An account of the construction of an earthwork, to investigate by experiment the way in which archaeological structures are denuded and buried. P. A. Jewell, Ed. British Assoc. for the Advancement of Science, London, 1963. 108 pp. Illus. Paper, $4.50.

Familiar Reptiles and Amphibians of America. Will Barker. Harper and Row, New York, 1964. 240 pp. Illus. $5.95.

The Flora of Delhi. J. K. Maheshwari. Council of Scientific and Industrial Research, New Delhi, India, 1963. 455 pp. $8.

Great Smoky Mountains Wildflowers. Carlos C. Campbell, William F. Hutson, Hershal L. Macon, and Aaron J. Sharp. Univ. of Tennessee Press, Knoxville, ed. 2, 1964. 88 pp. Illus. Paper, $1.50.

Herpetological Type-Specimens in the University of Illinois Museum of Natural History. Hobart M. Smith, David A. Langebartel, and Kenneth L. Williams. Univ. of Illinois Press, Urbana, 1964. 80 pp. Paper, $3; cloth, $4.

William Herschel and the Construction of the Heavens. Michael A. Hoskin. Norton, New York, 1964. 199 pp. Illus. $6.

India and the West. Barbara Ward. Norton, New York, ed. 2, 1964. 295 pp. $4.95.

Management and the Worker. F. J. Roethlisberger and William J. Dickson. Wiley, New York (© 1939), 1964. 639 pp. Illus. Paper, $2.65.

Mathematical Games and Pastimes. A. P. Domoryad. Translated from the Russian edition (Moscow, 1961) by Halina Moss. Pergamon, London; Macmillan, New York, 1964. 310 pp. Illus. $5.

Medieval Technology and Social Change. Lynn White, Jr. Oxford Univ. Press, New York, 1964 (reprint of 1962 edition). 222 pp. Plates. Paper, $1.85.

Nobel Lectures in Physics. vol. 3, 1942–1962. Published for the Nobel Foundation by Elsevier, New York, 1964. 635 pp. Illus. $85 set.

Overtures to Biology. The speculations of eighteenth-century naturalists. Philip C. Ritterbush. Yale Univ. Press, New Haven, Conn., 1964. 297 pp. Illus. $7.50.

Poisonous Plants of the United States and Canada. John M. Kingsbury. Prentice-Hall, Englewood Cliffs, N.J., 1964. 640 pp. Illus. $13.

A Short History of the Gout. And the rheumatic diseases. W. S. C. Copeman. Univ. of California Press, Berkeley, 1964. 248 pp. Illus. $6.