

the reader to the conclusion that talk of the planning of science was little more than an aspect of the loyalty drive. Scientists and administrators pledged to direct their research in an organized fashion toward increased efficiency and "practicality."

Similarly with Graham's pages on the reorganization of the Academy's institutes and laboratories. Clearly an effort was being made to point research toward increased service of industrialization, but the reader is left wondering about essential questions. How far did this effort go beyond administrative shuffling, with what impact on actual research in various fields? In the changing tables of organization that Graham surveys we see evidence of strenuous bustle, but what did it really signify for science on the one hand and for the economy on the other? A seven-page supplement summarizes the Academy's report of the "practical" jobs it had undertaken to do by 1932, but Graham does not go beyond the mere listing. If he had taken representative examples and studied them in depth, he might have been able to tell us how much the Academy really departed from its earlier pattern of work, with what gains and losses resulting. He might even have shed indirect light on the strange criteria of practicality in the minds of Bolshevik leaders, who found Pavlov's research worthy of increased support, though he fiercely opposed the Bolshevikization of the Academy, while they permitted the arrest of I. I. Ivanov, the world's leading authority on artificial insemination of livestock, of A. G. Doiarenko, the dean of Soviet agronomy, of S. S. Chetverikov, the founder of population genetics, and of most of the country's leading economists. I am not mocking the Stalinist leaders—there has been altogether too much of that—I am saying that one must dig deep in the record of their deeds if one wishes to understand their passionate faith in practicality.

On the political transformation of the Academy, Graham is very instructive. He shows in rich detail how Bolshevikization was actually accomplished. By a combination of idealistic appeals and gross threats, which were ultimately backed up by dismissals and jailings, the Communists got the academicians to renounce their autonomy, to elect Communists to membership (before 1929 there had been no Communist members), and to carry out the practical reorganization as a pledge of service to the Five Year Plans. Graham

tells the dramatic story remarkably well, considering his lack of access to the archives. He doubts that the loyalty drive had much effect on the actual work of scientists. "The fact that the Academy was purged and coerced was not so remarkable as the fact that within its battered framework it preserved the seeds of fruitful research" (p. 149). An important amendment should be added: in the social sciences the seeds of fruitful research were left in a state so dormant as to suggest death.

One cannot help wishing that Graham had undertaken a larger job, for example, a detailed history of the decade before 1927. Kadar's recent dictum to the Hungarian intelligentsia, "Anyone who is not against us is with us," aptly describes the prevailing attitude of Soviet Communist leaders during the '20's. One would like to

know how much the behavior of the Academy contributed to the sudden reversal at the end of that decade, the angry swing to total mobilization and militant intolerance. But even more one wishes for an expansion of the theme of practicality. Graham has shown that the Soviet leaders and scientists were not very articulate or profound in talking about their science policy. That is just enough to whet the appetite for a study in depth of the policy itself, or rather, a study of the policies in carefully selected fields of science, for the Soviet leaders have had varying degrees of success in their quest for practical benefit from the various sciences. Loren Graham is admirably qualified to discover the reasons why.

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Pigmentation and Inheritance

Comparative Genetics of Coat Colour in Mammals. A. G. SEARLE. Logos Press, London; Academic Press, New York, 1968. xii + 308 pp., illus. \$17.50.

Searle's competent presentation of comparative mammalian coat-color genetics will appeal to readers with an odd assortment of special interests: mammalian geneticists, practical breeders of domestic species, mammalogists, zoo-keepers, and students of evolution. The author is a mammalian geneticist who has worked with both cats and mice and has lived in Malaysia. The book's special value stems from its combination of topics and points of view.

After a brief introduction to genetics, Searle devotes one chapter to hair structure and function (including display and protective coloration), another to melanin and its production. An excellent chapter on pigment-gene action covers the neural crest story, melanoblasts during and after their migration, and the six best understood allelic series, each of which is present in many species. The largest part of the book is a descriptive list of pigment genes recognized in a great variety of mammals, including rodents, carnivores, ungulates, and one primate (man), with brief remarks on monotremes, marsupials, insectivores, bats, whales, and elephants. Wherever genetic data are available, Searle summarizes com-

petently; elsewhere he deduces equally well the extent and nature of uncertainties.

Searle uses the genetics of the extensively studied house mouse as his standard type for comparison, covering almost all pertinent literature through 1966. Unfortunately he missed Silvers' proof [*Science* **149**, 651 (1965)], from rat melanocytes invading transplanted mouse skin, that agouti genes of these two species act homologously. Searle discusses domesticated species well, with comprehensive listing of pigment mutants in *Peromyscus*, Norway and black rats, Syrian hamsters, guinea pigs, coypu (nutria), rabbits, cats, mink, dogs, foxes, cattle, water buffalo, sheep, pigs, horses, and man. His presentation clarified my understanding of the inheritance of colors in cats and horses, much to my gratification. An interesting feature is the description of and attempt to homologize coat colors of nearly one hundred wild species, including a recording of color variants that have been observed.

The final chapters attempt greater generalizations. Variegated coat colors are discussed in relation to the Lyon hypothesis, to somatic mosaicism, and to action of autosomal mottling genes. Pathological pleiotropic effects of certain pigment genes from different species are compared and discussed at a moderately sophisticated level. Very useful tables listing species showing particular kinds of mutations that affect the nature and distribution of

pigmentation leave no doubt of extensive homology among pigment genes of all mammalian species. The closing synthesis suggests that more extensive study of genetic variations such as these would increase understanding of evolutionary processes.

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Cellular Structures

Cell Walls and Membranes. H. J. ROGERS and H. R. PERKINS. Spon, London, 1968 (distributed in the U.S. by Barnes and Noble, New York). xii + 436 pp., illus. \$12. Spon's Biochemical Monographs.

The scope of this book is not as wide as its title would suggest. Perhaps "The Chemistry and Structure of Cell Walls" would have been more appropriate, since, with the exception of two brief chapters, functional properties are ignored. And, with 18 of its 25 chapters dealing with wall constituents in diverse organisms, the treatment of the cell membrane is limited. But the chemistry of the cell walls of higher plants, algae, fungi, and especially bacteria (eight chapters) is well covered, and discussions are included of the architecture of these walls and of the growth patterns involved. There is no mention of the ciliated or flagellated protozoa, and only a 4½-page chapter on amoebas.

The general pattern is to discuss the occurrence, chemistry, and synthesis of each chemical component of the wall for each major group of organisms. There is little attempt to relate chemistry to wall function, although some discussion of the relationships between chemistry and structure is presented.

This book had a remarkable ability to hold this reader's interest through what might have been a very dull recital of the natural chemistry of cell walls. I confess to some tedium toward the end of the book, brought on, in part, by the large quantity of tabular data. Although it is these data that will be of great use for reference, one wishes that some of the material might have been presented in graphic form (there are only seven graphs in the entire book, as opposed to 78 tables).

The very large number of diagrams, chiefly structural formulas, are useful to those readers who are not carbohydrate chemists. With this aid, it is not too

difficult to follow the macromolecular twists and turns of this subject. The references (listed chapter by chapter) seem sufficient, and the book should provide a good start for an interested student.

There are the seemingly inevitable lapses of style: some jargon, some undefined terms and methods, some relatively common techniques described in what seems unnecessary detail. And I suppose every reader feels, when a general work touches on his own field, that more should have been made of this important subject! Thus the omission of so much of membrane physiology is a disappointment, brought on chiefly by the overly ambitious title. Within its true scope, the chemistry and structure of cell walls, this book is well worth having.

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Vacancies and Interstitials

Défauts Ponctuels dans les Métaux. Y. QUÉRÉ. Masson, Paris, 1967. 236 pp., illus. Paper, 80 F. Collection de Monographies de Physique, No. 5.

This timely book by Quéré should fill a wide need among those metallurgists and solid state physicists who strive to keep informed on development in understanding the defects of metals. This is a broad and by no means static field and merits periodic review. It has now been about five years since the book by Damask and Dienes appeared with the English equivalent of this title but with a somewhat different point of view, so that the present publication is well timed. Although it is not a big volume (217 pages of main text) it surveys a large field with a sure and even touch. Restricted by his title to point defects (namely vacancies and interstitials), the author has nevertheless considered all the usual interactions of these with other lattice imperfections and so touched on nearly every aspect of the defect state for metals.

The book is clearly written with a strong emphasis on the underlying physical concepts. The style is simple and direct. It reads rapidly. The analytical sections are succinct and clear, for the most part accurate and fundamental. The presentation is particularly well organized and careful.

The first five chapters are primarily concerned with the conceptual background. The first two deal with the elastic model for a center of pressure and its application to the point defects. The next chapter considers the ramifications which develop when the atomistic nature of the lattice is considered, usually in terms of two-body forces. The fourth chapter introduces consideration of electronic forces and shielded potentials. The importance of the Friedel oscillations to many problems involving point defects is emphasized. Chapter 5 gives the application of thermodynamic principles to the field. Chapters 6 and 7 are individually longer than the preceding five and aim to give a survey of significant revealing experiments in this area. For this, a considerable degree of selection was necessary and of course an arbitrary cutoff date for recent developments. Chapter 5 deals with investigations of defects in equilibrium at high temperatures and chapter 7 with metastable concentrations of defects as induced by quenching, irradiation, or cold working. All these are treated deftly and concisely. The great controversy still raging between the adherents of the one- or two-interstitial mechanisms for radiation anneal is presented with an even fairness and a good selection of the essential arguments for each side. Throughout, the parts are carefully interwoven by cross reference in an excellent workmanlike manner that is characteristic of Quéré's scholarly approach.

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Studies of Water Sources

Isotopes in Hydrology. Proceedings of a conference, Vienna, Nov. 1966. International Atomic Energy Agency, Vienna, 1967. x + 740 pp., illus. Paper, \$15.

Increasingly sophisticated evaluation and exploitation of the resource potential of environmental hydrologic systems have led to ever closer scrutiny of the characteristics of these systems. Hydrologists consequently are faced with the necessity of arriving at accurate answers to a bewildering variety of questions, including ones about external input-output characteristics of systems and internal characteristics of