ence and the almost stationary status of social and educational institutions. This is especially true in the underdeveloped countries of the world, which will soon find themselves confronted with patterns of life to which they will be able to adjust only by a slow process of undisturbed development.

Most writers dealing with this grave problem of our time approach it from one of two diametrically opposite angles: they picture, in extravagant terms, the enormous possibilities which modern science and technology offer for the material benefit of mankind, with scant attention to man himself, or they envision economic and social utopias which are more the product of wishful thinking than of a realistic appraisal of technologic opportunities and social possibilities.

While both groups fail to give an integrated picture of the impact of modern science and technology on the social, psychological, and moral behavior of man as an individuum and a part of the community, R. L. Meirer draws from his large fund of knowledge in both the natural and the social sciences to give us a refreshing and provocative appraisal of the most probable course of events, considering both technologic and social factors. As a scholar trained in the exact sciences, he starts, naturally enough, with a sound attempt to quantify material human needs and world resources. He does not ignore spiritual requirements but does not complicate the picture by irrational and imponderable factors. Some agreement exists among scientists concerning an adequate level of living, and human needs can be expressed quantitatively in terms of nutrients, water, fiber, energy, and construction material. Estimates can be made of the availability of the world's renewable resources under conservative application of present agricultural, forestry, and fishery practices, and the probable reserves of nonrenewable resources will permit some extrapolations, provided that some minor resources such as uranium or titanium do not suddenly become major ones.

Where we reach the field of conjecture—namely, in the application of very recent discoveries in the physical and biological sciences to more efficient resource management—we find the book at its best, for it is always scientifically exact, technically sound, and directed toward a world as it is and not as it ought to be. Whether the author speaks about the protein problem, which he correctly considers the most fundamental in human nutrition, or of opportunities for expanding the protein supply by better utilization of marine resources, pisciculture in fresh waters, or growing of algae and other microorganisms, he always remains within the domain of proved scientific facts and technical experience. In one respect only could he have enlarged his exposition of maximal resource exploitation—that is, in the field of wild terrestrial vegetation, of which man uses only about 0.2 percent. There is no reason why the vast catabolism of organic matter, through bacterial and fungal decomposition (especially in the rain-soaked forests of the tropics and subtropics), could not be channeled toward an orderly degradation into useful products without impairing the cycle of nutrient metabolism in nature.

In the chapter on new fuels, the author deals lucidly with the utilization of solar energy, biological photosynthesis, nonbiological photosynthesis, and water- and wind-power as well as with utilization of atomic energy. He estimates the fossil fuel supply at 3×10^{19} calories. The yield of other energy sources, especially that of the "big unknown," atomic energy, cannot even be conjectured. There is no question that energy requirements for food, transportation, thermal comfort, and industry, especially in some newer metal-reduction processes, will increase rapidly, but so also will man's efficiency in utilizing energy.

In the most fascinating chapter of the book, Meirer tries to appraise the impact of this enormous expansion of human knowledge and productive capacity on the structure of society and the patterns of living. True scientist that he is, he meets this difficult problem objectively, without political bias or preconceived opinions. He realizes that the economically underdeveloped countries are not only suffering from overpopulation, or rather underemployment, but are continuously caught in a vicious economic cycle. Because of the low income-level, the people have a tendency to consume all their earnings and are unable to save. This naturally inhibits formation of domestic capital. Since low income is largely due to shortage of capital, the economy remains depressed. This lack of capital is the main factor in the ever-widening gap between scientific discoveries and their application. Only by way of international cooperation between the capital-rich and the capital-poor nations can satisfactory development of the world be brought about, and eventual disaster averted. However, such cooperation should be administered so as to leave the greatest possible freedom of self-expression and development of spiritual values to less advanced peoples.

All in all, this is an excellent book, written by a man who, as a chemist and physicist (University of California) and as an economist (Manchester School of Economic and Social Studies), is on good speaking terms with both natural and social scientists. While the former have lately become concerned with the consequences of their scientific research and discoveries, the latter are paying more and more attention to the dynamics of social and economic developments (especially in the less developed areas of the world), brought about by the progress and the application of science and technology. To both, the book is highly recommended.

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The Organization of the Cerebral Cortex. D. A. Sholl. Methuen, London; Wiley, New York, 1956. 125 pp. Illus. $4.25.

The Organization of the Cerebral Cortex is a summary of some interesting anatomical studies on the cerebral cortex. The point of view is that of quantitative cytological neuroanatomy. D. A. Sholl has some interesting data, from extensive silver preparations, on the distribution and extent of dendritic branchings. He attempts to relate these data to a theory of cortical activity based on connectivity and critical thresholds for excitation.

This theory has succeeded in mimicking one kind of cortical activity—that is, the slow spread of certain spontaneous figures of electric activity under deep Nembutal anesthesia. Such kinds of cortical activity may be confined to states of anesthesia, sleep, toxicity, and epileptic seizures. However, it may be that such mechanisms exist, operate, and are masked in the case of unanesthetized cortex that is bombarded by nonsynchronized activities.

The illustrations are excellent, and the bibliography is useful.

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Structure Reports for 1940–1941. vol. 8. A. J. C. Wilson, Ed. Published for the International Union of Crystallography. Oosthoek, Utrecht, Netherlands, 1956. 383 pp. Fl. 80.

The publication of *Structure Reports for 1940–1941* completes the coverage of all essential molecular structure information for solids, liquids, and gases obtained during the period 1913–50 and published in *Structurbericht,* volumes 1–7 (1913–39), and *Structure Reports,* volumes 8–13 (1940–50). The data for 1952 are now being assembled, and those for 1951 are presumably in press. This

is work of inestimable value to crystallographers, mineralogists, metallurgists, chemists, solid-state physicists, and all who are concerned with studying the structure of matter. It is an ever-increasing, monumental task, and the editors and reporters are to be congratulated on having maintained, in this volume, the high standard of accurate and critical reporting that has come to be associated with *Structure Reports*.

In contemplating the series as it now stands, three questions come to mind. First, should an effort be made to increase the rate of production beyond one volume a year in order to bring the series up to date? Second, in view of the inevitable increase in size and cost of subsequent volumes, should the price be reduced to maintain a wide distribution and to enable private subscribers to continue their support? Third, is the time ripe to revise the rationalization of crystal structure types that was given in volumes 1, 2, and 3? In my opinion, the answer to all three questions is definitely in the affirmative. It is, however, a remarkable tribute to the original compilers that the descriptions of structure types in volumes 1 and 2 of *Strukturbericht* are still very useful and in so many respects have stood the test of time.

It may very well be that these objectives could be achieved only by means of a considerable financial subsidy. If this is so, I take this opportunity to urge the International Union of Crystallography to seek such funds as are necessary to project into the future this indispensable means of coping with the increasing multiplicity of scientific papers.

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Handbuch der Physik. vol. XXXIII, *Optics of Corpuscles.* S. Flügge, Ed. Springer, Berlin, 1956. 702 pp. DM. 122.50.

Optics of Corpuscles, volume XXXIII of the new edition of the famous *Handbuch der Physik,* originally edited by Geiger and Scheel, deals with subject matter which, in the original "blue" *Handbuch,* covered a small space and was treated in different sections. It deals with methods and instruments that are based on the action of electric and magnetic fields on moving, electrically charged particles. These fields, when properly shaped, have deviating and focusing effects on charged particles in motion, as have lenses, mirrors, and prisms on light rays. All instruments that are based on this action of electric and magnetic fields are treated in this volume, and this leads to an arrangement of articles which, at first glance, appears to be peculiar. However, under the aspect of electron and ion optics, they are tied together in a natural way.

The arrangement of the different chapters appears as an analog to that expected in a treatment of instruments in light optics, in which a natural sequence would be formed by the discussion of light sources, the general theory of image formation on the basis of geometric optics, followed by a digression into wave optics in connection with a discussion of resolving power of instruments in general. This would be followed by the treatment of optical instruments, including microscopes and spectroscopes. This logical sequence is followed, in the present volume, with articles on electron and ion sources, electron and ion optics, electron microscopes, mass spectroscopes, and finally beta-ray spectroscopes.

The first article, by Detlev Kamke (Germany), is restricted mainly to electron and ion sources which are of importance for the subsequent contributions of this volume. Ion sources used in accelerators are not included; discussion of these is reserved for volume XLIX. This article is of a technical nature, and nearly two-thirds of the space is used for description of the different electron and ion guns.

The contribution on electron and ion optics by W. Glaser (Austria), is written by a first-rate expert in this field. More than one-third of the whole volume is devoted to this fundamentally important topic. The presentation excels in clarity and conciseness. One of the eight chapters is devoted to a discussion of image formation on the basis of wave mechanics.

The article on electron microscopes, written by S. Leisegang (Germany), gives, in about 150 pages, a thorough and attractive treatment of the fundamental aspects, a clear presentation of the different commercially available instruments, and a discussion of theoretical and practical limitations of electron microscopy.

A vivid account of the historical development and of the present state of mass spectroscopy is presented by H. Ewald (Germany) in his contribution entitled "Mass spectroscopic apparatus." All important types are described, and the discussion of their performance is elucidated by excellent reproductions of mass spectrograms.

The final section, on beta-ray spectroscopes, is written by T. R. Gerholm (Sweden) and is the only article of the volume written in English. It deals mainly with the instrumentation for the study of nuclear disintegration and nuclear structure. (An extensive theoretical and experimental treatment of beta-ray spectroscopy is to be included in volumes XLI, XLII, and XLV of this encyclopedia.) After a brief historical survey, the fundamental principles are discussed, and a treatment of the different instruments is given. This contains also a critical comparison of the different types. Two subsequent chapters are devoted to high-precision beta- and gamma-ray spectroscopic technique as it is applied to gamma-ray spectroscopy. An appendix contains a six-figure table for conversion of $B\rho$-values (electron momentum values) into electron energies, and vice versa, and covers the range from 0.9 kev to about 30 Mev.

Each section of the volume closes with a bibliography, which, in general, covers the years up to 1954 and, in some cases, to 1955. These same years are covered by the numerous references given in the text.

Layout, printing, and especially the numerous illustrations are of excellent quality. The only weak point is the inadequacy of the subject index, which is given in German-English and English-German. An encyclopedia of this type is intended to serve not only as a source of detailed information but also as a book of reference, and for the latter purpose the index should comprise many more entries than those that are given in the present volume. It would be better to have one complete index in one language than two deficient ones in two languages.

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Heterocyclic Compounds. vol. 5, *Five-Membered Heterocycles Containing Two Hetero Atoms and Their Benzo Derivatives.* Robert C. Elderfield, Ed. Wiley, New York; Chapman and Hall, London, 1957. 744 pp. Illus. $20.

These treatises on heterocyclic compounds constitute a real service to organic chemists, biochemists, and pharmacologists, since the authors have brought together information that is spread through hundreds of journals and books. The mass of material has been so well organized that future investigators will be saved the time and labor of doing it individually.

There are eight chapters in volume 5: "1,3-Dioxolane and its derivatives" (44 pages), by R. C. Elderfield and F. W. Short (1,2-Dioxolanes, which are essentially cyclic peroxides, are omitted, and 1,4-dioxanes are treated in volume 6); "Pyrazoles and related compounds" (117 pages), by T. L. Jacobs; "Indazoles" (32 pages), by Elderfield; "Imidazoles and condensed imidazoles" (104 pages), by E. S. Schipper and A. R. Day; "Oxazole and its derivatives" (120