such as India and Pakistan, where more than two-thirds of production is for communal use and lies outside the market; the neglect of the community development programs which are proving so successful in so many of the developing countries; the treatment of increased capital investment per capita as the determinant of per capita growth in income; the absence of any discussions of the role of development planning; and the exclusion of the balance-of-external-payments problem, which so seriously plagues most countries which are seeking more rapid development—all these aspects of Leibenstein's book indicate how partial the analysis is and how little it grapples with the real problems of economic growth, however successful it may be in diagnosing economic stagnation.

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A Frontal Section Anatomy of the Head and Neck. Otto F. Kampmeier, Arthur R. Cooper, Thomas S. Jones. University of Illinois Press, Urbana, 1957. xii + 25 plates. $15.

The authors have prepared a clear, accurate, and well-labeled atlas showing the frontal-section anatomy of the head and neck. This should be a useful reference book for surgeons and others concerned with the detailed topographic anatomy of the regions dealt with. It shows the anatomy of the anterior faces of 20 frontal or coronal sections through the head and neck to the level of the cricoid cartilage and seventh cervical vertebra. The original sections, each about 1 cm thick and evenly spaced, were cut fairly symmetrically through a young adult negro specimen.

The plates are natural size. In their preparation, photographic enlargements of the sections were reworked and clarified by author-artist Tom Jones. Bones are colored with a yellow overtone, but other structures are uncolored. The various other anatomical structures—nerves, vessels, muscles, and so on—are clearly depicted, and the labeling is quite complete. Except for the temporal fascia, however, fascial planes of the head and neck were ignored. In addition to the 20 frontal sections, there are helpful reconstructions showing the front and side views of the skull, a midsagittal view, and lateral views of the arteries and veins.

The introductory pages include notes on the preparation of the sections and plates and historical notes on the section approach to anatomy, with special concern for frontal sections.

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Quelques Problèmes de Chimie Minérale. Rapports et discussions publiés par les Secretaires du Conseil sous les auspices du Comité Scientifique de l'Institut. R. Stoops, Ed. Institut International de Chimie Solvay, Brussels, 1957. 544 pp. Illus. F. 590, paper; F. 675, cloth.

This book contains 12 papers dealing with problems in modern inorganic chemistry, presented at the 10th Congress of Chemistry held at the University of Brussels in 1956 under the auspices of the Scientific Committee of the Solvay International Institute of Chemistry. The value of the papers is enhanced by the inclusion of detailed discussion. Five of the papers are in French, and seven, in English. Much of the discussion is also in English. For those interested in the modern phases of inorganic chemistry, this published work should be extremely valuable.

The papers, presented by leading authorities from France, England, Denmark, the United States, and Sweden, deal with such subjects as the complex compounds of the transition metals; physical chemistry of some nonstoichiometric phases; nonstoichiometric organic compounds; absorption spectra of complexes with unfilled *d*-shells; application of the screening theory of chemical reactions involving nonmetallic solids; applications of the crystal-field theory to problems of transition-metal chemistry; problems of solid-state chemistry; and the influence of adsorbed gases on the reactivity and stability of surface crystalline lattices.

Included in the book are pertinent features about the institute, the composition of its administrative committee, a list of those who participated in the congress (which includes members of the scientific committee, the members who gave the papers, invited members, various secretaries, and invited auditors), the speech of the president of the institute, the banquet address of the president of the administrative committee, the speech of the president of the congress, and the closing speech.

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The Galactic Novae. Cecilia Payne-Gaposchkin. North-Holland, Amsterdam; Interscience, New York, 1957. 336 pp. Illus. $8.50.

About four hundred years ago Tycho Brahe wrote, "all philosophers agree, and facts clearly prove it to be the case . . . that the heavens and the celestial bodies in the heavens are without increase or diminution, and that they undergo no alteration, either in number or in size or in light or in any other respect" [quoted by J. B. Irwin, *Sky and Telescope* **16**, 544 (1957)]. Yet, it was Tycho himself who, in 1572, observed in the constellation Cassiopeia one of the rare cataclysmic "alterations" in a star of our galaxy —a supernova explosion in which a previously unknown (and probably invisible) star suddenly blew off a large fraction of its mass with a velocity that must have been of the order of several thousand kilometers per second and that raised the apparent brightness of the star until it rivaled Venus and could be seen in full daylight. We have no knowledge of the brightness of the star before its outburst. But at the present time there is no star in the position of the supernova brighter than about the 18th magnitude. The decline from maximum brilliance to the present postnova stage must have corresponded to at least 22 stellar magnitudes, or a factor of almost one billion. There is, however, in the region of the supernova a ragged-looking patch of turbulent nebulosity which emits not only visible light but also a large amount of long-wave radiation; it is, in fact, a conspicuous source of radio radiation. By analogy with the better known supernova of the year 1054—the Crab Nebula—it is reasonable to conclude that the radiation of the remnants of Tycho's supernova is, at least in part, of the "synchrotron" type.

While a supernova may appear in a single galaxy at a rate of one in several hundred years, the less spectacular normal novae appear at a rate of several dozen per year. Such a nova may suddenly increase in brightness by a factor of about 10,000; and the velocity of the ejected gas (about 0.00001 of the mass of the star) is more moderate—of the order of a few hundred kilometers per second.

All types of novae are now believed to represent particular stages in the evolution of old and massive stars which have exhausted most of their nuclear energy sources and are in the process of readjusting themselves to the state of "white dwarfs," a process that must involve a drastic reduction in the mass of the star.

Cecilia Payne-Gaposchkin's new book is a comprehensive summary of everything that is now known about these stars. It describes and coordinates the observations made by hundreds of astronomers during the past nine hundred years, and it illustrates the enormous difference between the research methods of the astronomers and those of other scientists. The phenomenon of a nova is not only a relatively rare occurrence, it is also one of short duration. An individual astronomer may succeed in observing its brightness or its spectrum on only a few

nights, and it would be impossible for him to draw any far-reaching conclusions from his own work. It is only by piecing together the results obtained by many observers of many novae that their common properties and the correlations of these properties with other stellar data can be ascertained. A very useful compilation of this sort was published in 1942 by G. Cecchini and L. Gratton, under the title *Le Stelle Nuove* (Ulrico Hoepli, Milan, Italy). But much new information has become available during the past 15 years, and nearly all of our knowledge of the significance of the novae in the broad picture of cosmical evolution has been collected in the past ten years. Cecilia Payne-Gaposchkin states in her introduction that "the book will be obsolete by the time it is printed," and we agree with her that "this is a measure of the timeliness of the subject." However, I believe that only her last and, incidentally, most inspiring, chapter, on "Evolutionary and Theoretical Problems," is in danger of being soon out-dated. The rest of the book will very likely remain for a very long time, if not forever, a source of information concerning the observational data for all novae up to the middle of the present century.

There are eleven chapters: "Statistics of Galactic Novae," "Distribution of Galactic Novae," "The Spectra of Novae," "Galactic Novae, First Class Data," "Galactic Novae, Second Class Data," "Galactic Novae, Fragmentary Data," "The Symbiotic Novae," "The U Geminorum and Z Camelopardalis Stars," "The Supernovae," "Comparative Study of Spectral Development," and "Evolutionary and Theoretical Problems." Each chapter lists extensive bibliographies. There is a convenient general index of all the novae discussed in the various chapters (including a number of stars which are not usually regarded as novae but which have spectroscopic or photometric properties that resemble those of novae).

The number of light curves and other line drawings is fully adequate to illustrate the photometric properties of the various groups of novae, but the number of halftone reproductions of the spectra of novae is disappointingly small. Some of these reproductions are vertically widened enlargements (accomplished by means of a cylindrical lens or a swinging pendulum) of very narrow original spectra. This process of widening often introduces spurious features in the reproductions which look like spectral lines but which are merely widened images of specks and clumps of grains on the original photograph. Considerable caution must be exercised in the use of these enlargements. The reader may wish to consult, in addition to this book, the very complete atlas of spectra of Nova DQ Herculis of 1934, which was published in 1939 by F. J. M. Stratton and W. H. Manning of the University of Cambridge, and the sets of synthetic drawings by D. B. McLaughlin of the University of Michigan, which represent the typical development of a nova spectrum from its premaximum stage (when the brightness is 1.5 magnitude less than at maximum) until the spectrum is that of a diffuse nebula (when the brightness is 6.2 magnitudes less than at maximum). These drawings may be found in *Astrophysics: A Topical Symposium* [J. A. Hynek, Ed. (McGraw-Hill Astronomical Series, New York, 1951), pp. 135, 136] and in other publications.

OTTO STRUVE
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United States Army in World War II. The Technical Services. *The Signal Corps: the Test* (December 1941 to July 1943). George Raynor Thompson, Dixie R. Harris, Pauline M. Oakes, and Dulany Terrett. Office of the Chief of Military History, Department of the Army, Washington, D.C., 1957 (order from Supt. of Documents, GPO, Washington 25). xv + xx + 621 pp. Illus. $4.50.

The Signal Corps: the Test is the second volume of the history of the Signal Corps in the recent war; it covers the period from December 1941 to July 1943. It was prepared by the Historical Division of the Signal Corps under the direction of its chief, George R. Thompson, as one of the volumes in the series entitled the *United States Army in World War II.*

The first volume related the struggle of the Signal Corps to maintain itself and to develop in the period between the two world wars. General Omar Bradley agreed with the men of the Signal Corps that "Although Congress can make a General, it takes communications to make him a Commander." But the Signal Corps was to create more than that. This volume deals with the development of sense receptors for the Army's physiology and the development of a nervous system for integration and mobilization of the global military organism.

The second volume begins with the attack on Pearl Harbor, and the incident is symbolic of the course of events for the next 18 months. The Japanese planes were "seen" by what radar there was in operation on Oahu, but the information center failed to realize the significance of what was on the radar screens. Later, at Manila, similar information failed to pass through the channels of Army command. Lack of trained personnel, lack of equipment, and misunderstanding of what the equipment could do were all factors contributing to these tragedies. Indeed, at the beginning of the war the Signal Corps was an organization whose manpower and budget ran behind that of the other services. Even as late as 1942 General Colton remarked that the Signal Corps was farther behind in meeting its objectives than the other services.

Yet, by 1943, the research for the major technical advances had been carried out and most of the advances were already in the production stage. The British cavity magnetron had been applied successfully to produce a much more accurate microwave radar. Armstrong's invention of frequency modulation had been successfully applied to mechanized warfare. At the end of World War I the Signal Corps catalog had included some 2500 items, but by June 1943 it included more than 70,000. Thousands of men were pouring through old and new training schools of the Signal Corps by 1943. A global network of communications had been set up for the Army command and for the Army Air Force. Radio relay gave flexibility to the networks, carrier added many more channels, and radio teletype increased the speed of flow of information.

These advances were achieved during a period of internal conflict at the highest levels of command. Was the Signal Corps to supply materiel from civilian industry, or was it to organize and maintain communications? The problem of Signal Corps growth within the Army Service Forces and the conflicting goals of development, supply, and operations were expressed in the struggle of the Chief Signal Officer to obtain control of Army communications. The book ends with his defeat and retirement, but the authors point out that others were to reap the harvest of what he had sown.

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New Books

Biochemistry and Human Metabolism. Burnham S. Walker, William C. Boyd, Isaac Asimov. Williams & Wilkins, Baltimore, ed. 3, 1957. 944 pp. $12.

A Handbook of Animal Physiology. E. M. Pantelouris. Baillière, Tindall and Cox, London, 1957 (order from Williams & Wilkins, Baltimore). 263 pp. $6.25.

The Life, Work and Times of Charles Turner Thackrah, Surgeon and Apothecary of Leeds (1795–1833). A. Meiklejohn. Livingstone, Edinburgh, Scotland, 1957 (order from Williams & Wilkins, Baltimore). 238 pp. $6.

Cerebral Lipidoses. A symposium. J. N. Cumins, Ed. Thomas, Springfield, Ill., 1957. 222 pp. $8.50.