dex for each of the six languages; each term in the index is followed by a reference to a section and an item number in the first part. These indexes are supposed to enable the user to look up unknown terms. It is therefore unfortunate that there are no cross references within each index. The user soon realizes that nearly all phrases are indexed under the grammatically most important noun, but it is unreasonable to expect him to look for least squares under "*method* of least squares." There are also some inconsistencies in the indexing: for instance, "expanding shell" appears only under "shell," while "spherical shell" appears only under "spherical."

Nevertheless, the book is generally useful, and it will be a valuable addition to library shelves. Few individuals will wish to pay such a formidable price, however.

IVAN KING
University of Illinois Observatory, Urbana

Historical Account

Astronomical Photography. Gerard de Vaucouleurs. Translated by R. Wright. Macmillan, New York, 1961. 94 pp. Illus. + plates. $6.

The subtitle of this small volume, "From the daguerreotype to the electron camera," correctly indicates that it is a history of astronomical photography rather than a how-to-do-it book. In telling who first photographed a particular object—say, the moon—the author also tells what kind of instrument, refractor or reflector, was used, its aperture and focal length, the exposure time, and the size of the image. Since the book is provided with a good index, it will undoubtedly serve as an excellent reference volume.

The reader would not guess that the book had been translated, if the title page did not indicate that R. Wright was responsible for the translation. There is no indication that it was originally published in French.

A good account is given of the gradual improvement of photography as an astronomical tool. The factor of increase in sensitivity of the photographic process, which occurred between 1857 and 1957, is estimated as 100 million. The author also uses a factor, not specifically defined, to measure the inferiority of photographic as compared to visual observations. He indicates that this factor has decreased from 10 in 1889 to 1.5 in 1943. In view of this interest in the comparative effectiveness of the human eye and the photographic plate, it is a little surprising that no comment is made concerning the gegenschein or the zodiacal light, save as an obstacle to recording faint stars.

Only a single page is devoted to color photography, and about ten interesting pages are concerned with electronic devices that are intended to increase the effective sensitivity of the photographic process. The illustrations are well chosen and well reproduced; they present astronomically important photographs taken between 1845 and 1959.

This book may be recommended highly to persons who are already well informed in physics or photography, but it is probably too technical for the general public. For example, the phrase, "failure of the reciprocity law," is used on pages 43 and 69, but it is explained briefly for the first time on page 81. Also, phrases such as "radiation of relativistic electrons in a magnetic field" (page 77) are used from time to time.

CHARLES H. SMILEY
Ladd Observatory, Brown University

English-German-French

Chemical Dictionary. J. Fouchier and F. Billet. Netherlands University Press, Amsterdam, ed. 2, 1961. 429 pp. $25.

The book is made up of three approximately equal parts, each of which provides a listing of about 12,000 technical terms from chemistry and physics with their equivalents in two other languages. Each page consists of three columns of words. The left-hand column contains single words or terms arranged alphabetically in one of the languages, English, German, or French; the other columns give the equivalents in the other languages. The three sections are English-French-German, French-German-English, and German-English-French. Clearly, the work is not simply a "chemical dictionary," as its title implies. It might be more aptly described as a "Dictionary of Chemical Terms with English, German, and French Equivalents."

The usefulness of any dictionary depends on both the number and the selection of words. The number of words or terms covered in this work is, by its triplicate nature, only one-third of what might be expected from simple consideration of the total number of pages: the coverage is limited indeed. A popular German-English dictionary for chemists contains 42,000 entries, compared with about 12,000 here. A more serious limitation appears in the selection of words. Although the authors claim to have included many new terms in this edition, I was struck by the following samples of its shortcomings: none of the words pteridine, lysergic acid, testosterone, estrone, pantothenic acid, or vitamin A were in the English listing; although the structural formulas for a large number of organic dyes and simple aromatic compounds are included, only molecular formulas are provided for such important compounds as cholesterol, ergesterol, and carotene.

On the positive side, the type and the arrangement of material on the page make for easy reading. The preface contains (in three languages) abbreviations, temperature conversion tables, a periodic chart, and a table of weights and measures. Finally, and this is one of the rather charming features of the dictionary, the authors have not limited themselves to a single translation; it is fun to see the shades of meaning that cluster about a single word in any one of the languages.

The price is high for such a limited dictionary, but this one will probably find its place on the desks of those concerned with translating technical articles written at a fairly unsophisticated level.

RICHARD H. EASTMAN
Department of Chemistry, Stanford University

Earth's Landforms

L'Evolution de la Lithosphère. vol. 3, *Glyptogénèse*. Henri Termier and Geneviève Termier. Masson, Paris, 1961. 471 pp. Illus. Paper, NF. 110; cloth, NF. 122.

Probably only geologists who have read Grabau's *Principles of Stratigraphy* will recognize the scope of this book from its title. As implied by its subtitle, the book deals with the sculpturing of the lithosphere and the resultant landforms. In a sense this is a regional geomorphology on a world scale, except that the approach is not one of systematic regional description but rather

places emphasis on mode of origin and geomorphic history of the earth's landforms.

The accomplishment of such an ambitious undertaking, in a book of this size, presents two major problems: the necessity of being brief without being superficial and the necessity of depending to a large degree on geologic literature. In a few places the discussions are so brief that it might be argued the space should have been allotted to another topic, but on the whole the authors resolved this problem reasonably well. Much of the book displays their firsthand knowledge of the areas, and where they must depend upon the literature, their knowledge of it is gratifyingly up-to-date. Language-shy American geologists will find that anyone who has a modest facility with scientific French can follow the text with little difficulty.

The book is divided into eight major parts which are discussed in the following order: general principles, climatic influences on landscapes, the effect of epeirogenic uplift on land sculpture, landforms beneath the oceans and seas, the recent basins of southern Europe, subsidence and areas of sedimentation, geomorphic features in tectonically active areas, and the role of organisms in landform development.

American geologists will undoubtedly find the sections dealing with areas outside North America most useful. References are in general adequate, and they are predominately to material published in French or English. Seven tables and 175 figures of good quality add much to the value of the book.

The Termiers undertook a difficult task, and they have succeeded in producing a book that should be read by all geologists who have an interest in the geomorphic history of the earth's lithosphere.

WILLIAM D. THORNBURY
Department of Geology,
Indiana University

Biological Sciences and Medicine

A Useful Collection

Physical Techniques in Biological Research. vol. 4, *Special Methods.* William L. Nastuck, Ed. Academic Press, New York, 1962. xiii + 410 pp. Illus. $13.

Special Methods, the fourth volume in this series, falls naturally into two broad divisions: the first is a group of articles on body fluids and respiration; the second is a very long article, by W. J. Fry and F. Dunn, on the design and use of controlled ultrasonic fields.

It is doubtful that a convenient niche for the latter subject can be found anywhere, so, if it is to be fitted into such a series as this one, it must be content with unsuitable companions. The subject is so competently and lucidly presented within the chosen limitations, that one could wish they had been less severe and that the authors had written a whole book. Derivations of many formulas have been omitted, but the clarity and care with which assumptions involved and criteria for use are presented is more than sufficient compensation, particularly in view of the article's stated purpose: to enable investigators entering the field to design experiments, interpret data, and formulate specifications for instruments. To this end the authors discuss, in addition to the production of ultrasonic fields of controlled configuration, their interactions with fluids and tissue and their measurement by detectors dependent on "non-linear" behavior. Among the "passive" applications of ultrasonic fields, in which they are without effect on the subject, are methods of visualizing internal structures, particularly soft tissues. Possible applications in microscopy are considered. Active uses are also described, in which fields of controlled properties are used to modify deep-seated parts of the brain, reversibly or permanently, and without effect on intermediate structures. Like the authors, one regrets that space limitations prevented the inclusion of sufficient detail to relate this part specifically to the earlier theoretical sections.

Three of the papers on body fluids and respiration are devoted to surveys of current techniques; Shu Chien and M. I. Gregersen, in "Determination of body fluid volumes," present a long and detailed account of dilution techniques for measuring the several fluid compartments. Many tracer substances are discussed, each with its method of use, validity, and precision. E. Renkin, in "Techniques of vascular perfusion," presents a relatively short discussion of fluids and apparatus which may be used; a classified list of references to perfusion systems for various purposes is appended. "Physical techniques in external respiration," by A. B. Otis, is a short but comprehensive review covering pressure, volume, flow, and gas analysis, including methods for quantities not directly accessible, such as alveolar pressure, and some simple ways in which the solutions of respiration equations may be displayed directly on an oscilloscope.

There are two articles on specific analytic techniques. M. Margoshes, in "Flame photometry," discusses separately the components of a flame photometer and the errors which can arise in each. The mechanism of interference by anions and other cations is discussed, and examples are given of ways in which it may be turned to advantage. Organic solvents and high temperature flames are considered as possible lines of development for the techniques, and a section is included on atomic absorption spectroscopy. "The oxygen cathode," by P. W. Davies, is a short but concise and comprehensive discussion (both theoretical and practical); it includes selected examples of the use of oxygen cathodes in various biological situations and is liberally provided with diagrams