BOOK REVIEWS

ERUPTIVE ROCKS, THEIR GENESIS, COMPOSITION, AND CLASSIFICATION, WITH A CHAPTER ON METEORITES. Second edition. By S. JAMES SHAND. New York, John Wiley & Sons; London, Thomas Murby & Co., **1943.** Pp. xvi+444; figs. 47, pls. 3. Price $5.00.

This second edition of Professor Shand's notable book has been extensively revised. The wide field and laboratory experience of the author and his many contacts with the points of view of petrologists of three continents, as a student in Scotland and as a teacher in South Africa and America, give him an unusually comprehensive grasp of the subject. This has resulted in a book which gives the best elementary treatment of the eruptive rocks that is in print. The author has a wide familiarity with the literature and lists many references at the end of each chapter. Throughout, the discussions are brief and critical, and they preserve an excellent balance between the field, the laboratory, and the geochemical data and arguments.

The first chapter deals with such properties of magmas as their fluidity, water content, and temperatures of consolidation. For the latter he boldly places the temperature of consolidation of extrusive rocks above 700° and those of most granular rocks from 700° to 500°. These temperatures are probably lower than would be given by most petrographers. At the time the quartz of the pegmatites was studied all of the pegmatites were thought to be magmatic, but our present knowledge indicates that all of the low quartz tested from pegmatites was hydrothermal and all of the magmatic quartz was high quartz. There is no convincing evidence that the temperature of crystallization of the extrusive rocks is much, if any, higher than that of the granular rocks with the same composition.

The second chapter deals with the minerals and mineral families in the eruptive rocks and the relative abundance of the oxides and elements. The descriptions of the mineral families deals chiefly with their chemical compositions and artificial formation. It recognizes the complexity of the rock minerals and explains this on the modern theory of atomic substitution. The descriptions are brief, but they are clear and accurate and so are suitable for an elementary student.

Chapter 3 deals with the fugitive constituents and is a well-balanced discussion of the field, laboratory, and geochemical data.

Chapter 4 discusses the temperature and pressure in the magma. The discussion is excellent. However, the reviewer has concluded both from a study of the literature and from personal observations that inversion of quartz to tridymite by magmatic heat is very rare, and we still need clear evidence that it takes place. The data on the effect of pressure on the high-to-low-quartz inversion is accurately known. The curve of Goldschmidt on the effect of pressure on the reaction $CaCO_3+SiO_2 \rightleftarrows CaSiO_3+CO_2$ has little value as the pressure involved is the vapor pressure of CO_2 and this may be low since the CO_2 escapes as the reaction takes place.

Chapter 5 on the freezing of the magma presents chiefly the physico-chemical data. Chapter 6, on the magma and its walls, places reasonable emphasis on reaction and assimilation by the magma. Chapter 7, on the order of crystallization, fails to give sufficient emphasis to the natural chilling experiments prepared for us by nature in the lavas and small intrusive bodies. Chapter 8 deals with compatible and uncompatible phases and Chapter 9 with eruptive rock complexes.

The next ten chapters deal with the classification and description of rocks and with problems that concern chiefly one group of rocks. After a general discussion of rock classification, the author presents his own system. The major divisions are based on the rather obvious and commonly used silica content—oversaturation, saturation, or undersaturation. The next subdivision is based on the alumina content with respect to that required to

form feldspars and feldspathoids. Does a broad study of rocks justify such great importance being given to alumina? Next are four divisions depending on the proportion of dark minerals. Then four divisions based on the proportion of the different feldspars or feldspathoids: or>an and or>ab; or>an and or<ab; or<an and ab>an; and or<an and ab<an.

Shand's system of classification seems to differ materially in many respects from that in common use, yet rock names are used by Shand with much the same meaning as in other systems.

Shand's book is very well written. It does not present the material dogmatically but gives the arguments pro and con clearly and concisely. The reader is shown the complexities and uncertainties that are inherent in nearly all petrological problems.

The repeated use of the terms acid and basic rather than silicic, or some other more appropriate terms, and the use of alkaline for alkalic will be unwelcome to many American petrographers who have been attempting to discourage the use of these inappropriate terms.

The philosophical quotations at the beginning of each chapter are apt.

ESPER S. LARSEN
Harvard University.

LUMINESCENCE OF LIQUIDS AND SOLIDS AND ITS PRACTICAL APPLICATIONS. By PETER PRINGSHEIM of the Department of Chemistry, University of Chicago, and MARCEL VOGEL, San Francisco, California. x+201 pages. Interscience Publishers, Inc., New York, N. Y. (**1943**). Price $4.00.

Part I of this book is devoted to "Physics of Luminescence." This section includes a brief chapter on the history of luminescence, after which the theory of luminescence is well discussed. Then follow chapters devoted to a description of the various types of light sources for producing photoluminescence, a discussion of photometric instruments for measuring the intensity of luminescence and its duration, spectroscopic methods for examining the light produced, and on the use of the microscope in examining fluorescent materials. In chapter IV of section I are discussed luminescent materials, both organic and inorganic. Synthetic inorganic phosphors are described in considerable detail and methods of preparing many of them are given. The reviewer finds no mention of the interesting fused mixtures of certain iodides, such as cadmium and manganese iodides. Rather little space is devoted to the fluorescence and phosphorescence of minerals because of the limited number of useful applications in this field. The fluorescence of scheelite is, however, rather extensively employed in prospecting for calcium tungstate and the fluorescence of willemite is also being utilized.

In Part II, 34 pages are devoted to the fluorescence analysis, both qualitative and quantitative, of organic and inorganic materials, including the use of fluorescent indicators and the determination of vitamins B_1 and B_2.

The last chapter is devoted to luminescence as a light source, including fluorescent and phosphorescent paints and screens, and fluorescent lamps. A long list of important organic and inorganic fluorescent compounds, with their properties and references to them, is included.

References to the literature are quite complete and greatly increase the value of the book. The general appearance and style of the book are good.

Although this book is of limited direct usefulness to mineralogists, the wide variety of uses of luminescent materials will make this book very interesting reading and a valuable text of reference to scientific workers in this and many other fields.

H. H. WILLARD
Dept. of Chemistry,
University of Michigan.

CHRONIC PULMONARY DISEASE IN SOUTH WALES COALMINERS, II, ENVIRONMENTAL STUDIES. A Report by the Committee on Industrial Pulmonary Disease. B.-G. Reports on Physical, Chemical and Petrological Studies. By T. Bedford and C. G. Warner; H. V. A. Briscoe, P. F. Holt, N. Spoor and others; G. Nagelschmidt; A. Brammall and J. G. C. Leech; D. Hicks and G. Nagelschmidt; J. Ivon Graham and D. F. Runnicles; and co-workers. 222 pages, *London*, His Majesty's Stationery Office **(1943)** Price 10s.6d.

The report on environmental studies is complementary to a previous report covering a medical survey and accompanying pathological studies issued a year earlier (Spec. Rep. Ser. Med. Res. Coun. London., #243, 1943). It will be found of value to students of silicosis, to workers in the petrology of sediments, and particularly to those interested in the mineralogy of clay and shale.

This report has been prepared under the direction of the Committee on Industrial Pulmonary Disease but is essentially restricted to environmental studies. The term "environmental conditions" is intended to embrace such features as dust breathed at the coal face, the nature and size of the dust particles, the composition and characteristics of the strata mined, irritant fumes of explosives, temperature and humidity of the air. Due to the broad scope of the investigation, it has been of necessity the product of the joint work of a large group.

The medical survey showed that the pulmonary abnormality encountered among coal miners could be found throughout the South Wales field; its incidence and severity being greatest in the case of miners who had worked for long periods at the coal face in the anthracite mines. The incidence of pulmonary abnormality was shown to vary with the rank of coal mined, allowing for certain local exceptions in the anthracite area. The disease of the South Wales coal miners, although a "disabling pulmonary disease" did not come within the accepted definition of "silicosis." Prolonged exposure to air-borne dust is given as the most important causative factor in the *pneumokoniosis* of coal workers.

The method of thermal precipitation previously described by Greene and Watson was used for the collection of dust samples. In this method particles are precipitated on glass slides due to the action of an electrically heated wire operating in an air current drawn directly from the air zone under examination. The glass slides containing the particles were studied under the microscope, making use of the oil-immersion objective and high magnification. According to Nagelschmidt, x-ray diffraction analysis can be considered as a substitute for microscopic analysis for mineral particles too small to be examined with the microscope.

According to the committee it is generally agreed that silicosis due to quartz dust may be attributed to particles which are less than five microns in diameter. Hence, it is concluded that the cause of *pneumokoniosis* among coal miners is to be found in the accumulation of the smaller particles in the air breathed.

Hicks and Nagelschmidt furnish the results of chemical and x-ray diffraction analyses of the mineral matter of coal seams, the adjacent strata, the air-borne dusts and screened fractions of the mined product. The quartz content of the rocks and dusts varies but shows no clear relationship to the rank of coal or *pneumokoniosis* incidence. In the mineral matter of the coal seam kaolin and carbonates predominate, while mica (illite) and quartz predominate in the rock strata. The dusts and screened fractions show these constituents and are similar to each other.

The sodium content of the mica in the rock decreases in passing from anthracite to bituminous coal. At the same time in the mineral matter of the coal seam the kaolin mineral changes from halloysite to kaolinite. The amount of kaolin and carbonates in the ash also undergoes increase. Notwithstanding these mineral changes the coal itself should be studied since the dust of anthracite may prove a greater hazard than bituminous dust.

Brammall and Leech furnish a detailed petrographic description of the rock strata overlying the coal. Differences in the degree of compaction and metamorphism establish a contrast between the shales of the bituminous and anthracite region. Anthracite, as would be expected, is associated with the higher pressure conditions.

A fairly complete suite of clay minerals is described in the clay-shal-slate sequence. The occurrence in the South Wales shales of primitive white mica (hydromuscovite, sericite or illite) is recorded. In addition both kaolinite and dickite are present in considerable abundance.

Petrologically the samples examined fall into two contrasted groups: (1) those from three non-anthracite mines, (2) those from anthracite mines. The chief contrast between the two groups lies in the degree of metamorphism that has been brought about by pressure.

PAUL F. KERR, *Columbia University.*

PAPERS PUBLISHED IN THE BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA OF SPECIAL INTEREST TO MINERALOGISTS

The following list of papers of special interest to mineralogists appeared in the July–December numbers of the *Bulletin of the Geological Society of America.* As indicated below some of these papers may be secured by writing to the Secretary of the Geological Society of America, 419 West 117th St., New York, N. Y.

Volume 54 (1943)
July–December

	Price
Archean sedimentation. By F. J. Pettijohn, pp. 925–972.	.45
Spectrographic analysis of New England granites and pegmatites. By John A. Shimer, pp. 1049–1066.	.15
Application of geology to the principles of war. By Charles E. Erdmann, pp. 1169–1194.	.20
Metamorphism of extrusives by basic intrusives in the Keweenawan of Minnesota. By G. M. Schwartz, pp. 1211–1226.	.15
Packing in ionic minerals. By H. W. Fairbairn, pp. 1305–1374.	.40
Recrystallization and flowage in Appalachian quartzites. By Robert E. Fellows, pp. 1399–1432.	.35
Plagioclase twinning. By J. D. H. Donnay, pp. 1645–1652.	*
Unusual lamprophyric dikes in the Manhattan schist of New York City. By R. J. Colony and H. R. Blank, pp. 1693–1712.	*
Transportation and deposition of heavy minerals. By Gordon Rittenhouse, pp. 1725–1780.	*

* The Geological Society has discontinued stocking reprints, but separates may be available from the author's supply.