

- S. Africa, P.O. Box 61019, Marshalltown, Johannesburg.
- THE CRYSTALLINE STATE; Peter Gay; 348 pp. Hafner Publishing Co., Inc., New York. \$14.95 U.S.
- THE INTERPRETATION OF GEOLOGICAL PHASE DIAGRAMS; Ernest G. Ehlers, 280 pp. W.H. Freeman and Company, 660 Market Street, San Francisco, California 94104. \$12.50 U.S.
- THE MINERALS OF FRANKLIN AND STERLING HILL; Clifford Frondel, 94 pp. John Wiley & Sons, Inc., New York. \$9.95 U.S.
- ATLAS OF THE TEXTURAL PATTERNS OF GRANITES, GNEISSES AND ASSOCIATED ROCK TYPES; S.S. Augustithis, 378 pp. Elsevier Scientific Publishing Company, New York. \$55.00 U.S.
- GRANITES AND THEIR ENCLAVES; J. Didier, 393 pp. Elsevier Scientific Publishing Company, New York. \$34.95 U.S.

BOOK REVIEW

SYMPOSIUM ON THE BUSHVELD IGNEOUS COMPLEX AND OTHER LAYERED INTRUSIONS. Pretoria, July 7-14, 1969, Geological Society of South Africa, Special Publication No. 1, 1970, xii + 763 p., Johannesburg; price: R 12 for members of the Geological Society of South Africa; R 20 for non-members.

In olden times, we used to have the "Festschrift" in honour of somebody. In recent years, published proceedings of symposia of one kind or another have increasingly become a familiar phenomenon. The volume under review is, in a way, a combination of these two styles of publication: it is, in fact, a Commemorative Volume in honour of Johannes Willemse.

During his whole professional life, Professor Willemse had been actively engaged in investigations in the Bushveld Complex and it was he who had in the first place been instrumental to having the Symposium take shape. It is thus fitting that the volume be dedicated to his memory. And it is deeply to be regretted that he did not live to take part at the Symposium. For one thing, it is permitted to assume that, had he been around, there would have been an attempt at a synoptic view of the different genetic interpretations, an attempt at correlation of diverging and overlapping nomenclature, an attempt at bringing the different calculations and graphical representations based on chemical data in a way "on one denominator" and make them more easily comparable. This would no doubt have enhanced the value and importance of this Symposium.

The publication has been edited by D. J. L. Visser and G. von Gruenewaldt. It constitutes a sizable (page size 8 × 10.5", 2" thick) and heavy (approx. 6 lb) book with numerous illustrations (well reproduced maps and line draw-

ings and very acceptable half tones). The language of most of the papers — whether translated from Afrikaans or otherwise — is somewhat indigestible and spiced with abstruse punctuation and there are rather more than the usual number of misprints. This detracts somewhat of the enjoyment the book is bound to give us but it is worthwhile in spite of these minor irritants as its contents are substantial and stimulating. An extensive subject index helps in the use of the book.

The volume contains 38 papers, 19 of which deal with various aspects of the Bushveld Igneous Complex or refer to local studies concerning the Bushveld Complex; 9 are on other South African ultramafic intrusions and 10 papers deal with ultramafic intrusions in other parts of the world (Muskox; Doré Lake; Dufek Intrusion, Antarctica; Giles Complex, Central Australia; Aberdeenshire; Turkey). Skaergaard and Stillwater, though frequently mentioned, do not constitute the subject of any one paper.

There are four contributions from Canada: — T.N. Irvine, Ottawa, Crystallization sequences in the Muskox intrusion and other layered intrusions (p. 441-476); — G.O. Allard, Quebec, The Doré Lake Complex, Chibougamau, Quebec, a metamorphosed Bushveld-type layered intrusion (p. 477-491); — A.J. Naldrett *et al.*, Toronto, Phase layering and cryptic variation in the Sudbury Nickel Irruptive (p. 532-546); — C.J. Hughes, St. John's Nfld., Major rhythmic layering in ultramafic rocks of the Great Dyke of Rhodesia, with particular reference to the Sebakwe area (p. 594-609).

Most of the other papers also deal with local or regional petrology or with the special mineralogy of some of their constituents and with

geochemical implications. Two papers are on local geophysical investigations (K. Biesheuvel, Pilanesberg, p. 266-282; F. Podmore, Great Dyke of Rhodesia, p. 610-620). There is one extensive contribution on the sulphides of the Bushveld Complex (L. Liebenberg, p. 108-207), stressing in particular the mineragraphy. A paper on petrochemical comparison of the Bushveld Igneous Complex with some other mafic complexes (D.R. Bowes *et al.*, p. 425-440) contains as an unexpected bonus 30 new chemical analyses of rocks from the Bay of Islands Igneous Complex, Newfoundland. It is unfortunate that the contribution by C. Burri and P. Niggli on the petrochemical conditions of the Bushveld (in "Die jungen Eruptivgesteine des mediterranen Orogens", I, p. 370-412, Guggenbühl & Huber, Zürich, 1945) appears to have escaped the attention of the authors as it is definitely still relevant.

The approaches outlined in the contributions on "Compositional variation of plagioclases in the Critical Series, Bushveld Complex" (J. Ferguson and I.H. Wright, p. 59-66) and on "Chromite segregations as petrogenetic indica-

tors" (T.P. Thayer, p. 380-390) may be of interest in the context of the investigation of any mafic igneous complex.

A tentative interpretation of the Bushveld Complex as having formed by overlapping impact craters (W. Hamilton, p. 367-379) and discussing also a possible formation by impact of the Sudbury lopolith, seems to have generated active discussion.

Contributions based on Earth Satellite remote sensing and photography are missing — such contributions may perhaps be forthcoming before long.

The Symposium gives an overall assessment of the present stand — and trends — of the geological investigation of the Bushveld Complex and it is informative also on other ultramafic layered intrusions. It is, necessarily, heterogeneous and incomplete but this may be considered an advantage — it invites discussion and it shows up open questions.

The volume should prove a valuable acquisition for any Library emphasizing Petrology.

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