Geology

Atlas and Glossary of Primary Sedimentary Structures. F. J. Pettijohn and Paul Edwin Potter. Translations into Spanish, French, and German by Jaun Carlos Riggi, Marie-Hélène Sachet, and Hans-Ulrich Schmincke. Springer-Verlag, New York, 1964. xvi + 370 pp. Illus. $14.75.

This handsome and lavishly illustrated book by the eminent authors of *Paleocurrents and Basin Analysis* represents a valuable supplement to that useful work and an eye-catching introduction for Springer-Verlag to the publishing scene in the United States. Written as a "*field guide* . . . for students to whom the entire subject is new and whose field study of sedimentary structures is just beginning," the *Atlas* stresses the pictorial representation of primary sedimentary structures at once significant for earth history and defying brief analysis.

As old as geology itself, the study of sedimentary structures nevertheless has undergone almost explosive growth during the past decade and more, following the evocative work of Kuenen and Migliorini on the processes and results of redeposition by gravity mass movement. This led, inevitably, to a proliferation of names (although many were not intended as formal terms) and to attempts at definition and interpretation, especially in English. Pettijohn and Potter have put geology in their debt, not only by arranging, classifying, and providing a glossary of these names, but by publishing their translation to equivalents in German, French, and Spanish (it would have been too much to hope for Russian!). They also mercifully eschew the temptation to "tidy up" in the form of a more systematic and descriptive competing terminology. The translators were faced with the problem that many features have independently been given names in other languages, or have English names that are difficult to translate exactly. They meet this problem in sensible ways that are carefully explained in each translators individual preface.

The authors wisely limit their near-inexhaustible subject and state clearly what it is limited to and where additional information can be found. Origin, top-and-bottom orientation, and directional and paleoecological significance are not elaborated upon; in this respect the book becomes a supplement to earlier works by the same authors and by Shrock. Only features produced by soft-sediment deformation (but not by chemical reorganization, frost action, or cryoturbation) are included; tectonic structures are excluded. Organic markings are given passing consideration but are considered too specialized, and too large, a subject for comprehensive treatment here.

The "Glossary of primary sedimentary structures" serves as an index to the photographic illustrations, mostly enlarged from 35-millimeter negatives, and mostly of North American outcrops. It is followed by cross-referencing indexes in German, French, and Spanish, which, like the rest of the book, will be useful in studying and reviewing for technical translation to those languages. In view of this, it is too bad that the foreign synonyms are not also given in the explanations of the plates rather than just the simple translation of the English term. The usefulness of these foreign-language indexes would also have been increased by including appropriate page and plate references.

A rough count indicates that about 350 terms are described or specifically referenced in the glossary and that about one-third of these are illustrated. Paradoxically, although the authors carefully define (and illustrate) bed, bedding, stratum, and stratification, words like varve, tillite, flysch, biohieroglyph, enterolithic folding, and equally esoteric terms are not defined in the glossary, although they are illustrated.

The great majority of the illustrations are excellent, well chosen, and so beautifully reproduced and arranged as to almost forestall criticism. Yet, to look the gift horse in the mouth, it must be said that the same space and investment could have been used to better advantage. Despite the authors' statement that "There is no duplication . . . [with] our paleocurrent volume" (p. III), a cursory check shows that plates 36, 58, 59A, and 89A were taken from identical or nearly identical localities, and are near duplicates of illustrations in the paleocurrent volume; others are very similar. Several pictures show little of interest (for example, 10A, 41A and B, and 50A), and a number of others do not notably supplement the descriptions. Ball and pillow structures (pseudonodules), flute casts, and cross-bedding are illustrated to the point of excess. And many pictures that take up an entire plate could just as effectively have been shown at half that size. Yet well over half of the structures described, some relatively unfamiliar even to experienced geologists, are not illustrated here.

Quibbles aside, however, my only real regret about this book concerns the decision of its authors not to discuss origins or elaborate on uses. True, this is done in *Paleocurrents and Basin Analysis*, but in the *Atlas* there is room between the plate explanations for a few words on these subjects, without increasing the size of the book at all. The authors and publishers would put the rest of us even more deeply in their debt by including such material in a subsequent edition.

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Varenna Summer School, 1962

Space Exploration and the Solar System. *Proceedings*, Course 24, International School of Physics "Enrico Fermi," June 1962. B. Rossi, Ed. Academic Press, New York, 1964. viii + 311 pp. Illus. $13.

Two weeks of the Varenna summer school in 1962 were devoted to space physics, and this volume is based on the lectures given there. The various articles cover a wide spectrum, both in subject matter and depth of survey. Only one paper deals particularly with measurements made in space. I expect that most individual purchasers of the book will buy it for one or two of the articles, so my job here is to summarize briefly what they are about.

An excellent introduction to plasma physics is given by R. Lüst. The article is limited to a discussion of the macroscopic equations and is largely complementary to L. Spitzer's well-known little monograph. For the expert in plasma theory, S. Hayakawa and H. Obayashi have developed an elegant description of charged-particle orbits with the canonical formalism.

G. J. F. MacDonald, in the longest article in the volume, presents a fascinating account of the interior structure of the earth and then goes on to "examine the present state of ignorance regarding the moon and the [other minor] planets." One exciting topic in-