

BOOK REVIEWS

Compaction of Argillaceous Sediments. H.H. Rieke and G.V. Chilingarian.
Elsevier, Amsterdam, 1974, 424 pp., Dfl. 85.00.

This volume is the sixteenth in the Elsevier series *Developments in Sedimentology*. As probably all geologists are aware, this series has been noteworthy for at least two things: exorbitant prices and all too often shoddy editing. Fortunately, only one of these two problems is present in the book under review, the high price. This is a good book that should be read by anyone interested in fine-grained sediments, be they geologists, engineers, or one of the many hybrids cultivated in recent years. Professors Rieke and Chilingarian appear to have read more on the topic of compaction of muds and their derivatives than any other pair of scientists known to the reviewer, and have done a good job of organizing and presenting their material. Both men have published extensively on this topic in the journals.

The book consists of eight chapters, titled: Introduction; Interrelationships among Density Porosity, Remaining Moisture Content, Pressure and Depth; Mechanics of Compaction and Compaction Models; Effect of Compaction on Some Properties of Argillaceous Sediments; Chemical Alterations and Behavior of Interstitial Fluids During Compaction; Subsidence; Abnormal Geopressures; and a final chapter on Equipment and Techniques used in Compaction Studies. It is clear from these chapter headings that extensive forays have been made by the authors into many branches of science and technology during the preparation of the book. I must confess that some of their presentation was difficult for me to follow, but I suspect this resulted from my own background deficiencies, rather than lack of clarity on the part of the authors. Their treatment of topics with which I am most familiar was thorough, readable and enjoyable.

I particularly liked the presentation in Chapter 5 of the effect of compaction on the chemistry of solutions squeezed out of clays and muds. Past students of this problem have gotten conflicting results and/or made different interpretations of their data, and Rieke and Chilingarian spread these conflicts out in plain view, so that the reader can evaluate them for himself. It is nice to see the differences pointed out in a publication, rather than simply the results favored by the book's writers. Chapter 5 is also noteworthy for its liberal use of Russian references, inaccessible to most of us but not to Professor Chilingarian. Fully 25% of the references for this chapter are from the Soviet literature.

In summary, I have no hesitation in recommending this book for purchase by academic and industrial libraries and by those individuals wealthy enough to

to patronize Elsevier. The book will be indispensable for reference purposes and as a guide to future studies.

HARVEY BLATT (Würzburg)

Monographie der Nördlichen Kalkalpen. 1. Grundprinzipien der alpinen Deckentektonik. Eine Systemanalyse am Beispiel der Nördlichen Kalkalpen. Alexander Tollmann. Franz Deuticke, Vienna, 1973, 404 pp., 170 fig., DM 126.00.

After extended examinations in the region of the northern Calcareous Alps, the author now presents the first of three volumes which try to give a complete representation of the northern Calcareous Alps.

The first volume deals with the principal questions of alpine nappe tectonics in general. The author has chosen his examples mainly of the northern Calcareous Alps. All the terms used in alpine nappe theory are defined in a very distinct manner, their history and employment are recorded and their genesis interpreted. All the terms and also the contents as well as the index of subjects are in German as well as in French and English.

After some preliminary remarks, a classification of the various types of nappes is given by tectonic style, by composition, by facies, by size, by the distance of thrusting, by mechanism of transport and finally by the time of transport. According to the tectonic style, shearthrust sheets and fold nappes are distinguished. The former (which dominate in the northern Calcareous Alps) can be divided into nappes which are removed along a slide and such ones with a basal oblique cut up. According to the facies, the real facies nappes (Hallein-Loferer Hällstätter nappe, Berchtesgaden nappe) are to be distinguished from polyfacies nappes (Mürzalpen nappe, Lammermasse, which Tollmann now considers as a local fault block of the Tyrolian base and not as a nappe).

Fundamental questions of nappe mechanics are linked with the manner of transport. Now as before, the tangential pressure still has a decisive role. The physical objections to this Tollmann partly tries to refute by referring to plate tectonics. He does not wish to eliminate the gravitative transport completely, but he is against every generalisation. An example of a downsiding nappe is the Berchtesgaden nappe in whose lower parts the Hallein-Loferer Hällstätter nappe was passively taken away as a drag nappe.

The most extensive chapter of the book (pp. 55–326) treats the diverse sectors of the nappes (the bottom, the dorsal limb, the front, the body of the nappes, root zone, klippen and windows). Only some aspects should be mentioned here. The preference of the underthrust as an explication for the nappe tectonics is rejected by Tollmann, though he confirms the "Unterströmungstheorie". He attaches great importance to the investigation of the direction of movement especially to rule out possible interpretations using exaggerated

fixed tectonics. The most important indicators are the verging fault structures (e.g. the window of Hornbach with a clear vergence towards the north in the Allgäu-Schichten layers, against the other interpretation as a pouch-shaped syncline). The alleged connection between the Allgäu nappe and Lechtal nappe in the Luitpold-Bärgünde section is attributed by Tollmann partly to a "Scheinserie" (pseudo series). Contrary to his earlier opinion, he concedes a relative autochthonous zone of the Zlambach facies of the eastern Salzkammergut, based on the transition (as shown by Schöllnberger) of the Zlambach-Schichten-layers (SE Grundlsee) with Dachstein-limestone in reef-facies of the Toten Gebirge-mountains. He thinks that a relative autochthonous stratification even for the Lammermasse and the Dachsteinmasse, is possible. He also approves of the existence of autochthonous klippen and windows, but he considers them to be far less common than the representatives of the fixed tectonics think.

A whole chapter about "Mimikry tectonic" is dedicated to the discussion with them. (p. 333 ff.: these are mushroom folds, autochthonous klippen and nappes, pouch-shaped synclines and autochthonous windows). In general, their significance is reduced. The existence on all sides mushroom folds and pouch-shaped synclines is denied for the northern Calcareous Alps.

The last chapter treats the fault systems in a nappe region. The book is well presented and should not be missing in any geological library.

WALTER DEL-NEGRO (Salzburg)

The Physical Principles of Rock Magnetism, Frank D. Stacey and Subir K. Bannerjee. Elsevier, Amsterdam, 1974, 195 pp., Dfl 60.00 (about \$12.10).

This book is certain to provoke discussion among specialists in the field of rock magnetism. In spite of the considerable amount of research that has been performed during the development of paleomagnetism since the late 1940's, many details remain unclear. As a consequence few integrated discussions of the physical principles have been attempted although the general concepts are widely accepted. These are covered in a number of books. The most notable is by T. Nagata (*Rock Mechanism*, 2nd edition, Maruzen, Tokyo, 1961). The first edition of Nagata's book has long provided a general introduction to the subject. The book by Stacey and Bannerjee has come therefore at an opportune time and contains many new ideas and some new data that have not been previously published. Even if there is some disagreement with the choice of contents and perhaps some of the detail, it will provide a stimulus to thinking in a field which has, in the past few years, not experienced much sustained excitement.

Although the authors will clearly reach specialists in the field, it is unlikely that they will succeed in their aim at producing a text comprehensible also to geologists and presumably, other non-specialists. Most of the physical,

chemical and mathematical arguments will be difficult to follow without some background in solid state physics. Chapter 1, for example, introduces the magnetic properties of solids. This assumes a working knowledge of statistical mechanics, crystallography, quantum mechanics and physical chemistry. Later chapters assume at least a familiarity with the field of solid state magnetism. However, the physical description of magnetic domain theory in rocks and details of the acquisition of rock magnetization are concise and lucid.

The book is organized with the bulk of material covering the physical concepts of rock magnetization and description of the parameters affecting this magnetization in the three introductory chapters. Chapters 4 and 5 on the detailed properties and physical behavior of magnetite and hematite, the magnetic minerals which contribute most to the observed magnetization of rocks, are perhaps the most useful from a research point of view. Chapter 6 on thermal activation effects contains several new unpublished ideas on the concepts of blocking temperature and viscous magnetization. Although the model explaining blocking temperature is simple, it is not clear that it will indeed work for all grain sizes (particularly those leading to P.S.D. behavior). Some indications of the complexity of this problem are given in the next chapter where blocking temperatures are suggested to be constant for the complete domain structure in a particular grain but different for different grains.

Chapters 7 to 10, on the acquisition of magnetization in rocks, provide a concise review of the physical mechanisms involved, and include some new ideas particularly on P.T.R.M. and the field dependence of T.R.M. It is unusual that the chapter on "Piezomagnetic Effects" is one of the longest in the book although there has been much discussion of this subject in recent years. The theoretical background, numerical calculation and laboratory observation of this effect are quite clear. This is largely due to the work of one of the authors (F.D.S.).

The final chapter on the magnetism of meteorites seems somewhat out of place without any discussion of the recent work on the magnetism of the lunar rocks, the problems encountered and their implications for terrestrial rock magnetism.

The book is well produced, free of misprints and should prove a useful reference and stimulus for those in this field. For those unacquainted with rock magnetism and looking for an introduction to the subject, this book may prove difficult reading.

M. JOHNSTON (California)