

The history of the study of landforms or the development of geomorphology, vol. 4: Quaternary and Recent processes and forms (1890-1965) and the mid-century revolutions, edited by T.P. Burt, R.J. Chorley, D. Brunnsden, N.J. Cox & A.S. Goudie. Geological Society of London, 2008. Hardback, 1025 pages. Price GBP 135.00 (fellows GBP 67.50; other societies' price GBP 81.00). ISBN 978-1-86239-249-6.

Here is a very large volume to complete a comprehensive history of geomorphology. The first volume appeared in 1964, and we now have the whole story, a superb climax to an admirable endeavour. How important is the history of a subject; how adrift are even the most amazing findings if they are not anchored in a developing and structured and organised subject; how necessary is history. Actually there is a mention in the preface of a possible volume 5, so perhaps this is not the end of the affair. To an old reviewer, 1965 is more or less now but there could be an exciting account of post-1965 history to be offered.

There are five editors and 24 contributors. There are 20 chapters divided among five parts. There are two appreciations - to Richard Chorley and Robert Beckinsale; and a prologue by N.J. Cox. In the prologue, there is a discussion, which did not appear in any of the three earlier volumes, on the question of defining geomorphology, and now we see that geomorphology encompasses not only the study of landforms, and their modes of origin, but also direct and detailed study of the processes that produce them, the materials that compose them and

their histories of environmental change. We see in volume 4 how geomorphology was slowly transformed in the 20th century from a study that typically started investigation by looking at landforms towards a study which more typically started by looking at processes: from the nature of landforms to the formation of landforms.

It is necessary to include considerable detail to give a full picture of the coverage and scope of the volume. Part 1 concerns 'Geological controls' and contains sections on 'Geology and landforms', 'Tectonics and related landforms' and 'limestone landforms', 1890-1965. Part 2 is about 'Fluvial processes and landforms', which consists of 'Weathering processes and forms', 'Mass movement', 'River channel processes and forms', 'Valley-side slopes and drainage basins, I, Runoff and Erosion'; and, also on valley slopes, 'II, Geometry and evolution'. Part 3 is on 'Glacial processes and landforms', which involves 'The Quaternary', 'Glacial erosional processes and forms: Mountain glaciation and glacier geography', 'Glacial depositional processes and forms', and 'Periglacial processes and forms'. Part 4 is 'Other regional processes and

landforms', which embraces 'Geomorphology in the humid tropics, 1890-1965', 'Developments in dryland geomorphology', 'Aeolian processes and forms', 'Coastal landforms', and 'Coral reefs'. Part 5 is about the 'Mid-Century revolutions' and contains 'The mid-century revolution in fluvial geomorphology' and 'The revolution in palaeoclimatology around 1970'.

It is an impressive package and delivers a vast(!) amount of information. One is immediately struck by the portraits; it is very agreeable to be able to see all those people with their familiar names, but who had until now no accompanying image. R.A. Bagnold looks very military and focused; Troy Péwé stands insouciantly on the hood of his jeep taking photographs in Alaska; Stanley Schumm manages a rather enigmatic expression; Luna Leopold demonstrates the perfect academic gaze; R.G. Carruthers wears his hat like a gentleman; Walery Lozinski is properly seated at his desk; Jan Dylík with cap and smile. There are over seventy portraits in this book and they provide a very welcome aspect, very interesting and satisfying.

The period covered by the volume is particularly interesting in that we see geomorphology becoming more scientific, and links developing with Quaternary geology and palaeoclimatology. Depending on one's viewpoint, it is either geomorphology expanding to include Quaternary and climatic studies or it is geomorphology joining the mainstream of the earth sciences and adopting all the scientific baggage which it had (possibly) been a little late in appreciating. The year 1965 appears to be a critical date and is mentioned several times as a turning point. It may be significant that in 1966 'Rock control in geomorphology' by Eijū Yatsu was published in Japan. It is such a critical and important work, and this is recognised in the discussions, particularly in John Gerrard's section on 'Geology and landforms'. He suggests that 1965 provides a good dividing line between the essentially verbal reasoning and argument by deduction that occurred prior to that date, and subsequent attempts to understand relationships by making measurements, establishing statistical correlations and employing statistical models; this was the start

of the so-called quantitative revolution. Gerrard gives Yatsu proper credit for his very important contribution. Yatsu posed the famous question: "Geomorphologists have been trying to answer the what, where, and when of things, but they have seldom tried to ask how. And they have never asked why. It is a great mystery why they have never asked why". Here, in volume 4, we see the how and why questions began to appear.

The whole coming-together of geomorphology, Quaternary geology and palaeoclimatology (possibly the underlying theme of this book) is well illustrated by loess - that widespread wind-laid silt. Loess has been appreciated by the inhabitants of northern China for thousands of years, but it became a topic for scientific investigation only in the early 19th century in Heidelberg, when Karl Caesar von Leonhard attached the name loess. Loess forms loess landscapes, and there is a geomorphology of loess; in fact, Marton Pecsí of the Hungarian Academy of Sciences estimated that about 10% of the continental surface is covered by loess. It is also a topic for investigation within the confines of Quaternary geology; it is seen as a Quaternary material, involved in Quaternary processes, and it has turned out that loess preserves an accessible chronological signal, that it is a good recorder of past climates, and a stalwart of palaeoclimatology. So how is loess treated in this fine book?

There are two main loess sections: Hugh French looks at loess in the context of periglacial processes and forms, and A.T. Grove does so in the setting of the revolution in palaeoclimatology. French offers a brief treatment centred around the problem of whether loess was the product of warm or cold deserts. In Europe, he notes, the fact that loess is concentrated near areas of former glaciation led to the conclusion that loess was winnowed out from glacial and outwash materials by strong winds, to be followed by local reworking by running water. A bit more attention in the palaeoclimatology section, because loess can be clearly seen as making a major contribution to the science of the reconstruction of past climates. Grove focuses on the work of Kukla in Central Europe and this is a record of remarkable scientific endeav-

our, but if loess were to be discussed in a palaeoclimatological context, there should have been some mention of Liu Tung-sheng and his colleagues, who established the complexity of the Quaternary via their work on long loess sections in China, and perhaps even of John Hardcastle in New Zealand, who was the first to report that loess contains a record of past climates. Obviously, it is hard in a short chapter (and even in a very large book) to cover all aspects of all relevant topics, but a wider vision of loess would have been welcome.

French provides a neat account of Walery Lozinski and the periglacial concept. The picture shows Lozinski at work and was taken from the first volume of *Biuletyn Peryglacialny* in 1954. There are several characteristics of Lozinski's 'periglacial zone' that made it a specific and limiting category of periglacial environment. First, it was a purely Pleistocene

concept. Today, French points out, one might envisage a modern-day Lozinski-style 'periglacial' zone only around the margins of the Greenland and Antarctic ice sheets. Second, as envisaged by Lozinski in his discussion on wind action, strong katabatic winds would have moved off the ice sheet and, to judge by areas such as NE Greenland or the ice-free areas of Antarctica today, the climate would not only have been very cold but also extremely dry. The periglacial story is inspiring; in fact the whole book is full of inspiring stories. The purpose was doubtless to record rather than inspire, but so many topics and problems are offered up to view that the reader cannot help but be inspired.

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