Book Review

Pre-Permian Geology of Central and Eastern Europe, R. D. Dallmeyer, W. Franke & K. Weber (Eds.), Springer-Verlag, Berlin Heidelberg New York 1995, 604 pp. ISBN 3-540-55472-6.

This impressive volume (over 600 oversized pages) is the pearl in the crown of IGCP Project 233 "Terranes in the circum-Atlantic Paleozoic Orogens", and more specifically, of the conferences held in Giessen and Göttingen, Germany in September 1990 entitled "Tectonothermal and Stratigraphic Evolution of the Central European Orogens". This is by no means the average collection of papers given at a conference, but a systematic compendium of knowledge about the tectonic development of Central Europe, and more specifically, of the Variscan belt between the Rheinisches Schiefergebirge, the Odenwald, and the Moravo-Silesian Zone.

The book begins with a brief introduction written by the three editors – Robert D. Dallmeyer (USA), one of the leaders of Project 233, and by the German geologists Wolfgang Franke and Karl Weber. Here one can find information about the layout of the book, as well as the general historical background to the problems presented. In the next chapter, P. Giese presents a review of the main geophysical features of the region, with special emphasis on the thickness and internal structure of the Earth's crust.

The core of the book consists of six chapters concerned with: the Rhenohercynian Foldbelt; the Mid-German Crystalline High; the Saxothuringian Basin; the Western Sudetes (Lugicum); the Moldanubian Region; and the Moravo-Silesian Zone. Each of the chapters begins with an introduction which gives a general idea about the geology of the given region. Many of the chapters are additionally subdivided according to regional criteria, especially:

Rhenohercynian Foldbelt – into (1) autochthon and non-metamorphic nappe units, and (2) metamorphic units (Northern Phyllite Zone);

Saxothuringian Basin – into (1) autochthon and non-metamorphic nappe units, and (2) exotic metamorphic nappes;

Moldanubian Region – into (1) Tepla–Barrandian Zone (Bohemicum) and (2) Moldanubian Zone;

Moravo-Silesian Zone – into (1) autochthon and (2) allochthonous units.

Each of the chapters or regional subchapters follows a single format: stratigraphy and lithology of the given region; its structure (tectonics); magmatic activity; metamorphic evolution, and metallogenesis. The final heading is missing from some of the chapters.

Three additional chapters follow the main body of the text. Dieter Franke describes the northern Variscan forelands; V. Bachtadse *et al.* describe the Paleozoic evolution of European paleogeography based on paleomagnetic data; and finally the editors of the book have included a summary chapter on the geodynamic evolution of the area. Within the framework of the previously defined tectonostratigraphic units (the largest of which are: eastern Avalonia, Armorica, the Moldanubian Region and Moravo-Silesian Zone), they consider the evolution of sedimentary basins, and stages in the convergence of lithospheric plates, placing these events within the larger framework of Europe and the present North Atlantic.

The book is richly illustrated, with well over 200 text figures. The stratigraphical subchapters contain base maps with locations of outcrops, geological maps, correlation diagrams, and paleogeographic maps. The tectonic subchapters have structural and tectonic maps, cross-sections (often based on excellent DEKORP seismic reflection profiles), as well as schemes and photographs of microstructures, which is so important in the case of tectonics of metamorphic rocks. Parts dedicated to volcanics and metamorphics contain data tables and diagrams illustrating the chemical and mineralogical composition of the rocks, P-T diagrams, tables of rare elements and their proportions, as well as metallogenetic and metallotectonic maps, block diagrams, and profiles showing the ore genesis, and profiles through specific ore deposits. The final chapter also contains small-scale tectonic maps and plate tectonic scenarios. I found that a useful feature of the book is the schematic map of the entire region, which is printed on the end papers of both the front and back covers.

The literature is provided at the end of each chapter – which is convenient – but it means some repetition of cited papers, which would have been avoided if the references were given as a separate chapter at the end. The end chapter consists of only a subject index.

The group of several dozen authors represents the best experts in the subject matter, as well as unquestioned experts in their respective specialties. It is a difficult task for the reviewer – who has never undertaken his own research in the study area, and who is only familiar with the Variscides from the literature – to provide critical comments on the whole content of the book. From my reading, I arrived at the opinion that the authors have created a useful picture of various aspects of the geology of the study area; have struck an excellent balance between presentation of facts and their interpretation; and have endeavored to objectively present differing opinions about controversial topics. They have not forgotten – as so often happens these days – about the early scientific pioneers like Eduard Suess or Franz Kossmat who decades ago built the foundations of our knowledge of the geology of the Central European Variscides.

The Polish reader is advised to pay especial attention to Chapter 6, covering the Western Sudetes (Lugicum). It was written by excellent specialists, representing the younger generation under the leadership of Andrzej Żelaźniewicz, with the aid of German and Czech co-authors, as the Lugicum covers area belonging also to these countries. Each of the subchapters contains separate conclusions, which works to the advantage of this chapter. This one chapter constitutes 1/10 the volume of the book, which is not in proportion to the areal extent of the region, but instead reflects the poor state of knowledge of the Lugicum. This state of affair leaves much to be desired, especially owing to the small amount of isotope data, and the near lack of geophysical information and deep drillings.

The Sudetes – as we know – are a complex mosaic of

small crustal blocks with very different profiles, and poorly known mutual relations. This creates the opportunity for very different interpretations. The current state of our understanding has come as a result of various theories – from the classical geosynclinal theory to the expanding Earth theory, to finally plate tectonics, which includes tectonostratigraphic terranes. The age of the folding and consolidation of the region has also been the subject of various opinions, with different importance assigned to the Assyntian (Cadomian), the Caledonian, and Variscan Orogenies.

In such a general text, the authors openly concede that they are concentrating on relating facts, and can only point out more general interpretations, controversies, and/or conflicting reconstructions – without making generalizations. The reader is left to make his own interpretations and test his ideas against existing models and those that will be devised in the future.

It is worthwhile to emphasize here the dominant north-south direction of tectonic transport in the western Sudetes. This is in agreement with the gently northward-dipping overthrust zones recently observed on deep seismic reflection profiles that traverse the foreland of the Sudetes. However, it is in contrast to the dominant northward tectonic transport in the area farther to the west.

Perhaps it is this uncertainty in the Sudetes (in contrast with e.g. Moldanubian Region) that caused the area to receive only passing mention in the general picture of Variscide evolution presented in the final chapter.

The chapter on the northern foreland of the Variscides was written by Dieter Franke, who for the past 40 years has been well-known to Polish geologists who have carried out research in the Polish Lowlands. The author endeavored to provide an objective picture of the geological evolution of the region, with emphasis on the different approaches to its geodynamical development. It seems to me, however, that writing about two versions of the northern boundary of the foreland (the Jutland-Moen Fault and the Trans-European Fault) he somewhat glosses over the problem. In the second version, the Jutland-Moen Fault is equated with the front of the Caledonian folds, and the Trans-European Fault is considered as the hidden edge of the rigid Precambrian basement upon which the folds were overthrust. This situation is analogous to the one that the author presented somewhat earlier, contrasting the Variscan fold front with the deeply rooted crustal boundary – the so-called "Norddeutsche Line".

The main emphasis of the chapter is precisely the northern foreland of the belt, however, on his paleogeographical maps the author does include a bit of the Polish territory, and in his description does mention the area and cites several sources from the Polish literature. However, by doing this the subsequent analysis is significantly more superficial. It's a pity that a Polish geologist wasn't asked to contribute, because the Sudetes are described in the book without their foreland – after all, it is the continuation of the areas that lie to the west of the Polish borders. There would have been quite enough things to write about. If D. Franke says that in his study area there are only a few boreholes that penetrated the Permian – in Poland he would have found dozens. On the other hand, the geophysical coverage on our side is not as good.

The above mentioned oversights in the discussion of the lands east of the Odra River are related to the only critical comment that one might have against this book. The title of the book is misleading. The subject matter of the volume concerns above all the Central European Variscides, excluding the Vosges and the Black Forest, as these areas are more closely connected with the Massif Central of France. Only a single small chapter covers the area from the Central European Variscide Foreland to the edge of the Eastern European craton. So, it is not a complete geology of the pre-Permian, and moreover, it does not concern Eastern Europe (as suggested in the title). As far as I am aware, Eastern Europe extends to the Ural Mountains. I wouldn't think that the inhabitants of the lands beyond the Niemen and Bug Rivers would take kindly to the idea of excluding them from Europe. If the book intended to cover the pre-Permian of EASTERN and Central Europe, then what happened to the whole of the platform cover (older Paleozoic, Devonian, and Carboniferous) of the Eastern European Platform? I would suggest a different title: "The Variscides of Central Europe".

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