



## The Paleozoic Balkan terrane: a re-evaluation

### Преценка на палеозойския Балкански терен

*Janko Gerdjikov<sup>1</sup>, Alexandre Kounov<sup>2</sup>, Dian Vangelov<sup>1</sup>*  
*Янко Герджиков<sup>1</sup>, Александър Кунов<sup>2</sup>, Диан Вангелов<sup>1</sup>*

<sup>1</sup> Sofia University, Department of Geology and Paleontology; E-mail: janko@gea.uni-sofia.bg

<sup>2</sup> Geological-Paleontological Institute, Departement Geowissenschaften Universität Basel; E-mail: a.kounov@unibas.ch

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Peri-Gondwanian affinity of some of the Lower Palaeozoic rock association in Bulgaria was suggested for the first time in the pioneering works of Haydoutov and Yanev (1997) and Yanev (2000). Their ideas were further developed through detailed researches involving geochronological, petrological and paleontological data. These contributions represent huge advances in our knowledge of the Palaeozoic history portraying the SE part of Balkan Peninsula as a one of the easternmost parts of the Variscan orogenic belt in Europe. The established models comprise 2 main tectonic elements: Thracian composite terrane and the Balkan terrane separated by ophiolite containing suture. Nevertheless, in these models of the Variscan evolution some questions, related to the protolithic or/and the depositional age as well as the time of the metamorphism of the main tectonic units (terrane), remains controversial. For example, although the Moesian platform is assumed not only as an Alpine, but also as a Variscan foreland its consolidation is poorly defined and prominent deformation of the Palaeozoic sedimentary cover is clearly documented.

Here we will focus on the topics related to the Balkan terrane. In the last few years new geological studies provide data which are stimulating a significant re-evaluation of the proposed models for the Paleozoic geodynamic evolution. The protolithic and/or depositional age of some of the major units turned out to be rather different from what was previously believed. The most striking case is with the Carpathian-Balkan ophiolite (CBO), which used to be regarded as an Upper Neoproterozoic oceanic crust. Three of the 4 fragments of this dismembered by the Alpine tectonics oceanic crust are now dated as Early–Mid Devonian (Balica et al., 2014 and references therein). The depositional age of other units in NW Bulgaria once supposed to be Cambrian–Ordovician (Dalgi Del and Srednogriv units) is now proven to be significantly younger (Late Silurian–Devonian: Maslarević, Krstić, 1997; Ercegovac et al., 2011). The new geo-

chronological and sedimentological data together with our regional-scale analysis indicate that the Cadomian basement is present in the units built mainly by Lower Paleozoic, non-metamorphic or low-grade rock assemblages. Moreover our structural data and re-evaluation of the previous datasets allows to clearly define the most significant Variscan shear zones and to delineate the areas affected by penetrative Variscan deformation. New detailed sedimentological studies in the area of Iskar gorge confirmed the presence of glacio-marine sediments at the Ordovician–Silurian boundary (Goutierrez-Marko et al., 2003; Chatalov et al., 2014). This fact unambiguously constrains the Gondwana margin affinity of the considered rock assemblage. Thus, it is now obvious that some of the previously suggested along-strike correlations with Southern Carpathians in terms of Palaeozoic tectonic units (e.g. Danubicum = Stara Planina = Avalonia and Geticum = Sredna Gora = Armorica) are unfounded. Previous regional studies (e.g. Boncheva et al., 2010) together with global-scale geodynamic reconstructions (e.g. Stampfli et al., 2013) allowed attribution of the rather well-preserved Lower Palaeozoic sediments in West Bulgaria to the evolution of the southern margin of the Rheic ocean and are allowing to put the various magmatic, sedimentary and metamorphic events into better constrained plate-tectonic frame.

The re-evaluation of the previous data combined with our new analysis and observations motivates a redefinition of the main features of the Balkan terrane as follows:

The unit is devoid of Variscan HP and high-grade metamorphic overprint.

There are clear evidences for the existence of fragments of Cadomian basement of the terrane preserved as small, variously overprinted by Variscan and Alpine events fragments (Vukan, Gologlavtsi, Lazovo, Divchovoto, Stakevtsi).

The Berkovitsa complex, previously regarded as formed in magmatic arc (Haydoutov, 1989) or com-

pressional orogenic setting (Ivanov et al., 1987), is most probably a product of Cambrian–Early Ordovician incipient rifting. These sediments at some places are forming the basement of the well-dated Ordovician–Devonian sedimentary succession. As suggested by some previous researchers the contacts between the Lower–Mid Devonian CBO and the Berkovitsa complex are tectonic.

The Ordovician–Devonian sedimentological record indicates a stable oceanic evolution and lack of any record of Ordovician orogeny or Caledonian events. The synorogenic Devonian mass-gravity flow deposits are indicative of the closure of the basin during this time.

The rock assemblages of CBO are product of Devonian plate-tectonic processes, unrelated to the Rheic ocean evolution. We interpret the CBO as an ephemeral pull-apart basin almost devoid of sedimentary rock association.

The Variscan orogeny had pronounced but diachronic and various in style imprint in the rock assemblages of the Balkan terrane. Importantly, on the basis of the new age determination, regional structural studies (Plissart, 2012) and our own field data, it is starting to appear that the pre-Mesozoic basement of the Balkan terrane in NW Bulgaria is recording strong Variscan syn-metamorphic shearing.

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