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Northern Gondwanan affinity of the East Moesian Terrane based on chitinozoans

M. Vaida [a,1], A. Seghedi [a,1], J. Verniers [b,*]

[a] Geological Institute of Romania, 1 Caransebes St., Bucharest 3, 78 344 Romania
[b] Research Unit Palaeontology, Department of Geology and Pedology, Ghent University, Krijgslaan 281 building S8, BE-9000, Ghent, Belgium

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Abstract

Identification of palaeocontinental affinities is important to place Moesia in the global context of palaeogeographical reconstructions. In the absence of palaeomagnetic data and relevant macrofauna, palynological data and especially chitinozoans represent an important tool, recently used to unravel palaeogeographical affinities. Chitinozoans from three main boreholes (Călăraşi 2881, Zăvoaia 2581 and Ţăndărei 1052) located in East Moesia have been studied. They indicate a predominant palaeogeographical affinity with northern Gondwana.

Keywords: Moesian Terrane; Chitinozoans; Northern Gondwana; Palaeocontinental affinity

1. Introduction

During Earth's history, continental growth was characterised by repeated accretion of continental blocks to form supercontinents as a result of orogenesis. The process was followed by destruction and supercontinent dispersal resulting in allochtonous terranes that were subsequently incorporated in younger fold belts (Van der Voo, 1988; Murphy and Nance, 1989, 1991; Dalziel, 1991, 1992, 1995; Dalziel et al., 1994). Because the original tectonic setting is usually obscured by their subsequent history of dispersal, accretion and involvement in younger orogenic belts, considerable uncertainty exists in the palinspastic restoration of such terranes. Palaeocontinental affinity of a terrane is established by comparing various data: palaeomagnetism, palaeontological evidence of faunal provinciality, as well as geochronological evidence. For Early Palaeozoic deposits, palaeocontinental affinities are established either by using benthic fossils, living on or in the seafloor sediments (trilobites, brachiopods, etc.), or by using planktonic fossils (graptolites, acritarchs, chitinozoans, etc.), with a palaeolatitudinal distribution sometimes disturbed by the current (Cocks and Fortey, 1982; McKerrow et al., 1991; Cocks and Verniers, 1998).

In its present form, Europe resulted from amalgamation of major crustal blocks and terranes. During the Palaeozoic, crustal blocks originating from the Gondwana supercontinent and affected by end-Precambrian Pan-African (or "Cadomian") orogenesis became attached to the SW margin of the East European Craton (Ziegler, 1990; Torsvik et al., 1996). The integration of microplates in the area north of the Alpine–Car-

* Corresponding author. Tel.: +32 9264 46 14; fax: +32 9264 46 08.
E-mail addresses: Mari.Vaida@igr.ro (M. Vaida), antoneta@igr.ro (A. Seghedi), Jacques.Verniers@UGent.be (J. Verniers).
[1] Tel.: +40 2 1 2 24 16 75; fax: +40 2 1 24 04 04.

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pathian Front, from Western Iberia to the Bohemian Massif, is now quite well understood (Winchester et al., 2002a,b). By contrast, geological understanding of microplate accretion to form the Palaeozoic basement of southeastern Europe is very poor. The Late Proterozoic and Early Palaeozoic geological record of Moesia are crucial to our understanding of the terrane accretionary history along the SE part of the Trans-European Suture Zone.

The goal of this paper is to establish the palaeocontinental affinity of the eastern part of Moesia during the early and middle part of the Palaeozoic and to find reliable evidence for their derivation from Gondwana, Avalonia or Baltica (i.e. the East European Craton). Eventually this evidence would serve to link up the Moesian terrane with the history of the neighbouring terranes (Balkan Terrane, Rhodope Terrane, Istrancea Terrane and the Istanbul Terrane) involved in younger, Alpine orogenies.

2. Geological framework of Moesia

Surrounded by the Carpathian, Balkan and North Dobrogea Orogens, the Moesian Platform is a major structural unit of the Carpathian foreland appearing like a spur in the Alpine mobile belt (Stille, 1953). This position explains the geological evolution and structure of the platform, forced by the ability of the surrounding areas to behave like an actively subsiding mobile zone receptive to the main tectonic events in the neighbouring areas.

Although north of the River Danube the Moesian Platform is covered by Quaternary deposits, various cover sequences or even basement rocks are exposed South and East of the Danube mainly along tributaries. The Cadomian basement with its Jurassic cover crops out in Central Dobrogea; lower and upper Cretaceous deposits are exposed in the central-Eastern part, while Tertiary sediments crop out in the western part of the platform, in South Dobrogea and in places along the right bank of the Danube.

The Intramoesian Fault divides the Moesian Platform into East and West Moesia, both areas showing distinct crustal properties, structural trends and lithostratigraphy of the cover successions. In Romanian literature East Moesia is referred to as the Dobrogean sector, while West Moesia as the Wallachian or Wallachian–Prebalkan sector (Săndulescu, 1984; Săndulescu and Visarion, 1988; Visarion et al., 1988). East Moesia is characterised by NW–SE trending crustal faults as the Peceneaga–Camena Fault and the Capidava Ovidiu Fault (Fig. 1b and c). West Moesia roughly corresponds to the Romanian Plain and occupies almost exclusively the Bulgarian part of the platform. West Moesia is characterised by the dominant E–W trend of major faults, intersected by a system of N–S faults (Săndulescu and Visarion, 1988). These two sectors of the platform show differences both in the stratigraphy of the cover sequences, as well as in their basement constitution.

The platform has a heterogeneous basement below its Ceno–Mesozoic and Palaeozoic cover. In South Dobrogea it consists of Archaean orthogneisses, Palaeoproterozoic Banded Iron Formation (Palazu BIF) and a Late Proterozoic volcano-sedimentary suite (Cocosu Group) (Giuşcă et al., 1967; Kräutner et al., 1988). In Central Dobrogea a Neoproterozoic metamorphic suite of pan-African affinity suggested by the lithological association, is overlain by Neoproterozoic–Early Cambrian turbidites (Histria Formation) above an extensional detachment. Metapelites and metabasites of the Altin Tepe Group, exposed in Central Dobrogea, show a Late Proterozoic amphibolite facies metamorphism (696 Ma, K–Ar on biotite, Giuşcă et al., 1967). The tholeiitic geochemistry, showing arc/back arc affinities (Crowley et al., 2000) suggests that the metabasites represent a part of the Cadomian arc accreted in the Neoproterozoic to the northern margin of Gondwana. In West Moesia, several boreholes bottomed in metapelites and metabasites similar to the Danubian basement of the South Carpathians, which suggests a pan-African affinity of this part of Moesian basement (Seghedi et al., 2001). For most metamorphic suites the Precambrian evolution is still poorly documented, as it is based mostly on K–Ar geochronology and field relations, no protolith ages being yet available.

A thick cover of Palaeozoic, Mesozoic, Palaeocene–Eocene, Miocene, Pliocene and Quaternary overlies the basement. In all areas of the platform, the cover starts with siliciclastic sandstones ascribed to the Ordovician and to some parts of the Cambrian. With some breaks, the sequence continues until the Late Neogene or Pleistocene. Four main sedimentary cycles separated by intervals of uplift and erosion have been separated in the Moesian cover, with some differences between East and West Moesia for the Mesozoic and Cainozoic (Paraschiv, 1979; Ionesi, 1994). The Cambrian–Westphalian and Permian–Triassic cycles are common for the whole platform cover. The following two cycles are Late Liassic (Toarcian)–Campanian (in places continuing throughout the Palaeocene–Eocene) and Late Badenian–Pleistocene for West Moesia, and Late Bathonian–?Early Maas-