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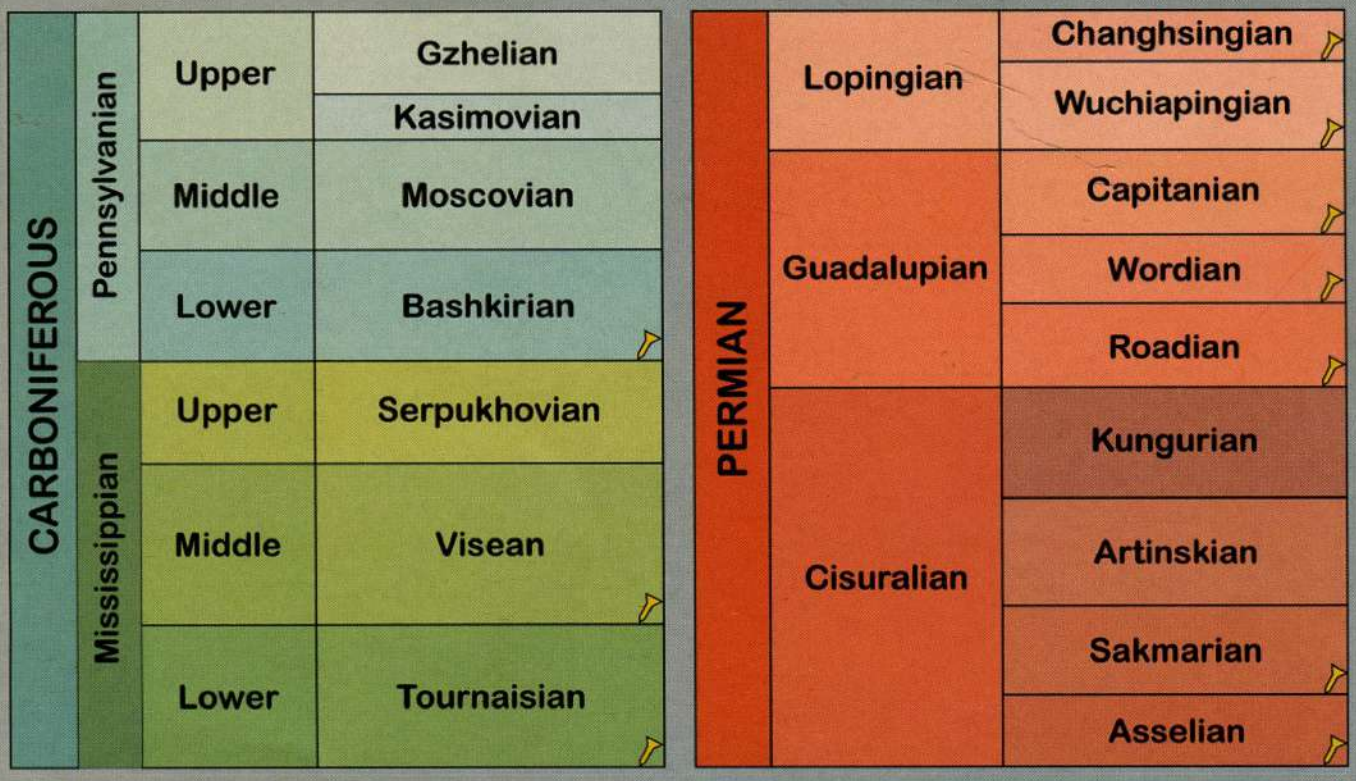
Abstracts

Sven HARTENFELS, Hans-Georg HERBIG, Michael R.W. AMLER & Markus ARETZ (Eds.)



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Correlation of Late Carboniferous, Permian and Early Triassic continental biostratigraphy to the Standard Global Chronostratigraphic Scale

Joerg W SCHNEIDER[1,13], Spencer G. LUCAS[2], Frank SCHOLZE[3], Sebastian VOIGT[4], Lorenzo MARCHETTI[4], Hendrik KLEIN[5], Stanislav OPLUŠTIL[6], Ralf WERNEBURG[7], Valeriy K. GOLUBEV[8,13], James E. BARRICK[9], Tamara NEMYROVSKA[10], Ausonio RONCHI[11], Michael O. DAY[12], Vladimir V SILANTIEV[13], Ronny RÖSSLER[14], Hafid SABER[15], Ulf LINNEMANN[16], Veronika ZHARINOVA[13] & Shuzhong SHEN[17]

[1]TU Bergakademie Freiberg, Institut für Geologie, Bernhard-von-Cotta-Straße 2, 09596 Freiberg, Germany, Joerg.Schneider@geo.tu-freiberg.de
[2]New Mexico Museum of Natural History, 1801 Mountain Road NW, Albuquerque, New Mexico 87104, USA
[3]Hessisches Landesmuseum Darmstadt, Friedensplatz 1, 64283 Darmstadt, Germany
[4]Urweltmuseum GEOSKOP, Burg Lichtenberg (Pfalz), Burgstraße 19, 66871 Thallichtenberg, Germany
[5]Saurierwelt Paläontologisches Museum, Alte Richt 7, 92318 Neumarkt, Germany
[6]Institute of Geology and Paleontology, Faculty of Science, Charles University, Prague 2, Czech Republic
[7]Naturhistorisches Museum Schloss Bertholdsburg, Burgstraße 6, 98553 Schleusingen, Germany
[8]Borissiak Paleontological Institute, Russian Academy of Sciences; Profsoyuznaya str., 123, Moscow, 119647, Russia
[9]Department of Geosciences, Texas Tech University, Box 41053, Lubbock, Texas 79409, USA
[10]Institute of Geological Sciences, National Academy of Sciences of Ukraine, Gonchar Str., 55-b, 01601 Kiev, Ukraine
[11]Dipartimento di Scienze della Terra e dell Ambiente, Università di Pavia, Via Ferrata 1, 27100 PV, Italy
[12]Department of Earth Sciences, The Natural History Museum (NHMUK), Cromwell Road, London SW7 5BD, United Kingdom
[13]Kazan Federal University, Institute of Geology and Petroleum Technologies, Kremlyovskaya str. 18, Kazan, Russia
[14]Museum für Naturkunde, Moritzstraße 20, 09111 Chemnitz, Germany
[15]Laboratory of Geodynamic and Geomatic, Department of Geology, Faculty of Sciences, Chouaïb Doukkali University, B.P 20, El Jadida, 24000, Morocco
[16]Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Königsbrücker Landstraße 159, 01109 Dresden, Germany
[17]School of Earth Sciences and Engineering, Nanjing University, 163 Xianlin Avenue, Nanjing 210023, China

The Carboniferous, Permian, and Triassic chronostratigraphic scales based on marine rocks and fossils are reasonably well defined and of global utility, but the situation is much different for non-marine deposits of this time interval. Due to the Carboniferous–Permian glaciation, the Hercynian-Appalachian-Ancestral Rocky Mountain orogenies, and other plate tectonic processes, numerous mixed marine-continental and, especially, purely continental basins from tens to thousands of square kilometers in size developed across the vast Pangean supercontinent. Apart from their economic importance (coals, hydrocarbons, salt, fire clay, etc.), those basins record the interplay between extrinsic and intrinsic processes that ranged from orbital cycles and climate fluctuations to volcano-tectonics and differential subsidence as well as the evolution of biota and environment, including the most severe mass extinctions in Earth's history During the last few decades a variety of bio- and chronostratigraphic methods has been developed and successfully applied in order to correlate continental deposits locally (intra-basinally) and regionally (inter-basinally).

Non-marine biostratigraphic/biochronologic schemes have been created for all or parts of the Late Carboniferous–Middle Triassic using palynomorphs, megafossil plants, conchostracans, blattoid insects, tetrapod footprints and tetrapod body fossils, and these provide varied temporal resolution. Cross correlation of the non-marine biochronologies to the Standard Global Chronostratigraphic Scale has been

achieved in some parts of the Late Carboniferous–Middle Triassic in locations where non-marine and marine strata are intercalated, the non-marine strata produce biochronologically significant fossils and the marine strata yield fusulinids, conodonts and/or ammonoids. Other cross correlations have been aided by magnetostratigraphy, chemostratigraphy and a growing database of radioisotopic ages. A synthetic non-marine biochronology for the Late Carboniferous–Middle Triassic based on all available non-marine index fossils, integrated with the Standard Global Chronostratigraphic Scale, focuses on the non-marine biostratigraphy/biochronology of blattoid insects, conchostracans, branchiosaurid amphibians, tetrapod footprints and tetrapod body fossils within the biochronological framework of land-vertebrate faunachrons. We divide correlation into seven time-intervals: Pennsylvanian, Carboniferous-Permian Boundary, Cisuralian, Guadalupian, Lopingian, Permian-Triassic Boundary and Early to Middle Triassic.

The insects, conchostracans and branchiosaurs provide robust non-marine correlations in the Pennsylvanian–Cisuralian, and the footprints and tetrapod body fossils provide robust correlations of varied precision within the entire Pennsylvanian–Middle Triassic. Radioisotopic ages are currently the strongest basis for cross correlation of the non-marine biostratigraphy/biochronology to the Standard Global Chronostratigraphic Scale, particularly for the Pennsylvanian–Cisuralian. Chemostratigraphy and magnetostratigraphy thus far provide only limited links of non-marine and marine chronologies. Improvements in the non-marine/marine correlations of late Paleozoic–Triassic Pangea require better alpha taxonomy and stratigraphic precision for the non-marine fossil record integrated with more reliable radioisotopic ages and more extensive chemostratigraphic and magnetostratigraphic datasets.

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The biostratigraphic significance of the Permian and Triassic conchostracans of the Kuznetsk Coal Basin (Western Siberia)

Veronika ZHARINOVA[1] & Vladimir V SILANTIEV[2]

[1]Kazan Federal University (KFU), 4/5, Kremlyovskaya, 420008 Kazan, Russia, nika_zharinova@mail.ru
[2]Kazan Federal University, 18, Kremlyovskaya St., 420008 Kazan, Russia, vsilant@gmail.com

The Kuznetsk Coal Basin (Western Siberia) is an ideal place to study the Permian and Triassic fauna. Conchostracans are ephemeral small crustaceans with a bivalved carapace. They can enter a state of anabiosis for a long time. They are widespread in continental deposits all around the world. Some species existed for only a short time and are useful for biostratigraphy and correlation (Li et al. 2007; Scholze & Schneider 2015; Schneider & Scholze 2018).

For several years, we studied the Permian–Triassic Babii Kamen section in the Kuznetsk Coal Basin. This section is located on the right bank of the Tom river, 45 km downstream from Novokuznetsk (N 54.38276; E 87.53430). The section is of interest to many scientists. For several decades, many groups of fossils (non-marine bivalves, conchostracans, insects and plants) were studied in detail (Mogucheva 1989; Betekhtina et al. 1986; Lezhnin & Papin 1998; Kazakov et al. 2002; Zharinova & Silantiev 2016; Karasev 2015). However, the Permian-Triassic Boundary in the section is still conventional, and is provisionally determined at the top of the last coal band.

The deposits of the Babii Kamen section consist of the Tailuganskaya and Maltsevo formations. The Tailuganskaya Formation is assigned to the Permian and the Maltsevo Formation is assigned to the Triassic. The numerous fossil remains are represented by ostracods, conchostracans, insects, gastropods, bivalves, fish scales, and terrestrial plants.

We sampled a new collection of conchostracans from the Tailugan and Maltsevo formations. About 500 conchostracan samples were collected from 12 stratigraphic layers. The taxonomic diversity of the conchostracans in the Babii Kamen section is large. The morphology of the valves was studied by using a new methodology of conchostracan classification (Scholze & Schneider 2015).

The upper beds of the Tailugan Formation contain the mass occurrences of *Pseudestheria novacastrensis* (Mitchell, 1927). This species was first described from the Upper Permian sediments of the Sydney Coal Basin, Australia. *Pseudestheria novacastrensis* is known from the Permian of the Siberian Platform (Yenisei river and Nizhnyaya Tunguska river), the East European Platform and the Timan-Pechora Basin (Mitchell 1927; Raymond 1946; Novojilov 1950; Goretzki 2003).

The species *P novacastrensis* also occurs in the lower part of the Maltsevo Formation together with *Palaeomutela (Palaeanodonta)* Amalitzky, 1895 that allows this interval to be assigned to the Permian (Zharinova & Silantiev 2016). The middle part of the Maltsevo Formation (about 150 m) is a "mute" interval. The upper part of the Maltsevo Formation (upper 115 m) is characterized by increasing diversity of conchostracans. This stratigraphic interval contains Permian species – *Cornia papillaria* Lutkevich, 1937, *Megasitum harmonicum* Novojilov, 1970, *Megasitum lopokolense* Novojilov, 1970, *Echinolimnadia mattoxi* Novojilov, 1965, as well as Triassic index species – *Concherisma tomiensis* Novojilov, 1958, *Cyclotungusites gutta* (Lutkevich, 1938).

The most important occurrence for biostratigraphy is that of *Cyclotungusites gutta* in the upper layers of the Maltsevo Formation. This species appears only in the Lower Triassic sediments and is known from deposits in the Pechora Basin, Siberia, and China (Molin & Novojilov 1965; CHU et al. 2017; Zharinova & Silantiev 2018).

The upper part of the Maltsevo Formation contains the Triassic species *Concherisma tomiensis*. This species is known from the Lower Triassic deposits of the Kuznetsk Coal Basin and Taimyr Peninsula (Molin & Novojilov 1965; Novojilov 1970).

The Permian and Triassic conchostracans that occurred in the Kuznetsk Coal Basin are known from the Permian and Triassic sediments of Eastern Europe, Siberia, China and Australia. This demonstrates the high importance of this group for biostratigraphy and for regional and global correlation.

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