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Tetrapod biocorrelation of Pangea: the Permo-Triassic terrestrial assemblage zones of South Africa and Russia

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One of the most important temporal windows to understand the evolution of terrestrial fauna in the world is the Permo-Triassic. Several key events in tetrapod evolution happened during this time including the establishment of modern vertebrate ecosystems [1], the appearance of the oldest representatives of the main lineages of amniotes, including therapsids (mammal-like lineage) [2] and reptiles (including first records of dinosaurs, crocodiles and turtles) [3]. It also incorporates at least two major mass extinctions, of which the Permo-Triassic one is the largest in the history of Earth [4]. The terrestrial Middle Permian to Middle Triassic is best recorded in the fossiliferous sequences of the Karoo Basin in South Africa and the basins of European Russia [5, 6]. Biostratigraphic correlations have been made between these regions but the discovery of several new taxa and taxonomic reappraisals of others in the last 15 years has produced important recent changes and updates in the faunal assemblages recognized in both countries. We present here a new regional correlation scheme between assemblage zones of the Karoo Basin and Eastern Europe basins developed through cooperative work between researchers from both countries. This new biostratigraphic scheme includes 14 assemblage zones (AZs) in Russia ranging from the late Cisuralian to the Ladinian and 12, also including subassemblages, from the Beaufort Group of South Africa, extending from the middle Guadalupian to the late Anisian. The Cisuralian *Clamorosaurus nocturnus* AZ from Russia is the oldest and the only one from the Early Permian. Four assemblage zones are included in the Russian Dinocephalian Superassemblage (SA) and three in the equivalent Dinocephalian-Scylacosaurid SA of South Africa. The Late Permian is represented by four AZs incorporated in the Theriodontian SA in Russia and by also four forming the Cryptodont SA in the Karoo. Five faunas represent the Triassic record in both regions. Major differences between Middle Permian faunas from Russia and South Africa are the diversification and abundance of parareptiles and amphibians in the first and of dicynodonts in the second. In addition, therocephalians were important predators in the Middle Permian Karoo, whereas they are scarcely represented in Russia at this time. In the Late Permian, dicynodonts are diverse and dominant on faunas from both regions and therocephalians is a heterogeneous group also represented in both regions, whereas burnetiamorphs are well diversified only in South Africa. In the Early Triassic a major contrast is the diversification and abundance of amphibians and the very rare records of lystrosaurs and therocephalians in Russia against the predominance and exuberant abundance of therapsids in South Africa. The Middle Triassic represents a key evolutionary moment for cynodonts with experimentation to occluding postcanine morphologies and to large sizes [7]. This trend is clearly represented in cynodonts from the Karoo but the group is not recorded in the Middle Triassic from Russia.

References:

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