Paleobiodiversity of the Tamengo and Guaicurus formations (Ediacaran-Cambrian boundary strata, Brazil): paleoecological, paleogeographic and biostratigraphic implications

Rodrigo Rodrigues ADORNO[1]*, Geological Survey of Brazil (rodrigo.adorno@sgb.gov.br)
Dermeval Aparecido do Carmo[2], University of Brasília
Matheus Denezine[3], University of Brasília
Ana Carolina Oliveira[4], University of Brasília
Martino Giorgioni[5], University of Brasília
Detlef Hans Gert Walde[6], University of Brasília
Bernd-Dietrich Erdtmann[7], Technische Universität Berlin
Ivan Cortijo[8], Villuercas-Ibores-Jara UNESCO Global Geopark
Shuhai Xiao[9], Virginia Tech, Blacksburg, VA 24060, USA
Fabricio Caixito[10], Federal University of Minas Gerais

Abstract

The paleobiota of the Tamengo and Guaicurus formations of the upper Corumbá Group (Ediacaran-Cambrian boundary strata, Brazil) was limited, until recently, to only a few species, with most publications dedicated to the study of Cloudina lucianoi (Beurlen & Sommer, 1957) and Corumbella werneri Hahn et al., 1982. Our recent systematic sampling, accompanied by palynological and ichnological analyses, revealed a paleontological diversity that can be considered quite rich for the Ediacaran - Cambrian transition. The number of species from the Ediacaran - Cambrian boundary strata in Brazil is updated, including a total of twenty-six species from the Tamengo and Guaicurus formations at five sections in the Corumbá and Ladário regions: Corcal and Laginha quarries, Porto Sobramil, Porto Figueiras and Ecoparque Cacimba. In addition, paleoecological and paleoenvironmental inferences are presented based on the occurrence of this fossil assemblage and an updated lithostratigraphic description of the upper Corumbá Group. Cloudina carinata, has been documented in terminal Ediacaran successions in Spain, Siberia, as well as the Tamengo Formation at the Porto Figueiras section of Brazil. Cloudina hartmannae, considered a synonym for Cloudina lucianoi, and Cloudina carinata from the Tamengo Formation offer an important tool for paleobiogeographic and biostratigraphic correlation of the Tamengo Formation and other coeval successions in Paraguay, Spain, Uruguay, Argentina, United States, Canada, Namibia, South Africa, Oman, Russia, and China. The paelobiota from the Tamengo Formation is composed of numerous biomineralizing metazoans: Cloudina lucianoi, Cloudina carinata, Corumbella werneri, sponge spicules, and putative sponge gemmules. Four ichnospecies (Gordia marina, Pilichnus cf. P. dichotomus, Didymaulichnus lyelli and Multina minima) are present in the upper Corumbá Group. Three macroalgal fossil species were identified in the upper Corumbá Group: Vendotaenia antiqua from the Tamengo Formation, and Eoholynia corumbensis and Tawuia dalensis from the Guaicurus Formation. The species diversity of the upper Corumbá Group fossil assemblage was complemented by the occurrence of organic-walled microfossils, including Chuaria circularis, Arctacellularia januarensis, Leiosphaeridia ternata, Leiosphaeridia crassa, Leiosphaeridia jacutica, Leiosphaeridia

minutissima, Leiosphaeridia tenuissima, Leiosphaeridia obsuleta, Bavlinella faveolata, Bambuites erichsenii, Synsphaeridium sp., Jacutianema sp., Lophosphaeridium sp., Ostiama microcystis and Navifusa. A dramatic change in paleoenvironmental conditions between the Tamengo and Guaicurus formations possibly contributed to the 95% taxonomic turnover between the two formations. Among all of the Tamengo species, only the ichnospecies Multina minima continues to be present in the Guaicurus Formation. This local disappearance could represent the Ediacaran-Cambrian extinction. The transition from the Tamengo to the Guaicurus Formation is marked by a stratigraphically rapid drop in FeHR/FeT, recording a shift to more oxic bottom waters. The Tamengo Formation represents an environment with anoxic bottom waters, with fragments of biomineralized organisms that lived on shallower, probably mildly oxygenated surface waters, and that were then transported down-slope. Similar to coeval successions (e.g., the Nama Group in Namibia), recently published data support the hypothesis that late Ediacaran biomineralized organisms lived in a thin oxygenated surface layer above a relatively shallow chemocline. The Guaicurus Formation, on the other hand, records an expansion of oxic conditions to deeper waters during a sea level rise.

Keyword

Ediacaran-Cambrian boundary, Tamengo Formation, Precambrian Paleontology