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XIV International Palynological Congress X International Organisation of Palaeobotany Conference



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NEW INSIGHTS ON ASSOCIATED PALEOZOIC TO CENOZOIC FLORAS AND PALYNOFLORAS FROM GONDWANA

Mercedes di Pasquo, Roberto Iannuzzi & Paulo A. Souza

Palynostratigraphy of the Yaurichambi and Copacabana formations in the Manuripi X-1 core, Madre de Dios Basin, northern Bolivia: First constraints from U-Pb dating of volcanic ash

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The interval between 1140 and 850 m depth in the Manuripi X-1 Mobile-Oxy core was examined for palynology. The Yaurichambi Formation (ca. 40 m) is composed of sandstones with minor interbedded mudstones separated from the underlying latest-Visean/early Serpukhovian Toregua Formation (*Mag* Zone Melo and Loboziak) by a regional erosional surface. Its upper contact with the Copacabana Formation occurs at the first appearance of carbonate beds, which is mainly composed of fossiliferous carbonates, evaporites, cherts, sandstones, shales and tuffs. From the Yaurichambi Formation one (1132 m depth) of six samples (1140-1090 m depth) and eight (1081m, 1080m, 1058m, 1046m, 1043m, 1042m, 1041m, 948m depth) of eleven samples (1085-850 m depth) of the Copacabana Formation were productive. The first assemblage yielded poorly preserved acritarchs (*Maranhites*, *Polyedryxium embudum*, *Pterospemella pernambucensis*) and less frequent spores (*Punctatisporites*, *Calamospora*). Instead of Pennsylvanian, they indicate recycling of underlying Devonian and Mississippian deposits associated to the erosive unconformity of the Serpukhovian glaci-regressive event. This paleotopography, covered by Bashkirian transgressive sedimentation, is also documented in the base of other Bashkirian units of South America, like in the Pando X-1 core where reworked palynomorphs were also identified directly over the unconformity. The palynofacies of eight samples of the Copacabana Formation are characterized by fairly well- to rather poorly-preserved palynomorphs (indigenous monosaccate pollen grains, spores and *Botryococcus*) with evidence of pyrite affecting their walls in some levels. Reworked palynomorphs (*Retispora lepidophyta*, *Gorgonisphaeridium discissum*) from Devonian deposits are also recognized in low abundance. Amorphous organic matter, terrestrial components (tracheids, cuticles), and others (resins, brown and black particles) are variably recorded in different levels. These features suggest an input of terrestrial organic matter incoming into a restricted warm-water marine

palaeoenvironment under semi arid conditions. Indigenous species with biostratigraphic meaning are the spores *Lundbladispora braziliensis*, *Reticulatisporites passaspectus*, *Convolutispora muriornata*, *Brevitriletes levis*, the monosaccate pollen grains *Costatacycclus crenatus*, *Caheniasaccites flavatus*, and species of *Cannanoropollis*, *Plicatipollenites*, *Potonieisporites* and few striated pollen grains (e.g. *Meristocarpus* sp., *Protohaploxyppinus* sp.). This assemblage shares many species with the Bashkirian palynofloras in the Pando X-1 and the Machareti Group in southern Bolivia, as well as with other Bashkirian to Cisuralian (Permian) palynofloras in South America. Calcareous foraminifera, fusulinids and conodonts demonstrate a Bashkirian through Middle Moscovian age for this interval. Supportive new evidence comes from an ash bed found at the depth of 882.4-883.2 m in the Manuripi core, which has yielded an age of 316.0 ± 0.4 Ma ($^{206}\text{Pb}/^{238}\text{U}$ CA-ID-TIMS method). The combined results establish a robust Bashkirian age.

Keywords: Palynostratigraphy, radiometric age, Yaurichambi and Copacabana formations, Madre de Dios Basin, Bolivia