



Early Carboniferous palynoflora from the Ambo Formation, Pongo de Mainique, Peru

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Abstract

Six productive samples from the upper part of the Early Carboniferous Ambo Formation at Pongo de Mainique, Peru, are analyzed for 55 recognized miospore species of continental origin. One new morphospecies, *Cristatisporites peruvianus*, is described. An emended diagnosis is proposed for *Kraeuselisporites* together with lists of species that are accepted or rejected for this morphogenus. Five species are transferred to *Kraeuselisporites*: *K. explanatus* (Luber in Luber and Waltz, 1941 [Luber, A.A., Waltz, I.E., 1941. Atlas of microspores and pollen of the Paleozoic of U.S.S.R. Tr. Tsent. Nauchno-Issled. Geol.-Razved. Inst. 139, 1107 (in Russian)]) nov. comb., *K. scorpius* (Balme and Hassell, 1962) nov. comb., *K. dolianitii* (Daemon, 1974) nov. comb., *K. reidii* (Foster, 1979) nov. comb., *K. daemonii* (Loboziak et al., 1999) nov. comb. A detailed analysis of the composition of the palynoflora allows its identification with the late Viséan *Cordylosporites magnidictyus* Palynozone, recently defined in the Amazon Basin in Brazil. Worldwide comparison of the Peruvian association indicates greater affinity with coeval palynofloras from Gondwana region (South America and North Africa) and North America. The greatest differences exist with European and Argentinean palynofloras, although the latter are still imperfectly known. The degree of similarity is likely to be determined by paleolatitude.

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1. Introduction

This contribution is the second of a planned series of palynological, paleobotanical and biostratigraphical

studies related to Upper Paleozoic units in Peru. This study was carried out within the framework of a cooperation agreement between the Ricardo Palma University (Peru), the University of Buenos Aires (Argentina) and the University of Rio Grande do Sul (Brazil). The aim of this study is to contribute to the improvement of biostratigraphical knowledge of the Ambo Formation. Palynomorphs are listed, described and illustrated and the age, paleoenvironmental

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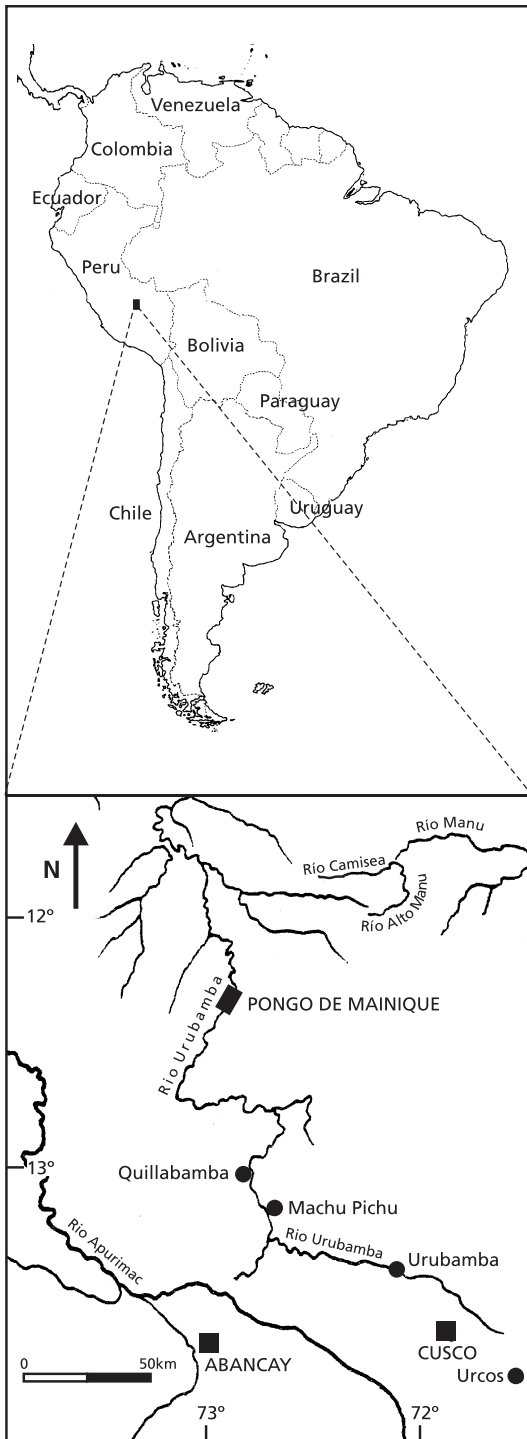


Fig. 1. Location of the Pongo de Mainique locality.

conditions and palynofloral comparisons are discussed. The correlation with other palynofloras of equivalent age, mainly from southern South America, the rest of Gondwana and Euroamerican continents, is considered.

The palynological material described in the present paper was collected in the Pongo de Mainique locality, which in local native language means “strong narrowness in the course of a river”. Exposures at this locality (Lat. $12^{\circ}20' S$, Long. $72^{\circ}50' W$) represent one of the more complete stratigraphical sections of eastern Peru. Pongo de Mainique is located in the eastern edge of the Andean Range, about 450 km to the east of Lima and some 160 km to the northwest of Cusco, at the point where the Urubamba River leaves the last of the eastern spurs (Subandean Belt) of the Eastern Range, to enter to the Amazonian Plain (Fig. 1). There, the course of the river is very narrow until reaching in some places a width of around 50 m and crosses for 10–15 km vertical sedimentary sequence, ranging in age from Silurian to Tertiary.

2. Geological setting

The Late Paleozoic sedimentary rocks present in the Madre de Dios Basin are mainly siliciclastic with a smaller proportion of calcareous sediments. The latter belong chiefly to the Late Carboniferous–Early Permian. The Late Paleozoic sequence is subdivided into four formational units that in ascending stratigraphical order are: Ambo, Tarma, Copacabana and Ene Formations (Fig. 2).

The Ambo Formation has its type section in the neighborhood of the homonym locality, where outcrops attain approximately 700 m in thickness and are composed of quartzous sandstones, lutites, conglomerates and volcanic tuffites (Newell et al., 1949). Plant remains belonging to lycophytes, sphenophytes and pteridosperms were recovered and attributed to the Early Carboniferous.

The Ambo Formation at Pongo de Mainique is 822 m thick, and it unconformably overlies Devonian rocks of the Cabanillas Formation. The basal portion consists mainly of light grey, fine-grained sandstones that are superficially brown; less frequent are medium to coarse-grained sandstones. These fine- to coarse-grained layers have internal cross-stratification with

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