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A Late Jurassic fossil assemblage in Gondwana: Biostratigraphy and correlations of the Tacuarembó Formation, Parana Basin, Uruguay

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ABSTRACT

The Tacuarembó Formation has yielded a fossil assemblage that includes the best known body fossils, consisting of isolated scales, teeth, spines, and molds of bones, recovered from thin and patchy bonebeds, from the Botucatu Desert, Parana Basin, South America. The remains are preserved in the sandstones widespread around the city of Tacuarembó. We propose a new formalized nomenclature for the Tacuarembó Formation, naming its "Lower" and "Upper" members as the Batoví (new name) and Rivera (new rank) members, respectively. An assemblage zone is defined for the Batoví Member (fluviolacustrine and aeolian deposits). In this unit, the freshwater hybodontid shark *Priohybodus arambourgi* D'Erasmo is well represented. This species was previously recorded in Late Jurassic–Early Cretaceous units of the Sahara and the southern Arabian Peninsula. Globally considered, the fossil assemblage of this member (*P. arambourgi*, dipnoan fishes, *Ceratosaurus*-like theropods, and conchostracans) is indicative of a Kimmeridgian–Tithonian age, which in combination with the stratigraphic relationships of the Tacuarembó Formation with the overlying basalts of the Arapey Formation (132 My average absolute age) implies that the latter was deposited during the Kimmeridgian–Hauterivian interval.

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RESUMEN

La Formación Tacuarembó ha proporcionado una asociación fosilífera que incluye los mejores fósiles de cuerpo del Desierto de Botucatú, Cuenca de Paraná, Sud América; consistentes en escamas aisladas, dientes, espinas y moldes de huesos, extraídos de bancos osarios delgados y discontinuos. Los restos están preservados en las areniscas de los alrededores de la ciudad de Tacuarembó. Proponemos una nueva nomenclatura formalizada para la Formación Tacuarembó, nominando sus miembros "Inferior" y "Superior" como Batoví (nuevo nombre) y Rivera (nuevo rango) respectivamente. Se define una Zona de Asociación para el Miembro Batoví (depósitos fluviolacustres y eólicos). En esta unidad está bien representado el tiburón dulceacuícola *Priohybodus arambourgi* D'Erasmo. Esta especie fue registrada previamente en unidades del Jurásico Tardío y Cretácico Temprano del Sahara y sur de la Península Arábiga. Globalmente considerada, la asociación fosilífera de este miembro (*P. arambourgi,* peces pulmonados, terópodos similares a *Ceratosaurus* y concostráceos) es indicativa de una edad Kimmeridgiense–Tithoniense, la cual en combinación con las relaciones estratigráficas de la Formación Tacuarembó con los suprayacentes basaltos de la Formación Arapey (132 Ma de edad absoluta) implica que la última fue depositada durante el intervalo Kimmeridgiense–Hauteriviense.

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1. Introduction

The cross-bedded sandstones of the Botucatu Formation, widespread in southern Brazil, are part of the largest known fossil desert in the world, which also extended into Uruguay, Argentina, Paraguay, and probably into Africa (Salamuni and Bigarella, 1967). The best-known body fossils from these sedimentary rocks in South America come from the southernmost part of their distribution, in Uruguay, where they are known locally as the Tacuarembó Formation.

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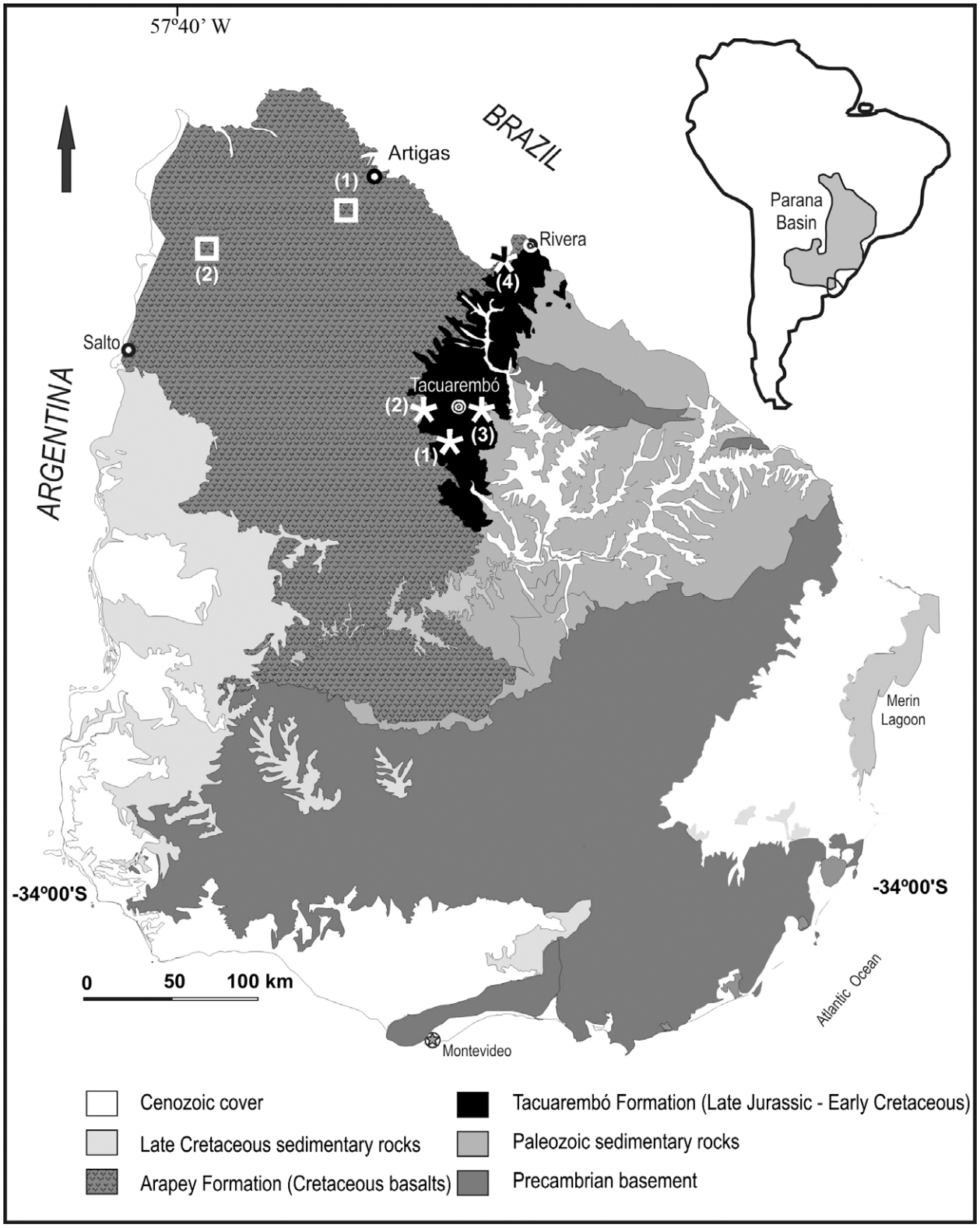

Fig. 1. Map of Uruguay showing the distribution and relationships of the Tacuarembó Formation and its areas of best exposure (stars): Batoví Hill (1); Valle Edén (2); Cuchilla del Ombú (3); Subida de Pena (4). Well localities are indicated with squares: Pelado (1) and Belén (2).

Exposed in northern Uruguay (Fig. 1), the Tacuarembó Formation is a mixed fluvial–aeolian unit with associated lakes. The distribution of these facies reveals complex spatial and temporal variations in deposition which may be related to different phases of its sedimentary evolution. A yellowish-pink medium-grained sandstone deposit which constitutes the greater part of this unit southwards Tacuarembó City is included in the formation (Fig. 1).

The formation preserves a chronologically indicative assemblage composed of crustaceans, mollusks, fishes, and reptiles. Among the latter, theropod dinosaurs are the only terrestrial representatives. The fossil remains consist mainly of isolated scales,

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