

# Studies on continental Late Triassic tetrapod biochronology. I. The type locality of *Saturnalia tupiniquim* and the faunal succession in south Brazil

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## Abstract

Late Triassic deposits of the Paraná Basin, Rio Grande do Sul, Brazil, encompass a single third-order, tetrapod-bearing sedimentary sequence that includes parts of the Alemoa Member (Santa Maria Formation) and the Caturrita Formation. A rich, diverse succession of terrestrial tetrapod communities is recorded in these sediments, which can be divided into at least three faunal associations. The stem-sauropodomorph *Saturnalia tupiniquim* was collected in the locality known as ‘Waldsanga’ near the city of Santa Maria. In that area, the deposits of the Alemoa Member yield the ‘Alemoa local fauna,’ which typifies the first association; includes the rhynchosaur *Hyperodapedon*, aetosaurs, and basal dinosaurs; and is coeval with the lower fauna of the Ischigualasto Formation, Bermejo Basin, NW Argentina. The second association is recorded in deposits of both the Alemoa Member and the Caturrita Formation, characterized by the rhynchosaur ‘*Scaphonyx*’ *sulcognathus* and the cynodont *Exaeretodon*, and correlated with the upper fauna of the Ischigualasto Formation. Various isolated outcrops of the Caturrita Formation yield tetrapod fossils that correspond to post-Ischigualastian faunas but might not belong to a single faunal association. The record of the dicynodont *Jachaleria* suggests correlations with the lower part of the Los Colorados Formation, NW Argentina, whereas remains of derived tritheledontid cynodonts indicate younger ages. The Late Triassic tetrapod-bearing sequences of northwest Argentina and south Brazil are essential to understanding the faunal succession during that time in south Pangea. The proposed scheme represents a comprehensive framework through which to correlate of these tetrapod faunas with those of other parts of the supercontinent, notably in India and southern Africa.

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## 1. Introduction

The stem-sauropodomorph *Saturnalia tupiniquim* (Langer et al., 1999; Langer, 2001, 2003) was collected in a rich historical fossil area, traditionally known as either ‘Alemoa’ (Bigarella et al., 1967; Colbert, 1970) or ‘Km 3’ (Beltrão, 1965). It is located at the northern slope of the Cerriquito Mount, in the eastern outskirts of the city of Santa Maria, Rio Grande do Sul state, Brazil. The fossil remains of Alemoa almost certainly were noticed by local inhabitants of Santa Maria, as well as by the first European scientific expeditions to explore the Rio Grande province during

the 19th century. However, fossils collected from the area have been studied scientifically only since the beginning of the last century (Woodward, 1903; Langer et al., 2000).

During the early 20th century, various local amateur naturalists regularly explored the Alemoa area. Some collected material ended up in the possession of the German paleontologist Friedrich von Huene, who published a compendium describing the specimens, which mostly consisted of rhynchosaur remains (Huene, 1926). During the austral summer of 1928–1929, Huene collected in Rio Grande do Sul. Around Santa Maria, his crew explored the so-called ‘sangas,’ which represent large erosion areas that expose the typical red, fossiliferous mudstone of the region. In Alemoa, four main localities were prospected: the Grossesanga (or Sanga Grande) and localities 1–3 (Figs. 1 and 2). The most important of these were the Grossesanga and locality 1, also known as Waldsanga or Sanga do Mato

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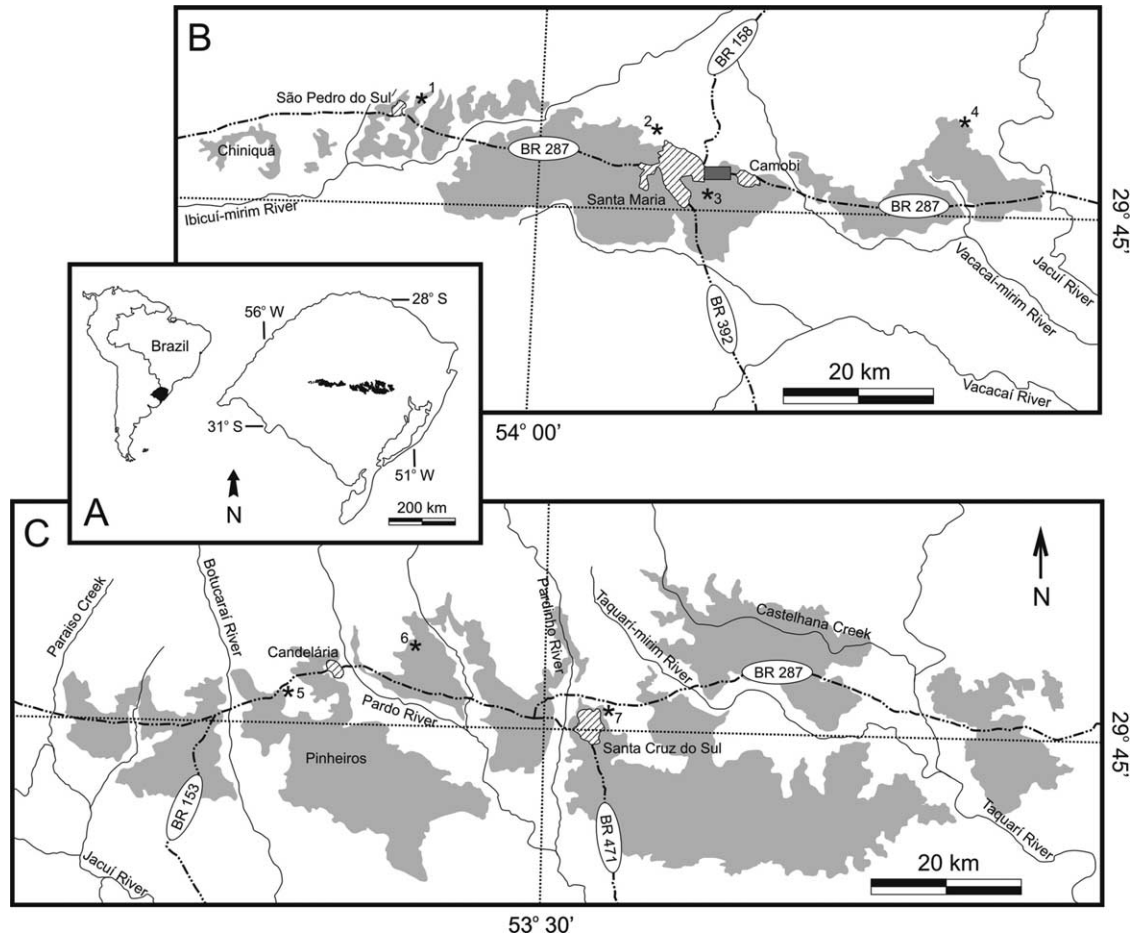


Fig. 1. Maps depicting the geographical distribution of the outcrop belt of the Alemoa Member, Santa Maria Formation (shaded), based on unpublished work by Ubiratan Faccini. (A) Location of Rio Grande do Sul in South America and the Alemoa belt within it. (B, C) Detail of the western (B) and eastern (C) parts of the Alemoa belt. Exposures extend from the classic localities of Chiniquá to the eastern banks of the Taquarí River. Main fossil sites discussed in the text: (1) Inhamandá, (2) Água Negra, (3) Faixa Nova, (4) Faxinal do Soturno, (5) Botucaraí Mount, (6) Linha Facão, and (7) Santa Cruz. Shaded rectangle in (B) indicates the approximate areas depicted in Figs. 2–4.

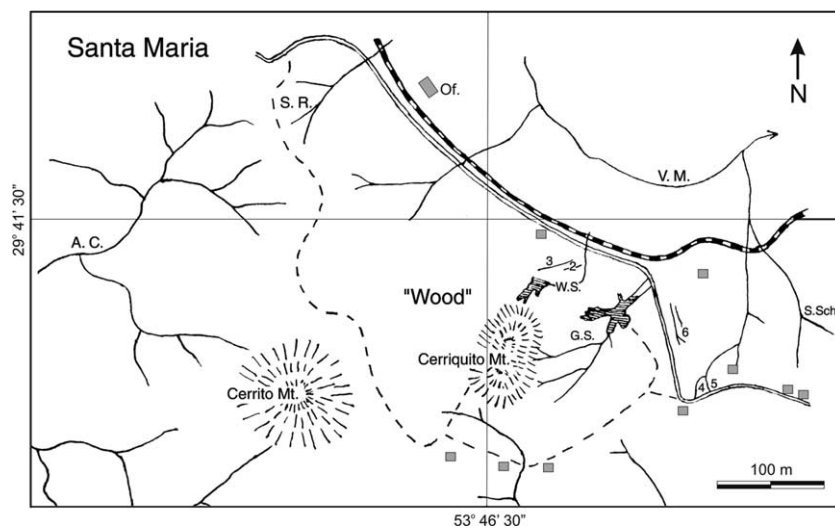


Fig. 2. Area between Santa Maria and São José during the late 1920s (redrawn from Huene and Stahlecker, 1931). Santa Maria was northeast of the map and São José just west of the Sanga Schramm. Abbreviations: 2, 3 = sangas 2 and 3 of the Alemoa complex, A.C. = Cancela Creek, G.S. = Grossesanga, Of. = railway station, S.R. = Sanga Ribas, S.Sch. = Sanga Schramm, V.M. = Vacacaí-Mirim River, and W.S. = Waldsanga. Symbols: gray squares = houses, full lines = water courses, stippled lines = tracks, double line = main road, and double stippled line = railway track.

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