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# CAMPANIAN AMMONITES AND INOCERAMIDS FROM THE SERGIPE BASIN, BRAZIL

*P. Bengtson*<sup>1</sup>, *W.S. Lima*<sup>2</sup>, *K.-A. Tröger*<sup>3</sup>, *E.A.M. Koutsoukos*<sup>4</sup> and *M.H. Zucon*<sup>5</sup>

<sup>1</sup> *Geologisch-Paläontologisches Institut, Universität Heidelberg*

<sup>2</sup> *Petrobras S.A.-E&P-SE/AL-GEXP*

<sup>3</sup> *Institut für Geologie, TU Bergakademie Freiberg*

<sup>4</sup> *Petrobras-Cenpes/Divex/Sebipe*

<sup>5</sup> *Departamento de Biologia/CCBS, Universidade Federal de Sergipe*

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Comparatively little is known about the uppermost Cretaceous macropalaeontology of the Sergipe Basin. The lithology of this part of the marine succession is dominated by shales with intercalations of locally calcareous siltstones and fine-grained sandstones; these make up the Calumbi Formation (formerly Piaçabuçu Formation). There are few fossiliferous outcrops, in sharp contrast to the extensively exposed fossil-rich underlying clastic and carbonate sequence (Riachuelo and Cotinguiba formations, Aptian to Coniacian). Biostratigraphy of the uppermost Cretaceous of Sergipe has until now relied almost entirely upon microfossil work on subsurface material (e.g., Koutsoukos & Bengtson 1993). The recent finds of ammonites and inoceramid bivalves from an outcrop of the Calumbi Formation are therefore of considerable importance. Here we present a systematic and biostratigraphical study of these macrofossils, together with supporting biostratigraphical data on the accompanying foraminifera.

For a summary account of the Cretaceous development of the Sergipe Basin, the reader is referred to Koutsoukos et al. (1993) and Koutsoukos & Bengtson (1993) and references therein. The carbonate platform and subsequent ramp regime of the Riachuelo and Cotinguiba formations lasted until the mid-Coniacian. As a result of the final structural detachment of South America from Africa the basin tilted seawards, which caused uplift of the marginal areas, widespread regression and a breakdown of the previous carbonate-dominated depositional cycle. The subsequent transgression reached the present onshore parts of the basin in the late Santonian or early Campanian, with deposition of the chiefly terrigenous clastic Calumbi Formation. A number of macrofossils, mainly molluscs, have been described from these beds (Oliveira 1940, Löfgren & Oliveira 1943, Santos & Castro 1970, Muniz et al. 1981, Muniz 1984, Santos et al. 1994); however, very few of these are of any biostratigraphical significance. No ammonites have been reported and the only description of an inoceramid dates back to 1940 (Oliveira 1940). The material described here comes from the "type locality" of the formation, an isolated small outcrop northeast of the state capital Aracaju, near the village of Calumbi, which once lent its name to the formation (Duarte 1936, Bender 1959). Previous workers suggested a Campanian/Maastrichtian or Maastrichtian

age to the siltstones exposed at this locality. The association of ammonites and inoceramids together with foraminifera now indicate a more precise, late Campanian age; nevertheless, further work is needed in order to achieve a reliable correlation with the surrounding south and central Atlantic basins.

Although macrofossils are common at the Calumbi outcrop, ammonites and inoceramids are rare; so far only seven specimens of each have been found. The limited number of specimens, in combination with their poor preservation, makes taxonomic work difficult, as the full ontogenetic development and the range of intraspecific variation cannot be assessed. This concerns particularly the ammonites, of which as many as six of the seven specimens found belong to different species.

The ammonite fauna of the Calumbi section includes *Eulophoceras* sp., *Vertebrites* cf. *kaye*i (Forbes, 1846), *Diplomoceras?* sp., and an apparently new kossmaticeratid genus, all previously unknown from Brazil. The inoceramids belong to the group of *Inoceramus* (*Endocostea*) *balticus* Bšhm, 1907, which have been reported from the Pernambuco-Para'ba Basin further north (Muniz 1993). The association of benthic foraminifera extracted from the macrofossil specimens is referred to the early to late Campanian *Lacosteina gouskovi-Orthokarstenia clavata* Zone of Koutsoukos & Bengtson (1993), which is typical of an outer shelf to upper bathyal environment, near the shelf edge, below the euphotic zone. Planktonic foraminifera are less abundant and less diagnostic (*Contusotruncana fornicata*, *Globigerinelloides multispina*, *G. prairiehillensis*, *Rugoglobigerina* ex gr. *rugosa*), although consistent with a Campanian age. Other, non-diagnostic fossils from the Calumbi outcrop include abundant small bivalves and gastropods and fish remains.

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# **PALYNOLOGY OF POZO D-129 FORMATION IN THE SAN JORGE GULF BASIN, LOWER CRETACEOUS, PATAGONIA, ARGENTINE**

*Patricia Vallati*  
*Laboratorio de Bioestratigrafía*  
*Universidad Nacional de la Patagonia. Comodoro Rivadavia*

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## **INTRODUCTION**

The *Pozo D-129* Formation (Lesta, 1968) in the San Jorge Gulf Basin includes source-rich facies. A lacustrine environment of deposition has been proposed for these beds. Recently, probable marine fossils (dinoflagellates and foraminifera) were reported from these levels, suggesting a marine connection (Fitzgerald et al., 1990). This unit was previously known only for the basin subsoil, where it can reach a considerable thickness. In spite of intensive search, the recovery of fossils from these beds, has proved to be difficult.

The uppermost part of this unit was later on recognized outcropping a few kilometres north of Sarmiento Town, in the center of Chubut Province. In these levels, at Cerro Chenque Locality, an important microfossil assemblage (Zone of *Flabellonchara harrisi*) was reported by Musacchio (Hechem et al., 1987; Musacchio, 1989). Precisely, these strata, have yielded the well-preserved microflora that is now reported.