



REVIEW OF “*Paleodictyon*” (= *Lophoctenium*) FROM THE INAJÁ FORMATION AND CONSIDERATIONS ABOUT ITS OCCURRENCE IN THE BRAZILIAN DEVONIAN

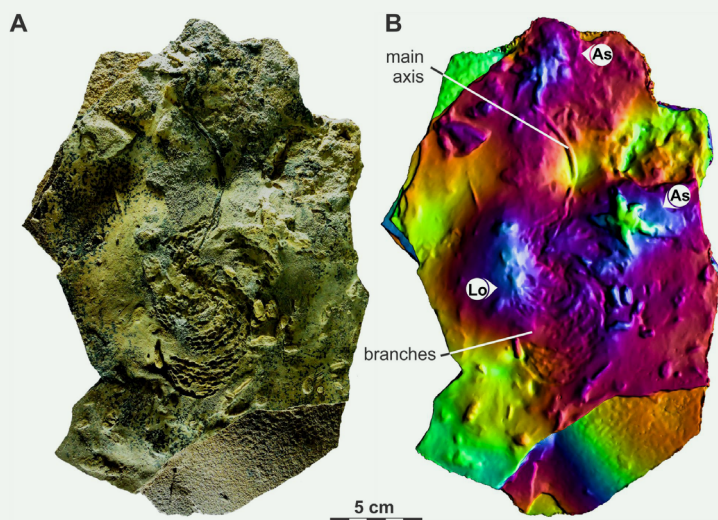
RAFAEL COSTA DA SILVA 

Serviço Geológico do Brasil - CPRM, Museu de Ciências da Terra, Av. Pasteur, 404, Urca, 22290-255, Rio de Janeiro, RJ, Brasil
rafael.costa@cprm.gov.br

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Silva, 2021. *Paleontologia em Destaque*, v. 36, n. 75, p. 85, Figure 1.

REVIEW OF “*Paleodictyon*” (= *Lophoctenium*) FROM THE INAJÁ FORMATION AND CONSIDERATIONS ABOUT ITS OCCURRENCE IN THE BRAZILIAN DEVONIAN

RAFAEL COSTA DA SILVA 

Serviço Geológico do Brasil - CPRM, Museu de Ciências da Terra, Av. Pasteur, 404, Urca, CEP 22290-255, Rio de Janeiro, RJ, Brasil. rafael.costa@cprm.gov.br

Keywords: ichnofossils, Jatobá Basin, *Lophoctenium*, shallow marine, *Cruziana* ichnofacies.

The ichnogenus *Paleodictyon* Meneghini in Murchison, 1850 consists of regular hexagonal networks of burrows parallel to stratification (e.g., Chamberlain, 1971; Seilacher, 1977; Uchman, 1995, 1999; Fernandes *et al.*, 2002; Fürsich *et al.*, 2007). This ichnofossil is the main ichnotaxon among the “graphoglyptids”, a term that encompasses traces with positive reliefs at the bases of the “flysch” sandstone layers, today interpreted as turbidites (e.g., Seilacher, 2007).

Paleodictyon is generally found in shallow marine Cambrian rocks, occupying deep marine environments after Ordovician (Seilacher, 2007). At present, it only occurs in bathyal and abyssal environments (Rona *et al.*, 2009). However, some occurrences indicate their presence in shallow Mesozoic environments (e.g., Fürsich *et al.*, 2007). There are also controversial records in rocks from continental Carboniferous systems (e.g., Fürsich *et al.*, 2007). These probably represent similar forms developed by different groups of organisms or just a misidentification.

In Brazil, there are only two records of *Paleodictyon*, both in shallow Devonian marine systems (Fernandes *et al.*, 2002). The first one was published by Santos & Campanha (1970) from a sample of the Inajá Formation, Middle to Late Devonian, Jatobá Basin, coming from Fazenda Quixabinha (09°01'S; 38°14'O), municipality of Petrolândia, state of Pernambuco, Brazil. The sample is deposited in the Fossil Invertebrates collection of the Museu de Ciências da Terra, MCTer - Serviço Geológico do Brasil - CPRM (Museum of Earth Sciences, MCTer - Geological Survey of Brazil - CPRM) under the number MCT.I.5386. The second occurrence, from the Itaim Formation, Early Devonian of the Parnaíba Basin, was uncertainly attributed to *Paleodictyon*? and presented as an abstract by Agostinho *et al.* (2001).

The occurrences of *Paleodictyon* in Brazil raise the idea that it could occur in shallow Devonian seas, but they are based on isolated occurrences and should be reviewed. The occurrence of the Inajá Formation is here reviewed and determined as another ichnotaxon based on the analysis and reinterpretation of its morphology and comparison with the literature. It should be noted that the ichnological literature has changed a lot after the original description by Santos & Campanha (1970) and the limitation in ichnological knowledge at that time is the main reason for this revision. The new interpretation follows below:

Lophoctenium Richter, 1850

Diagnosis. Branches of closely spaced, inwardly bent “twigs” with comb-like branches, joining to form main axis (after Hantzschel, 1975).

Lophoctenium comosum (Richter, 1850)

1970 - *Paleodictyon* sp. Santos & Campanha: p. 744, figs. 4c and 7.

Material. MCT.I.5386, traces in concave and convex hyporelief, lower surface of a sandstone layer, Inajá Formation, Jatobá Basin (Figure 1).

Description. Rows of curved, parallel, and striped ridges, branching from a main axis, forming a horizontal structure similar to a “rooster’s tail”. The lateral ridges are slightly curved in the same direction, forming an angle of approximately 45° with the axis. The rows occur close together, densely covering the surface, and the distal ends of the ridges are tapered. The ridge grooves manifest in the form of depressions and spines. The main shaft measures 5 mm width and the ridges measure an average of 3 mm width.

Remarks. The identification of this material by Santos & Campanha (1970) was due to the interpretation of the ridges and stripes as the hexagonal networks of *Paleodictyon*. However, the observed structures are rounded and do not form polygons. Furthermore, the toponomic interpretation is not correct. The presence of *Asteriacites* in the sample shows that the slab surface corresponds to hyporelief and, if it were *Paleodictyon*, the depressions and galleries would be inverted. Comparing with the *Lophoctenium* diagnosis, it is clear that the “worm tube” illustrated by Santos & Campanha (1970, fig. 4d) corresponds to the main axis and that the depressions, interpreted above as the center of the hexagons, correspond to the concave hyporelief of the ridges. According to Uchman (1998), the ichnogenus *Lophoctenium* needs to be revised and only the ichnospecies *L. ramosum* (Toula) and *L. comosum* (Richter) would be valid, as interpreted by Książkiewicz (1977). The traces herein described differ from *L. ramosum* by the larger diameter of its main axis and ridges, which are also longer and denser in *L. comosum* (e.g., Chamberlain, 1971; Książkiewicz, 1977). Tapered ends can occur in *L. ramosum*, but are not typical. The rows of ridges correspond to *spreiten* of the main gallery, originated by the probing activity of the producer organism, presumably bivalve mollusks, through the movement of its palpal tentacles, forming feeding grooves (Ekdale & Bromley, 2001). Thus, *Lophoctenium* would correspond to a mixture of *pascichnia* and *fodinichnia*.

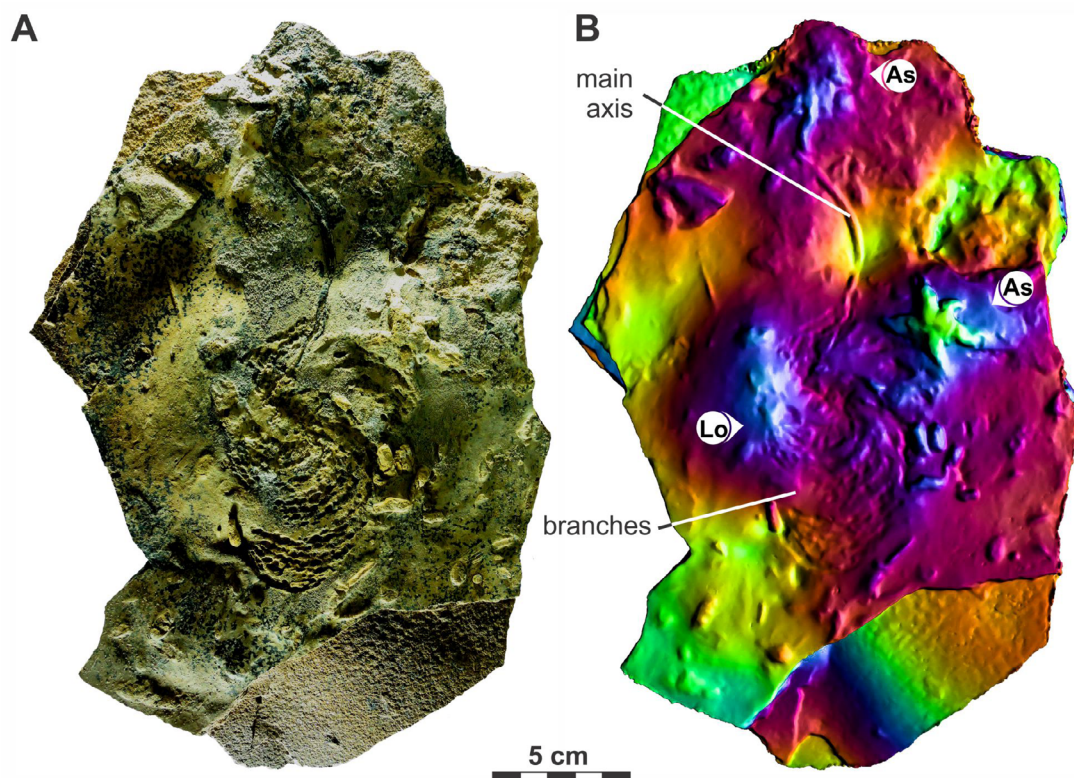


Figure 1. Photo (A) and digital 3D model (B) of sample MCT.I.5386, Middle to Late Devonian Inajá Formation. **Abreviações:** Lo, = *Lophoctenium comosum*; As; *Asteriacites*.

Figura 1. Foto (A) e modelo digital 3D (B) da amostra MCT.I.5386, Devoniano Médio e Superior da Formação Inajá. **Abbreviations:** Lo, *Lophoctenium comosum*; As, *Asteriacites*.

The ichnogenus *Lophoctenium* is relatively common in the Devonian of Brazil, having been recorded in the Pimenteira Formation (Silva *et al.*, 2012), in the Ponta Grossa Formation (Silva & Scheffler, 2015) and in the Inajá Formation itself (Fernandes *et al.*, 2002). Those occurrences are consistent with the interpretation of shallow seas in those formations, typically integrating the ichnocoenosis of the Cruziana ichnofacies.

The record of *Paleodictyon?* by Agostinho *et al.* (2001) was presented in a conference abstract, without illustration or collection number, and its location is currently unknown. Thus, the validity of the presence of *Paleodictyon* in the Early Devonian Itaim Formation must be disregarded until the specimen is revealed or new specimens are found through field research. This occurrence possibly corresponds to a preservation variety of *Protopalaeodictyon spinata* networks, such as those recorded by Silva *et al.* (2012) in the Pimenteira Formation (Parnaíba Basin). Thus, so far there is no reliable evidence of the presence of *Paleodictyon* in Brazil and its occurrence in shallow Devonian seas. The case shows us that morphological and preservation characteristics must be carefully observed in the ichnotaxonomic determinations and that there are possibly other ichnotaxons needing revision, which potentially can change existing paleoenvironmental and paleoecological interpretations.

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