

PALYNOLOGICAL DATA FROM THE TRISIDELA MEMBER OF UPPER PEDRA DE FOGO FORMATION (“UPPER PERMIAN”) OF THE PARNAÍBA BASIN, NORTHEASTERN BRAZIL

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ABSTRACT – The Permian Pedra de Fogo Formation comprises a widespread transgressive-regressive, clastic-evaporitic sequence. The formation occurs in an outcrop belt mainly adjoining the central area of the intracratonic Parnaíba Basin and is present in the subsurface. Palynological analysis of ten core samples of the Trisidela Member yields a well-preserved palynoflora, and provides more definitive palynological information on poorly known Permian deposits of the Parnaíba Basin. The samples mostly correspond to silty/shaly levels within a dominantly sandy and dolomitic bank sequence. Permian pollen grains and spores were recovered from all samples, together with scarce acritarchs and *Botryococcus*. The palynological assemblage is dominated by taeniate bisaccate pollen grains. The biostratigraphically significant species are *Corisaccites alutas* Venkatachala & Kar, 1966, *Lueckisporites virkkiae* (Potonié & Klaus) emend. CLARKE, 1965, *Tornopollenites toreutos* Morgan, 1972, *Hamiapollenites karrooensis* (Hart) Hart, 1964, *H. andiraensis* Playford & Dino, 2000b, *Vittatina saccata* (Hart) Playford & Dino, 2000b, *V. subsaccata* Samoilovich, 1953, *V. costabilis* Wilson, 1962, *Rhizomasphora radiata* Wilson, 1962, and several species of *Striatoabieites*, *Lunatisporites*, and *Protohaploxypinus*. Most of the identified species are known from Permian assemblages of Gondwanan and Euramerican regions. The palynofloral composition shows close similarity to that of the Amazonas Basin's *Tornopollenites* palynozone (Playford & Dino, 2000b). This connotes temporal correlation between the upper Pedra de Fogo Formation and the top of the Andirá Formation (Amazonas Basin). Less definitive comparisons can be made with the P III zone of Gabon (Jardiné, 1974) and the Flowerpot Formation assemblage in Oklahoma (Wilson, 1962). The palyno-assemblage, and host lithologies, mirror the dominance of a continental environment with weak, shallow, restricted-marine influence during deposition of the analyzed sequence. The presence of woody macrofossils, such as *Psaronius*, and of abundant land-derived palynodebris, together with scarcity of acritarchs, suggest a nearshore marine environment under warm, arid or semi-arid conditions.

Key words: palynology, biostratigraphy, Parnaíba Basin, Permian, Brazil.

RESUMO – A Formação Pedra de Fogo, Bacia do Parnaíba, é caracterizada por uma sedimentação cíclica constituída por uma seqüência predominantemente clástica-evaporítica. Ocorre numa extensa faixa de afloramentos, principalmente na área central da bacia, sendo também bem representada em subsuperfície. Foram analisadas neste trabalho, 10 amostras de testemunhos, correspondentes a níveis sílticos e argilosos do topo da formação, as quais se revelaram ricas em palinomorfos tipicamente permianos, além de raros acritarcos e *Botryococcus*. A associação palinológica é dominada por grãos de pólen bissacados estriados, sendo que dentre os bioestratigraficamente mais importantes, destacam-se as espécies: *Corisaccites alutas* Venkatachala & Kar, 1966, *Lueckisporites virkkiae* (Potonié & Klaus) emend. Clarke, 1965, *Tornopollenites toreutos* Morgan, 1972, *Hamiapollenites karrooensis* (Hart) HART, 1964, *H. andiraensis* Playford & Dino, 2000b, *Vittatina saccata* (Hart) Playford & Dino,

2000b, *V. subsaccata* Samoilovich, 1953, *V. costabilis* Wilson, 1962, *Rhizomastophora radiata* Wilson, 1962, e várias espécies dos gêneros *Striatoabietes*, *Lunatisporites*, e *Protohaploxylinus*. Esta associação apresenta alto grau de similaridade com a palinozona *Tornopollenites toreutos* da Bacia do Amazonas (Playford & Dino, 2000b), indicando uma parcial contemporaneidade entre as formações Pedra de Fogo e Andirá. Igualmente, comparações podem ser estabelecidas com a zona P III do Gabão (Jardiné, 1974), e a associação presente na Formação Flowerpot in Oklahoma (Wilson, 1962). Em termos paleoambientais, a presença de *Psaronius*, abundantes palinomorfos de origem continental, escassos elementos do microplâncton marinho, aliada aos dados litológicos, apontam para um ambiente marinho raso, costeiro, sob condições quente e árida a semi-árida.

Palavras-chave: palinologia, bioestratigrafia, Bacia do Parnaíba, Permiano, Brasil.

INTRODUCTION

Müller (1962) first observed Permian palynomorphs in sediments from the Parnaíba Basin. Bharadwaj, Kar & Navale (1976) illustrated palynomorphs from the Parnaíba Basin but the samples lacked adequate locality and stratigraphic detail. Müller's (1962) report gave little attention to the spore-pollen systematics; however, more than 30 taxa were illustrated, and a comprehensive informal palynozonation was erected for the basin. Previous

palaeontological works concerning the Pedra de Fogo Formation include records of wood macrofossils attributed to the genus *Psaronius* (Campos, 1925), coquinas with fish remains, and stromatolitic beds.

These Permian sediments are among the most poorly dated in the major Palaeozoic Brazilian basins due to their seemingly low petroleum potential and the absence of stratigraphically significant macrofossils. The purpose of the present paper is to report the presence of spores, pollen grains, and acritarchs in the upper part of the Pedra de Fogo Formation and to assess their stratigraphic and palaeoenvironmental significance.

Permian palynomorphs have been retrieved abundantly from the upper Pedra de Fogo Formation. However, a detailed palynostratigraphic zonation of the presumed Permian succession of the Parnaíba Basin necessarily awaits systematic collecting of representative areas of the basin.

Initial comparisons with the *Tornopollenites toreutos* palynozone defined by Playford & Dino (2000b) in the Permian sequence (upper Tapajós Group) of the Amazonas Basin were based on selected palynomorph-rich samples and involved identification of certain well-defined, stratigraphically significant palynomorphs of the Permian assemblage.

STRATIGRAPHY

General remarks

The Parnaíba Basin (Figure 1), occupying almost 600,000 km², is one of the four major intracratonic Brazilian basins (Amazonas, Solimões, Parnaíba, and Paraná Basins). Located in the west northeast of Brazil, the Parnaíba Basin is bounded by folded belts that border the Amazonas, São Luís, and São Francisco shields.

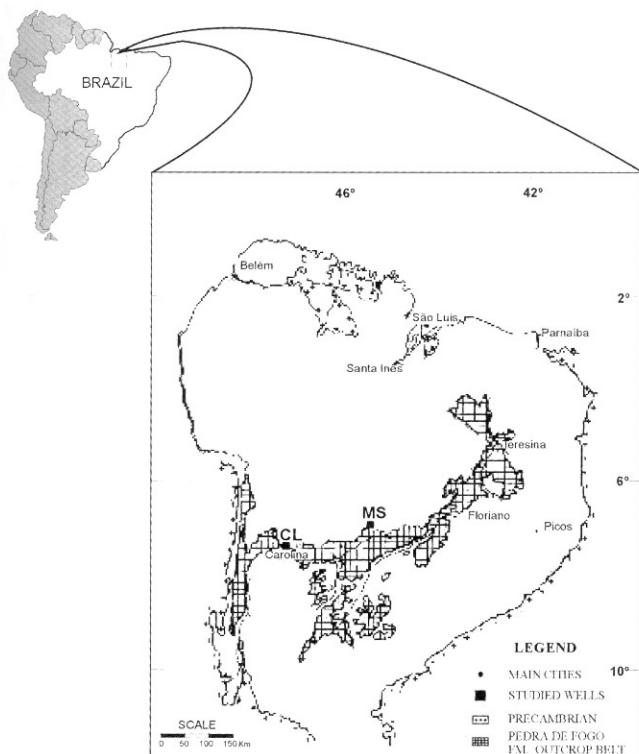


Figure 1 - Location map of the Parnaíba Basin with the studied wells.