

Nevertheless, regarding the insects, in the First International Paleontological Conference, in Moscow in the current year Dr. A. G. Ponomarenko, who has been studying the Permian insects of the Kuznetz basin, informed the senior author that nowadays it is thought that our fauna should be attributed rather to the Kungurian than to the Kazanian. This collaborates for the correlation which crustaceans and reptiles allow between the Irati Fm. and White Hill Fm. of South Africa, whose age is attributed to the Kungurian. On the other hand the crustaceans in the Minas do Leão outcrop do not belong to the genus *Pygaspis* Beurlen, 1934 as was attributed before by several authors, but to new genera and even families. These facts occurs also in several other places in the Paraná basin and in the Great Karoo basin in South Africa. So all these observations induce to a full revision of the systematic of crustaceans and their stratigraphical position which could bring to an excellent tool for stratigraphy and correlation. — (November 4, 1998).

BIOSTRATIGRAPHICAL SYNTHESIS OF THE ARARIPE BASIN, NORTHEAST BRAZIL

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The Araripe basin is one of the most important in Brazil. It is known throughout the world because of the great quantity of fossils found therein, sometimes with exceptional preservation. Besides, although this basin is only one of many other Brazilian sedimentary basins that were active during the Cretaceous time, its inland location is unusual, since the majority of Brazilian Cretaceous basins are situated at the continental margin.

This basin has around 700m of a Mesozoic sedimentary sequence thought to be of Upper Jurassic to Albian/Aptian age. Two formations, Mauriti in the bottom and Exu in the top, have considerable disagreement over their ages.

Stratigraphical studies carried out in last years have demonstrated the polycyclical nature of sedimentation of

the Araripe basin. Biostratigraphy based on ostracodes and palynology decisively contributed to identify the following chronostratigraphical local units in the column of the basin: Dom João stage (Jurassic?-Lower Cretaceous?), Rio da Serra stage (Neocomian) and Alagoas stage (Aptian and Albo-aptian). Contrary to what is said in some previous works there is a large hiatus between the Rio da Serra and Alagoas stages.

The chronostratigraphical units identified are coherent with the most modern lithostratigraphical scheme, mutual relations being as follows:

—Dom João stage: Brejo Santo and Missão Velha formations;

—Rio da Serra stage: Abaiara Formation;

—Alagoas stage (Aptian): Rio da Batateira Formation and Crato Member of the Santana Formation;

—Alagoas stage (Albo-Aptian): Santana Formation (Ibupi and Romualdo members) and Arajara Formation.

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MICROSPORANGIATE ORGANS FROM LOWER CARBONIFEROUS OF NORTHEASTERN BRAZIL (POTI FORMATION, PARNAÍBA BASIN)

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The record of pteridosperm reproductive organs is very rare on Carboniferous from Gondwana. In South America continent these structures had been found until now in Carboniferous strata from Peru and Argentina.

Specimens of *Kegelidium lamegoi* Dolianiti, 1954 (Bol. DGM, 148: 24-27) are here revised and redescribed here. The original diagnosis is emended. The studied material comprise detached portions of leafless branches bearing terminal sporangia. It was collected from one core and outcrops of Poti Formation (Visean in age, according to palynological studies).

More complete specimens of *Kegelidium* show a three-dimensional branch system bearing a dichotomic and alternate arrangement of the axes. The axes are always attached at acute angles. Sporangia are 2,9-4,1

mm long and 0,7-1,4 mm wide, banana-shaped, with a lengthwise striated surface, without dehiscence slits and tapering to a short blunt tip. *Kegelidium* sporangia are borne always in two pairs of four unfused sporangia, loosely arranged. Each terminal sporangia pair is joined at the base in a single sustaining structure.

Kegelidium is comparable to pteridosperm nonsynagiate organs, like *Zimmermannitheca* from Lower Carboniferous of Europe. *Kegelidium* is also very similar to *Obandotheca* from earliest Upper Carboniferous of Peru, but, due to differences in superficial characters and terminal arrangement of sporangia, and, mainly, in branch system, *Kegelidium* is considered a distinct taxon.

Kegelidium is an important element to the understanding of the Paleozoic Gymnosperm evolution. *Kegelidium* could be related to early pteridosperms groups which probably were at the base of pteridosperm evolution (e.g. Lyginopteridaceae). However, *Kegelidium* has some exclusive features and distinct geographical distribution in relation to euramerican taxa, what could indicate that it is originated from a different evolutionary lineage. Therefore, Gondwana groups could be related to euramerican ones in higher taxa level only. — (November 4, 1998).

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***Paulophyton dolianitii* SP. NOV., A NEW SPECIES OF ENIGMATIC PLANT WITH PSILOPHYTIC HABIT FROM THE EARLY CARBONIFEROUS (LATE VISEAN) OF NORTHEASTERN BRAZIL**

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The genus *Paulophyton* was erected by Dolianiti (Bol. DGM, 148: 27-30) for plant fragments with psilophytic habit found in an early Carboniferous flora from the Poti Formation (Parnaíba Basin, NE Brazil). The upper part of Poti Formation, where plant megafossils have been collected, is considered to be late Visean by recent palynological studies.

All specimens of *P. dolianitii* are preserved as impressions and are found in Curral de Pedra locality (Teresina-Picos Road – BR 316, Km 63). The specimens are represented by short, narrow, leafless axis bearing small terminal sporangia. *P. dolianitii* exhibits a regular pseudomonopodial branching system, an arrangement of secondary axis alternate in pars (probably spiral) and pseudomonopodial/sympodial division patterns of terminal axis. However, *P. dolianitii* differs from other species of *Paulophyton* genus mainly by: a) the circinated orientation of sporangia; b) the sporangia are smaller (0.6-0.9 mm long by 0.4-0.5 mm wide) than those of most other of *Paulophyton* species, except by *P. cuyanum* which present them with the same dimensions.

Paulophyton is rare but apparently widespread plant that belongs to two major biogeographic realms, Gondwana and Euroamerica (it is known from Brazil, Argentina, Bolivia, Peru and Germany). The distribution of this genus in those two biogeographic realms is remarkable and suggest a link of western Europe and northern Gondwana areas during late early Carboniferous. This hypothesis is supported by the most widely accepted paleogeographic reconstructions, where part of actual western Europe was connected to Gondwana plates. — (November 4, 1998).

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ALGORITHMS FOR TIMING ANALYSIS OF CMOS DIGITAL CIRCUITS

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Timing analysis is a widely used technique for estimating the maximum delay of a circuit, thus determining its maximum operation frequency. Its greatest advantages over circuit simulation comes from the fact that it is much faster and no input vector is required. The timing analysis approach takes a graph representation of the circuit and enumerates its paths in a non increasing order of path delays. The delay of a path is the sum of the delays of each gate belonging to the path. Particularly for CMOS circuits, the delay of a path is found by the alternate sum of fall and rise gate delays