Some new palynomorphs from the Silurian of the Quetame Massif, Cordillera Oriental, Colombia, South America.

Por:

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INGEOMINAS
BIBLIOTECA
CENTRAL

CONTENIDO

ABSTRACT 29

1. GEOLOGY 29

2. LABORATORY TECHNIQUES 30

3. PALYNOMORPHS 31

4. DESCRIPTION OF PALYNOMORPHS 34

5. SUMMARY 36

6. ACKNOWLEDGMENTS 36

7. REFERENCES 36

TABLES

1. Stratigraphic distribution of selected spores after Richardson & Ioannides 31

FIGURES

1. Geological sketchmap of the area whith sample location at km 88 of the Bogotá - Villavicencio road 30

2 and 3. Photographs from samples of Palynomorphs ..... 32 - 33

ABSTRACT

During a palynological investigation of Paleozoic series in the Colombian Cordillera Oriental Silurian-indicating fossils were found in Colombia. In this paper we describe four palynomorphs which were significant for the Silurian of the Quetame Massif.

Resumen

Durante investigaciones palinológicas en la Cordillera Oriental de Colombia se encontraron palinomorfos de edad Silúrica. Estas formas representan la primera evidencia de rocas de dicha edad documentadas en Colombia. En este artículo se describen cuatro palinomorfos de estas series, las cuales son características para el Silúrico del Mazico de Quetame.

Zusammenfassung

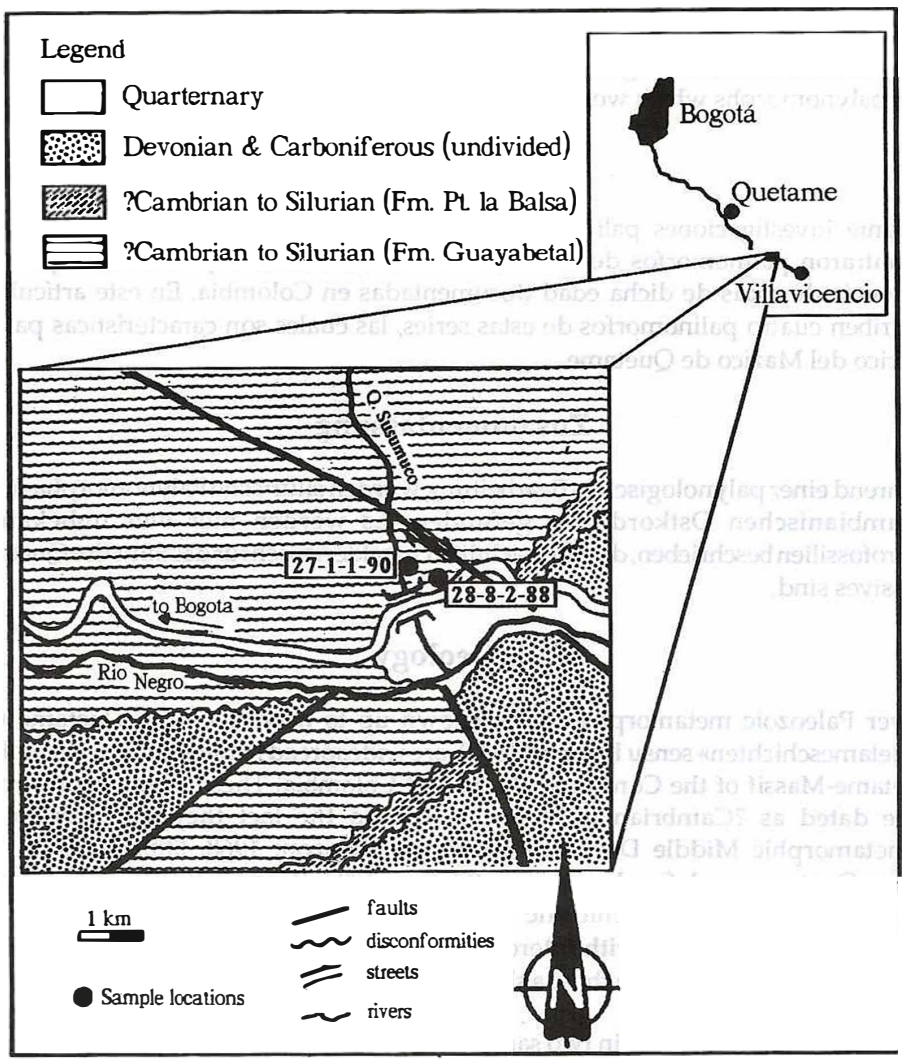
Während einer palynologischen Bearbeitung wurden silurische Palynomorpha in der kolumbianischen Ostkordillere gefunden. Es werden hier vier unbekannte Mikrofossilien beschrieben, die offensichtlich charakteristisch für das Silur des Quetame Massives sind.

1. Geology

Lower Paleozoic metamorphic rocks, known up to now as Grupo Quetame (the «Quetameschichten» sensu Hettner (1892), are widespread in the southern parts of the Quetame-Massif of the Cordillera Oriental of Colombia. These metamorphic rocks were dated as ?Cambrian to ?Silurian, due to the fact they are overlain by unmetamorphic Middle Devonian sediments (Renzoni 1968, Stibane 1968). The Grupo Quetame, as defined up to now (Hettner 1892, Renzoni 1968, Cortes & De La Espirella 1984), includes chloritic to sericitic schists, phyllites, quartzites, and conglomeratic quartzites with intercalations of grey to yellowish-grey shales. The rocks of the Grupo Quetame show a slight metamorphism up to the greenschist facies.

The palynoflora was found in two samples belonging to the very slight metamorphic grey to yellowish-grey shales interbedding conglomeratic quartzites situated at km 88 on the road Bogota - Villavicencio west of the Quebrada Susumuco. An overall description of the flora is part of another publication (Grösser & Prössl 1991).

Field work carried out by one of the authors (J.R.G.) in November and December 1990 indicates that conglomeratic quartzites with intercalations of shales should be excluded from the Grupo Quetame. The Grupo Quetame shows a higher metamorphism and does not have a gradational contact with the quartzitic rocks (also pers. comm. with O. Pulido, Ingeominas Bogota). So these quartzites may represent the base of dated Middle Devonian rocks. They seem to postdate the metamorphism of true Grupo Quetame rocks, thus restricting the Grupo Quetame to being older than Lower Silurian (Grösser & Prössl 1991).



FUGURE 1. Geological sketchmap of the area with sample location at km 88 of the Bogotá - Villavicencio road. Geological map modified after Renzoni (1968) and Cortes & De La Espriella (1984).

2. Laboratory Techniques

The phyllite samples were treated using conventional techniques (Kaiser & Ashraf 1974). From more than 45 samples only two (sample No.: 27-1-1-90 and 28-8-2-88) contained spores and other structured plant remains. Although the palynomorphs were completely carbonized, they were well preserved. Because the specimen are opaque the photographs were taken according to the method described by Pflug & Reitz (1987). The identification was based on the overall shape and the ornament of the

visible face. The reverse of the figured specimens were also examined by turning over the slides. As far as possible the specimens were then also compared with SEM photomicrographs from other authors.

3. Palynomorphs

Three groups of palynomorphs occurred: 1. Spores and acritarchs, 2. tubes and 3. cuticle-like sheets.

The following spores were identified and allowed the dating of the samples as Silurian, most probably Ludlovian age (see Table 1):

Ambitisporites avitus Hoffmeister 1959

Ambitisporites cf. *avitus* Hoffmeister 1959

Ambitisporites dilutus (Hoffmeister 1959) Richardson & Lister 1969

Ambitisporites cf. *dilutus* (Hoffmeister 1959) Richardson & Lister 1969

Archaeozonotriletes cf. *chulus* var. *nanus* Richardson & Lister 1969

?*Latosporites* sp. A (Fig. 2.4, 2.9)

?*Latosporites* sp. B (Fig. 2.5, 2.8; Fig. 3.1, 3.4, 3.5)

?*Leschikisporites* sp. A (Fig. 2.1, 2.2, 2.3, 2.6)

?*Leschikisporites* sp. B (Fig. 2.7)

Retusotriletes minor Kedo 1963

Retusotriletes cf. *minor* Kedo 1963

Retusotriletes cf. *warringtonii* Richardson & Lister 1969

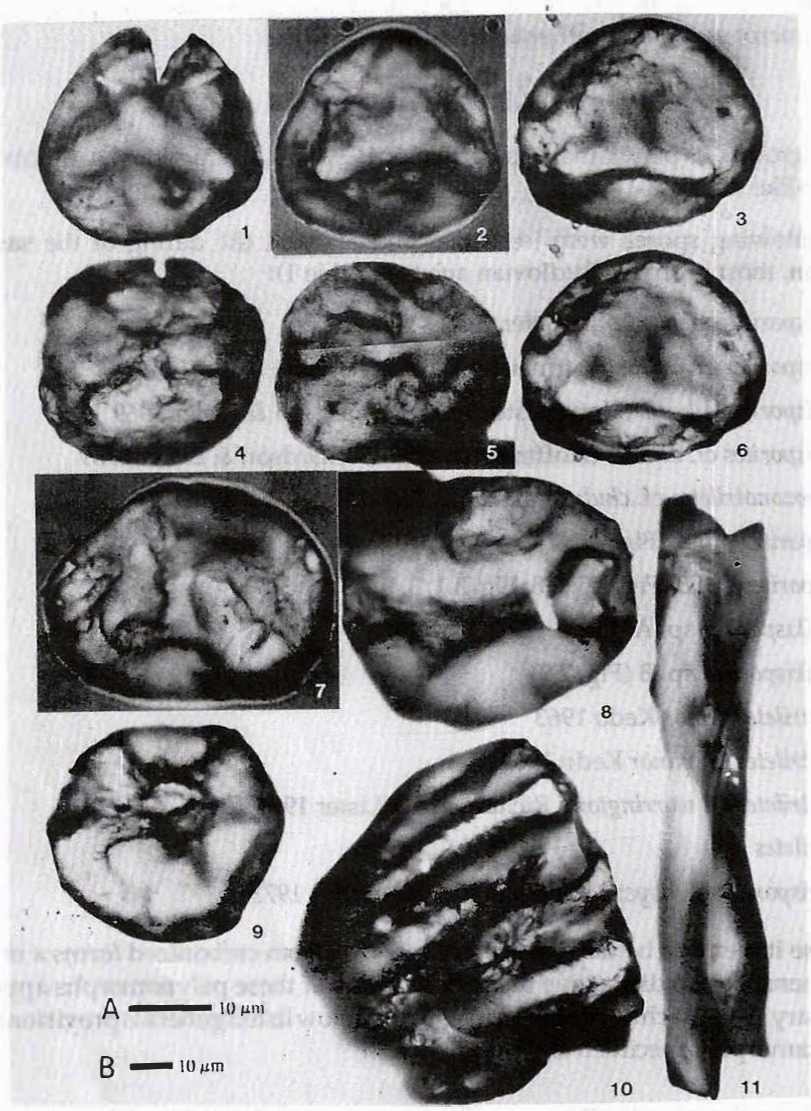
?*Leiotriletes* sp.

?*Synorisporites* cf. *libycus* Richardson & Ioannides 1973

Because it seems to be unwise to erect new taxa from carbonized forms a number of specimens look so distinctive that a description of these palynomorphs appear to be necessary. The attachment of the fossils to the below listed genera is provisionally until unmetamorphic specimen are found.

Table 1. Stratigraphic distribution of selected spores after Richardson & Ioannides 1973 and Richardson & McGregor 1986.

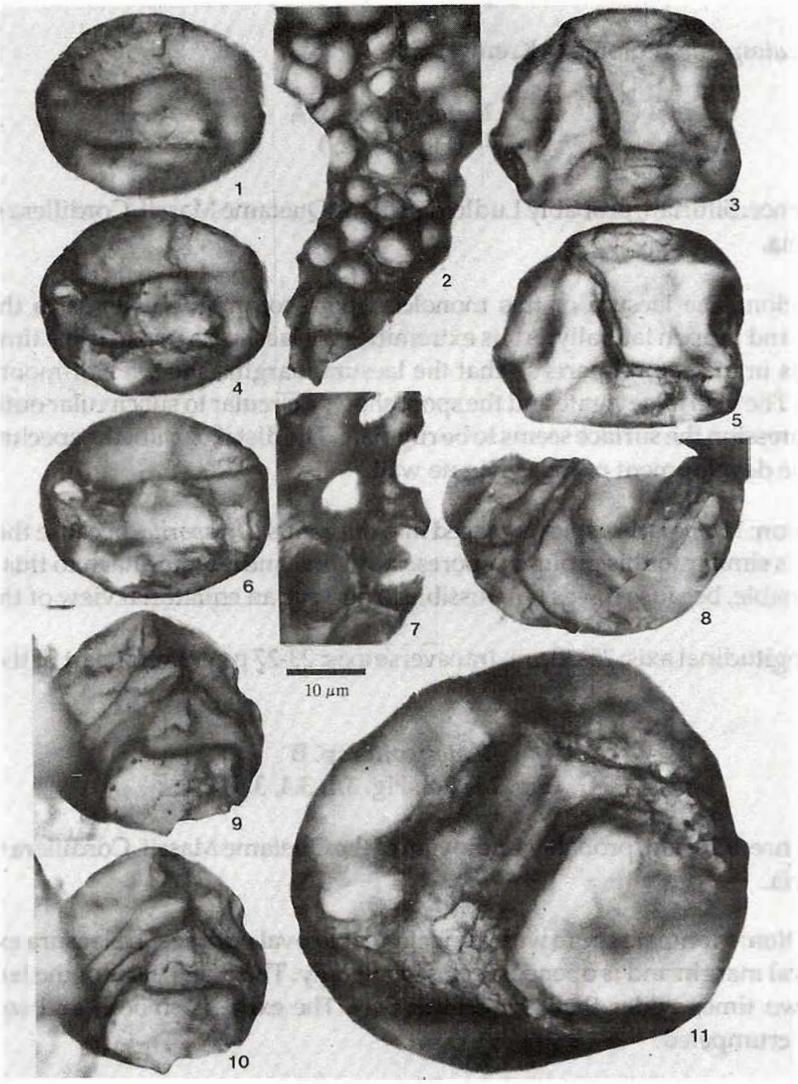
	Llandoverian	Wenlockian	Ludlovian	Pridolian	Devonian
A. avitus	******	**********	**********	****	
A. dilutus	******	**********	**********	**	
R. warringtonii	****	**********	**********	**********	**
A. chulus var. *nanus*	**	**********	**********	**********	**
?S. libycus		**	**********	**	
R. minor			**********	**********	**



All photographs are taken from sample no. 28-8-2-88 with the Leitz Ortholux no. 457457. The Roman and Arabic numbers represent the slide no. and the coordinates of the objects relate to the reference point in mm (slide no. 28-8-2-88 I ref. p.: 55,4/122,2; slide no. 28-8-2-88 III ref. p.: 56,3/122,4; slide no. 28-8-2-88 IV ref. p.: 54.9/121,1). For magnification of Fig. 2 (1-9) see bar A, for magnification of Fig. 2 (10-11) see bar B.

1. ?*Leschikisporites* sp. A, III 27,0/121,2.
2. ?*Leschikisporites* sp. A, IV 44,2/110,6.
3, 6. ?*Leschikisporites* sp. A, IV 43,0/118,7.
4. ?*Latosporites* sp. A, III 30,9/118,2.
5. ?*Latosporites* sp. B, I 34,5/112,2.
7. ?*Leschikisporites* sp. B, IV 32,1/107,2.
8. ?*Latosporites* sp. B, III 30,5/124,7.
9. ?*Latosporites* sp. A, IV 25,0/118,6.
10. Sheet with a rough stiation, III 43/113.
11. Slightly twisted, smooth tube, I 25/128.

FUGURE 2 (1 - 11). Photographs from samples of Palynomorphs



All photographs are taken from sample no. 27-1-1-90 with the Leitz Ortholux no. 457457. The Roman and Arabic numbers represent the slide no. and the coordinates of the objects relate to the reference point in mm (slide no. 27-1-1-90 I ref. p.: 54,7/117,5). For magnification of the Fig. 3 (1-11) see bar left of Fig. 3 (9).

1, 4, 6. ?*Latosporites* sp. B, I 36,6/116,0.
2. Cuticle-like sheet with small polygonal fields, I 35,2/119,4.
3, 5. Trilete spore with compressed outline, I 36,8/123,2.
7. Cuticle-like sheet with big polygonal fields, sometimes perfoated by holes, I 37,0/118,0.
8. Broken trilete spore showing curvaturae perfectae which are sometimes coincident with the equator, I 33,4/123,7.
9, 10. Trilete spore, a very thick labrum is possible, I 34,6/114,5.
11. Tetrade of spores, I 36,6/116,0.

FUGURE 3 (1 - 11). Photographs from samples of Palynomorphs

4. Description of palynomorphs

Genus *Latosporites* Potonié & Kremp 1954

?*Latosporites* sp. A
(Fig. 2.4, 2.9)

Occurrence: Silurian, probably Ludlovian of the Quetame Massif, Cordillera Oriental, Colombia.

Description: The laesura of this monolete spore commonly extends to the lateral margin and is open laterally. At its extremities the laesura is two to three times wider than it is in the central parts so that the laesura margins show a half-moon shaped outline. The wall is laevigate and the spore shows a circular to subcircular outline. Due to compression the surface seems to be rugulate. The distal parts of the specimen show the same development of the laevigate wall.

Discussion: ?*Latosporites* sp. A is placed into the genus *Latosporites* because the general outline is similar to this group of spores. Notwithstanding the attach to this genus is questionable, because it was not possible to observe an equatorial view of this spore.

Size: longitudinal axis: 25-30 µm, transverse axis: 23-27 µm, central part of the laesura 4-8 µm.

?*Latosporites* sp. B
(Fig. 2.5, 2.8; Fig. 3.1, 3.4, 3.5)

Occurrence: Silurian, probably Ludlovian of the Quetame Massif, Cordillera Oriental, Colombia.

Description: Monolete spore with a subcircular to oval outline. The laesura extends to the lateral margin and is opened or closed laterally. The distal parts of the laesura are up to two times wider than the central part. The exine is smooth and sometimes slightly crumpeled.

Discussion: This species differs from ? Latosporites sp. A in having a more oval outline and the more parallel edges of the laesura.

Size: longitudinal axis: 26-35 µm, transverse axis: 23-30 µm, central part of the laesura 3-8 µm.

Genus *Leschikisporites* Potonié 1958

?*Leschikisporites* sp. A
(Fig. 2.1, 2.2, 2.3, 2.6)

Occurrence: Silurian, probably Ludlovian of the Quetame Massif, Cordillera Oriental, Colombia.

Description: The spore is subtriangular and possesses a Y-shaped laesura which has two longer axes and one shorter axis. The longer ones extend 2/3 to 3/4 of the spore radius the shorter one 1/4 to 1/3 of the radius. Therefore the longer axes are three to four times longer than the shorter one. The laesura is only represented by a morphological depression. There is no labrum or commissure visible. The wall is laevigate.

Discussion: At first view ?*Leschikisporites* sp. A may be assigned to the genus *Leschikisporites* PotoniÇ 1958, but the latter is a monolete spore with a crack (?) in the wall.

Size: longitudinal axis: 25-30 Êm, transverse axis: 24-26 Êm, width of the laesura: 3-6 µm.

?*Leschikisporites* sp. B
(Fig. 2.7)

Occurrence: Silurian, probably Ludlovian of the Quetame Massif, Cordillera Oriental, Colombia.

Description: Subtriangular to oval spore with a Y-shaped laesura. The longer axes are two times longer than the shorter one. The exine is smooth and sometimes slightly crumpled.

Discussion: Only one specimen was found. It differs from ?*Leschikisporites* sp. A by being bigger and more oval in outline.

Size: longitudinal axis: 34 µm, transverse axis: 27 µm, width of the laesura 3-4 µm.

Together with the above mentioned spores some acritarchs also occurred. *Micrhystridium* sp. and *Veryhachium* sp. were only found in very poor preserved fragments. Green algae which seem to belong to the genera of *Cymatiosphaera* Wetzel 1933, *Leiosphaeridia* Eisenack 1958, and *Muraticavea* Wicander 1974 were better preserved. However, they were very rare.

Most of the organic material belongs to tubes (Fig. 2.11) and to structures which were called cuticle-like sheets (Fig. 3.2, 3.7) previously reported in deposits of Silurian age (Banks 1975, Johnson 1985, McGregor & Narbonne 1978, Pratt et al. 1978, Strother & Traverse 1979, Niklas & Smocovitis 1983, Al-Ameri 1984, Smelror 1987) as well as of Ordovician age (Gray et al. 1982).

The tubes are represented by four different kinds:

1. smooth, sometimes veined tubes (Fig 2.11)
2. tubes with a muro-vermiculate structure
3. tubes with a fine striation
4. tubes with cuticle-like structures

The tubular fragments have a diameter of 8 - 26 µm with a length up to 150 µm.

The cuticle-like sheets show a polygonal reticulum. Those cell areas have diameters from 2 µm up to 15 µm. Very rare were sheets with a rough striation (Fig 2.10).

5. Summary

The well known and former described spores found in the Quetame Massif of the Cordillera Oriental of Colombia indicate Silurian. This palynoflora postdate the main regional metamorphism in the Cordillera Oriental of Colombia and also the metamorphic rocks of the Grupo Quetame.

Besides these spores and plant remains some unknown but significant palynomorphs were present. They seem to be restricted to the Silurian of Colombia, because none of them was reported in other associations.

Although they are carbonized the description of the palynomorphs may be an important help for further palynological work in the Paleozoic of Colombia.

6. Acknowledgments

The authors are indebted to F. Stibane for helpful comments and discussions on the geologic framework. Special thanks to W. Riegel for revising the comments on the determination of the palynomorphs. One of the authors (J.R.G.) is grateful to the Universidad Nacional at Bogota and the teaching staff for logistic help and to the Ingeominas Bogota. The geologist J.I. Diaz is thanked for field assistance during the field work in the Quetame Massif. M. Schorge is thanked for photographic work and J. Schwarz for work carried out in the laboratory. Miss M. Lavin is thanked for revising the English text. The critical reading of the text by Dr. G. Sarmiento (Ingeominas, Bogotá) and Dr. H. Dueñas (BIOSS Ltda., Bogotá) is acknowledged.

The project was supported by the Deutsche Akademische Austauschdienst (DAAD) and the Deutschen Forschungsgemeinschaft (DFG: grant no. GR 944/1-1).

The material is stored in the collection of Grösser & Prössl, Institut für Angewandte Geowissenschaften, Justus-Liebig-Universität, Diezstr. 15, 6300 Giessen, Germany.

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