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# CATALOGUE OF THE CARBONIFEROUS FOSSIL MEGAFLORA FROM THE DOBROGEA COAL BASIN (NORTHEAST BULGARIA)

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## Introduction

The Carboniferous of the Dobrudza Coalfield, Northeast Bulgaria is stratigraphically divided into the upper Viséan to lower Namurian Group (the upper part of which belongs to the Rakovski Formation [Rak]) and the upper Namurian to lower Stephanian Balchik Group (*Tenchov and Kalaksuzov, 1972; Kalaksuzov and Tenchov, 1973*). The Balchik Group in turn is divided into the Mogilishte (Mo), Vranino (Vr), Makedonka (Ma), Velkovo (Ve), Krupen (Kr), Polyantsi (Po) and Gurkovo (Gu) Formation (*Tenchov and Kalaksuzov, 1972*). The Makedonka is further subdivided into lower and upper members (known as MaB and MaC, respectively). The Gurkovo formation is divided into Topola (lower, Gut), Briyastovo (middle, Gub) and Kabalak (upper, Guk) members (*Nikolov et al. 1989*).

## Material and methods

Sixty seven samples from 35 boreholes from Dobrudza Coalfield are described. They are registered in Paleontology section of the main fund of the Department of Natural History of Varna Regional Museum of History. Inventory number, determination of the fossil, depth (in m), formation (the names of lithostratigraphical units are abbreviated as shown above) and age are given (*Table 1*). In *Table 2* are present the general results of catalogue of fossil flora in Age and in *Table 3* in Formation.

Identifications of species and whole-plant assemblages, where appropriate, were based on standard paleobotanical literature: neuropterids: Crookall (1959) and Laveine (1967); sphenophylls: Corsin (1951), Boureau and Doubinger (1975).

**Table 1.** A Catalogue of the Carboniferous fossil megaflores from the Dobrogea Coal Basin.

Inventory number	Determination of the fossil	Depth, m	Formation	Age
1	2	3	4	5
268	<i>Eusphenopteris striata</i>	1661	MaC	Westphal C
269	<i>Annularia jongmansii</i>	1948	Mog	Westphal B
270	<i>Lobatopteris vestita</i>	1512	Gub	Cantabrian
271	<i>Neuropteris heterophylla</i> , <i>Annularia aff. stellata</i>	2069	Mog	Westphal B
272	<i>Lyginopteris baumleri</i> , <i>Dictyoxylon Renaultia rotundifolia</i>	2128	Mog	Westphal B
273	<i>Stigmaria ficoides</i>	1380	MaB	Westphal B
274	<i>Sphenophyllum cf. saarense</i> , <i>Annularia sphenophylloides</i>	1412	Gut	Westphal D
275	<i>Annularia jongmansii</i>	1666	Mog	Westphal A
276	<i>Stylocalamites cisti</i>	1725	Mog	Namurian C
277	<i>Paripteris gigantea</i> , <i>Mariopteris muricata</i>	1473	Mog	Westphal A
278	<i>Sphenophyllum cuneifolium f. saxifragifolia</i> , <i>Lyginopteris baumleri</i>	1481	Mog	Westphal A
279	<i>Reticulopteris munsteri</i>	1814	MaC	Westphal C
280	<i>Neuropteris semireticulata</i>	1635	MaC	Westphal C
281	<i>Neuropteris semireticulata</i> , <i>Radicites columnari</i>	1635	MaC	Westphal C
282	<i>Cordaites palmaeformis</i>	1650	MaC	Westphal C
283	<i>Lepidodendron acutum</i>	1687	MaC	Westphal C
284	<i>Neuropteris heterophylla</i>	1418	Mog	Westphal B
285	<i>Asterophyllites charaeformis</i>	1428	Mog	Westphal B
286	<i>Eusphenopteris striata</i>	1395	MaC	Westphal C
287	<i>cf. Linopteris neuropteroides</i> , <i>Lycophyta</i>	1585	Mog	Westphal B
288	<i>Stigmaria rugulosa</i>	1713	Mog	Westphal A
289	<i>Renaultia schatzlarensis</i>	2036	Mog	Namurian C
290	<i>Crossotheca crepini</i>	1742	Mog	Westphal B
291	<i>Sphenophyllum cuneifolium f. Saxifragifolia</i>	1886	Mog	Westphal B
292	<i>Paripteris schutzei</i> , <i>Paripteris pseudogigantea</i>	1888	Mog	Westphal B
293	<i>Linopteris neuropteroides</i> , <i>Paripteris gigantea</i>	1683	MaB	Westphal B
294	<i>Sphenophyllum cuneifolium</i> , <i>A. charaeformis</i>	1443	MaB	Westphal B
295	<i>Neuropteris obliqua</i> , <i>Calamites sp.</i>	1703	Mog	Westphal A
296	<i>Calamitina undulata</i>	1717	Mog	Westphal A

1	2	3	4	5
297	<i>Diplocalamites carinatus</i>	1934	Mog	Westphal A
298	<i>Alethopteris densinervosa</i>	1408	Gub	Westphal D
299	<i>Diplcalamites paleaceus</i>	1712	Mog	Westphal A
300	<i>Corynepteris corraloides</i>	1313	Mog	Westphal B
301	<i>Annularia cf. radiata, A. decurrens, Mariopteris muricata</i>	1615	Mog	Westphal B
302	<i>Stylocalamites jubatus</i>	1766	Mog	Westphal A
303	<i>Stylocalamites suckowi</i>	1358	Kr	Westphal C
304	<i>Neuropteris cf. rarinervis, Lepidodendron sp.</i>	1475	MaC	Westphal C
305	<i>Stigmaria reticulata</i>	1694	Mog	Westphal B
306	<i>Stylocalamites cisti</i>	1709	Gub	Cantabrian
307	<i>Mariopteris acuta</i>	1633	Mog	Westphal A
308	<i>Sigillaria rugosa</i>	1641	Mog	Westphal A
309	<i>Sphenophyllum emarginatum</i>	1459	Gub	Cantabrian
310	<i>Annularia fertilis</i>	1836	Mog	Westphal B
311	<i>Neuropteris rarinervis</i>	1641	MaC	Westphal C
312	<i>Asterophyllites equisetiformis</i>	1694	MaC	Westphal C
313	<i>Annularia radiata</i>	1694	MaC	Westphal C
314	<i>Asterophyllites equisetiformis, Annularia galioides</i>	1697	MaC	Westphal C
315	<i>Neuropteris obliqua</i>	1733	MaB	Westphal B
316	<i>Linopteris minor</i>	1501	Kr	Westphal C-D
317	<i>Neuropteris rarinervis, Annularia cf. fertilis</i>	1506	Kr	Westphal C
318	<i>Lepidodendron acutum</i>	1973	MaB	Westphal B
319	<i>Linopteris brongniarti</i>	1431	Gub	Cantabrian
320	<i>Neuropteris rarinervis</i>	1447	Gub	Cantabrian
321	<i>Neuropteris rarinervis</i>	1447	Gub	Cantabrian
322	<i>Neuropteris ovata, Neuropteris scheuchzeri</i>	1447	Gub	Cantabrian
323	<i>Neuropteris ovata, Neuropteris scheuchzeri</i>	1461	Gub	Cantabrian
324	<i>Neuropteris ovata, Neuropteris scheuchzeri</i>	1461	Gub	Cantabrian
325	<i>Alethopteris lonchitica</i>	1541	MaC	Westphal C
326	<i>Lobatopteris miltoni</i>	1741	MaB	Westphal B
327	<i>Asterophyllites grandis</i>	1816	MaC	Westphal C
328	<i>Lepidostrobophyllum lanceolatum</i>	1608	Mog	Westphal B
329	<i>Bothrodendron sp.</i>	3160	Rak	Namurian A
330	<i>Neuropteris ovata</i>	1505	Gut	Westphal D
331	<i>Neuropteris ovata</i>	1508	Gut	Westphal D
332	<i>Linopteris neuropteroides</i>	1462	Gub	Cantabrian
333	<i>Lepidostrobus squarosus</i>	1484	Kr	Westphal D
334	<i>Lepidophloios acerosus</i>	1527	Mog	Westphal A

**Table 2.** General results of catalogue of fossil flora by age.

Cantabrian	<i>Lobopteris vestita</i> , <i>Stylocalamites cisti</i> , <i>Sphenophyllum emarginatum</i> , <i>Linopteris brongniarti</i> , <i>Neuropteris rarinervis</i> , <i>Neuropteris ovata</i> , <i>Neuropteris scheuchzeri</i> , <i>Linopteris neuropteroides</i>
Westphal D	<i>Sphenophyllum cf. saarense</i> , <i>Annularia sphenophylloides</i> , <i>Alethopteris densinervosa</i> , <i>Linopteris minor</i> , <i>Neuropteris ovata</i> , <i>Lepidostrobus squarosus</i>
Westphal C	<i>Eusphenopteris striata</i> , <i>Reticulopteris munsteri</i> , <i>Neuropteris semireticulata</i> , <i>Radicites columnari</i> , <i>Cordaites palmaeformi</i> , <i>Lepidodendron acutum</i> , <i>Eusphenopteris striata</i> , <i>Renaultia schatzlarensis</i> , <i>Stylocalamites suckowi</i> , <i>Lepidodendron sp.</i> , <i>Neuropteris rarinervis</i> , <i>Asterophyllites equisetiformis</i> , <i>Annularia radiata</i> , <i>Asterophyllites equisetiformis</i> , <i>Annularia galioides</i> , <i>Linopteris minor</i> , <i>Annularia cf. fertilis</i> , <i>Alethopteris lonchitica</i> , <i>Asterophyllites grandis</i>
Westphal B	<i>Annularia jongmansii</i> , <i>Neuropteris heterophylla</i> , <i>Annularia aff. Stellata</i> , <i>Lyginopteris baumleri</i> , <i>Dictyoxylon Renaultia rotundifolia</i> , <i>Stigmara ficoides</i> , <i>Neuropteris heterophylla</i> , <i>Asterophyllites charaeformis</i> , <i>cf. Linopteris neuropteroides</i> , <i>Lycophyta</i> , <i>Crossotheca crepini</i> , <i>Sphenophyllum cuneifolium f. Saxifragifolia</i> , <i>Paripteris schutzei</i> , <i>Paripteris pseudogigantea</i> , <i>Linopteris neuropteroides</i> , <i>Paripteris gigantea</i> , <i>Sphenophyllum cuneifolium</i> , <i>A. charaeformis</i> , <i>Corynepteris corraloides</i> , <i>Annularia cf. radiata</i> , <i>A. decurrens</i> , <i>Mariopteris muricata</i> , <i>Stigmara reticulata</i> , <i>Annularia fertilis</i> , <i>Neuropteris obliqua</i> , <i>Lepidodendron acutum</i> , <i>Lobopteris miltoni</i> , <i>Lepidostrobophyllum lanceolatum</i>
Westphal A	<i>Annularia jongmansii</i> , <i>Paripteris gigantea</i> , <i>Mariopteris muricata</i> , <i>Sphenophyllum cuneifolium f. saxifragifolia</i> , <i>Lyginopteris baumleri</i> , <i>Stigmara rugulosa</i> , <i>Neuropteris obliqua</i> , <i>Calamites sp.</i> , <i>Calamitina undulata</i> , <i>Diplocalamites carinatus</i> , <i>Diplocalamites paleaceus</i> , <i>Stylocalamites jubatus</i> , <i>Mariopteris acuta</i> , <i>Sigillaria rugosa</i> , <i>Lepidophloios acerosus</i>
Namurian	<i>Stylocalamites cisti</i> , <i>Renaultia schatzlarensis</i> , <i>Bothrodendron sp.</i>

**Table 3.** General results of catalogue of fossil flora by Formation.

Gurkovo Formation	<i>Lobopteris vestita</i> , <i>Sphenophyllum</i> cf. <i>saarense</i> , <i>Annularia sphenophylloides</i> , <i>Alethopteris densinervosa</i> , <i>Stylocalamites cisti</i> , <i>Sphenophyllum emarginatum</i> , <i>Linopteris brongniarti</i> , <i>Neuropteris rarinervis</i> , <i>Neuropteris ovata</i> , <i>Neuropteris scheuchzeri</i> , <i>Linopteris neuropteroides</i>
Krupen Formation	<i>Stylocalamites suckowi</i> , <i>Linopteris minor</i> , <i>Neuropteris rarinervis</i> , <i>Annularia</i> cf. <i>Fertilis</i> , <i>Lepidostrobus squarosus</i>
Makedonka Formation	<i>Eusphenopteris striata</i> , <i>Stigmaria ficoidea</i> , <i>Reticulopteris munsteri</i> , <i>Neuropteris semireticulata</i> , <i>Radicites columnari</i> , <i>Cordaites palmaeformis</i> , <i>Lepidodendron acutum</i> , <i>Eusphenopteris striata</i> , <i>Linopteris neuropteroides</i> , <i>Paripteris gigantea</i> , <i>Sphenophyllum cuneifolium</i> , <i>A. charaeformis</i> , <i>Neuropteris</i> cf. <i>rarinervis</i> , <i>Lepidodendron</i> sp., <i>Neuropteris rarinervis</i> , <i>Asterophyllites equisetiformis</i> , <i>Annularia radiata</i> , <i>Asterophyllites equisetiformis</i> , <i>Annularia galioides</i> , <i>Neuropteris obliqua</i> , <i>Lepidodendron acutum</i> , <i>Alethopteris lonchitica</i> , <i>Lobopteris miltoni</i> , <i>Asterophyllites grandis</i>
Mogilishte Formation	<i>Annularia jongmansii</i> , <i>Neuropteris heterophylla</i> , <i>Annularia</i> aff. <i>stellata</i> , <i>Lyginopteris baumleri</i> , <i>Dictyoxylon</i> , <i>Renaultia rotundifolia</i> , <i>Stylocalamites cisti</i> , <i>Paripteris gigantea</i> , <i>Mariopteris muricata</i> , <i>Sphenophyllum cuneifolium</i> f. <i>saxifragifolia</i> , <i>Lyginopteris baumleri</i> , <i>Neuropteris heterophylla</i> , <i>Asterophyllites charaeformis</i> , cf. <i>Linopteris neuropteroides</i> , <i>Lycophyta</i> , <i>Stigmaria rugulosa</i> , <i>Renaultia schatzlarensis</i> , <i>Crossothea crepini</i> , <i>Sphenophyllum cuneifolium</i> f. <i>Saxifragifolia</i> , <i>Paripteris schutzei</i> , <i>Paripteris pseudogigantea</i> , <i>Neuropteris obliqua</i> , <i>Calamites</i> sp., <i>Calamitina undulata</i> , <i>Diplcalamites carinatus</i> , <i>Diplcalamites paleaceus</i> , <i>Corynepteris corraloides</i> , <i>Annularia</i> cf. <i>radiata</i> , <i>A. decurrens</i> , <i>Mariopteris muricata</i> , <i>Stylocalamites jubatus</i> , <i>Stigmaria reticulata</i> , <i>Mariopteris acuta</i> , <i>Sigillaria rugosa</i> , <i>Annularia fertilis</i> , <i>Lepidostrobusphyllum lanceolatum</i> , <i>Lepidophloios acerousus</i>
Rakovski Formation	<i>Bothrodendron</i> sp.

## REFERENCES

- <sup>1</sup> **Boureau, E. and Doubinger, J.**, 1975. Pteridophylla (Premiere partie). In: E. Boureau (Editor), *Traite de Paleobotanique*. Masson et Cie, Paris, Vol. 4, 768.
- <sup>2</sup> **Corsin, P.**, 1951. Pacopatridentes. In: Bassin Houiller de la Sarre et de la Lorraine. I. Flore fossil. *Etudes de Gites Mineraux de la France*, Part 4, 370.
- <sup>3</sup> **Crookall, R.**, 1959. Fossil plants of the Carboniferous rocks of Great Britain (second section). *Mem. Geol. Surv. G.B. Palaeontol.*, 4: 85–216.
- <sup>4</sup> **Kalaksuzov, G., Tenchov, Y.** 1973. Stratigraphiya na dolniya Karbon ot Dobrudzhanskiya vaglishten basein. *Izvestiya na Geologicheskiya Institut, seriya Stratigraphiya i Litologiya* 22: 39–53.
- <sup>5</sup> **Laveine, J.**, 1967. Contribution a l'atude de la flore du terrain houiller. Les Neuropterides du Nord de la France. I. Hore fossile. *Etudes Geol. Atlas Top. Sout.*, H.B.N.P.C, Lille, Part 4, 344.
- <sup>6</sup> **Nikolov, Z., Popova, K., Dimitrova, T., Popov, A.** 1989. Podyalba i korelatsia na Gurkovskata svita v Dobrudzhanskoto vaglishtno nahodishte. – *Review of the Bulgarian Geological Society* 50:1–14.
- <sup>7</sup> **Tenchov, Y., Kalaksuzov, G.** 1972. Litostratigraphiya na gorniya Karbon ot Dobrudzhanskiya vaglishten basein. *Izvestiya na Geologicheskiya Institut, seriya Stratigraphiya i Litologiya* 21:41–62.

## КАТАЛОГ НА КАРБОНСКАТА МЕГАФЛОРА ОТ ДОБРУДЖАНСКИЯ ВЪГЛИЩЕН БАСЕЙН (СЕВЕРОИЗТОЧНА БЪЛГАРИЯ)

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### Резюме

Каталогът включва 67 проби от Добруджанския въглищен басейн, инвентирани в основния фонд на отдел „Природа“ на Регионалния исторически музей–Варна. Извършено е определяне на наличните растителни части. Посочени са инвентарните номера, дълбочината на сондажа, свитата и е определена възрастта на седимента.