SBORNÍK NÁRODNÍHO MUSEA v PRAZE
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F. NĚMEJC:

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(PŘEDBĚŽNÁ STUDIE.)

ODONTOPTERIDES AND MIXONEURAE OF THE PERMOCARBONIFEROUS OF BOHEMIA.

(A PRELIMINARY STUDY.)

PRAHA 1949

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V GENERÁLNÍ KOMISI MATICE ČESKÉ, PRAHA II.-1700, VÁCLAVSKÉ NÁM.

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V GENERÁLNÍ KOMISI MATICE ČESKÉ, PRAHA II.-1700, VÁCLAVSKÉ NÁM.

F. NĚMEJC:

Odontopteridy a Mixoneury českého karbonu a permu.

(Předběžná studie.)

Odontopterides and Mixoneurae of the Permocarboniferous of Bohemia.

(A preliminary study.)

(Předloženo 8. XII. 1949.)

Při revisi stratigrafických poměrů českých kamenouhelných pánví, obzvláště ve vyšších horizontech, setkával jsem se stále velmi často s různými zlomky listů *Odontopteridů* a jim podobných *Mixoneur*, jejichž přesné určení se mi zdá být velmi důležité pro přesné stanovení některých obzorů, právě tak jako jest tomu u *Alethopteridů* (o nichž jsem podal zprávu ve své práci z r. 1936) nebo *Neuropteridů*, jde-li o obzory podstatně hlubší. Během posledních let při terénních výzkumech konaných ve spolupráci se Státním geologickým ústavem v Praze, podařilo se mi sebrati právě z takových vysokých permokarbonských obzorů mnoho nového materiálu (obzvláště v oblastech u Svatoňovic a Radvanic ve vých. Čechách a u Rosic a Oslavan na Moravě), který umožnil bližší poznání některých nálezů zlomkovitých ze středních Čech a následkem toho i přesnější vzájemné porovnání ostatních nálezů.

Celkem zjistil jsem v limnických oblastech českého a středomoravského permokarbonu následující druhy *Odontopteridů* a *Mixoneur:*

Souvrství žacléřská (westfalien A až spodní westfalien C):

Mixoneura obliqua BGT.

Souvrství radnická (nejvyšší polohy westfalienu B až westfalien C):

Odontopteris stradonicensis ANDRÄ sp.
Mixoneura praeovata NJC n. sp. (sotva rozeznatelná od *M. plicata* STBG.).
M. grandifolia NJC. n. sp.
M. münsterifolia NJC. n. sp.

Souvrství n ý ř a n s k á (incl. mirošovské arkosy; t. j. westfalien D):

Odontopteris reichiana GUTB.
Mixoneura (Odontopteris) britannica (GUTB.) ZEILLER (1909).
Mixoneura plicata STBG.

Souvrství s v r c h n í s v a t o ň o v i c k é („Ida"; t. j. přibližně střední stefanien):

Odontopteris genuina GR'. EURY.

Souvrství k o u n o v s k é v e s t ř e d n í c h Č e c h á c h (svrchní stefanien):

Odontopteris genuina GR'. EURY.
Odontopteris intermedia NJC. n. sp.
Mixoneura (Odontopteris) subcrenulata (ROST.) ZEILLER.
Mixoneura neuropteroides GOEPP.
Mixoneura auriculata BGT.

Souvrství r a d v a n i c k é a r o s i c k o-o s l a v a n s k é (svrchní stefanien):

Odontopteris minor BGT.
Odontopteris Brardi BGT.
Odontopteris osmundaeformis SCHL.
Mixoneura (Odontopteris) subcrenulata (ROST.) ZEILLER.
Mixoneura neuropteroides GOEPP.
Mixoneura auriculata BGT.

Souvrství s p o d n o p e r m s k á:

Odontopteris osmundaeformis SCHL.
Mixoneura (Odontopteris) subcrenulata (ROST.) ZEILLER.
Mixoneura neuropteroides GOEPP.
Mixoneura auriculata BGT.

Rozbor jednotlivých vyjmenovaných druhů jest podrobně podán v následujícím anglicky sepsanémm pojednání. Tam jest také podán podrobněji i výčet míst, kde byly zmíněné druhy zjištěny.

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Introduction.

Revising the stratigraphical conditions of the younger series (Westphalian D, Stephanian and Permian) of the Permocarboniferous of Bohemia and Central Moravia, I met very often several *odontopteroid* types, the precise determination of which seems to be highly important for the critical definition of the stratigraphical age of various coal series, just as in the case of the *Alethopterides, Pecopterides* and *Neuropterides,* of which several types I have already discussed in my previous papers. During the last years (after the last world war) I gained a large material concerning especially species occuring in the stephanian

coal bearing beds at Svatoňovice and Radvanice in E. Bohemia, just as from equally old beds from the coal districts of Rosice and Oslavany in Central Moravia, which anabled me to undertake a precise comparision with specimens collected in other Bohemian permocarboniferous beds as well as with several forms gained several years before from the Permocarboniferous of Central France, wherefrom the chief part of the stephano-permian *Odontopteris* species was originally described.

In the whole I veryfied in the Permocarboniferous of Bohemia 7 species of the genus of Odontopteris and 5 well defined species of the genus of Mixoneura; besides there are still further 3 forms of Mixoneura, which show so strong relations to several of the 5 well defined Mixoneurae, that their independence is rather problematical. They are as follows:

In the coal measures of Žacléř (i. e. Westphalian A till lower C):

Mixoneura obliqua BGT.

In the Radnice coal measure series (uppermost Westphalian B till C):

Odontopteris strádonicensis ANDRÄ.
Mixoneura praeovata n. sp. (rather problematical).
M. grandifolia n. sp. (rather problematical).
M. münsterifolia n. sp.

In the Nýřany coal measure series (Westphalian D):

Odontopteris reichiana GUTB.
Mixoneura britannica (GUTB.) ZEILLER 1909.
Mixoneura plicata STBG.

In the Upper coal measures of Svatoňovice ("Ida"; Middle Stephanian):

Odontopteris genuina GR'. EURY.

In the coal measures of Kounov of Central Bohemia (Upper Stéphanian):

Odontopteris genuina GR'. EURY.
O. intermedia n. sp.
Mixoneura ("Odontopteris") subcrenulata (ROST.) ZEILLER.
Mixoneura neuropteroides GOEPP.
Mix. auriculata BGT.

In the coal measures of Radvanice as well as of Rosice and Oslavany (Upper Stéphanian):

Odontopteris minor BGT.
O. brardi BGT.
O. osmundaeformis SCHL.
Mixoneura ("Odontopteris") subcrenulata (ROST.) ZEILLER.
M. neuropteroides GOEPP.
M. auriculata BGT.

Lower permian beds:

Odontopteris osmundaeformis SCHL.
Mixoneura ("Odontopteris") subcrenulata (ROST.) ZEILLER.
Mixoneura neuropteroides GOEPP.
Mixoneura auriculata BGT.

At the mean time we know only fragments of sterile fronds. No seeds nor any other reproductive organs belonging to *Odontopterides* have ever been collected in the coal basins of Bohemia or in Central Moravia.

Discussion of species discovered in Bohemia.

1. *Odontopteris stradonicensis* ANDRÄ sp.

Pl. I, fig. 1—8.

Literature and synonyms:
1864 R. ANDRÉE, pp. 170: *Odontopteris* sp., Pl. 4, fig. 4, 4a.
1875/6 O. FEISTMANTEL, pp. 290: *Odontopteris reichiana* v. GUTB., Pl. 57, fig. 4, 5, 5a.
1870 E. WEISS, pp. 869: *Xenopteris sp. indet.* ANDRÉE.
1881 E. WEISS, pp. 265: *Neuropteris stradonitzensis* ANDRÄ, Textf.; — pp. 446.
1879 J. ANDRÄ, pp. 104: *Aspidites stradonitzensis.*

This form was originally described from the whitish shales called "brousky" ("Schleifsteine") at Strádonice near Beroun by R. ANDRÉE as *Odontopteris sp.*, later by O. FEISTMANTEL as *Odontopteris reichiana* v. GUTB. and finally by J. ANDRÄ as a new form called *Aspidites stradonitzensis.* E. WEISS, the well known monographer of the genus of *Odontopteris,* joined this form to the genus of *Neuropteris,* especially to forms showing leaflets attached by a rather broad base to the rhachis (See WEISS's species of *Neuropteris cordato-ovata*).

The leaflets of our *O. stradonitzensis* agree as to their shape mostly with the leaflets of *Odontopteris reichiana, brardi* and *minor.* In the terminal parts of the last pinnae they remind also strongly *Mixoneura obliqua.* They are of a triangular asymmetrical shape with slightly rounded tops and broadly attached to the rhachises of the last pinnae, decurrent at the kathadrome side but slightly incised at the anadrome side. They are broadest at the base, their anadrome half is more developed than the kathadrome one, wherefore the central vein has an excentric position. The nervation is very similar to *O. reichiana* v. GUTB. as defined and figured originally by v. GUTBIER (1836) and later by H. B. GEINITZ (1855) or R. ZEILLER 1899 (1902), but not as described and figured by most of the later authors (incl. ZEILLER), who included under the name of *O. reichiana* specimens, which have nothing in common with the original GUTBIER's form (see under *O. reichiana*). The central vein is slightly decurrent and very thin, giving off pinnately at both sides several once till tree times forklike divided secondary veins under

very acute angles (especially in the upper part of the leaflets). All secondaries in the anadrome half of the leaflets are attached only to the central vein, whereas in the kathadrome half of the leaflets the two lowest secondaries are given off directly from the rhachis to which the respective leaflets are attached, just before the departure of the central vein. All veins are very straight and the whole nervation system is of a more or less radiating or fanlike feature the secondaries being in the upper part of the leaflets attached at narrower angles than those in their middle or lower parts. The leaflets attain a length till 2 cm at a width of 7 till 9 mm, but mostly they are smaller (only about 8—14 mm long). Among specimens in the collections of the Nat. Museum, Prague, we meet generally frond fragments only twice pinnate, but there is no doubt that the whole fronds were of a more complicated architecture. We meet there also specimens evidently asymmetrical in shape bearing longer pinnae at one side than at the other one. Further we meet specimens bearing unusually elongated leaflets like in several *Mixoneura* species *(M. obliqua, ovata* a. o.; forms named as *"Neuropteris acutifolia* STBG."). All these facts suggest that the fronds of *O. stradonitzensis* are of a similar construction as those of the imparipinnate *Neuropterides,* the *Mixoneurae* or perhaps also like in *O. minor.*

Distribution. — At present this form is known only from Bohemia. It was collected very frequently only in the whitish gorlitic shales ("brousky" or "Schleifsteine") in the side valley of the river of Berounka between Zdejciná and Strádonice near Beroun (in all collections generally named as Strádonice), which are to be correlated with the series of gorlitic rocks ("brousky, bělky") between the Lower Radnice coal measure and the Upper Radnice coal measure of the Lower grey beds (i. e. the passage from Westphalian B to Westphalian C). Till now nowhere else in Bohemia any specimens of this type were yet found.

2. *Odontopteris reichiana* v. GUTB. sp.

Pl. I, fig. 9—9b, Pl. II, fig. 5.

Literature and synonyms:

1835—1836 A. v. GUTBIER, pp. 65: *Odontopteris reichiana,* Pl. 9, fig. 1, 2, 3, 5, 7, Pl. 10, fig. 13; pp. 67: *Odontopteris boehmii,* Pl. 10, fig. 12; pp. 9, fig. 4; pp. 68: *Odontopteris dentata,* Pl. 9, fig. 4.

1855 H. D. GEINITZ, pp. 20, Pl. 26, fig. 6, 7: *O. reichiana.*

1899 (1902) R. ZEILLER, pp. 41, Pl. 4, fig. 3—5: *O. reichiana.*

After a very thorough study of various *Odontopteris* specimens from our Bohemian and Moravian coal districts and after having compared these specimens with specimens collected in Central France, Saxonia a. o. as well with the figures and descriptions by GEINITZ, POTONIÉ and ZEILLER, I went to the conclusion that the later authors after GUTBIER and GEINITZ generally have described under the term of *O. rei-*

chiana at least two essentially different types (besides some specimens related perhaps with *O. minor* or *brardi*). Besides in GUTBIER's and GEINITZ's works I found true *O. reichiana* described and figured only in ZEILLER's paper dealing with the carboniferous flora of Eregli (Héraclée) in Asia Minor.

True *Odontopteris reichiana* as to the shape of the leaflets is no doubt very similar to forms grouped under the terms of *O. minor* and *brardi*. From these types it differs essentially by the nervation and exhibits several relations to our *O. stradonitzensis* ANDR. sp.

Its leaflets are provided by a very thin and slightly decurrent central vein, which divides pinnately giving off several once or twice forklike divided secondaries. Beside these, one or two secondaries enter into the leaflets also directly from the rhachis, to which the leaflets are attached by their broad bases, but only at the kathadrome side of the central vein (like in *O. stradonitzensis*); we meet no accessory secondaries at the anadrome side of the central vein. This is the same type of nervation as in *O. stradonitzensis*. In contrary specimens of *O. minor* or *brardi* exhibit accessory secondary veins at both sides of the central vein, which is also the case in most of the specimens, which later (after GUTBIER and GEINITZ) have been described by various authors especially from the upper stéphanian beds under the term of *O. reichiana*. From *O. stradonitzensis* our *O. reichiana* differs chiefly in the following points: The leaflets are essentially smaller. Their veins are less numerous and more distant and not as straight. Between two neighbouring veinlets still two parallel thin lines are to be observed. The central vein occupies a nearly central position within the leaflets, which therefore are less asymmetrical in shape than the leaflets of *O. stradonitzensis*.

O. reichiana is a more slender type. The length of the leaflets attains in our bohemian specimens till about 1 cm (mostly 6—8 mm) and the width about 4—5 mm (mostly only cca. 3 mm).

True *O. reichiana* was described till present only from the uppermost westphalian beds (Westphalian D) e. g. in Saxony, at Eregli in Asia Minor (series of Caradons). All other specimens figured hitherto in the literature as *O. reichiana* from higher (mostly upper stéphanian) or deeper zones are provided by an essentially different nervation and must be therefore regarded in future as specifically different types (see especially specimens cited by Zeiller from stéphanian beds of Central France).

Distribution: I stated true *O. reichiana* V. GUTB. sp. meanwhile only in several places of the coal districts in Central Bohemia in the Nýřany coal measure series (i. e. Westphalian D):

Rakovník, the abandoned collieries E. from the town (at the place of the present ceramic manufacture): Pit Moric, hanging wall of the coalseam called "Věnec".

Nýřany, collieries N. from the village at the place called "Pankrác", in the hanging wall of the Nýřany coal seam.

Odontopteris intermedia n. nom.

Pl. I, fig. 10—14.

Literature and synonyms:

1877 C. Gr.' Eury, Vol. 1. pp. 112—113: *Odontopteris reichiana.*

1890 R. Zeiller, pp. 119: *Odontopteris reichiana,* Pl. 10, fig. 1.

1906 R. Zeiller, pp. 82: *Od. reichiana.*

1904 H. Potonié, Lief. II, No. 24: *Od. reichiana* (ex parte). Besides see also for comparition the diagnoses of *O. minor* and *obtusa* in the following papers: R. Zeiller 1906, B. Renault—R. Zeiller 1888, H. Potonié 1904 (Lief. II, No. 23) and 1903 (Lief. I, No. 13).

Under this new term I am joining several specimens described till present from the stéphanian beds of various european countries (especially from Central France) under the name of *Od. reichiana* Gutb., which as to the character of the nervation are essentially different from the true Gutbier's type. I found this form also at several places of the coal district of Plzeň in beds equally old.

Odontopteris intermedia is a rather slender type reminding *O. reichiana* v. Gutb. or *Od. minor* Bgt. In the specimens recorded by Zeiller from the Stéphanian of Central France the leaflets attain 4—15 mm in length and 2—6 mm in breadth. In our specimens from western Bohemia they are 5—11 mm long and 3—6 mm broad (i. e. nearly 2:1 till 1,7:1). The leaflets are ovato triangular with rounded tops, slightly similar to *O. minor* but essentially broader; an intermediary shape between the narrowly triangular leaflets of *O. minor* Bgt. and the tonguelike and rounded leaflets of *O. obtusa* Bgt. Also with the leaflets of *O. reichiana* v. Gutb. (with which as told it often was identified) a rather strong similarity may be stated. As to the rounded tops of the leaflets we may notice also certain resemblance with *O brardi* Bgt., but this species is much more robust.

The nervation consits of a central vein giving off several once or twice forklike divided secondaries. Besides these still further accessory secondaries are given off directly from the rhachis to which the leaflets are attached: 1 or 2 at the anadrome side, and 2—3 (or even 4) at the kathadrome side of the central vein. Between the neighbouring nerves still a very thin veinlet (perhaps a subcortical stereome band?) is to be observed; in this feature our *O. intermedia* agrees with Brongniart's *O. obtusa* as described by Zeiller.

As already told our *O. intermedia* resembles very much as to the general appearence to *O. reichiana, O. obtusa* and slightly also to smaller specimens of *O. Brardi.* Besides we may state also a strong similarity to the shortleafy forms of *O. minor* as defined by H. Potonié (1903) under the name of *O. minor* Bgt. *forma Zeilleri.* But in our type the leaflets are still shorter and broader than in the named Potonié's variety of *O. minor.*

Distribution: As already told I found this species in the stéphanian beds of the coal district of Plzeň in western Bohemia:

Tlučná near Nýřany, colliery Krimich II, shales accompanying the horizon of the Líny coal measure (i. e. the equivalent of the Kounov c. m. in the coal districts of Kladno and Rakovník); Upper Stéphanian.

Arkose sandstone quarries on the hill Malý Krkavec between Kotíkov and Košutka, N. from Plzeň, in the shaly stripes of the arkose sandstones of the Upper grey beds; Upper Stéphanian.

Odontopteris minor Bgt.

Pl. II, fig. 1—3a.

Literature and synonyms:
1828—1836 Ad. Brongniart, Vol. I, pp. 253, Pl. 77: *Od. minor.*
1888 B. Renault—R. Zeiller, pp. 215, Pl. 25, fig. 3—5: *O. minor.*
1903 H. Potonié, Lief. I, No. 13, Textf.: *O. minor.*
1906 R. Zeiller, pp. 82, Pl. 19, fig. 1, Pl. 20—21, fig. 1, 2, Pl. 22, fig. 1.

O. minor is a well known and very common *Odontopteris* type of the uppermost zones of the Upper Stéphanian. By its more or less triangular and rather narrow leaflets, attached by the whole broad base to the respective rhachis, it reminds strongly the upperwestphalian species of *Odontopteris reichiana.* But it differs from the last by the narrower shape of the leaflets as well as by the nearly complete absence of a better defined central vein; only in the largest leaflets of the basal parts of the fronds we may state a slightly differenciated vein in their middle, which is more abundantly furcated than the other few veinlets entering into the leaflets directly from the rhachis. Further difference may be stated also as to the position of the accessory secondaries; these enter into the blade of the leaflets not only at the kathadrome side of the strongest ("central") vein but also at its anadrome side, 2 or 3 at each side.

The leaflets are mostly 7 till 9 mm long and 3 till 4 mm broad. In the basal parts of the fronds they are attaining often a legth of 14 mm at a breadth of 6 mm. Such large leafy fragments are strongly similar to the following rather robust form of O. Brardi Bgt. They differ from the last by the more pointed and narrower leaflets, by the fewer nerves entering into the leaflet bases as well as by the less marked central veins.

The last pinnae of *O. minor* exhibit often (just as in *O. brardi* and several other allied species) palmately lobed basal leaflets at their kathadrome side, especially in the lower parts of the fronds.

Distribution: Untill present I stated *O. minor* Bgt. only in the uppermost stéphanian beds. It is rather rare in the coal districts of Bohemia being very abundant in the coal district of Central Moravia. Untill now I collected no specimens in the districts of Central Bohemia.

The coal district of Radvanice in E. Bohemia: Radvanice, colliery Kateřina, the coal measure series of Radvanice (Upper Stéphanian), very rare.

The coal district of Rosice and Oslavany in Central Moravia: in the shales accompanying all three coal measures of the Rosice—Oslavany beds. Very abundant in all collieries of that region. — Upper Stéphanian.

Odontopteris brardi BGT. (i. e. *O. alpina* STBG.).

Pl. II, fig. 4, 4a, 6—10.

Literature and synonyms:

1828—1836 AD. BRONGNIART, Vol. I, pp. 252, Pl. 75, 76: *Od. brardi.*
1825—1838 K. c. STERNBERG, Vol. II, pp. 79: *Od. brardi* BGT.; pp. 76, Pl. 22, fig. 2: *Neuropteris alpina.*
1877 O. HEER, pp. 25, Pl. 7, fig. 1—7: *Od. brardi* BGT. (Pp. 26, Pl. 6, fig. 14, 15, Pl. 5, fig. 6b: *Od. alpina* STBG. — This second HEER'S form according to HEER'S figures exhibits another type of nervation than the true STERNBERG'S *O. alpina.* It resembles strongly to GUTBIER'S *Mixon.* ["*Odontopteris*"] *britanica.)*
1880 R. ZEILLER, pp. 60: *Od. brardi* BGT.
1892 R. ZEILLER, Fsc. II, pp. 39, Pl. 8, fig. 7: *Od. Brardi* BGT.
1903 H. POTONIÉ, Lief. I, No. 14: *Od. brardi* BGT.
1904 H. POTONIÉ, Lief. II, No. 22: *Od. alpina* STBG. (ex parte; non fig.).

Odontopteris brardi resembles to *Odontopteris minor* BGT. as to the shape of its leaflets and pinnae, but is in all parts much more robust. Its leaflets are mostly broader, their tops are not as sharply pointed but rather blunt or rounded; they are supplied by more numerous accessory secondary veinlets. The central nerve in larger leaflets is more strongly marked than in *Od. minor.* The leaflets attain a length till about 2 cm and a breadth till 8 mm. The basal kathadrome leaflets of the last pinnae are more or less palmately lobed like in *Od. minor* BGT.

Studying STERNBERG'S original type specimen of *Neuropteris alpina* conserved in the collections of the geological department of the Nat. Museum, Prague, I went to the conclusion that there is no essential difference between *Odontopteris brardi* of the french authors and the just named STERNBERG'S form, though POTONIÉ expressed the opinion (1904) that STERNBERG'S form is to be identified with *Od. genuina* of the french authors. The leaflets of Sternberg's type specimen of *N. alpina* are of a blunt triangular shape and provided with rather numerous and several times forked veins, whereas true *O. genuina* have still broader and more rounded leaflets with very few, much more distant and only very poorly forklike divided veins.

O. HEER in his Flora fossilis Helvetiae (1877) cites *O. Brardi* as well as *Od. alpina.* Under the name of *O. brardi* HEER figured (Pl. 7, fig. 1—7) some relatively small leafy specimens with rather clearly triangularly shaped leaflets, whereas under the name of *O. alpina* (Pl. 6, fig. 14, 15, Pl. 5, fig. 6b) he presented specimens with rather tongue like leaflets. The nervation of the leaflets of HEER'S *O. alpina* do not agree with that of STERNBERG'S type specimen: according to HEER'S Pl. 6, fig. 14 a considerably well marked central vein bearing many secondary forklike divided veinlets is developed in the leaflets and besides only

one or two accessory also forklike divided veinlets at the kathadrome side of the central vein are entering into the base of the leaflets. By all these features HEER's *O. alpina* remembers very strongly GUTBIER's *Odontopteris britanica* [see also *O. britanica* as described and figured in ZEILLER 1899 (Héraclée) as well as in H. B. GEINITZ 1855, Pl. 26, fig. 8, 9].

On account of all just mentioned facts, I regard STERNBERG's *Neuropteris alpina* as identical with *O. brardi* BGT. of the french authors and very probably also identical with HEER's *O. brardi*. But I can not accept POTONIÉ's opinion about its identity with STERNBERG's *N. alpina* or with *Od. genuina* of GR'. EURY, just as HEER's identification of his specimens figured on Pl. 6, fig. 14, 15 and Pl. 5, fig. 6 b with the same STERNBERG's species.

Distribution:

Odontopteris brardi BGT. was stated till present only in the coal district of Rosice and Oslavany in Central Moravia in shales accompanying the coalmeasures, which are to be correlated with the uppermost Stéphanian. Specimens were collected at various collieries near Zastávka, Zbejšov as well as at Padochov. Till now no specimens have ever been found in Bohemia.

Odontopteris genuina GR.' EURY.

Pl. III, fig. 1—3a.

Literature and synonyms:

1877 C. GRAND' EURY, p. 115: *O. genuina.*
1888 B. RENAULT—R. ZEILLER, I. p., pp. 219—224, Pl. 24, fig. 1—3, Pl. 25, fig. 1, 2, Pl. 31, fig. 1: *O. genuina.*
1906 R. ZEILLER, Fasc. II, pp. 87, Pl. 23, Pl. 24, fig. 1—3, Pl. 24, fig. 1, 2: *O. genuina.*
1885 K. FEISTMANTEL, pp. 60, Pl. 1, fig. 4, 5: *O. obtusiloba.*
Further see also several notes in:
1855 H. B. GEINITZ, pp. 20: *O. alpina* STBG. (Pl. 26, fig. 12, Pl. 27, fig.) and *confluens* GUTB. (non fig.), which seem to be related with BERTRAND's *O. jeanpauli.*
1904 H. POTONIÉ, Lief. II, No. 22: *Odontopteris alpina* (— includes also several forms different from the true GR.' EURY's *O. genuina;* see in P. BERTRAND 1930).
1930 P. BERTRAND, Vol. I, Fasc. 1. — See notes on pp. 52, under *Odontopteris jeanpauli.*

This species was described in detail and figured already by RENAULT and ZEILLER (1888). It is characterised by semicircular, tongueshaped till ovato triangular, broad leaflets, attached to the rhachises mostly by their whole breadth and provided be very distant veinlets. Into the bases of the leaflets are entering some few nearly equally thick nerves, which are once till three times (rarely more) forklike divided; only larger leaflets show a very slightly marked central vein. Small leafy specimens are often strongly similar to some fragments of *O. osmundaeformis* SCHL., but this last form exhibits an essentially denser nervation.

Odontopteris genuina was often mistaken with several other similar types, evidently because of the somewhat insufficient diagnosis

of GR.' EURY. H. POTONIÉ (1904) joined to it several forms described originally by STERNBERG, GEINITZ and HEER under the name of *O. alpina*. As already stated by R. ZEILLER and later also by P. BERTRAND, these forms represent utterly different *Odontopteris* types: *O. alpina* STBG. and *O. alpina* HEER are identical or at least very nearly allied with *O. brardi* BGT. (coming from T e r r a s o n, dep. Dordogne). Further H. POTONIÉ joined to *O. genuina* also a slightly similar type from the Sarre coal district, which later was recognised by P. BERTRAND also as an essentially different independent species, very similar to GEINITZ's *O. alpina;* P. BERTRAND described it under the name of *O. jeanpauli.* This last species seems to be very nearly allied (if not quite identical) with *Odontopteris britannica* GUTB. as defined and figured by various later authors [see especially in R. ZEILLER, 1899 (see under *Mixoneura britannica* GUTB.)].

D i s t r i b u t i o n: *O. genuina* was collected untill present only in the stéphaninan beds of Bohemia.

Central Bohemia: Shaly beds accompanying the Kounov coal measure of the upper grey beds (Upper Stéphanian).

Eastern Bohemia: The coal measures of "Ida" i. e. the Upper Svatoňovice coal measures of the collieries near M a l é S v a t o ň o v i c e and R t y n ě (mine Ida, Tmavý důl a. o.).

Odontopteris osmundaeformis SCHL. (i. e. *schlotheimi* BGT.).

Pl. III, fig. 4—9.

Literature and synonyms:

1804 E. F. SCHLOTHEIM, pp. 33, Pl. 3, fig. 5, 6: *Filicites osmundaeformis.*

1828—1836 A. BRONGNIART, Vol. I, pp. 256, Pl. 3, fig. 3 (— a copy of SCHLOTHEIM's Pl. 3, fig. 5): *Od. schlotheimi.*

1836 A. v. GUTBIER, Pl. 9, fig. 6: *O. schlotheimi* (— according to this fig. it is not certain if GUTBIER's specimen is really identical with SCHLOTHEIM's form. The leaflets are very small and their nerves are much more distant, nearly like in *O. genuina).*

1864—1865 H. R. GOEPPERT, pp. 109, Pl. 14, fig. 2, 3: *Od. schlotheimi* BGT. (— GOEPPERT's figures represent a very small leafy form with transversally wrinkled rhachises reminding strongly *Sphenopteris germanica* and there is no doubt that they represent only large leafy specimens of this permian *Sphenopteris.*)

1869 CH. E. WEISS, pp. 34, Pl. 1, fig. 11—14: *Odontopteris (Xenopteris) schlotheimi.*

1870 E. WEISS, pp. 865 (Bd. 22), Pl. 21, fig. 5: *Odontopteris (Xenopteris) schlotheimi* (the figured specimens are different from our type. Their leaflets are relatively narrower and longer, much more similar to leaflets of *O. obtusa* BGT. They are coming from the mine Gerhard near S a a r b r ü c k e n — „mittlere Steinkohlenformation").

1880 R. ZEILLER, pp. 63: *Od. osmundaeformis.*

1890 R. ZEILLER, pp. 126 (see notes under *O. duponti* ZEILLER).

1885 K. FEISTMANTEL, pp. 59: *O. schlotheimi.*

1893 H. POTONIÉ, pp. 119, Pl. 2, fig. 1, 3, 4, Pl. 14, fig. 4, Pl. 15 (specimen figured on Pl. 15 differs from our as well as from the most part of specimens figured in the literature by the leaflets, which are incised into rounded large lobes): *O. osmundaeformis.*

1904 H. POTONIÉ, Lief. III, No. 25: *O. osmundaeformis* (POTONIÉ's Textf. 1. is the same anomalous specimen as figured in his paper from 1893, Pl. 15).
1929 C. PURKYNĚ, Roč. 13, č. 19, Pl. I, fig. 5, 6: *Od. schlotheimi.*

This species if only fragmentary available, is often very similar to *Mixoneura subcrenulata.* The leaflets are rounded, ovate, rather broad and often shortly tongue shaped and mostly attached to the respective rhachis by their whole base; in the lowest part of the pinnae they are more or less contracted at the base and cyclopteris like, being very similar to leaflets of *Mixoneura neuropteroides.* Larger leaflets in the basal parts of the fronds are often anew lobed by shallow incisions. The nervation as to its density represents an intermediary type between *O. genuina* and *Mixoneura neuropteroides* or *subcrenulata.* The shape of the last pinnae is oblong lanceolate, the size of its leaflets is slowly decreasing towards the top, the terminal leaflet being the smallest of all and not specially prolonged (chief difference from *Mixon. neuropteroides*) nor enlarged and rounded (difference from *Mixoneura subcrenulata*).

O. osmundaeformis belongs to the most frequent fossils of our upper stéphanian and lower permian beds. Its fragments are very polymorphous, wherefore its synonymity is also very complicated *(schlotheimi, nummularia, vesicularis, osmundaeformis)* and it was also, as already told, mistaken with other similar forms, chiefly with *Mixoneura neuropteroides* and *subcrenulata.* Fragments with smaller and deeply lobed leaflets were also mistaken with large leafy fragments of *Sphenopteris germanica* (Goeppert 1864—1865). The whole synonymity was excellently worked out by H. POTONIÉ in 1893 and 1904 and I believe it needs no further remarks.

Distribution: In the coal districts of Bohemia it was collected chiefly in the lower permian beds: "Skalka" near Český Brod, Chobot near Vlašim, Čikváska, Ploužnice and "Na Lísku" in the surroundings of Stará Paka. In the upper stéphanian beds it was found only very rarely (a small fragment in the shaly beds accompanying the Líny coal measure in the coal mine Krimich II at Tlučná near Plzeň). — It is very frequent in the Rosice Oslavany coal measure series (the coal mines at Babice, and Zastávka, at Zbýšov, Padochov as well as at Oslavany).

Mixoneura obliqua BGT. sp.

Pl. IV, fig. 1—3.

Literature and synonyms:
1886—1888 R. ZEILLER, pp. 284, Pl. 48, fig. 3 *(Neuropteris obliqua).*
1906 W. GOTHAN in POTONIÉ Abb. u. Beschr. Lief. 4, No. 68 *(Neuropteris obliqua).*
1913 W. GOTHAN, pp. 207, Pl. 50, fig. 5, Pl. 53, fig. 5 *(Neuropteris obliqua).*
1909 (1911) R. KIDSTON, pp. 83, Pl. 8, fig. 1—3 *(Neuropteris obliqua).*
1933 F. STOCKMANS, pp. 34, Pl. 7, fig. 5, Pl. 8, fig. 6, Pl. 9, fig. 2, Pl. 10, fig. 6, Pl. 11, Pl. 12, fig. 1—2.

M. obliqua was already rather thoroughly described and discussed by ZEILLER and GOTHAN as well as newly by STOCKMANS. In the above mentioned papers of these three authors we find also the respective list of synonyms and I believe that this problem needs no further remarks.

M. obliqua (treated generally under the term of *Neuropteris obliqua*) is a rather polymorphous type with a very loose nervation; only a few veinlets are entering into each leaflet; they are afterwards dichotomously divided being at the same time irregularly flexuous. A central vein is slightly marked in larger, well developed leaflets, but not in those less developed of the terminal parts of the last pinnae. Some especially large leaflets are elongated and often attenuate and pointed at their tops, just like the "acutifolia" form of the *Mixoneurae* of the goup of *M. ovata* HOFM. The tops of the other leaflets are always rounded. A very characteristical feature of *M. obliqua* is the very frequent strong asymmemtry of its ultimate or pennultimate pinnae. It is strongly similar to our *M. münsterifolia* NJC. But this last form differs essentially by the shape of its larger leaflets, which (as far as seen on the available specimens) never are triangularly attenuate and pointed.

M. obliqua appears chiefly in the beds of the Lower and Middle Westphalian (A till the lowermost C) being very rare in the lower parts of the Upper Westphalian. True *M. obliqua* seems to be utterly missing in the westphalian beds (the Lower grey beds) of Central Bohemia (ie. in the Radnice and Nýřany coal measure series). Untill present I stated this species only in deeper horizons of the coal district of Žacléř and Svatoňovice within the Žacléř coal measure series.

Mixoneura münsterifolia n. sp.

Pl. III, fig. 10—14, text. fig. 1.

Literature:
For comparision with *M. obliqua* BGT. and *Linopteris münsteri* EICHW. resp. *Lin. münsteri var. Dawsoni Bell* see: A. BRONGNIART 1828, R. ZEILLER 1886—1888, W. GOTHAN 1906 and 1913, R. KINDSTON 1909 (1911), A. RENIER 1910, F. STOCKMANS 1933, W. A. BELL 1938.

Specimens which I am just describing under the new term of *M. münsterifolia* are strongly similar to *M. obliqua* BGT., but the veins of their leaflets seem to be still looser and strongly flexuous. At many places the neighbouring veinlets are bent mutually each against the other till nearly touching each other (just like described by W. BELL in his *Linopteris münsteri var. dawsoni*). The *Mixoneura* character of the nervation seems to be less developed than in *M. obliqua;* it is best marked in the terminal parts of the last pinnae. Other well developed leaflets are rather of a *Neuropteris* appearence.

Several large leafy specimens are also slightly similar to *Neuropteris macrophylla* BGT.; but this species is still more robust and newly W. A. BELL in his specimens of *N. macrophylla* figures a rather dense nervation (nearly as in *M. ovata* HOFM.).

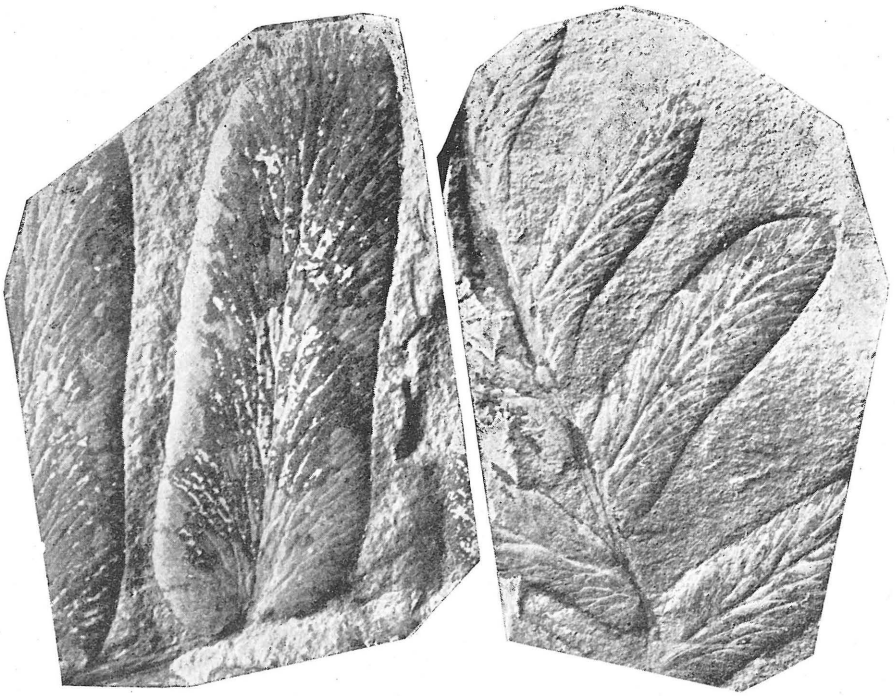

Fig. 1. (3:1).

The shape of the leaflets of our specimens is very variable like in the foregoing *M. obliqua* BGT. But untill now I did not see any specimens with attenuate and pointed leaflets; all leaflets, even the very large ones, are broadly rounded at their tops.

All these mentioned features are the reason why at present I do not venture to identify this form directly with the true common westphalian *M. obliqua* BGT. The term *M. münsterifolia* is derived from the similarity of its nervation to the nervation of *Linopteris münsteri* EICHW. resp. *L. münsteri var. dawsoni* BELL.

Distribution: The most part of specimens of *M. münsterifolia* NJC. was collected in the gorlitic shales ("brousky" or "Schleifsteine") in the ravines between Strádonice and Zdejciná near Beroun (the classical locality of "Strádonice"), which are to be correlated with the beds of gorlitic rocks between the Lower Radnice coal measure and the Upper Radnice coal measure. Further rather rare specimens were found in the same stratigraphical horizon at Lubná near Rakovník (coal mine Rako) and at Bílá Hora near Plzeň (here in the iron stone nodules of the roof of the coal seam, which is to be correlated with the Plzeň coal measures at Nýřany). In all mentioned places we have to do with a transition series between Westphalian B and Westphalian C.

Mixoneura praeovata n. sp.

Pl. IV, fig. 1—7a, text. fig. 2.

Literature:

For comparision with *M. ovata* HOFM. and several allied species see: P. BERTRAND — Bassin houiller de la Sarre et de la Lorraine I. Flore fossile. 1. Fasc. Les Néuroptéridées. — Lille 1930. — Pp. 45, Pl. 29.

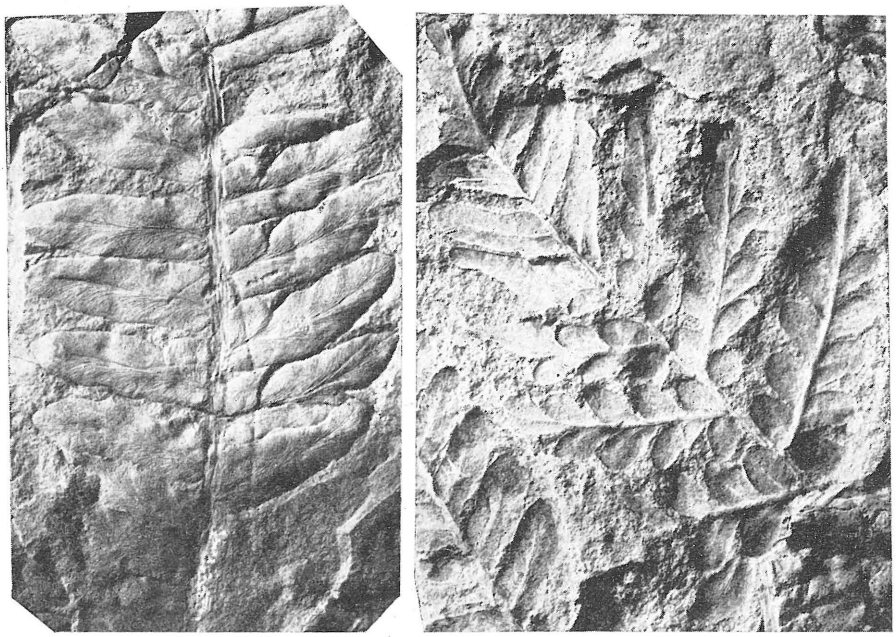

Fig. 2. (1:1).

P. BERTRAND in his above mentioned work described a rather small leafy *Mixoneura* type *(M. simoni)* from a very deep horizon of the westphalian C series of the coal district of Pas de Calais (assize de Bruay, some 200—300 m above the marine horizon Aigir—Rimbert at Liévin), which as to the auriculate and ovate till tonguelike shape as well as to the very dense nervation reminds strongly the *Mixoneura* species of the group of *Mixoneura ovata* HOFM. His new type is distinguished by a considerably large variability of the shape and size of the leaflets as well as by rather short and broad terminal leaflets of the last pinnae. P. BERTRAND regards this species as the predecessor of the typical members of the *ovata* group of the end of the westphalian time resp. of the beginning of the stéphanian time.

I stated also in a rather deep horizon of the Westphalian of Central Bohemia (ransition series between Westph. B and C) also a *Mixoneura* form which without any doubt is related to the same group. Our form is also distinguished by a considerably large variability of the shape and size of the leaflets, still larger than in the mentioned BERTRAND's species. The leaflets are here (if well developed) 8 till 16 mm long, but

their breadth (even in pinnae with equally long leaflets) is rather different. I observed f. inst. in verious pinnae with leaflets 15 mm long, in some specimens a breadth of only 5 mm, in others 7 mm. In other cases I found normally developed leaflets only about 8 mm long and 4,5—5 mm broad. They are at the base distinctly auriculate, mostly typically and broadly tongueshaped or (if smaller) ovate; in several less typically developed specimens leaflets unusually narrow and sometimes also slightly narrowed toward their top. The nervation is characterised first by its density and second by an imperfectly developed broad central vein, which especially at the base looks like composed of several veinlets entering into the leaflets and which in well developed leaflets attains till ½ or even ⅔ of the length of the leaflets. In smaller leaflets or especially in those situated near the top of the last pinnae, the central veins are missing. On both sides of the eventual central veins several other thin veinlets enter into the leaflet blade directly from the rhachis of the last pinnae. The terminal leaflets are also slightly differing from those of BERTRAND's *M. simoni;* they are much more prolonged.

On account of all mentioned features our form is very similar to STERNBERG's *M. plicata,* known from the arkose sandstone series at Mirošov (which represent a transision series between our Radnice c. m. series and our Nýřany c. m. series and which may be best correlated with the lower part of Westphalian D). Our *M. praeovata* was collected in an essentially deeper horizon, in the beds of gorlitic rocks ("brousky" or "Schleifsteine" of the Radnice c. m. series containing at the same time Lonchopterides of the group of *L. rugosa* BGT.; i. e. transition series between Westphalian B and Westphalian C). That means that this type is essentially older than the true *M. plicata* STBG. But it is extremely difficult to state some more significant differences between both types. I would like to point out at least two more significant fetures: the much larger variability of the shape and size of the leaflets and second the absence (at least among specimens known hitherto) of attenuate large leaflets of the "acutifolia" form. Nevertheless I regard our *paeovata* form as still nearer allied with the true *M. ovata* HOFM. group of the Westphalian D than BERTRAND's *M. simoni,* especially with several allied types provided with larger leaflets like BERTRAND's *M. sarana, alpina,* GR.' EURY's *M. flexuosa* as well as STERNBERG's *M. plicata.*

Distribution:

Untill present I know this form only from the gorlitic beds of the Carboniferous between Strádonice and Zdejcina near Beroun (equivalent of the gorlitic bed between the Lower Radnice c. measure and the Upper Radnice c. measure of the Radnice c. m. series).

Mixoneura grandifolia n. sp.

Text. fig. 3, 4.

Literature:

For comparision with several similar forms see:

1855 H. B. GEINITZ, pp. 21, sub *Neuropteris auriculata,* Pl. 27, fig. 5.

1938 W. A. BELL, pp. 60, sub *Neuropteris macrophylla* BGT. Pl. 54, fig. 5, Pl. 55, fig. 2—4 (— especially fig. 2 —).

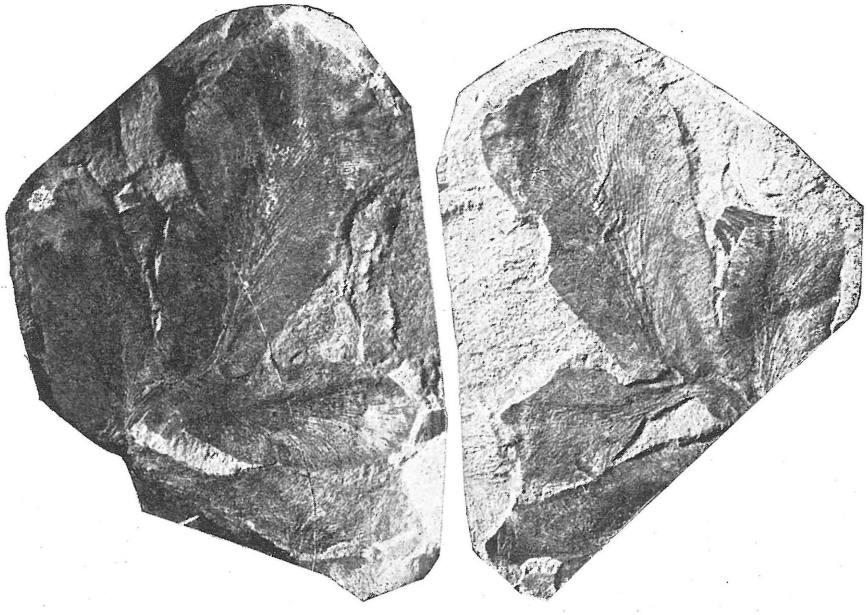

Fig. 3. (1:1).

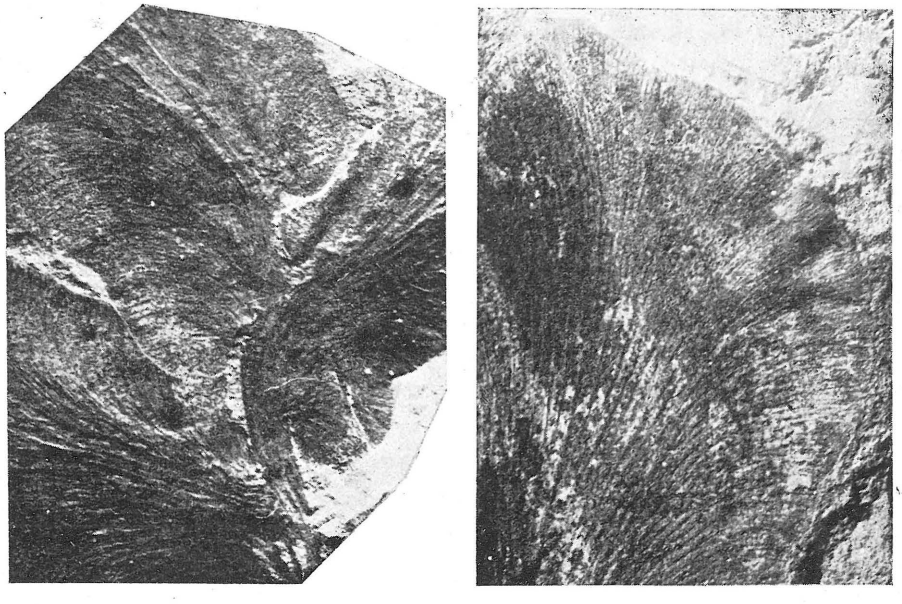

Fig. 4. (3:1).

Under this provisional name I mention here the unique specimen of a large leafy fragment of a *Mixoneura* frond conserved in the geol.-pal. collections of the National Museum, Prague, which was collected

in the same beds of gorlitic rocks ("brousky" or "Schleifsteine") between Strádonice and Zdejciná near Beroun as the foregoing *M. praeovata.*

This specimen represents the end of a pinna provided with rather long and broad tongue shaped leaflets, which are auriculate at the base, rounded at the tops and exhibiting a very dense nervation with a slightly marked central vein atteining hardly one half of the length of the leaflets. The terminal leaflet is about 4,7 cm long and 2,3 cm broad, other leaflets are 3,2—3,8 cm long and cca. 1,4 cm broad.

It is very difficult to state any essential difference between this specimen and the above mentioned saxonian form of GEINITZ (coming from the Westphalian D) as well as several specimens of BRONGNIART's *Neuropteris auriculata* described from the Stéphanian of France. We may state also a rather considerable similarity with BELL's *Neuropteris macrophylla* BGT. from Nova Scotia. But I believe that neither GEINITZ's *Neuropteris auriculata* nor BELL's *N. macrophylla* are independent species but that both belong as large leafy fragments of the tops of larger parts of the fronds to certain *Mixoneura* species of the group of *M. ovata,* which have been collected just in the same beds. I presume also similar relations in our case i. e. between the just described frond fragment of Strádonice and the preceeding *M. praeovata.* Just as in the case of Geinitz's *N. auriculata,* I regard also the eventual identity of our specimen from Strádonice with the true *M. auriculata* BGT. as highly unprobable especially on account of the utterly different stratigraphical age of the plantbearing beds containing the mentioned types. Our specimen from Strádonice are coming from beds representing a transition series between the Westphalian B and Westphalian C, whereas true BRONGNIART's *N. auriculata* is known from the stéphanian (mostly from the upper zones) and permian beds.

Distribution:

Untill present I know only the unique specimen described above, which as told was collected in the beds of gorlitic rock of the small coal district between Strádonice and Zdejciná near Beroun and which are to be correlated with the beds of similar rocks between the Lower Radnice coal measure and the Upper Radnice coal measure in other central bohemian coal districts i. e. a transition series between the Westphalian B and C (or at least the lowermost Westphalian C).

Mixoneura plicata StBG.

Pl. V, fig. 1—5.

Literature:

1825—1838 K. c. STERNBERG, Vol. II, pp. 70, *Neuropteris acutifolia,* Pl. 19, fig. 4, pp. 74, *Neuropteris plicata,* Pl. 19, fig. 1, 3, pp. 74, *Neuropteris obovata* Pl. 19, fig. 2.

1921—1922 J. ŠETLÍK, Textfig. 1, 2, 3, *Neuropteris plicata.*

For comparision with other allied "species" (— i. e. with the whole group of *M. ovata* HOFM. —) see:

1826 FR. HOFFMANN, pp. 272, *Neuropteris ovata.*

1850 F. UNGER, pp. 87, *Neuropteris ovata.*
1862—1864 F. A. ROEMER, pp. 28, *Neuropteris ovata,* Pl. 6, fig. 1.
1926 P. BERTRAND, pp. 381—388, Pl. 26.
1930 P. BERTRAND, pp. 44—49.
1934 E. SIMSON-SCHAROLD, pp. 46.

This species was originally described by K. C. STERNBERG under three different names: *N. acutifolia, plicata* and *obovata.* The identity of all these Sternberg's forms was sufficiently attested by DR. J. ŠETLÍK, who pointed also to the remarkable polymorphy of its leaflets. The shape of smaller leaflets is broadly tongueshaped with round tops, the greater ones are slightly narrowed toward the tops being of a triangularly tonguelike shape with rounded tops. Especially big leaflets are elongated, triangular and their apices are rather pointed (*N. acutifolia* STBG.). In all cases their bases are slightly cordate and auriculate on both sides; near the top of the last pinnae they are decurrent and attached nearly by their whole base. The nervation is very dense and typically mixoneuroid; the veinlets are rather thin.

STERNBERG'S *Mixoneura plicata* STBG. belongs no doubt to the group of *M. ovata* HOFFM. of the westphalian D series (i. e. *M. ovata* HOFFM., *sarana* P. B., *alpina* P. B. and *flexuosa* GR.'EURY). Further similar types are *M. deflinei* P. B. (with rather distant leaflets) and *M. voutersi* P. B. (with leaflets provided by a thickened marginal border), the veinlets of which are more distant, than in the mentioned group of *M. ovata* HOFFM. The differences between the mentioned 4 species of the "*ovata*" group are very insignificant and most of the authors (especially also W. GOTHAN) regard them as specifically identical. These differences consist according to P. BERTRAND chiefly in the size of the leaflets and partly also in the features of the veinlets. *Mixoneura ovata* Hoffm.*) is distinguished by especially small leaflets. Other three "species" exhibit relatively larger leaflets, especially *M. flexuosa* GR.' EURY. This last form has rather strong and dense veinlets. *M. sarana* and *alpina* stand nearer to the original Hoffmann's type of *M. ovata* as to the size of the leaflets than *M. flexuosa;* in *M. sarana* the thin veinlets are very strongly marked, in *M. alpina* they are very fine. It is of course an open question whether the very unsignificant differences concerning the nervation of these various *Mixoneura* forms, as stated by P. BERTRAND, are not due to different conditions of fossilisation. It is very possible, that all these forms represent only several very unimportant local varieties of only one well defined but very variable species, among which perhaps only two geographical races are more distinct: the rather small leafy *M. ovata* HOFFM. of the system of the paralic coal basins

*) The term of *M. ovata* is not quite clear. HOFFMANN in his paper from 1826 mentioned from P i e s b e r g several forms, of which one has been figured later by F. A. RÖMER (1862/4) as *Neuropteris ovata* HOFFMANN. But ROEMER added the following note: „... zweifelhaft bleibt es mir aber, ob HOFFMANN gerade die abgebildete Form als *N. ovata* bezeichnet hat; ich schlage vor dies anzunehmen.... Häufig am Piesberge bei Osnabrück; bei Ibbenbühren auf den schafberger Flötze. Der Nahme hat die Priorität vor der sehr ähnlichen *N. ovata* GERM.

of N. W. Europe (to which perhaps the *M. sarana* of the limnic Sarre coal district stands rather near) and the large leafy forms *(alpina, plicata, flexuosa)* of the limnic coal basins of western and central Europe (France, Alpes, Bohemia).

As to our *M. plicata* STBG., I regard it as very nearly allied (or perhaps even identical) with Bertrand's *M. alpina*. We find among the rich material collected at Mirošov and conserved in the collections of the National Museum, Prague, also several very small leafy specimens, but most frequent are here large leafy fragments. Mostly large leafy fragments were collected also in the cannel coal of the Nýřany coal measure at Nýřany as well as in the hanging shales of the coal seam called "Věnec" of the coal mines "Moravia" at Rakovník.

Mixoneura plicata STBG. is very similar, especially the normally developed parts of its fronds, to our *M. praeovata* from Strádonice. In some cases it is nearly impossible to find out ony essential difference between both types. As noted in the chapter on *M. praeovata*, there are several differences as to the variability of the shape of the leaflets and especially as to the stratigraphical distribution of both these types, which are the reason, why I do not venture at present to unite both these forms.

Distribution: *M. plicata* STBG. is known chiefly from our Westphalian D. It was collected at the following places:

Mirošov: in the shaly interlayers of the arkose sandstones in the large quarries at "Janov", which are to be correlated with the sandstone (resp. conglomerate) beds between the Radnice coal measure series and the Nýřany coal measure series.

Nýřany: in the cannel coal seam ("Plattenkohle") of the Nýřany coal measure.

Rakovník: in the hanging shales of the coal measure called "věnec" of the abandoned collieries "Moravia" (pit Moric) eastward from Rakovník.

Mixoneura britannica (GUTB.) ZEILLER.

Pl. IV, fig. 8—14.

Literature and synonyms:

1835—1836 A. v. GUTBIER, pp. 68, Pl. 9, fig. 8—11: *Odontopteris britannica.*
1855 H. B. GEINITZ, pp. 21, Pl. 26, fig. 8, 9 (? 10, 11): *Od. britannica.*
1899 (1902) R. ZEILLER, pp. 40, Pl. 4, fig. 6: *Od. britannica.*
1906 W. GOTHAN in H. POTONIÉ (Abb. u. Beschr.) Lief. VI, No. 68: *Neurodontopteris obliqua* (— see on pp. 7: ... *O. britannica* GUTB. gründet sich auf etwas unklare Reste, die sich aber vielleicht mit unserer Art vereinigen lassen. Bereits ZEILLER (Valenciennes, 1883, pp. 284) hatte sie mit ? hierher gestellt, sie aber später (Héraclée 1899, pp. 40) wieder als besondere Art betrachtet, mit dem Hinweis, dass es eine echte *Odontopteris* ist.
1930 P. BERTRAND — see the notes under *O. jeanpauli* n. sp.

Beside that see also the literature quoted in *O. genuina* as well as the following works:

1886 R. KIDSTON, pp. 108: *Od. britannica.*
1870 CH. E. WEISS, pp. 875: *Od. britannica.*
1869 CH. E. WEISS, pp. 45: *Od. britannica.*

Under the name of *Mixoneura britannica* I mention here several specimens coming from the Nýřany coal measure horizon of the surroundings of Rakovník, which in all essential features agree wholly with a specimen described and figured by R. Zeiller (l. c. 1899 [1902]) from the series of Caradons in the coal district of Eregli in Asia Minor. Specimens provided with larger and broader leaflets are very similar to *Odontopteris jeanpauli* P. B. (see also in GOTHAN, l. c. 1906) as well as to some of the largeleafy specimens described by GEINITZ (l. c. 1855) as *Od. alpina*. The small leafy fragments resemble to GUTBIER's (l. c. 1836) and GEINITZ's *Od. britannica*. These last specimens remind in a certain measure the *Mixoneurae* of the group of *M. ovata* HOFFM., but differ from them by the more distant secondary veins. At present, having no saxonian specimens at hand, I am unable to ascertain whether our specimens are wholly identical with the mentioned saxonian specimens, though a very strong resemblance is undeniable; only a detailed new study of the saxonian carboniferous flora may clear up this task.

Our specimens exhibit a rather large variability as to the size and shape of the leaflets, by which they remind STERNBERG's *M. plicata;* but there are prevailing leaflets joined to the rhachis by their whole large bases; specimens with slightly narrowed leaflets at their base or even with auriculate leaflets are rather rarer. The secondary veins are much more distant than in *M. plicata* STBG. and the whole nervation reminds in certain features our *Odontopteris stradonitzensis* or *Od. reichiana:* all secondaries of the anadrome side of the leaflets are sent off only from the central vein, whereas at the kathadrome side several secondaries (2—3) are attached directly to the rhachis, to which the leaflets are joined. The central vein is very thin, the secondaries are twice or 3 times forklike divided.

I just mentioned the strong similarity of our specimens with BERTRAND's *Od. jeanpauli* from the Sarre coal districts as well as of GEINITZ's saxonian *O. alpina*. As to the nervation this comparision holds wholly. But as to the shape of the leaflets, we must aknowledge that many of our specimens are provided with essentially narrower and smaller leaflets than as figured by P. BERTRAND *(O. jeanpauli)* or H. B. GEINITZ *(O. alpina)*. Further resemblance especially as to the nervation may be stated also to BERTRAND's *O. peyerimhoffi,* but this species has leaflets still narrower than our type and its veinlets are orientated much obliquely toward the margin.

Distribution: Our *M. britannica* specimens are coming from the Nýřany coal measure series i. e. from our westphalian D (practically from the same stratigraphical horizon, from which came also ZEILLER's specimens of *Od. britannica* at Eregli, as well as GUTBIER's and GEINITZ's very similar forms of Saxony and BERTRAND's specimens *(O. jeanpauli)* of the Sarre coal districts. — As already mentioned our specimens were collected in the coal district of Rakovník, in the abandoned collieries "Moravia" eastward from the town; they have been found chiefly in the hanging shales of the coal seam called "Věnec" of the pit Moric.

Mixoneura neuropteroides (GOEPPERT) ZEILLER.

Pl. V, fig. 6—11.

Literature and synonyms:

1835—1836 A. v. GUTBIER, pp. 53, Pl. 8, fig. 7—12: *Neuropteris grangeri;* pp. 55, Pl. 8, fig. 6: *Neuropteris loschi.*
1849 A. v. GUTBIER, pp. 12, Pl. 4, fig. 2, 3: *Neuropteris loschi.*
1836 H. R. GOEPPERT, pp. 186, Pl. 4, 5: *Gleichenites neuropteroides.*
1861—1862 H. B. GEINITZ, Vol. II, pp. 137: *Odontopteris obtusiloba* ex parte (only Pl. 18, fig. 2, Pl. 19, fig. 3, 8, 9).
1864 F. SANDBERGER, pp. 6, Pl. 4, fig. 1.
1869 CH. E. WEISS, pp. 36: *Odontopteris (Mixoneura) obtusa* ex parte (only Pl. 6, fig. 12).
1875—1877 D. STUR, pp. 56: *Neuropteris gleichenioides.*
1881 J. T. STERZEL, pp. 107: *Odontopteris (Mixoneura) gleichenioides.*
1895 J. T. STERZEL (Peterstal-Reichenbach, Baden), pp. 41; *Mixoneura gleichenioides.*
1895 J. T. STERZEL (Oppenau), pp. 281, Pl. 8, fig. 6, Pl. 9, fig. 1: *Neurocallipteris gleichenioides.*
1888 M. B. RENAULT—R. ZEILLER, pp. 257, Pl. 29, fig. 4: *Neuropteris heterophylla.*
1906 R. ZEILLER, pp. 94, Pl. 25, fig. 2: *Mixoneura neuropteroides* GOEPP.

Mixoneura neuropteroides GOEPP. was very often mistaken for *Mixoneura* (resp. *Odontopteris*) *subcrenulata* ROST., which from the stratigraphical point of view represents a still younger type. Indeed *M. neuropteroides* is an intermediate type between the forms of the group of *M. ovata* and the just mentioned *M. subcrenulata.* Its leaflets are provided by a very dense mixoneuroid nervation. The leaflets at the end of the last pinnae are joined to the rhachis by the whole broad and decurrent base and exhibit an odontopteroid nervation without any stronger central vein; a stronger central vein is more or less marked in larger well developed leaflets. The terminal leaflets are elongated as in all *Mixoneura* forms of the group *ovata-flexuosa,* but mostly much broader, slightly wedgelike narrowed toward the base and attenuate toward the rounded top. The basal kathadrome leaflets of the last pinnae are mostly circular, cyclopteris like and mostly pushed down into the angle of the ultimate and pennultimate rhachises or often even partly upon the pennultimate rhachis. Other leaflets are broadly oval till ovato tongueshaped very similar to the leaflets of *Neuropteris heterophylla* BGT., under which name this *Mixoneura* often has been described in the literature.

Mixoneura neuropteroides was best and most detailed described and discussed by T. J. STERZEL under the term of *Mixoneura gleichenioides* or *Neurocallipteris gleichenioides,* as well as by R. ZEILLER under the name of *Mixoneura neuropteroides.* Both these authors identified it with GOEPPERT's *Gleichenites neuropteroides,* which is mentioned also by D. STUR in his Culmflora as *Neuropteris gleichenioides.* GOEPPERT regarded the *Gleichenites neuropteroides* as a lower carboniferous plant from the culmian beds of Landeshut in Lower Silesia. But later it was stated (especially by Sterzel) that GOEPPERT's original specimens came from the lower permian (Mittelrotliegendes) "Tonsteine" (porphyric tuffs) of Reinsdorf near Zwickau in Saxony, which is the same locality where also GUTBIER's specimens of

"*Neuropteris loschi*" were collected. GOEPPERT's presumption of a lower carboniferous age of *M. neuropteroides* appeared thus as due to a mistake caused by unsufficient data in the older collections of the Museum in Wroclaw (formerly Breslau).

M. neuropteroides is rather similar to *M. subcrenulata* ROST. with which as already mentioned it was very often mistaken. But the leaflets are in general of a more neuropteroid shape and the terminal leaflets are elongated as in many *Neuropteris* forms *(N. tenuifolia, heterophylla* a. o.), whereas in *M. subcrenulata* the leaflets are of a more odontopteroid shape and the terminal leaflets are shorter and broader, never attenuate toward their ends.

Distribution:

Mixoneura neuropteroides is widely distributed in our upper stéphanian as well as lower permian beds. — Coal districts of Plzeň: Ledce, Vorlík (upper grey beds or Kounov coal measure series; Upper Stéphanian). — Coal districts of Kladno and Rakovník: Olovnice, Zeměchy (upper grey beds or Kounov c. m. series; Upper Stéphanian). — Coal distr. of Český Brod: Peklov (uppermost Upper Stéphanian). — The region below the Giant Mountains (Krkonoše): various places in the surroundings of Nová Paka (Lower Permian). — The coal district near Vlašim: Chobot (Lower Permian). — The coal district of Č. Budějovice: the collieries near Hůry and Vrato, Lhotice (Lower Permian). — The coal districts and the younger palaeozoic regions in Central Moravia: the coal measures of the collieries at Zastávka, Babice, Zbýšov and Oslavany (Upper Stéphanian), lower permian beds in the surroundings of Boskovice, Zbýšov, Padochov a. o.

Mixoneura subcrenulata ROST. (*obtusiloba* NAUM.).

Pl. V, fig. 12—14.

Literature and synonymes see cited in:

1906 R. ZEILLER, pp. 92, Pl. 25, fig. 1 (*Mixoneura neuropteroides* GOEPP.).

Figures illustrating this species see in the following papers:

1844 E. F. GERMAR (Wettin-Lebejün), pp. 11, Pl. 5, *(Neuropteris subcrenulata).*

1861—1862 H. B. GEINITZ (Dyas), Vol. II, pp. 137, only Pl. 28, fig. 1—4 *(Odontopteris obtusiloba* NAUM. ex parte).

1864—1865 H. R. GOEPPERT (Permflora), pp. 108, Pl. 14, fig. 4—6 (*Odontopteris obtulisoba* NAUM.) and perhaps also *Odontopteris crassinervia:* Pl. 14, fig. 11, as well as *O. stiehleriana:* Pl. 14, fig. 8—10.

1869 CH. E. WEISS (Saar-Rhein), pp. 36, only Pl. II and III (non VI, fig. 12): *Odontopteris (Mixoneura) obtusa.*

1901 C. DE STEFANI (Toscana), pp. 49, Pl. 8, fig. 8, 9 *(Odontopteris subcrenulata).*

1893 H. POTONIÉ (Thüringen), pp. 116, Pl. 14, fig. 6, Pl. 16, fig. 3: *Odontopteris subcrenulata* (Rost.) Zeill. emend.

1904 H. POTONIÉ (Abb. u. Beschr.), Lief. II, No. 26, fig. 1—3: *Odontopteris subcrenulata.*

1927 T. G. HALLE (Shansi), pp. 114, Pl. 34: *Odontopteris subcrenulata.*

Mixoneura subcrenulata is without any doubt a transition form between the formgenera of *Mixoneura* and *Odontopteris.* The leaflets

near to the ends of the last pinnae are mostly semicircular and are attached to the rhachis by the whole broad base. Others are of a more or less oval till elliptical shape, much more Cyclopteris than Neuropteris like. The terminal leaflets are not attenuate towards their tops; they are rather short, broad and rounded at the end (the chief difference from the foregoing *M. neuropteroides* GOEPP.). The nervation is rather dense and fine, the central vein mostly whooly absent, only in the largest leaflets slightly marked, but always much more obscure than in the foregoing species.

The synonymity of this species was well enough worked out by ZEILLER (l. c. 1906) as well as by POTONIÉ (l. c. 1893 and 1904 [Abb. u. Beschr. Lief. II, No. 26]). It needs no further remarks.

Distribution:

Mixoneura subcrenulata seems to be very rare, — no doubt much more rarer than *M. neuropteroides* —, in our upper stéphanian beds. It is more frequent in the Lower Permian. — From the stéphanian beds I know only one specimen coming from a shaly bed in the series of arkose sandstones of the upper grey beds (Kounov coal measure series) at Hředle (N. of Rakovník). From the Lower Permian of Bohemia specimens are known from the quarries of "Skalka" at Český Brod (in a bed of permian limestones), from the hill Kozinec (shales with cooper ore impregnations) near Jilemnice and from Košťálov (bituminous shales) near Stará Paka, and finally from the surroundings of Broumov (permian limestones).

Mixoneura auriculata BGT. (*dufresnoyi* BGT. ex parte).

Literature and synonyms see in the following papers:

1893 H. POTONIÉ (Thüringen), pp. 124: *Neurodontopteris auriculata.*
1906 R. ZEILLER (Blanzy-Creusot), pp. 96: *Mixoneura auriculata* BGT.

Figures illustrating this species see in:

1844 E. F. GERMAR (Wettin-Lebejün), pp. 9, Pl. IV: *Neuropteris auriculata.*
1890 R. ZEILLER (Autun-Epinac), pp. 132, Pl. 10, fig. 7, 8: *Odontopteris dufresnoyi.*
1893 H. POTONIÉ (Thüringen), pp. 124, Pl. 16, fig. 1, 2: *Neurodontopteris auriculata.*

M. auriculata is provided with rather long and broad tonguelike leaflets. Their bases are more or less asymmetrically auriculate with more developed kathadrome sides, which generally are decurrent. The ends of all leaflets (also of the terminal ones) are rounded. Their nervation is very dense, there are more additional secondaries on both sides of the slightly marked central vein rising directly from the rhachis. The central vein is rather short; it may be observed in well developed leaflets untill to one half of their length, but generally it is still shorter. The size of the leaflets is mostly very large; they attain a length of about 4 till 5 cm and a breadth of 1—2 cm.

Mixoneura auriculata BGT. may be observed already in the upper stéphanian beds and is rather common in several lower permian deposits.

R. ZEILLER (l. c. 1906) mentions among the synonyms also several very similar specimens described as *Neuropteris auriculata* BGT. by H. B. GEINITZ from the upper westphalian (D) beds of Saxony (1855: pp. 21, Pl. 27, fig. 4—7 [especially fig. 5]). These specimens are without any doubt very difficult to be distinguished from the true stephano-permian type. But I regard their mutual identity as very imporbable on account of the very large time space between the occurrence of both these types. I suppose that the specimens from Saxony named by GEINITZ as *Neuropteris auriculata* represent terminal parts of fromds of some Mixoneurae of the group of *M. ovata,* which occur in the same beds. Very similar specimens were found also in Bohemia in a still deeper horizon at Strádonice; they are discussed in this paper under the provisory name of *Mixoneury grandifolia.*

Distribution: I stated fragments of *M. auriculata* in the shales of the arkosesandstone quarries at Žilov and Trnová (upper grey beds: kounov c. m. series) in the coal districts of Plzeň, in the uppermost stéphanian beds (shales with cooper ore impregnations) of Peklov in the coal basin of Český Brod, as well as in the coal measure series of Rosice and Oslavany in Central Moravia. From the lower permian beds I know it from the anthracitic coal measure between Hůry and Vráto near České Budějovice, from the shaly beds on the hill Kozinec near Jilemnice, as well as from the localities at Ploužnice and Krsmoly near Stará Paka; further it was collected on several places in the surroundings of Boskovice, Rosice and Oslavany.

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DESCRIPTION OF THE PLATES.

Plate 1.

Fig. 1—8:

Odontopteris stradonicensis ANDR. sp. — Parts of fronds (ultimate and pennultimate pinnae) showing the variability of the size and shape of the leaflets. — 1/1 — Loc.: Strádonice, transition series between the Middle and Upper Westphalian (B—C). — Coll. of the Nat. Museum, Prague.

2a:

Detto. — 2 leaflets enlarged 3/1 to show the nervation.

9:

Odontopteris reichiana GUTB. — Portion of a pennultimate pinna. — 1/1 — Loc.: Rakovník, mine Moric, upermost Westphalian (D). — Coll. of the Nat. Museum, Prague.

9a and 9b:

Detto. — Leaflets showing the nervation enlarged 3/1.

10—14:

Odontopteris intermedia NJC. — Portion of a pennultimate pinna and four fragments of last pinnae showing the variability of the leaflets. — 1/1 — Loc.: Tlučná near Plzeň, mine Krimich II, Upper Stéphanian. — Coll. of the Nat. Museum, Prague.

11a:

Detto. — Part of a last pinna (fig. 11) enlarged 3/1 to show the shape of the leaflets and thier nervation.

Plate 2.

Fig. 1—3:

Odontopteris minor BGT. — Parts of ultimate pinnae showing the variability of the size of the leaflets. — 1/1 — Loc.: Zbejšov, mine Antonín, Upper Stéphanian. — Coll.: Nat. Museum, Prague.

3a:

Detto. — Leaflets enlarged 3/1 to show the nervation.
Of the specimen fig. 3.

4:

STERNBERG's type specimen of *Odontopteris alpina*, nat. size. — Loc.: Stangenalp, Styria. — 4a: A leaflet of the same specimen enlarged 3/1 with slightly marked nervation. — Coll.: Nat. Museum, Prague.

5:

Part of an ultimate pinna of *O. reichiana* GUTB. showing normally developed leaflets. — 1/1 — Loc.: Nýřany, colliery Pankrác, Uppermost Westphalian (D). — Coll.: Nat. Museum, Prague.

6—10:

Odontopteris Brardi BGT. Terminal part of a pennultimate pinna and four various parts of last pinnae showing the variability of the size and shape of the leaflets. — 1/1 — Loc.: Zbejšov, mine Antonín, Upper Stéphanian. — Coll.: Nat. Museum, Prague.

Plate 3.

Fig. 1—3:

Odontopteris genuina GR. EURY. — Three fragments of the last pinnae showing the variability of the shape of the leaflets. — 1/1 — Loc.: Colliery Ida at Rtyně near Malé Svatoňovice, Stéphanian. — Coll.: Nat. Museum, Prague.

3a:

Detto. — Part of the specimen fig. 3 enlarged 3/1 to show the nervation.

4—8:

Odontopteris osmundaeformis SCHL. — Fragments of variousely developed last pinnae showing the variability of the shape of the leaflets. — 1/1 — Loc.: Ploužnice (fig. 4—7) and Bitouchov (fig. 8), Permian. — Coll. Nat. Museum, Prague.

7a:

Detto. — Leaflet of the specimen fig. 7 enlarged 3/1 to show the nervation.

9:

Detto. — Leaflets of another non figured specimen enlarged 3/1 to show the nervation. — Loc.: Ploužnice, Permian. — Coll.: Nat. Museum, Prague.

10—14:

Mixoneura münsterifolia NJC. — Three fragments with impressions of last pinnae and two isolated leaflets, showing the variability of their size and shape. — 1/1 — Loc.: Strádonice, transition series between the Middle and Upper Westphalian (B—C). — Coll.: Nat. Museum, Prague.

Plate 4.

Fig. 1—3:

Mixoneura obliqua BGT. — Fragments of normally developed last pinnae. — 1/1 — Loc.: Žacléř, mine Maria-Julia. — Middle Westphalian (-lower part). — Coll.: Nat. Museum, Prague.

1a:

Detto. — Three leaflets of the specimen fig. 1 enlarged 3/1 to shaw their nervation.

4—7:

Mixoneura praeovata NJC. — Fragments of last pinnae showing the variability of the size and shape of the pinnules. — 1/1 — Loc.: Strádonice (4—6) and Pejpina (7). — Transition series between the Middle and Upper Westphalian (B—C). — Coll.: Nat. Museum, Prague.

4a:

Detto. — Part of the specimen fig. 4 enlarged 3/1 to show the nervation.

7a:

Detto. — A leaflet of the specimen fig. 7 enlarged 3/1 to show the nervation.

8—12:

Mixoneura britannica (GUTB.) ZEIL. — Fragments of last pinnae showing the variability of the shape of the leaflets. — 1/1 — Loc.: Rakovník, mine Moric, uppermost Westphalian (D). — Coll.: Nat. Museum, Prague.

13, 14:

Detto. — Leaflets of a non figured specimen, enlarged 3/1 to show their nervation. — Loc., geol. horizon and Coll. as in the foregoing specimens.

Plate 5.

Fig. 1—5:

Mixoneura plicata STBG. — Specimens showing the variability of the size and shape of the leaflets. — 1/1 — Loc.: Mirošov (Janov), uppermost Westphalian (transition beds between C and D). — Coll.: Nat. Museum, Prague.

3a:

Detto. — Leaflets of the specimen fig. 3 enlarged 3/1 with partly visible nervation.

6—10:

Mixoneura neuropteroides (GOEPP.) ZEIL. — Various fragments of last pinnae showing the variability of the size and shape of the leaflets. — 1/1 — Peklov (near Kostelec nad Č. Lesy), uppermost Stéphanian. — Coll.: Nat. Museum, Prague.

11:

Detto. — Leaflets of a non figured specimen enlarged 3/1 to show the nervation.

12, 13:

Mixoneura subcrenulata (ROST.) ZEIL. — Parts of the last pinnae showing the characteristical shape of the terminal leaflets. — 1/1 — Loc.: Zastávka (near Brno; fig. 12), mine Julius (Permian) and Hředle (fig. 13) near Rakovník (Upper Stéphanian).

14:

Detto. — Leaflet of the negative impression of the specimen fig. 12 enlarged 3/1 to show the nervation.

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V. (1949) - B (PŘÍRODOVĚDNÝ) GEOLOGIA ET PALAEONT. No. 1.

REDAKTOR IVAN KLÁŠTERSKÝ

F. NĚMEJC: ODONTOPTERIDY A MIXONEURY ČESKÉHO KARBONU A PERMU. ODONTOPTERIDES AND MIXONEURAE OF THE PERMOCARBONIFEROUS OF BOHEMIA.

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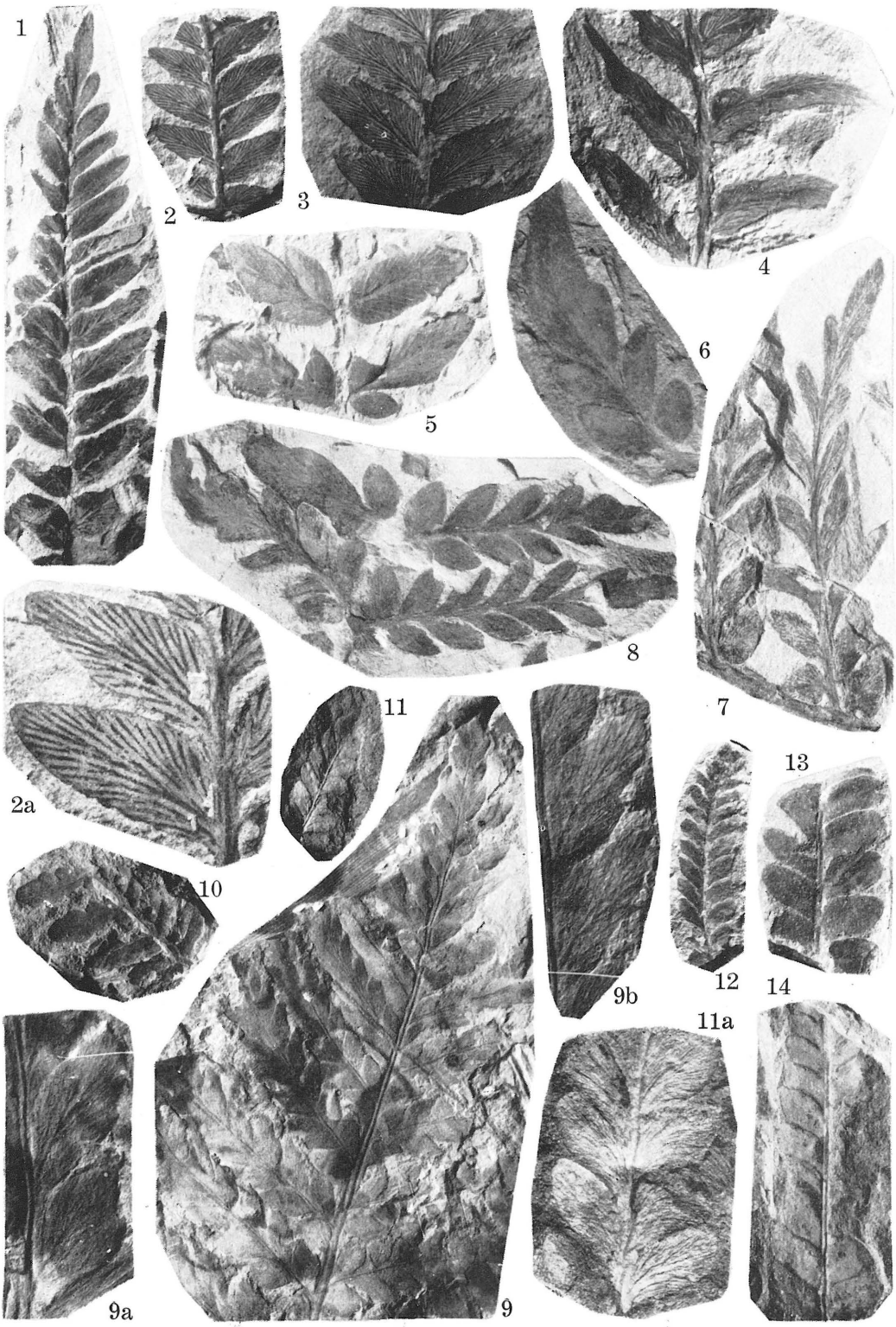
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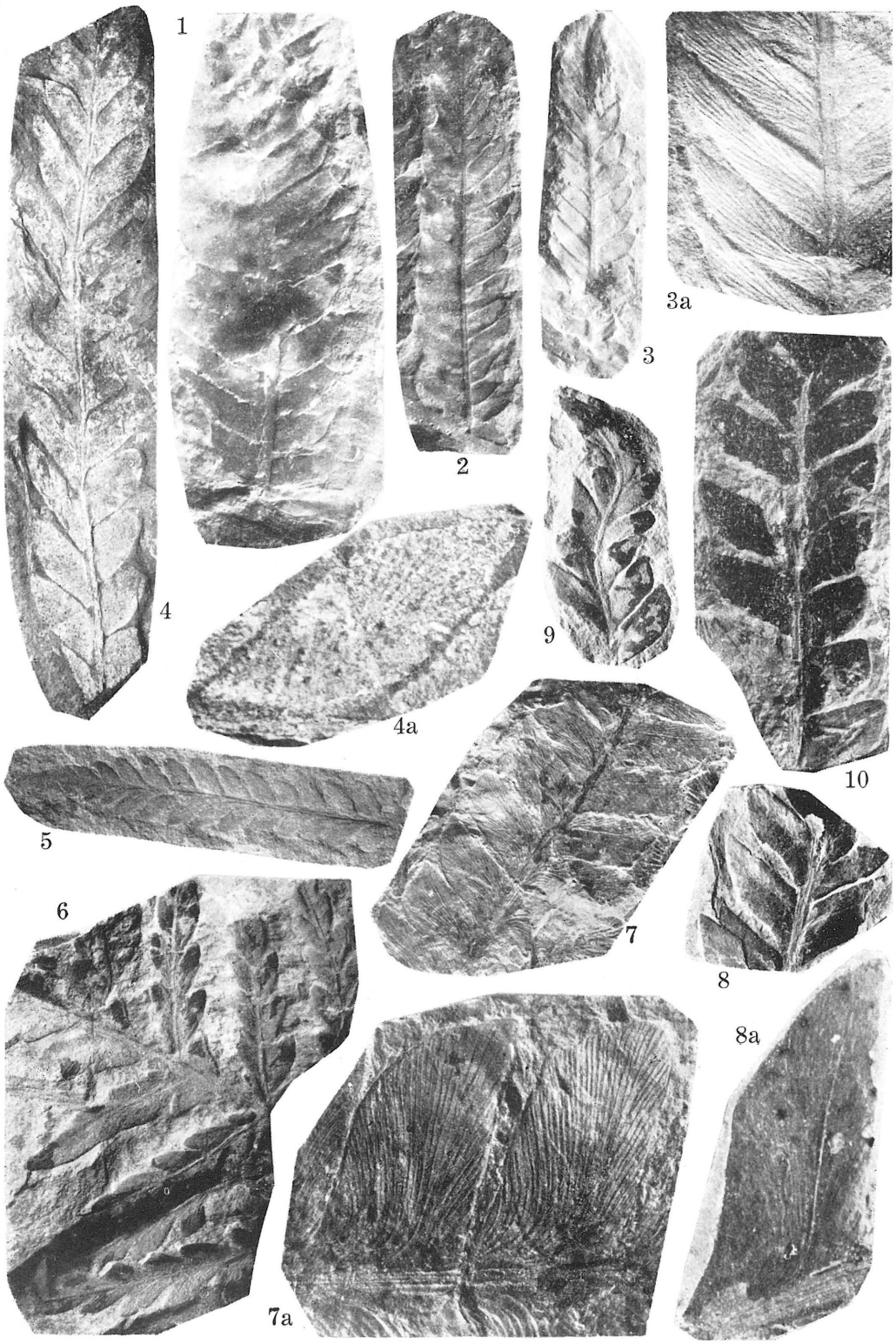
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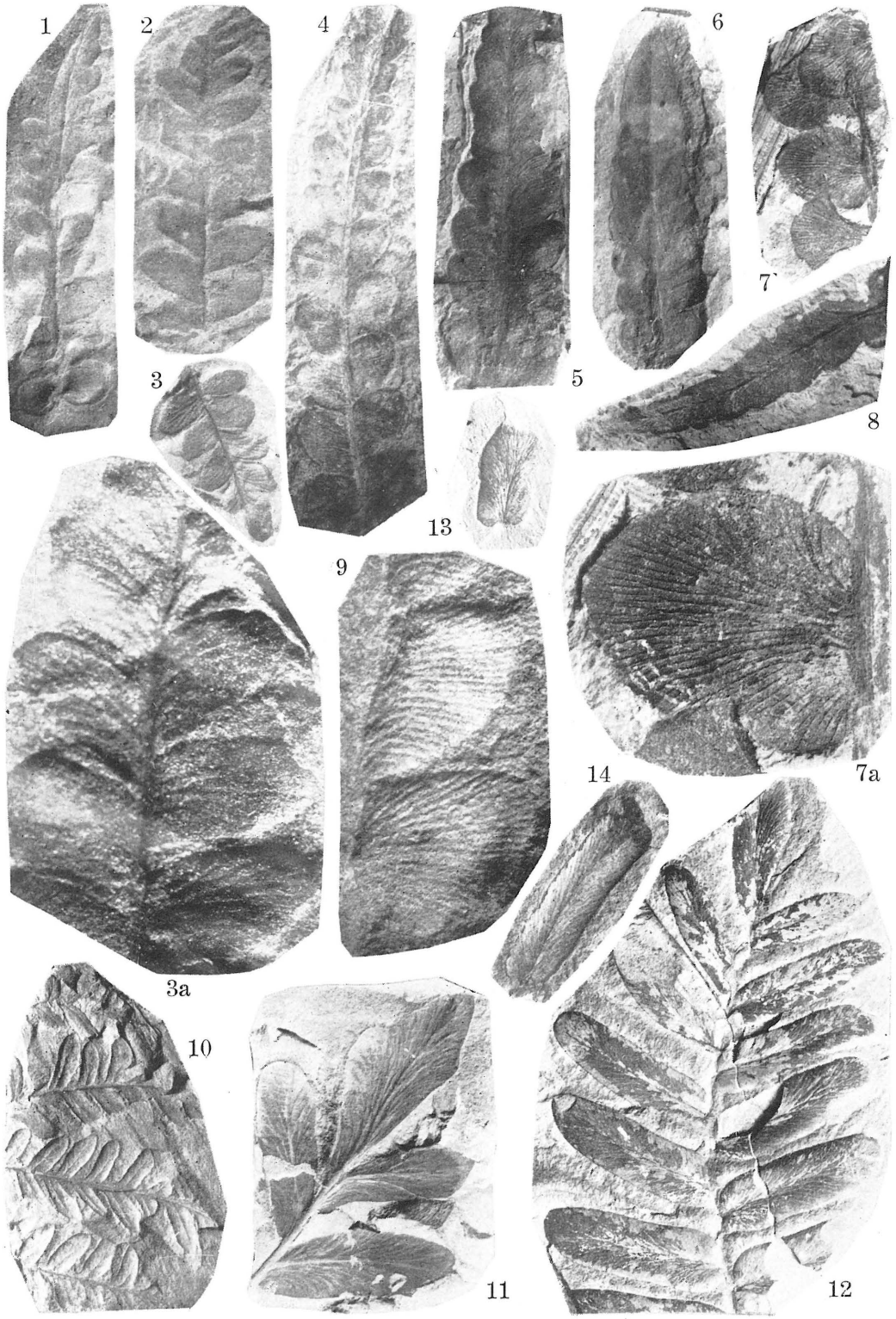
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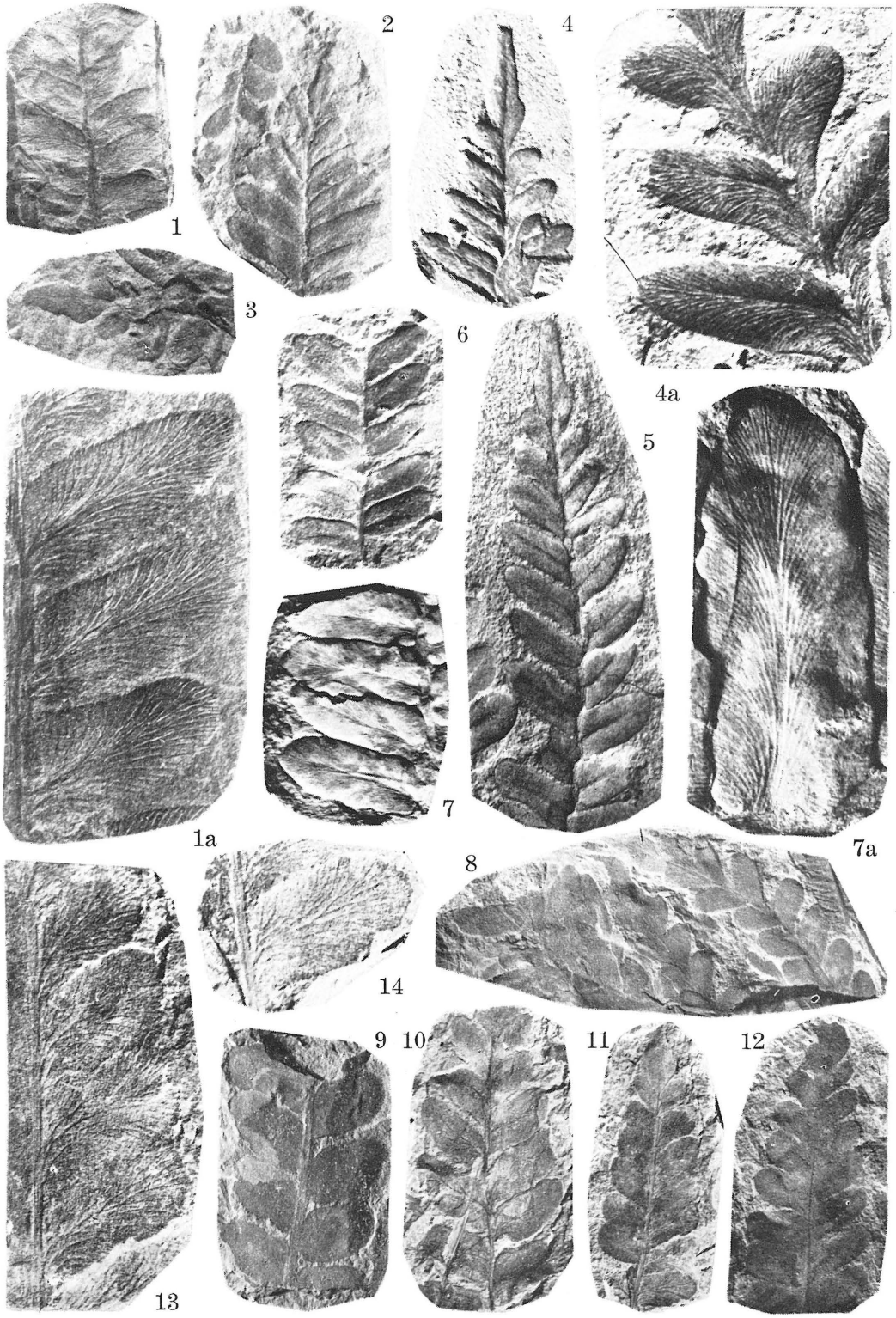
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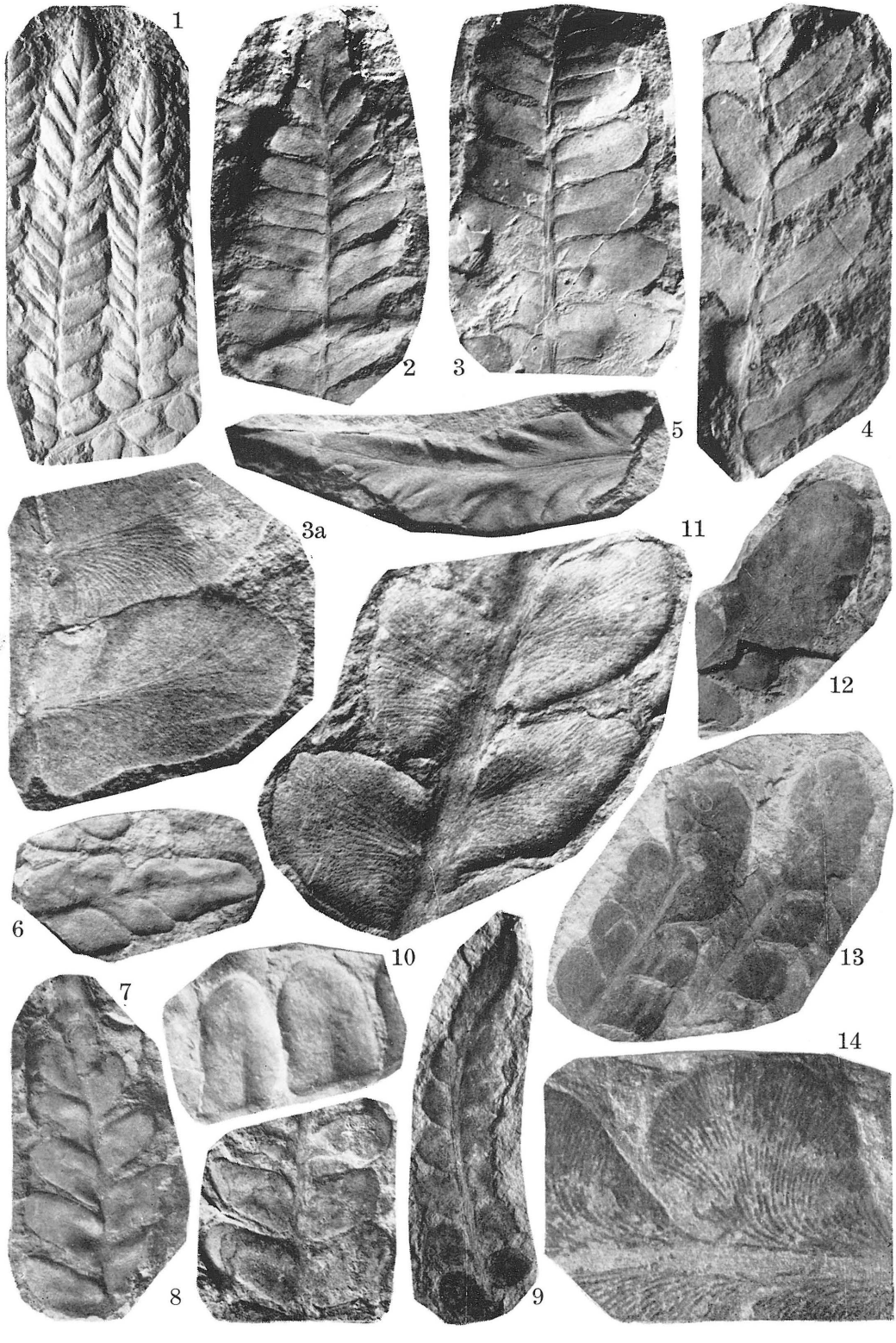
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byl založen r. 1938. První tři ročníky, I. 1938, II. 1940 a III. 1947, vyšly jako souborné svazky (jednotlivé práce lze však koupiti také separátně) a obsahují následující práce vesměs v cizích jazycích s českou předmluvou:
was founded in 1938. The first three volumes I-1938, II-1940, and III-1947 have been published each comprising several papers which may be obtained also separately. The three volumes contain the following papers, each in a foreign language and with a Czech preface:

I. (1938): 1. **O. Štěpánek:** Nová geografická rasa Ablepharus pannonicus Fitzinger. (Tab. I.) — Eine neue geographische Rasse von Ablepharus pannonicus Fitzinger. (Tab. I.) (Kčs 3.50). 2. **F. Němejc:** Příspěvek k poznání svrchnokarbonských Archaeopteridů středních Čech. (Tab. II.—III.) — Contribution to the knowledge of the Archaeopterides of the Upper Carboniferous in Central Bohemia. (Tab. II.—III.) (Kčs 4.30). 3. **M. Deyl:** Československé druhy rodu Sesleria. — Die čechoslovakischen Sesleria-Arten. (Kčs 7.80). 4. **J. Mařan:** O geografickém rozšíření a rasách druhů Nebria taygetana Rottb. a aetolica Apf. — Die Nebriae taygetanae Rottb. et aetolica Apf. distributione geographica. (Coleoptera - Carabidae.) (Kčs 3.—). 5. **I. Klášterský:** Růže z černohorského herbáře Jos. Rohleny. — Rosae montenegrinae ex herbario Jos. Rohlena. (Kčs 4.20). 6. **F. Prantl:** Revise českých paleozoických Reptariideí. (Mechovky.) (Tab. IV.) — Revision of the Bohemian Paleozoic Reptariidae. (Bryozoa.) (Tab. IV.) (Kčs 4.10). 7. **K. Tuček:** Dva zajímavé typy phillipsitu z čedičů v severovýchodních Čechách. — Two interesting Types of Phillipsite from the Basalts of N-E. Bohemia (Kčs 1.80). 8. **K. Táborský:** Monografická studie bulharských Embiodeí. (Tab. V.) — Monographische Studien über die bulgarischen Embiidinen. (Tab. V.) (Kčs 10.10). 9. **Vl. Zázvorka:** Trogontherium cuvieri Fischer od Přezletic (Střední Čechy) a porovnání s ostatními známými nalezišti Trongotherií v Evropě. (Tab. VI.) — Trongotherium cuvieri Fischer from Přezletice (Central Bohemia) and a comparison with the other known localities of Trogontherium in Europe. (Tab. VI.) (Kčs 9.60). 10. **A. Pilát:** Seznam druhů hub, popsaných A. C. J. Cordou s udáním originálních exemplářů, které jsou uloženy v herbáři Národního Musea v Praze. — — Liste der von A. J. C. Corda beschriebenen Pilzarten, mit Angabe der Originalexemplare, die im Herbarium d. Nationalmuseums in Prag aufbewahrt sind (Kčs 4.70). 11. **J. Obenberger:** Studie o druzích rodu Anthaxia Eschsch. (Col. Bupr.) — Etudes sur le éspèces du genre Anthaxia Eschsch. (Col. Bupr.) (Kčs 24.—).

II. (1940): 1. **F. Němejc:** The Pecopterides of the coal districts of Bohemia (Kčs 8.40). 2. **Jos. Mařan:** Příspěvek k poznání geografického rozšíření a rasového cyklu Zabrus aetolus Schaum. — Beitrag zur Kenntnis der geografischen Verbreitung und Rassenbildung bei Zabrus aetolus Schaum. (Coleoptera, Carabidae) (Kčs 2.10). 3. **Alb. Pilát:** Hymenomycetes Carpatorum orientalium (Kčs 13.20). 4. **Ferd. Prantl:** Ordovické a silurské mechovky z ,Montagne Noire (Languedock). — Some Ordovician and Silurian Bryozoa from Montagne Noire (Languedoc) (Kčs 8.80). 5. **O. Štěpánek:** Herpetologie ostrovů Gandos a Dia. — Materiae herpetologicae in insulis Gandos et Dia collectae Kčs (1.20). 6. **J. Obenberger:** Ad regionis palaearticae Buprestidarum cognitionem additamenta. — Studie o palaearktických krascích (Col. Bupr.) (Kčs 23.70). 7. **Vl. Zázvorka:** Deinotherium levius Jourdan a jeho stratigrafický význam (Kčs 8.70). 8. **R. Rost:** O českých copiapitech (Kčs 3.20).

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1. **F. Němejc:** Dodatky k poznání Pecopteris oreopteridia Schl. et auct. a Pecopteris cyathea Schl. et auct. — Additional notes on Pecopteris oreopteridia Schl. et auct. and Pecopteris cyathea Schl. et auct. (Kčs 20.—). 2. **Jan Bechyně:** Příspěvek k poznání phyllogenese a zoogeografie rodu Timarcha. — Contribution à la connaissance du genre Timarcha (Kčs 70.—). 3. **Jar. Petrbok:** Příspěvek k poznání postterciérních měkkýšů Bulharska. — A contribution to the Knowledge of the Post-Tertiary Molluscs of Bulgaria (Kčs 50.—). 4. **Karel Tuček:** Nový nález glaukofanu v Krkonoších. — A new find of Glaucophane in the Giant Mts. (Kčs 8.—). 5. **Ferdinand Prantl:** Výskyt rodu Volborthella Schmidt v Čechách (Nautiloidea). — On the occurence of the genus Volborthella Schmidt in Bohemia (Nautiloidea). (Kčs 12.—). **M. Svrček:** České druhy podčel. Lachneoideae (čel. Pezizaceae). — Bohemian species of Pezizaceae subf. Lachneoideae.

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