

SBORNÍK NÁRODNÍHO MUSEA v PRAZE

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Vol. IV. B (1948) No. 1.

Geologia et Palaeont. No. 1.

REDAKTOR IVAN KLÁŠTERSKÝ

F. NĚMEJC:

DODATKY K POZNÁNÍ PECOPTERIS OREOPTERIDIA

SCHL. ET AUCT. A P. CYATHEA SCHL. ET AUCT.

ADDITIONAL NOTES ON PECOPTERIS OREOPTERIDIA

SCHL. ET AUCT. AND P. CYATHEA SCHL. ET AUCT.

PRAHA 1948

NÁKLADEM NÁRODNÍHO MUSEA V PRAZE

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

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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.

(Předloženo 12. IV. 1948.)

Ve svém monografickém přehledu Pecopteridů ze středních a východních Čech z r. 1940 upozornil jsem na to, že pod SCHLOTHEIMOVÝMI názvy *P. oreopteridia* a *P. cyathea* popisovala většina pozdějších autorů zcela jiné typy pecopteridní než původně SCHLOTHEIM měl na mysli. Novější sběry, které jsem konal během posledních let v uhelných oblastech v okolí R a d v a n i c a S v a t o ř o v i c ve vých. Čechách jakož i v uhelné pánvi r o s i c k o - o s l a v a n s k é na Moravě, přinesly mi řadu nových poznatků, současně mi však jasně ukázaly i jisté omyley v synonymice, jichž jsem se dopustil zejména u prvého z obou jmenovaných druhů.

Pokud jde o pecopteridní formy, které pozdější autoři obyčejně identifikovali omylem se SCHLOTHEIMOVÝM *P. oreopteridia* (BROGNIART, ZEILLER, KIDSTON a j.), tu po novém důkladném porovnávání různých sběrů se STERNBERGOVÝMI druhy jsem zjistil, že tyto formy jsou identické s *Pecopteris* („*Goeppertia*“) *polypodioides* STBG. a nikoliv, jak jsem se tehdy mylně dle celkového zjevu domníval, s *P. alpina*. Tento druhý STERNBERGŮV typ jest identický s HEEROVOU *P. lamuriana*. Následkem toho veškeré moje citace *P. pseudovestita* nebo *vestita*, jakož i *oreopteridia* nebo *alpina* v mých dřívějších spisech nutno považovati vesměs za *P. polypodioides* STBG. Mimo to novější nálezy mi zcela jasně ukázaly, že tento typ t. j. *P. polypodioides* STBG. jest velmi variabilní i když zatím nemohu rozlišiti v jeho mezích více forem. V hlubších horizontech, hlavně v zonách westfalienu D (nýřanské vrstvy) objevují se průměrně mnohem robustnější formy než v zonách vyšších, t. j. stefanienských a perinských. Zde lze místy (na př. ve svrchních svatoňovicích vrstvách dolu Ida u S v a t o ř o v i c) sbírat nápadně drobnolisté kusy, které svým vzezřením živě upomínají na HEEROVU *P. lamuriana* (t. j. *alpina* STBG.), ale nervaturou se od ní zřetelně odlišují. Pravá *P.*

lamuriana dosud nebyla u nás zjištěna. — Sběry z Rosic a Oslavy a n potvrdily správnost názoru, že původní SCHLOTHEIMŮV *P. oreopteridia* jest totožný s GOEPPERTOVÝM resp. ZEILLEROVÝM *P. densifolia*. Ze synonymiky forem, jež bývaly donedávna s tímto SCHLOTHEIMOVÝM druhem omylem identifikovány, t. j. STERNBERGOVY *P. polypodioides*, jak jsem ji citoval ve své práci z r. 1940 (sub *P. alpina* STBG.), dlužno napříště vypustiti STERNBERGOVU *P. alpina*, která jest identická s HEEROVOU *P. lamuriana*.

Pokud jde o druhý zmíněný okruh forem pecopteridních, které byly většinou autorů vztahovány na SCHLOTHEIMOVOU *P. cyathea*, potvrdily i nové sběry podstatný rozdíl týkající se hlavně úpravy posledních vějírků. S původním SCHLOTHEIMOVÝM druhem pravděpodobně jest identický STERNBERGŮV druh *P. lanceolata*, jak již také podotčeno v práci z r. 1940. Druhy *P. nýranensis* NJC. a *P. permica* NJC., které jsem postavil na místo poněkud nejasného pojmu *P. cyathea* pozdějších autorů (non SCHL.!), ukázaly se ve světle nových sběrů z Radavaniec (vých. Čechy) a z rosocko-oslavanské pánve velmi blízce příbuznými. Lze míti za to, že jest mezi nimi dosti podobný pomér jako mezi velkolistými formami a drobnolistými formami od *P. polypodioides* STBG; jsou však snadněji a přece jen přesněji od sebe rozeznatelné. Robustnější *P. nýranensis* NJC. se objevuje v obzorech hlubších (westfalen D a starší stefanien, t. j. naše serie nýranská a svrchní vrstvy svatoňovické), kdežto drobnější *P. permica* NJC. teprve v nejvyšších zonách stefanienských a v permu (u nás obzor slojí radvanických, rosocko-oslavanských a spodní perm).

Veškeré podrobnosti týkající se těchto stanovení jsou podrobně uvedeny v následujícím anglickém tekstu.

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In my preliminary report (1940) on the various species of the group of the *Pecopterides*, which have been collected hitherto in the coal-district of Central and S. E. Bohemia, I mentioned among others also two forms, which have been classified by various authors in rather different manner: SCHLOTHEIM'S *Pecopteris oreopteridia* and *Pecopteris cyathea*. I pointed out that later authors were joining by mistake these both terms very often with specimens, which in fact have nothing in common with the original SCHLOTHEIM'S type specimens, or at least (SCHLOTHEIM'S type specimens were lost) with identical specimens coming from the same localities and horizons as his type specimens ("topotypes"). After a detailed study of several new collections from our coal districts, especially those from the coal districts of Svatoňovice and Radavaniec in E. Bohemia as well as of Rosice and Oslavany in Central Moravia, I went to the conviction, that in my above mentioned paper (1940) I committed also some errors, wherefore the true sense of both SCHLOTHEIM'S terms with regard to other forms generally joined to them by various authors was not quite

justly fixed. Besides I stated at the same time several other rather important facts relating especially to the stratigraphical distribution of these species. The aim of the following lines is first to correct my previous point of view and second to mention some new circumstances relating to this task, which were stated during my last field working.

1. On *Pecopteris oreopteridia* SCHL., *alpina* STBG.
and *polypodioides* STBG.

In my above mentioned paper I clearly pointed out (as already suspected by POTONIÉ) that *Pecopteris oreopteridia*, as originally defined by SCHLOTHEIM, is to be identified with GOEPPERT's resp. ZEILLER's *Pecopteris desifolia* and not with the various specimens, which in the later European palaeobotanical literature were generally described under SCHLOTHEIM's name (A. BRONGNIART, R. ZEILLER, R. KIDSTON) or under the terms of *P. abbreviata* (C. GR. EURY, H. POTONIÉ), *pseudooreopteridia* (H. POTONIÉ), as well as by mistake also some times under the name of *P. miltoni* (R. KIDSTON). The leaflets of the true SCHLOTHEIM's *P. oreopteridia* are characterised by secondary veins, which generally all are once forklike divided, whereas the mentioned specimens, which by mistake have been identified with it, exhibit in the basal part of the leaflets once or even twice divided, in the middle part once divided (in smaller leaflets often only simple) and in the apical part mostly simple secondary veins. In this respect these forms are very similar to *Pecopteris miltoni* ART., with which they have been also very often confounded. But *Pecopteris miltoni* ART. is very easy to be distinguished by its quite smooth rhachises, which in the specimens regarded erroneously as *P. oreopteridia* are rather densely covered by scale like hairs.

In my mentioned paper on *Pecopterides* of Central Bohemia I cited among the synonyms of this type (named as *P. alpina* STBG.), which is very widely spread in the uppermost westphalian, in the stephanian as well as in the permian beds throughout all european coalbasins, also LESQUEREUX's and WHITE's speies of *P. vestita* resp. *pseudovestita* of the uppermost permocarboniferous of the coal districts of USA, which by no essential marks are distinguishable from our european forms and which by several european palaeobotanists have been often joined by error (e. g. W. GOTCHAN) with certain Pecopteris forms appearing in deeper horizons of the european westphalien C. This last form (mentioned by me as *P. aspidioides* STBG.) represents a more robust type, with larger leaflets and with only rather scarcely scattered hairs on the rhachises; it was described in detail by D. ŠTÚR under the names of *P. schaumburg-lippeana* and *žďárkensis*, as well as by K. C. STERNBERG as *P. aspoidioides* and *undulata*.

Finally I pointed out in the same paper as identical with the mentioned very common european form still two STERNBERG's species: *Pecopteris alpina* and *Goeppertia polypodioides*, the first one from the carboniferous of the austrian alpes (Stangalp in Styria), the second

one from the northern part of the coal basin of Plzeň (Plasy). Both these forms are strongly similar as to the shape of the leaflets and the last pinnae, as well as with regard to the size, to the european forms regarded generally as *P. oreopteridia*. Unfortunately both STERNBERG's type specimens (conserved in the collections of the Nat. Museum, Prague) represent only very small and in some respects less distinctly preserved fragments. In 1940 I choosed from both these STERNBERG's terms one, i. e. the name of *Pecopteris alpina*, as the convenient term for the just mentioned *Pecopteris* type, the american names of *P. vestita* and *pseudovestita* being of more recent date.

In consequence of some new researches in the coal districts of E. Bohemia (Svatováclavice and Radvaničce) as well as in Central Moravia (Rosice and Slavany), I anew examined both named STERNBERG's original type specimens as well as a large material of various similar forms from our coal districts conserved already in our Museum. The reason of that were my new collections of *Pecopteris* specimens especially of some very small leafy types from Svatováclavice, which at first sight seemed to resemble strongly to the lower stephanian species of *Pecopteris lamuriana* HEER. But after a detailed and very thorough comparision with true specimens of *P. lamuriana* HEER collected at various places in Central France (coal districts of St. Etienne and Alais). I stated, that all our specimens coming into consideration are essentially differing from the true *P. lamuriana* HEER, though some of them exhibit leaflets nearly as large as in our cases. But in true *P. lamuriana* HEER their secondary veins are mostly simple and slightly straighter, whereas in our specimens these are slightly archlike bent and besides forklike divided veins are prevailing. Reexamining afterwards anew both STERNBERG's type specimens, I stated to my surprise, that the first of them i. e. *Pecopteris alpina* agrees with *P. lamuriana* HEER, especially with its great leafy specimens, in having secondary veins rather straight and mostly undivided, though otherwise as to the shape and size of the leaflets and last pinnae it corresponds completely with the small leafy fragments of our "oreopteridia" type. The second STERNBERG's type (*P. polypodioides*), exhibits a different type of nervation, which in all essential features corresponds with the nervation type of the specimens regarded mostly as *P. oreopteridia*. This fact leads me to the conclusion that we have to identify these last forms even if they are provided with very small leaflets, only with STERNBERG's *P. ("Goeppertia") polypodioides* and not with *P. alpina* as I previously (misled by the size and shape of its pinnae and leaflets) believed in the mentioned paper from 1940 (pp. 11, 12).

As the result of this comparative study I have to state:

1. All specimens hitherto identified by various authors as *P. oreopteridia* SCHL. (especially from the uppermost westphalian, stephanian and permian beds) have generally nothing in common with the original SCHLOTHEIM's type; they are mostly to be identified with STERNBERG's *P. polypodioides* (or eventually with some specimens known from N. America as *P. vestita* and *pseudovestita*).

2. STERNBERG's *P. alpina* is identical with the great leafy forms of *P. lamuriana* HEER and not with the forms identified hitherto mostly as *P. oreopteridia* ZEILL. et auct. (non SCHL.) as I supposed previously by mistake. Therefore all quotations of *P. alpina* or *pseudovestita* in my previous papers are to be related to STERNBERG's *P. polypodioides*.

3. Our *Pecopteris polypodioides* STBG. (ie. *P. oreopteridia* ZEILLER et auct; non SCHL.) is a very variable type especially as to the size of its leaflets (-on which depends also their more or less complicated nervation: small leafy fragments exhibit always less divided secondaries than those provided with large leaflets). Large leafy forms are prevailing in our bohemian and moravian coal districts especially in the uppermost westphalian beds (Westph. D), whereas specimens provided with extremely small leaflets reminding often *P. lamuriana* are to be found more frequently in higher zones, especially in the stephanian and permian series. Meanwhile I am unable to distinguish among the whole material any separate and well defined species, the various forms being connected by many transition forms even on the same localities.

2. On *Pecopteris cyathea* SCHL., *nýřanensis* NJC. and *permica* NJC.

These three "species" are evidently rather nearly allied and if only small fragments available, they are rather difficult to be distinguished. In my paper from 1940 I pointed out that many palaeobotanists by mistake have often identified specimens of true SCHLOTHEIM's *Pecopteris cyathea* with *P. arborescens* SCHL. and that they have in contrary described under the name of *P. cyathea* SCHL. specimens, which as to the shape of the last pinnae are essentially different from the original SCHLOTHEIM's type. SCHLOTHEIM presented in his work of 1804 an excellent figure of his *P. cyathea* (pp. 38, Pl. 7, fig. 11). Unfortunately SCHLOTHEIM's typ specimen was lost. His *P. cyathea* was collected at M a n n e b a c h, from which place came also STERNBERG's specimen of *Pecopteris lanceolata*, which in all essential features agrees with SCHLOTHEIM's figure; I have therefore no doubt as to the mutual identity of both specimens. Their last pinnae are of an oblong shape rather suddenly narrowed at the ends. By this feature they resemble more to the true *P. arborescens* SCHL. than to the forms, which generally by the later authors have been described under SCHLOTHEIM's name of *P. cyathea* (in 1940 I named them as *P. nýřanensis* and *P. permica*). They differ from the true *P. arborescens* SCHL. only by longer leaflets, wherefore I mentioned this original SCHLOTHEIM's type of *P. cyathea* (resp. STERNBERG's *P. lanceolata*) also as a distinct species (1940) independent from *P. arborescens* SCHL.

Specimens, which mostly have been confounded with the true SCHLOTHEIM's *P. cyathea*, differ from it very remarkably by the shape of the ends of the last pinnae: these are slowly narrowed, under a much narrower angle. Among specimens of this kind I verified already in 1940 two types, which I named *P. nýřanensis* and *P. permica*. The difference

between both is not very sharp as mentioned above. It consists partly in the size of the leaflets, partly in the features of the secondary nerves and also in the character of the rhachises. *P. permica* is a slender form than *P. nýřanensis*. Its leaflets are mostly shorter and narrower, they hardly attain the size of several slender forms of *P. nýřanensis*. The rhachises of *Pec. permica* are mostly remarkably thick (in some specimens from Chobot near Vlašim, which exhibit last pinnae of a breadth of 7—8 mm, they attain cca 6 mm across, in some specimens from Č. Budějovice, where the ultimate pinnae measure cca. 8—10 mm across, their width is about 8—9 mm; similar conditions were stated also in the newly collected material from the coal district of Rosice and Oslavany). Among the secondary nerves forklike divided ones are rather frequent. If only poor material available, the distinguishing of both forms makes some difficulties.

The more robust form of *P. nýřanensis* NJC. is identical with the form, which was described by KINDSTON (in his great work from 1923—1925) as *P. cyathea* SCHL. from the uppermost westphalian series of England. The more slender type of *P. permica* NJC., as already told in 1940 is identical with several specimens described by POTONIÉ as *P. arborescens* (1893, Pl. 6, fig. 5). As to RENAULT-ZEILLER's specimens of *P. cyathea* from the stephanian beds at Community (1888, Pl. 13, fig. 1—4), which I mentioned in 1940 as synonyms of the true *P. cyathea*, I do not venture after new experiences gained chiefly on the new material from Radavice (E. Bohemia) and from Central Moravia (Rosice, Oslavany) to tell at present with utter certainty, to which of the three mentioned species they are to be joined. ZEILLER's figures do not exhibit always enough well preserved ends of the last pinnae: in fig. 2 and 3 no ends are visible, in fig. 1 and 4 they are rather poorly preserved. As to the general appearance of the figured specimens, I suppose that the more robust forms of the fig. 1, 2 and 4 represent perhaps our *P. nýřanensis* NJC., fig. 3, which is comparatively slender, may be probably joined to our *P. permica* NJC.

As to the distribution of *P. nýřanensis* NJC. and *P. permica* NJC., the conditions seem to be rather analogue with those mentioned in our *P. polypodioides* STBG. The more robust type of *P. nýřanensis* NJC. seems to be stratigraphically older. I collected it in all plantassociations of our Nýřany coal measure series (i. e. westphalian D) and further also in the Upper Svatoňovice coal measure series ("Ida" coal measures; — i. e. the lower part of our stephanian series). In contrary the more slender type of *P. permica* NJC. was collected everywhere in our Lower Permian (the small coal districts of Č. Budějovice, of Vlašim, of Č. Brod, as well as in the Permian below the Giant mountains [Krkonoše]) and in many localities of our uppermost Stephanian (in the coal series of Radavice [E. Bohemia], as well as of Rosice and Oslavany [central Moravia]). Both types, though very similar, are more easily to be distinguished than the various forms joined under the above mentioned term of *P. polypodioides* STBG. I cite them here as two distinct species (just as in 1940), but it is of course

not excluded (just as in *P. polypodioides*) that they represent only two biological races, of which *P. permica* NJC. would be a dwarf race depending on the changed climatical (more arid, dry and perhaps also slightly cooler) conditions of the uppermost stephanian and permian period, compared with the conditions of the upper westphalian (D) and lower stephanian period of our regions

Conclusions.

During the last two years a rather rich new material of various *Pecopterides* was gained especially from the coal districts of M. Svatová řečnice and Radvanice (E. Bohemia), as well as from Rošice and Oslavany (Central Moravia), the study of which suggests several changes and additions as to my opinions on the classification of this fern group, published in 1940.

1. The various *Pecopteris* forms described hitherto by various authors mostly under the term of *P. oreopteridia* SCHL. are to be named in future as *Pecopteris polypodioides* STBG. and not as *P. alpina*, as I believed by mistake in my paper from 1940.

2. *P. alpina* STBG. is identical with the more robust forms of *P. lamuriana* HEER, *P. oreopteridia* SCHL. with *P. densifolia* GOEPP.

3. *P. polypodioides* STBG. seems to be a rather polymorphous type. In deeper horizons are met mostly more robust forms (e. g. in the uppermost westphalian [D]) than in higher zones (stephanian and permian). The slender younger forms reminds very strongly some specimens of *P. lamuriana*, but they are always easily to be distinguished by their secondary nervation.

4. *Pecopteris nýřanensis* NJC. and *P. permica* NJC. represent two rather nearly allied species. The more slender *P. permica* NJC. is geologically younger being distributed chiefly in higher upper stephanian zones as well as in lower permian. Both have been very often mistaken with SCHLOTHEIM's *P. cyathea*, from which they are to be distinguished by the very slowly attenuate shape of their last pinnae.

LITERATURE QUOTED

see in my previous paper on the Pecopterides of the Bohemian coal districts:
F. NĚMEJC: The Pecopterides of the coal districts of Bohemia (a preliminary study).
Sborník Národního musea v Praze (Acte Musei nationalis Pragae), Vol. II B.
(1940) No. 1.

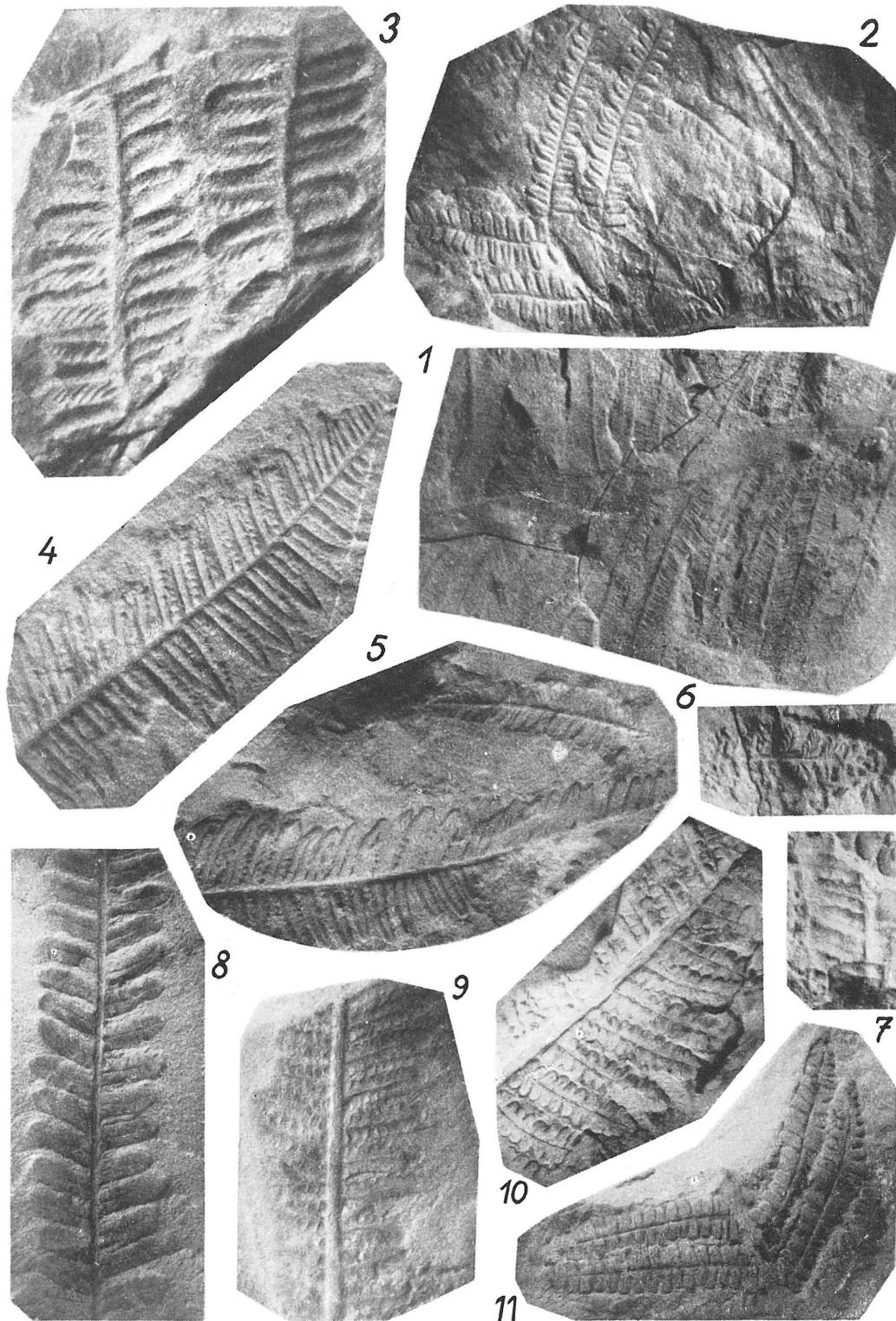
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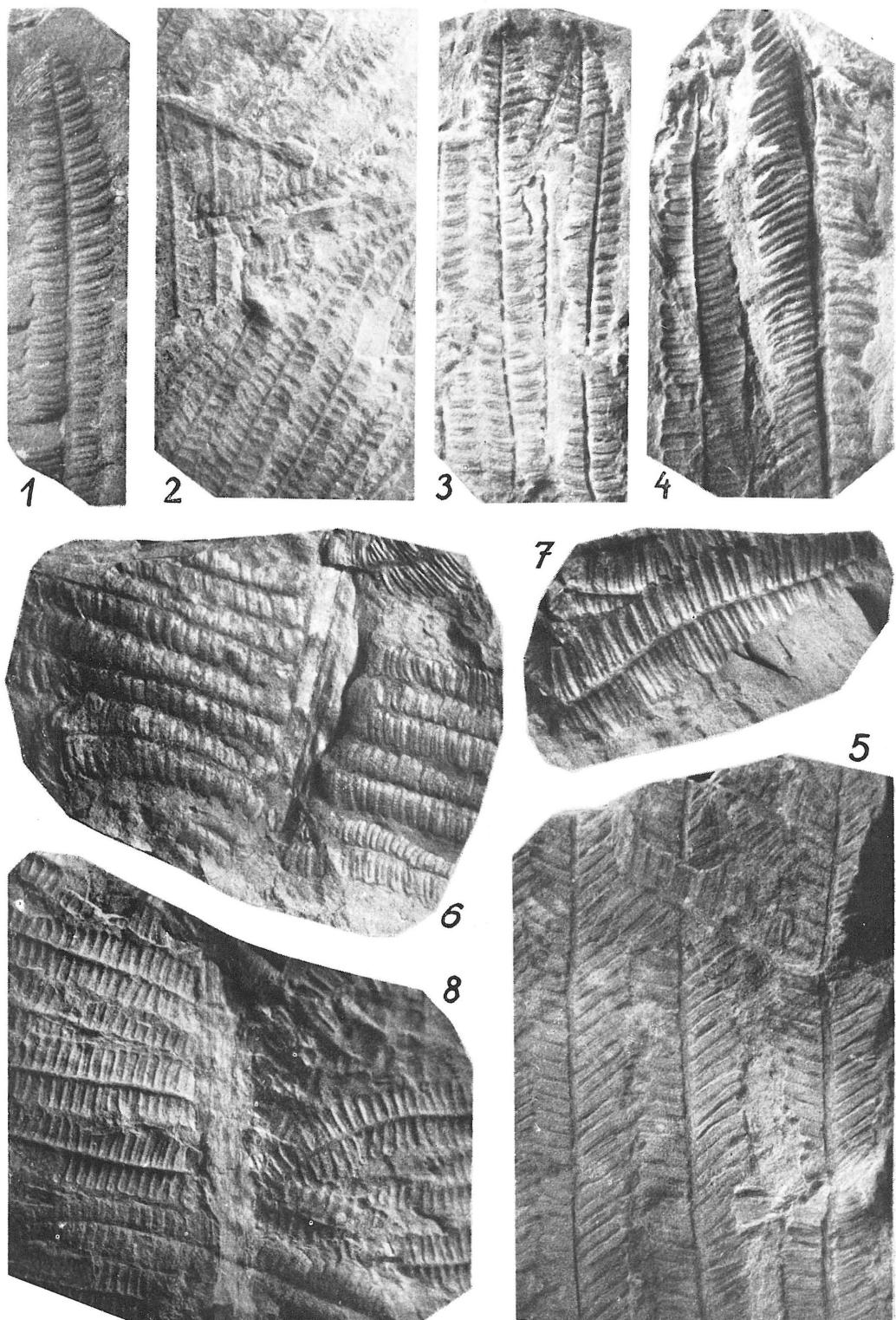
Plate I.

- Fig. 1. *Pecopteris permica* NJC. — A small leafy specimen showing the very thick rhachis. — Loc.: Chobot near Vlašim, permian. — Nat. size.
Fig. 2. *Pecopteris alpina* STBG. — Sternberg's type specimen (Stbg. II, Pl. 39, fig. 5). Loc.: Stangenalp, Styria, lower stephanian. — Nat. size.
Fig. 3. — Dettö. — 3/1.
Fig. 4, 5. *Pecopteris lamuriana* HEER. — Loc.: Sondage du Sanguinet de la Comp. Comp. de Bessèges (Gard), série inf. du Molière. — Nat. size.
Fig. 6, 7. „*Goeppertia*“ *polypodioides* STBG. — Fragments of the ultimate and pennultimate pinnae of Sternberg's type specimen (Stbg. II, Pl. 50, fig. 1). — Loc.: Plasy, Bohemia; westphalian D (Nýřay coal measure series). — Nat. size.
Fig. 8, 9, 10, 11. *Pecopteris polypodioides* STBG. — (i. e. *P. oreopteridia* Zeiler et auct., non SCHL.). — Specimens showing the shape and size of the leaflets and ultimate pinnae. — Loc.: Olovnice near Kralupy, Bohemia. — Nat. size.

Plate II.

- Fig. 1. *Pecopteris lanceolata* STBG. — Sternberg's type specimen (Stbg. I, Pl. 45, fig. 3). — Loc.: Mannebach, lower permian. — Nat. size.
Fig. 2, 3, 4. *Pecopteris nýřanensis* NJC. (i. e. *P. cyathea* KIDST., non SCHL.). — Small leafy (2, 3) and great leafy (4) specimens showing the shape of the tops of the last pinnae. — Loc.: Mine Krimich II at Tlučná near Plzeň, Bohemia, westphalian D (Nýřany coal measure). — Nat. size.
Fig. 5. — Dettö. — Loc.: Mine Moric at Rakovník, Bohemia, westphalian D (the coal measure called „Věnec“). — Nat. size.
Fig. 6, 7, 8. *Pecopteris permica* NJC. — 6 and 8 normal leafy specimens showing the big rhachises; 7 an especially great leafy specimen. — Lhotice near Č. Budějovice, lower permian. — Nat. size.





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V LISTOPADU 1948 VYDALO SVÝM NÁKLADEM V POČTU 1000 VÝTISKŮ NÁRODNÍ MUSEUM
V PRAZE - VYTISKLA STÁTNÍ TISKÁRNA V PRAZE III. CENA BROŽOV. VÝTISKU 20-. Kčs

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byl založen r. 1938. Přynáší 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 jazyčích 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:

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