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F. NĚMEJC:

TAXONOMICKÉ STUDIE O PLODNÍCH ŠIŠTICÍCH LEPIDODENDRACEÍ (LEPIDOSTROBUS BGT. INCL. LEPIDOSTROBOPHYLLUM HIRMER) STŘEDOČESKÝCH KAMENOUHELNÝCH PÁNVÍ

TAXONOMICAL STUDIES ON THE STROBILI OF THE LEPIDODENDRACEAE OF THE COAL DISTRICTS OF CENTRAL BOHEMIA

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F. NĚMEJC:

Taxonomické studie o plodních šišticích lepidodendraceí (Lepidostrobus Bgt. incl. Lepidostrobophyllum Hirmer) středočeských kamenouhelných pánví

Таксономические исследования спороносных колосиков лепидодендронов (Lepidostrobus Bgt. incl. Lepidostrobophyllum Hirmer) среднечешских каменноугольных месторождений

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Při monografickém studiu různých nálezů kor a olistěných větviček ze skupiny lepidodendraceí pocházejících ze středočeských kamenouhelných oblastí, které jsem provedl ve sbírkách Nár. Musea v Praze (N ě m e j c, 1947), objevila se také celá řada plodních šištic, které zřejmě také náležejí k této čeledi a které známe pod jménem *Lepidostrobus* B g t. Taktéž se zde objevilo několik druhů různých isolovaných plodolistů, které označujeme názvem *Lepidostrobophyllum* H i r m e r (dříve prostě *Lepidophyllum* B g t.) a které podle povahy sporangií nesporně též pocházejí od zástupců této čeledi a to od takových druhů, jejichž šištice se ve zralosti rozpadávaly asi podobným způsobem jako šišky našich dnešních jedlí. Jest jisto, že takové zbytky nám celý obraz o společnosti lepidodendraceí našeho středočeského permokarbonu velmi vhodně doplňují. Proto jsem je také podrobil pečlivému taxonomickému zkoumání. Bohužel že většina těchto nálezů představuje pouhé otisky a jen v mizivém počtu případů jest na otiskách zachována též lpící uhelná hmota, která by po vhodné maceraci mohla skýtat výtrusy a případně ukázati i jiné podrobnosti ve stavbě takových šištic neb jejich sporofylů. Rovněž souvislost sbíraných šištic s větévkami různých druhů našich lepidodendraceí (v podstatě se tu jedná jen o rody *Lepidodendron* S t b g. a *Lepidophloios* S t b g.) byla zjistitelná jen v několika málo vyjimečných případech. Většinou nevíme ku kterým druhům našich lepidodendraceí takové nálezy šištic patří. Usuzovati na takovou souvislost z rozmanitých

okolností jejich výskytu, na př. ze současné přítomnosti určitých druhů kor nebo olistěných větviček v téže vrstvičce, ve které se objevily některé typy šištic s nimi pohromadě, jest jistě značně odvážné, neboť zatím víme sotva něco podstatnějšího o poměru období, kdy tyto rostliny odhazovaly své vysemeněné plodné orgány, k období nějakých klimatických poruch vedoucích ve větším měřítku k ulamování větví. Ač se tu někdy dají jisté souvislosti ze současného takového výskytu vyvoditi, přece jen přílišným sevšeobecňováním tohoto postupu mohli bychom snadno dojít k závažným omylům a mohli bychom pak různé šištice přisuzovat i druhům, ku kterým vůbec nepatří, s jejichž zbytky jen shodou okolnosti propadly současné fosilisaci. A konečně jest zde ještě jedna okolnost, která při klasifikaci takových šištic padá značně na váhu: variabilita jejich tvaru, zejména jejich rozměrů (délky a šířky). V tomto ohledu bylo třeba vždy posouditi pokud možno velký počet jedinců a pečlivě je navzájem srovnávati. Výsledky v takových případech jsou jistě vždy značně subjektivní a odvisejí značnou měrou, jak říkáme, od systematického taktu pozorovatele samotného, od jeho zkušenosti s obdobnými případy v jiných skupinách rostlinných dosud žijících. Mně osobně zde tanuly na mysli zejména šištičky plavuní a pak tvarová proměnlivost šišek dnešních konifer, kterýžto typ rostlin tak často sdílí s paleozoickými lepidofyty tolik společných ekologických zjevů.

Z těchto všech důvodů jsem při taxonomickém hodnocení různých nálezů především upustil od využití povahy spor, neboť, jak řečeno, jen v mizivém počtu případů by se byly zatím daly získati. Celou taxonomii, aby byla zachována jednotná linie pro všechny „druhy", jsem založil v prvé řadě a hlavně na úpravě sporofylů, zejména jejich lupenité volné části, na povaze vřetene jakož i celkové tvářnosti šišek. A tu po podrobné revisi celého bohatého materiálu uloženého ve sběrech Nár. Musea v Praze se ukázalo, že se v našem středočeském permokarbonu objevuje větší počet různých tvarově dobře rozeznatelných „druhů" takových šištic než bychom očekávali podle našich znalostí různých „druhů" lepidodendraceí klasifikovaných podle úpravy kmenů a jejich olistěných větévek. Příčina jest tu jasná. Spočívá buď v okolnosti, že některé přirozené druhy mohou mít olistění i skulptury kor si do té míry podobné, že je nelze dobře podle otisků kor rozlíšiti; jejich šištice však přitom mohly být odchylné úpravy. Anebo u jiných druhů se mohly vytvářet šištice dvojího druhu jestliže nastalo rozlíšení jejich podle pohlaví (t. j. na šišky nesoucí pouze mikrosporangia a jiné pouze makrosporangia). Takové otázky bude lze řešit teprve případ od případu v budoucnosti pečlivými maceračními pracemi a případně i anatomickými studiemi na náhodných vhodných nálezech. Nicméně různé práce v oborech, jež využívají poznatků rostlinné paleontologie pro své speciální práce často zcela prakticky zaměřené (geologická stratigrafie, hornictví) volají stále více po přesné taxonomii různých rostlinných zbytků z našeho permokarbonu a proto jsem se odhodlal publikovati i taxonomii všech dosavadních středočeských nálezů Lepidostrobů, třeba že jsem si dobře vědom její značné umělosti. Přes tuto slabou její stránku, z výsledků, ku kterým touto cestou docházíme, jest velmi dobře vidět, jak i zde postupem času počet „druhů" klesal, zcela obdobně jako u „druhů' kor a olistěných větviček

k téže čeledi náležejících. Z celkového počtu asi 15 zjištěných druhů připadá jich na náš středočeský stupeň vestfalu C (radnické pásmo) kol 12, na vestfal D (nýřanské pásmo) 8 a na stefan (svrchní šedé vrstvy, kounovský obzor) pouze jen 3 neb nejvýše 4 druhy. Připojená tabulka ukazuje jasně celý tento postup ubývání. Popisy a kritické rozbory jednotlivých zjištěných druhů jsou obsaženy v následující anglicky sepsané stati.

Přehled lepidostrobových »druhů« zjištěných ve středočeském permokarbonu s vyznačeným jejich stratigrafickým výskytem.

A review of the Lepidostrobi of the Permocarboniferous of Central Bohemia with their stratigraphical occurrence.

Druhy (species)	Radnické pásmo (Radnice series)	Nýřanské pásmo (Nýřany series)	Kounovské pásmo (Kounov series)
Lepidostrobus ornatus L. H.	+		
Lep. kidstoni Zal.	+	+	
Lep. meunieri Ren.-Zeil.	+	+	+
Lep. stefanicus Njc. n. sp.		+	+
Lep. obovatus Ren.	+		
Lep. brongniarti (Goepp.) Berger	+		
Lep. lycopoditis O. F.	+		
Lep. ovatus Njc. n. sp.		+	
Lep. sternbergi Cda.	+	+	
Lep. crassus Njc. n. sp.	+	+	
Lep. (resp. Lepidostrobophyllum) cernuus Stbg.	+		
Lep. (resp. L.) intermedius (L. H.) Arber	+		
Lep. (resp. L.) lanceolatus L. H.	+	?	
Lep. (resp. L.) majus Bgt.	+	+	+?
Lep. (resp. L.) hofmanni Njc. n. sp.		+	

*

При монографических исследованиях, которые я произвел в колекциях Национального Музея в Праге (Ф. Немейц 1947 года), над различными найденными корами и веточками покрытыми листочками из семейства Лепидодендронов, которые были обнаружены в среднечешских каменноугольных областях, был открыт целый ряд спороносных колосиков, которые явно также относятся к этому семейству и которые нам известны под именем *Lepidostrobus* Bgt. Также тут было открыто несколько видов различных изолированных плодущих чешуй, которые мы называем *Lepidostrobophyllum* Hirmer (раньше *Lepidohyllum* Bgt.) и которые по характеру спорангий безусловно происходят от представителей этого семейства, а именно от тех видов, колосики которых в зрелом возрасте распадались приблизительно тем же способом, как шишки наших теперешних ёлок. Ясно,

что подобные остатки пополняют и дают более правильную картину общества лепидодендронов среднечешского каменноугольного периода. Поэтому то я и подверг их тщательным таксономическим исследованиям. К сожалению большинство этих находок представляют только одни отпечатки и лишь в нечтожном количестве случаев на отпечатках был обнаружен приставший угольный налёт, который после соответствующей мацерации мог бы выявить споры, а также указать на другие подробности строения этих колосиков и их спорофилов. Точно также связь собираемых колосиков с веточками различных видов наших лепидодендронов (в сущности тут идет речь только о роде *Lepidodendron* Stbg. и *Lepidohploios* Stbg.) могла быть обнаружена лишь в нескольких исключительных случаях. В большинстве же случаев мы не знаем к какому виду наших лепидодендронов относятся найденные колосики. Делять заключение на основании присутствия в данный момент определенных видов кор или веточек покрытых листьями в том же слое, в котором были обнаружены некоторые типы колосиков вместе с ними, довольно рискованно, так как пока что мы знаем очень мало определенного об отношении времени когда эти растения сбрасывали свои лишонные семян плодовые органы, ко времени каких-то климатических явлений, которые бы вызвали полом веток в крупных размерах. Хотя в некоторых случаях и можно было бы провести аналогию при сопоставлении с действительностью, все же излишним обобщением этого способа мы бы могли допустить ряд грубых ошибок, а именно мы бы могли разным колосикам приписать виды, к которым они вовсе не относятся, и с остатками которых они лишь по стечению обстоятельств подверглись одновременной фосилинации. В конце концов тут есть еще одно обстоятельство, которое при классификации подобных колосиков играет важную роль: различность их форм в особенности размеров (длина и ширина). Принимая во внимание это обстоятельство, нужно было исследовать в отдельности возможно большее количество колосиков подробно сравнивая их между собой.

Результаты этих исследований получаются всегда весьма субъективные а зависят главным образом от, как мы называем, систематического такта исследоваться, от его опыта при тойже работе с группами еще живущих растений. Главным образом я имел ьвиду колосики плаунов, а также шишки теперешних конифер, так как этот тип растений имеет много общих экологических черт с палеозоическими лепидофитами.

На основании всего вышеизложенного при таксономической оценке различных находок мною не были использованы характеристики спор, так как обнаружить их, как было сказано выше, пришлось лишь в незначительном количестве случаев. Всю таксономию, для сохранения единой линии для всех «сортов» я основал во-первых и главным образом на структуре спорофилов, в особенности их чешуйчатой свободной части, на характере побега, а также на общей форме колоска.

Таким образом после подробного контроля всего богатого материала колекций Национального Музея было установлено, что в нашем

среднечешском пермокарбоне имеется большое количество разных, по форме хорошо отличительных колосиков, чем мы предполагали на основании нам известных различных видов *Lepidodendraceae* классифицированных на основании строения стволов и их лиственных веточек. Причина тут ясна, она зависит или от того, что некоторые естественные виды могут иметь листву и структуру коры до такой степени подобные, что их нельзя достаточно точно отличить на основании отпечатков, хотя колосики их при этом могли иметь разную структуру, или же у других видов могли возникнуть колосики двух родов, если наступило половое различие (т. е. колосики только с микроспорангиями, а другие только с макроспорангиями).

Эти вопросы можно будет решать лишь в будущем от случая к случаю путем тщательных мацировочных работ, а в некоторых случаях и анатомическим исследованием случайных находок. Несмотря на эти работы в разных отраслях, которые пользуются данными растительной палеонтологии для своих специальных работ, зачастую вполне практических (геологическая стратиграфия, горное дело) ждут все более точной таксономии различных растительных остатков нашего пермокарбона. Поэтому я и решил опубликовать таксономию всех до настоящего времени обнаруженных среднечешских находок Лепидостробов, несмотря на то, что я хорошо сознаю ее известную искусственность.

Из достигнутых этим путем результатов хорошо видно, как со временем уменьшалось количество «видов», совсем аналогично, как у «видов» кор и лиственных веточек, которые относятся к одному и тому же семейству. Из общего количества обнаруженных видов — приблизительно 15 — приходится на наш среднечешский ярус вестфаля С (радницкий ярус) около 12, на вестфаль D (ниржанский ярус) 8, а на стефан (верхние серые слои, коуновский ярус) только 3 максимально 4 вида.

По приложенной таблице ясно видно процесс этого убывания. Описания и критический разбор каждого обнаруженного вида составляют содержание на английском языке написанной публикации.

Taxonomical studies on the strobili of the Lepidodendraceae of the coal districts of Central Bohemia

I. Introduction.

Revising in the collections of the geological and polaentological department of the National Museum (Prague) the very large material of the barks and leafy shoots of the genera *Lepidodendron* S t b g., *Lepidophloios* S t b g., *Sigillaria* B g t. as well as of the other lepidophytalean plants, I met also a considerably large number of various strobili, which no doubt belong to various species of the just named genera, mostly to *Lepidodendron* S t b g. and *Lepidophloios* S t b g; specimens of strobili

belonging to the genera *Sigillaria* B g t., *Bothrodendron* L. H. or of several other lepidophytalean genera are among this material extremely rare. Therefore in this paper I am dealing before all only with those strobili, which according to the shape of their sporangia as well as of their sporophylls may be well recognised as strobili of the genera *Lepidodendron* S t b g. and *Lepidophloios* S t b g.

In the most cases we have to do here with mere impressions, which do not allow any pursuing of their internal qualities especially from the anatomical point of view. They are bearing only exceptionally some coaly matter at their surface so that even a systematical study of the spores contained within their sporangia is rather problematic and of no use for our taxonomical purposes. Further, only in a few exceptional cases it was possible to state with utter certainty, to which mother plants (i. e. to which Lepidodendron resp. Lepidophloios species defined according to various barks or leafy shoots) such strobili belong. It is interesting to state just here that the number of well distinguishable forms of such strobili classified according to their external features is considerably larger than the number of species of the genera Lepidodendron and Lepidophloios as stated in our coal basins of Central Bohemia according to various bark or leafy shoot remains. Nevertheless for various practical purposes (stratigraphical investigations in our coaldistricts a. o.) it was necessary to establish also here at least several well defined artificial species and to compare them with specimens described already from various permocarboniferous regions of abroad. But just this last problem in many cases shows several difficulties as under many of the various Lepidostrobus names registred already in the literature, are described by various authors very often specimens evidently of unequal qualities (see for instance *Lepidostrobus variabilis, Lep. ornatus* a. o.) Therefore I was forced to pay especially thorough attention to the original descriptions and figures of the various Lepidostrobus "species" and then to compare them with all forms described and figured later under the same names but from other localities or horizons. For statistical studies it was necessary to gain always an enough rich number of specimens of all forms ("species") stated in our coal districts, by means of which the variability of their dimensions as well as of their shape could be reliably interpreted.

All following taxonomical studies of the impressions of the Lepidostrobi coming from the coaldistricts of Central Bohemia are based therefore chiefly on the qualities (especially dimensions) of the cone axis, of the shape and dimensions of both parts of the sporophylls (their distal free part as well as their basal sporangium bearing part) and their sporangia, on the arrangement of the sporophylls upon the coneaxis and not in the last range on the size and shape of the whole strobili. There is no doubt that the variability of these all features of the strobili of the palaeozoic Lepidodendron and Lepidophloios species was at least just as large as for instance in the cones of the recent Coniferae, which from the oekological point of view have so much in common with the just named palaeozoic plant group. This problem of variability makes our task somewhat difficult. But taking into consideration the whole assamblage of all mentioned marks I was able to distinguish among the found specimens

at least several groups of more or less similar specimens, which then are to be defined as some artificial taxonomical units, artificial „species" or „strobili-forms". Perhaps in future further investigations on better preserved material (bearing also carbonised substance) will help us to decide which of these artificial units have claime to be fixed as true independent biological species, which of them are in fact only extreme forms of other strobili considered here as independent „strobili-forms", or finally which of them contain more true species similar in shape but differing essentially as to their internal (anatomical) features; a thorough study of the spores in future will certainly enable us to recognise also, wehether several of such strobili are perhaps only sexually differenciated (i. e. macro- or microsporangia bearing) types.

At the revision of the rather rich material of Lepidodendraceae strobili amassed in the collection of the National Museum, Prague, I was able to distinguish taxonomically at least 15 well defined (of course artificial) „species". Among these „species" or „strobili forms" we may point out 2 types. In the first one the sporophylls were most probably persistent on the axis at the maturity, wherefore whole well preserved cones are rather frequent as impressions and known under the name of *Lepidostrobus* B g t. The second type is represented by strobili, the sporophylls of which were falling away from the axis at the maturity; we know therefore of these strobili mostly only isolated sporophylls which are described generally under the name of *Lepidophyllum* B g t, or more recently *Lepidostrobophyllum* H i r m e r. Whole cones of this type are extremely rare. This second type of strobili is mostly characterised by very prolongated and rather broad free parts of their sporophylls and relatively short sporangia. 10 of the described "species" belong to the first type (*Lepidostrobus* B g t.) and 5 of them belong to the second type (*Lepidostrobophyllum* H i r m e r). The stratigraphical distribution of the various "species" stated in the coal districts of Central Bohemia is evident from the joined table.

It is very interesting to note that there are no special forms, which would be exclusively limited to the stephanian beds (i. e. Upper grey beds or the Kounov coal measure series) of Central Bohemia. All forms described here from these young horizons are present at the same time also in deeper series, at least in the Nýřany (i. e. Westphalian D) coal measure series (i. e. the upper coal measure series of the Lower grey beds).

As to the conditions stated within the westphalian series of Central Bohemia i. e. in the Lower Grey beds, I have to state that in their upper coal measure series i. e. in the Nýřany c. m. series 8 "species" were found of which only 2 are exclusively confined to this horizon being absent in deeper as well as in higner zones, 1 "species" is present also in the Upper grey beds (Kounov c. m. series) and 5 "species" were stated also in deeper zones (i. e. in the Radnice c. m. series). The lower coal measure series of the Lower grey beds (i. e. the Radnice c. m. series) contain 12 "species", of which 5 were found also in the Nýřany c. m. series and 2 in the Kounov c. m. series.

The rather rapid disappearing of the lepidodendroid elements during the time space between the Lower grey beds and the Upper grey beds i. e. practically during the time of the Lower red beds is from the above tabular review well evident. It agrees in the whole with the results of my previous taxonomical studies on the lepidodendroid barks and leafy shoots; only the number, as already stated, of the found "species" does not correspond. For instance in the Nýřany coal series, where I stated only one species of the genus of *Lepidodendron* and one species of the genus of *Lepidophloios,* I found 8 species of *Lepidostrobi* (resp. of *Lepidostrobophylla),* and in the Kounov coal series, where untill present I stated only 1 species of *Lepidophloios* and no forms of *Lepidodendra,* three forms of *Lepidostrobi (*resp. *Lepidostrobophylla)* were recognised. I suppose therefore that in the future still further discoveries of some lepidodendroid "bark species" are eventually to be expected. [1])

II. Description and discussion of the various "species" stated in the Permocarboniferous of Central Bohemia.

1. Notes on *Lepidostrobus variabilis* L. et H.

The term of *Lepidostrobus variabilis* became during the later times after having been defined by L i n d l e y and H u t t o n one of the most obscure names in the literature dealing with the strobili of the Lepidodendraceae. If we examine in the well known palaeontological manual "Fossilium catalogus" J o n g m a n s's list of all various *Lepidostrobi,* which untill present have ever been described and figured by various palaeobotanists as *L. variabilis* L. et H. and if we pay attention thoroughly to the dimensions at least of those figures which seem to be enough accurate, we easely recognise that this term represents in the imagination of the various authors very often something quite different, than we would expect according to the original figures by L i n d l e y and H u t t o n.

The original type specimens described by L i n d l e y and H u t t o n (1831/33, Vol. II, Pl. 10, 11) came from famous locality Jarrow colliery near New Castle upon Tyne (Gr. Britain), from the hanging beds of the Bensham coal seam (Lower coal measures). As far as they are not deformed (the specimen of P. 10, fig 3 measuring across only 1,7 cm. is evidently deformed by side pressure) they measure 2—2,3 cm. across, their axis is cca. 3 mm. (2,5—3,5 mm.) thick. The basal sporangia bearing parts of their sporophylls are cca. 8 mm. long and more or less vertically orientated to the cone axis. The distal leafy portions of the sporophylls are mostly turned upwards and rather closely adpressed to the cone body.

Later authors, as is evident from their descriptions and figures, laid

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[1]) We have to note at this occasion, that in the stephanian beds (Upper Svatoňovice coal series and Radvanice coal series) of the coal districts of Svatoňovice and Radvanice in N. E. Bohemia further species of *Lepidodendra* besides the well known *Lepidophloios laricinum* S t b g., known only from the Stephanian of Central Bohemia, were already discovered.

often not enough stress to the dimensions of the various found strobili; they described under this name often specimens, which are much broader, till about 5 or even 6 cm. Others, for instance R. Zeiller (1886—1888), figured under this name strobili no doubt nearly just as thick as those by Lindley and Hutton, but showing the distal sporophyll leafy portions rather declined aside from the come body and not adpressed. To show these conditions enough distinctly I present here a short schematical review of the chief features (especially the dimensions) of the most important specimens mentioned under this term in the classical literature:

Author and Fig.	Width of the cone in cm.	Width of the cone axis in cm.	Length of the sporangia in cm.	Notes
Lindley-Hutton 1831—1833:				L.—H.: »... These are, no doubt, bodies analogous to that figured by Parkinson in his organic remains Vol. I, Pl. 9, fig. 1), which M. A. Brongniart calls *Lep. ornatus*...« — Loc.: Jarrow col., New Castle upon Tyne; Lower coal measure. — R. Kidston 1890—1891; Pl. 10, fig. 2 = ? *L. spinosus* Kidst.
Pl. 10, fig. 1.	2.—	0,25	0,8	
Pl. 10, fig. 2a	1,7			
Pl. 10, fig. 2b	2,—	?	?	
Pl. 10, fig. 3 (rather deformed)	1,75	0,25	?	
Pl. 11	2,3	0,35	?	
	2,—	?	?	
R. Zeiller, 1886—1888: pp. 499, Pl. 76,				The free portions of the sporophylls are very declined aside. — Loc.: Nord, faisceau gras de Douai: l'Escarpelle, fosse no. 5., vein 17. — Corresponds with R. Kidston's *L. squarrosus* 1891.
fig. 34	2,— till 2,4	0,2 till 0,3	0,7	
E. Bureau, 1914:				
»*L. ophiurus*«:				Loc.: La Tardivière, Mouzeil (Basse Loire).
Pl. 37, fig. 1	2,9	?	?	Correspond with our *L. Kidstoni* Zal.
»*L. variabilis*«:				
Pl. 37, fig. 2	2,3	?	?	
Pl. 37, fig. 3	2,3	?	?	
Pl. 37, fig. 4	2,9	?	?	
Pl. 37, fig. 5	3,5	?	1,—	Corresponds with our *L. meunieri* Zeiller.

Author and Fig.	Width of the cone in cm.	Width of the cone axis in cm.	Length of the sporangia in cm.	Notes
»*L. variabilis*« (-also »*Sigillaria venosa* Bgt.«): Pl. 37, fig 7	3,1	cca 0,25	1,2	Loc. according to A. Brongniart: puit St. Jacques de la Flandrière (Montrelais, Basse Loire).
H. B. Geinitz, 1855: »*L. variabilis*«:				
Pl. 2, fig. 1	5,6	0,8	1,8	Loc.: Oberhohendorf (Saxony), Westphalian D. — Correspond with our *L. crassus* Njc. (i. e. *L. princeps* D. White ex parte).
Pl. 2, fig. 3	5,7	?	?	
Pl. 2, fig. 4	?	0,8	1,5	
»*Sagenaria dichotoma* Stbg.«: Pl. 2, fig. 6, 7				Loc.: Bockwaer Communwald bei Niedercainsdorf. — Is a *Lepidostrobophyllum* (see our *L. hofmanni* Njc.).
Von Roehl, 1868: Pl. 2, fig. 4	—	—	—	Perhaps a seed, certainly no *Lepidostrobus*.
Pl. 7, fig. 2	6,—	?	?	Corresponds most probably with our *L. sternbergi* Cda.
Pl. 22, fig. 2	2,2	0,5	?	Looks like »*Gymnostrobus salisburii*« i. e. *Stigmaria*.
Pl. 29, fig. 17	3,2	?	?	Represents only an undeterminable top of a strobilus or a budlike top of a leafy shoot.
E. Simson Scharold, 1934: pp. 7, without Fig.	3,—			Loc.: Obere Flammkohlenpartie des Saargebietes: Lampennest. — Free portions of the sporophylls are cca. 1 cm long. — It agrees mostly with our *L. kidstoni* Zal.
W. Hartung, 1935: Pl. 15, fig. 74	3,— till 3,5	0,3 till 0,4	1,2	Loc.: Bulgaria, from the carboniferous of the Central Balkan anticline. — Correspond mostly with our *L. meunieri* Zeiller.
Pl. 15, fig. 75	cca 3,1	0,3 till 0,4	1,2	
M. D. Zalesskij, 1904 (pp. 40):				Loc.: Sofievka (at the station of Chacepetovka), mines of the Cop. Berestovo Bogoduchovskoje: pit 3 (Jurovka); hor.: C_2^6. — Correspond mostly with our *L. ornatus* Bgt.
Pl. 6, fig. 7	2,3	0,3	0,7	
Pl. 7, fig. 5	1,8	?	?	
K. Novik, 1931 (pp. 89): Pl. 20, fig. 1	2,1	0,25 till 0,3	0,8 till 0,9	Loc.: Něstěrivska rudnja: pit No 5; hor.: C_2^3 — C_2^4. — Corresponds mostly with our *L. ornatus* Bgt.

Author and Fig.	Width of the cone in cm.	Width of the cone axis in cm.	Length of the sporangia in cm.	Notes
O. Feistmantel, 1873:				
Pl. 18, fig. 19	4,8	1,3	1,8	Loc.: Nýřany, cannel coal of the Nýřany coal seam. — Identical with our *L. crassus* Njc (i. e. *L. princeps* D. White ex parte).
O. Feistmantel, 1875—1876:				
Pl. 14 (43), fig. 1	4,5	?	?	Loc.: Žacléř. — According to W. J. Jongmans both correspond with *L. geinitzi* Schimp.
Pl. 15 (44), fig. 1	4,7	0,6	1,5 till 1,6	
Pl. 15 (44), fig. 2	6,—	0,7	cca 2,—	Loc.: Rakovník. — All specimens are very deformed. They agree mostly with our *L. sternbergi* Cda.
Pl. 15 (44), fig. 3	4,5	0,35	0,6 till 1,6	
Pl. 15 (44), fig. 4	5,8	0,5	0,5 till 2,5	
Pl. 16 (45), fig. 1	2,6	0,5 till 0,8	0,8	Loc.: Žacléř. — According to W. J. Jongmans it agrees with *L. geinitzi* Schimp.
Pl. 16 (45), fig. 2				Loc.: Žacléř. — Represents no L. at all, but is identical with *Gymnostrobus salisburii* Bureau i. e. *Stigmaria*.
A. Hofmann—F. Ryba, 1899:				
Pl. 16, fig. 3	3,— till 4,—	0,5 till 0,6	?	Loc.: Nýřany, mine Krimich. — Is identical with our *L. meunieri* Zeiller.
Pl. 16, fig. 4	7.— till 7,5	1,2 till 1,3	?	Loc.: Kamenný Újezd. — Is identical with our *L. crassus* Njc. (i. e. *L. princeps* D. White ex p.)
Pl. 16, fig. 5	6,4	1,3	1,7	Loc.: Kamenný Újezd. — Is identical with our *L. crassus* Njc.
Pl. 16, fig. 6	—	—	—	Loc.: Mirošov. — Represents a *Lepidostrobophyllum* with the free portions of the sporophylls cca 2—2.5 mm long agreeing mostly with our *L. hofmanni* Njc.
C. r. Purkyně, 1929:				
Pl. 4, fig. 1	4,9	0,9 till 1,1	1,5 till 1,7	Loc.: Ploužnice. — Agrees mostly with our *L. crassus* Njc.
Pl. 4, fig. 2	3,5	?	?	Loc. Ploužnice. — Agrees mostly with our *L. meunieri* Zeiller. (According to W. J. Jongmans they are similar to *L. geinitzi* Schimper.)

I believe that the most important opinions about all these strobili mentioned in this table have been expressed by R. Kidston 1892/3, E. A. N. Arber 1922 as well as by W. J. Jongmans 1930.

E. A. N. Arber (1922) evidently interpreted the "species" of *L. variabilis* in a unusually large sense as an utterly artificial and collective "species". According to him we have to regard as *L. variabilis* specimens of very different size and dimensions, the diametr of the cross section of which ranges from 2 untill to 6 cm. This is well evident from the synonyms, which he adds to its discussion and description of this "species" and of which especially the following ones are to be taken into consideration:

L. variabilis L. H. 1831.
L. ornatus L. H. 1831, Vol. I, Pl. 26.
L. ornatus var. *didymus* L. H. 1837, Vol. III, Pl. 163.
L. ornatus Zeiller 1886/88, Pl. 76, fig. 5—6.
L. geinitzi Zeiller 1886/88, Pl. 76, fig. 2.
L. squarrosus Kidst. 1892/3, Pl. 4, fig. 13, 14.
L. geinitzi Ren. 1888/90, Pl. 61, fig. 5, 6.

Such conception is at first sight untenable, as stated quite justly already by W. J. Jongmans in 1930.

W. J. Jongmans (1930, pp, 518) considers the term of *L. variabilis* as a "Sammelart" and believes, that we have according to the various conditions and special features of the various specimens to exclude successivly from this "Sammelart" the single well defined and rather natural true species (as for instance: *L. ornatus, spinosus, squarrosus, geinitzi* a. o.)

As to the just above mentioned species, which are cited by Arber as synonymous with Lindley-Hutton's *L. variabilis,* he regards as true *L. variabilis* L. — H. only the following ones:

L. variabilis L. H. 1831, Pl. 10, fig. 1.
L. variabilis Hofm. — Ryba 1899, Pl. 16, f. 3
L. variabilis Zal. 1904
L. variabilis (incl. *L. ophiurus* fig. 1.) Bureau 1914.

Besides he identifies with Lindley — Hutton's *L. variabilis* still several strobili figured by Ad. Brongniart (1838), the tabellary review of their size and shape with notes on their relations to the various strobili stated in our Bohemian coal districts fallows: -see the table on pp. 15.

From this review it is evident that W. J. Jongmans's point of view stands no doubt very near to the original conception of this species by Lindley and Hutton. But nevertheless according to his identifications of Bureau's specimens, I believe that it is notyet in an utterly precise agreement with all features, which from the taxonomical point of view can be taken into consideration. From the just presented tabellary review we easely see that Lindley — Hutton's specimens are considerably thinner than the mentioned specimens figured by Bureau 1914 (which, except the fig. 5, agree mostly with Zales-

Brongniart's fig.:	Width of the strobilus in cm.	Wildth of the axis in cm.	Length of the sporangia in cm.	Mentioned also in	Is identical with our
Pl. 22, fig. 1	2,4	0,35	0,75	Zeiller 1886/8 Bureau 1914	*L. kidstoni*
Pl. 22, fig. 5	2,2	0,5	0,6	Kidston 1909/11	*L. ornatus*
Pl. 22, fig. 6	1,9	0,45	0,6	Kidston 1909/11	*L. ornatus*
Pl. 22, fig. 7	1,9	0,5	0,6	Kidston 1909/11	*L. ornatus*
Pl. 23, fig. 3	2,4	0,35	?		*L. kidstoni*
Pl. 23, fig. 4	2,2	0,35	?		*L. ornatus*
Pl. 24, fig. 1	2,8	0,35	1,—	Bureau 1914	*L. kidstoni*
Pl 24, fig. 2	?	0,35	1,—	Bureau 1914	*L. kidstoni*
Pl. 24, fig. 3	2,4	?	?		*L. kidstoni*
Pl. 24, fig. 4	1,75	0,45	0,6	Kidston 1886	*L. ornatus*
Pl. 25, fig. 1	2,4	0,3	0,9		*L. kidstoni*
R. Kidston regards (1886) also as *L. variabilis*					
Pl. 25, fig. 4	1,8 till 2,1	0,35 till 0,45	0,65	this form is according to R. Zeiller (1886/8) identical with *L. ornatus*, according to W. J. Jongmans (1930) also with *L. ornatus*	*L. ornatus*
E. Bureau (1914) identifies with *L. variabilis* L. H. also Brongniart's fig.:					
Pl. 22, fig. 2	3,3	?	?	R. Kidston (1892/3) regards this form as *L. spinosus*	? *L. stefanicus* or *meunieri?*

skij's *L. kidstoni).* Of course later authors (i. e. after Lindley and Hutton) were generally inclined to range hereto very often also thicker strohili, except some extremely big ones, which are usually termed as *L. geinitzi.* And perhaps just for this reason Jongmans's point of view expresses rather clearly the conception of this "species" in the sense of the most of the later palaeobotanists. Most of the specimens described later under Lindley — Hutton's term of *L. variabilis* are therefore cca. 2,5—3 cm. thick, their axis measures cca. 3—4 mm. across and their sporangia about 8—9 mm. in length. The distal portions of their sporophylls are mostly turned upwards and rather closely adpressed to the cone body. This conception of *L. variabilis* agrees no doubt well with Za-

lesskij's strobili of *L. kidstoni*[2]) (1904) but certainly not with the original type specimens of Lindley and Hutton's *L. variabilis.*

In connection with the foregoing task Jongmans's point of view on another also very similar Lindley and Hutton's "species", the *L. ornatus* (resp. *L. ornatus* var. *dydimus*) L. — H. 1831/37, Pl. 26 (Vol. I) and Pl. 163 (Vol. III) seems to be also very important. Jongmans considers this species as an utterly independent form with no relations to *L. variabilis.* Jongmans refers chiefly to Zeiller's diagnosis from 1886/8. But just here we have to take in account that Zeiller described in fact under the name of *L. variabilis* a specimen which is indeed identical with *L. squarrosus* Kidst, but not with the true Lindley and Hutton's *L. variabilis.* This was already clearly mentioned by R. Kidston in 1892/3, pp. 342; therefore the differences, which Jongmans pointed out do not relate in reality to *L. ornatus* and *L. variabilis,* but to *L. squarrosus* and *ornatus.* In this respect I consider as higly important Kidston's opinion expressed in his critical paper on Lindley and Hutton's original type specimens from 1890/91, pp. 357, as well as in his diagnose and description of *L. squarrosus* from 1892/3, pp. 342. Just here Kidston points out that there are absolutely no marks by which the true *L. ornatus* L. H. and *L. variabilis* L. H. may be safely distinguished. And indeed both just mentioned Lindley — Hutton's species (i. e. *variabilis* and *ornatus)* show very similar shape and size:

L. variabilis			*L. ornatus*		
Diameter of the strobili	axis	Length of the sporangia	Diameter of the strobili	axis	Length of the sporangia
2,— cm.	0,25	0,8	1,8	0,45	0,65
1,7 cm.	?	?	1,8—2,1	0,3—0,4	0,65
2,— cm.	?	?			
1,75 cm.	0,25	?			
2,3 cm.	0,35	?			
2,— cm.	?	?			

It was perhaps the different kind of preservation which led Lindley and Hutton to the definition of two different species. Their *L.*

[2]) Very near to this definition of *L. variabilis* stand also several strobili described and figured originally by Binney (1871) under the names of *L. harcourti* and *vasculare,* which are perhaps identical with Williamsno's (1893) *L. oldhamius:*

	Width of the		Length of the sporangia
	strobilus	axis	
L. harcourti (Pl. 7, fig. 1, 2, 3)	3,1 cm.	0,3 cm.	1,2 cm.
L. vasculare (Pl. 8, fig. 1, 2, 3)	2,7 cm.	0,3 cm.	1,— cm.

variabilis represents mere impressions, whereas *L. ornatus* incrustations in an iron stone nodule, which is also the cause of the slightly differing dimensions; othervise the outer appearence of the strobili in both cases is quite equal.

Taking into consideration this Kidston's[3]) point of view, we may characterise the strobili of the true Lindley and Hutton's *L. variabilis* (incl. also of their *L. ornatus*) as follows: Strobili cylindical, rather elongated and thin, only about 2 (1,8—2,3) cm. across, with an axis cca. 3 mm. thick and ith the free ends of the sporophylls upward bent and rather adpressed, their fertile basal portions being vertically orientated to the coneaxis and cca. 7—8 mm. long.

We have therefore to do here with rather narrow strobili quite similar to those figured by Binney in 1871, strobili which are often associated with leafy shoots of several short leafy *Lepidodendrons* (e. g. *L. simile* Kidst., *L. acutum* Presl, *L. ophiurus* Bgt. a. o.). Especially near to Lindley — Hutton's species of *Lepidostrobus variabilis* stand the following Binney's species from 1871:

Name and figure	Width of the		Length of the sporangia in cm.
	cone in cm.	axis in cm.	
L. hibbertianus Pl. X, fig. 2 (heterosporous)	1,2—2	0,3	0,7
L. (?) dubius Pl. IX, fig. 3 (heterosporous)	2,—	0,3	0,7
L. levidensis Pl. X, fig. 1 (heterosporous)	2,2	0,3	0,75
L. russelianus Pl. IX, fig. 1, 2 (isosporous ?)	2,1—2,3	0,25	0,75—0,85
L. tenuis Pl. IX, fig. 4 (isosporous ?)	1,7	?0,1	0,75

From all stated above we see how abscure became Lindley and Hutton's term of *Lepidostrobus variabilis* during the later times even if we would use it in a considerably restricted sense: in agreement with Jongmans's point of view we had to do with rather broader strobili (cca. 2,5—3 cm.), than if following Kidston's point of view (in this last case strobili only about 2 cm. thick). By this way we had to identify as *L. variabilis* not only several thicker specimens (which no doubt are very related or even identical with Zalesskij's *L. kidstoni*), but also some rather thin strobili of the type of *L. ornatus* L. H. (in Kidston's sense; non Zeiller nec Jongmans). On acount of the obscurity of this term of *Lepidostrobus variabilis*, I shal not make use of it in this paper dealing with the taxonomy of the *Lepidostrobi* collected in the Carboniferous of Central Bohemia. I have only to note, in agreement with Kidston's deductions (which beyond any doubt are based on extremely accurate and very thorough taxation of all mentioned Lindley and Hutton's specimens resp.

[3]) Jongmanns, as will be stated more in detail in the chapter about *L. ornatus*, ascribed to this species also some strobili, which are rather short (this is evidently not in agreement with the original Lindley-Huttons's specimens), perhasps in accordance with Zeiller's diagnosis from 1886/8. Such strobili stand no doubt much nearer to specimens like those figured by A. Renier, 1910, Pl. 3, as strobili of *Lepidodendron obovatum* Stbg.

their figures),[4]) that with this term are corresponding quite precisely only several rather thin and elongated strobili (not the shorter and bigger ones as assumed by Zeiller and Jongmans, which is in contradiction especially in the case of Lindley — Hutton's fig. Pl. X, fig. 1 and Pl. XI). In this present paper I am treating such forms under the name of *Lepidostrobus ornatus* (Parkinson) Bgt.

2. *Lepidostrobus ornatus* (Parkinson) Bgt.
Pl. III, fig. 1, 2, 3; Pl. VIII, fig. 1 (see also Pl. VII, fig. 1).

The name of *Lepidostrobus ornatus* comes from Brongniart 1828 (pp. 87 and 174), who presented but no figures nor any accurate description and refers merely to the figures in Parkinson's work from 1820 (Vol. I., pp. 428—429). Further new figures and descriptions are to be found in Lindley and Hutton's work from 1831—1837 (Vol. I, Pl. 26; Vol. II, Pl. 163). These last figures are not to be distinguished by any detail from the previous Parkinson's type.

Parkinson's specimen (1820, Pl. 9, fig. 1), which according to Brongniart came from the coal district of Shropshire in England, represents an incrustation of cylindrical shape in an iron stone nodule. Its sporangia and sporophylls are well preserved but the cone axis was evidently affected by rotting and is therefore represented by a thin cylindrical hole measuring cca 3—6 mm across (the exact thickness of the axis is very difficult to be imagined; most probably it attained a thickness of about 3—4 mm.). Lindley and Hutton's specimen of 1831/7 (Vol. I, Pl. 26) came from very fine grained and soft shales of the Barnsley coal district (England) and represents the top of a strobilus, the axis of which measures about 3—4 mm across (in Lindley — Hutton's figure it is only partly visible, otherwise it is marked by a cylindrical hole cca. 6 mm wide). Lindley and Hutton's specimens from 1831—37 (Vol. II, Pl. 163) are exceedingly well preserved incrustations in rather hard iron stone nodules from the coal mines at Newhaven near Edinburgh, which exhibilit well on polished sections all internal structures. Even though R. Kidston states (1892/3 — discussing the taxonomy of *Lepidostrobus squarrosus*) that this specimen is not identical with the just mentioned foregoing specimens (i. e. L. — H'.s specimens of Pl. 26), I am nevertheless absolutely unable to find out any substantial difference between both. Both agree well in their elongated cylindrical shape, in the kind of the attachement and position of the sporangia as well as in the shape of the sporophylls. Also the cone axis exhibits in both cases the same features and dimensions: it is cca. 3—4 mm. thick and the eventually remaning hole after its decay (i. e. incl. the very bases of the sporophylls) is cca. 5—6 mm. vide. The slightly differing outer appearence of both these discoveries consists, as so often in various palaentological discoveries, merely in their different kind of fossilisation. The important dimensions of all these just mentioned strobili as well as of their organs are as follows:

[4]) Several of Lindley and Hutton's type specimens were last.

Author and Fig.	Width in cm. of the		Length of the sporangia in cm	Locality
	strobilus	axis (resp. of the remaining hole)		
Parkinson, 1820: Pl. 9, fig. 1	2,—	? (hole 0,3—0,5)	0,5—0,8	Shropshire, iron stone.
Lindley-Hutton, 1831/37: Pl. 26	1,9	0,3—0,45 (hole: 0,6)	0,65	Barnsley, shales.
Lindley-Hutton, 1831/37: Pl. 163	1,8—2,1	0,3—0,4 (hole: 0,6)	0,65	Newhaven near Edinburgh, iron stone.

In these three casts of elongated cylindrical strobili the basal sporangia bearing parts of the sporophylls are vertically orientated to the cone axis, their distal free sporophyll portions are bent upwards and scale like adpressed to the cone body.

With these features agree the shape and organization of several rather long, cylindrical not very thin strobili, which are often met associated to several of our short leafy *Lepidodendron* twigs (*L. simile* Kidst, *L. acutum* Presl, *L. ophiurus* Bgt.) in the Radnice coal measure series of the coal districts of Central Bohemia. Unfortunately untill present I have notyet found them in direct connection with those sterile leafy twigs. These strobili generally met as mere impressions measure about 2,1 cm across, their axis being cca. 3 mm thick. Their surface is marked by imbricately overreaching sporophyll ends. It seems according to the occurrence of this "species" that there exist very near relations between the strobili of this type and between several narrower strobili of the type of *Lepidostrobus brogniarti* Goepp. (in Berger) and of *L. lycopoditis* O. Feistm., which both occur also in association with the same short leafy Lepidodendra as our *Lepidostrobus brongniarti* (Parkinson) Bgt. (see also notes in the following chapter on *Lepidostrobus lycopoditis* O. Feistm.)

It is difficult to comprehend, why some of the later palaeobotanists have changed the sense of this considerably clear term of *L. ornatus* (e. g. W. J. Jongmans). This term was very precisely and clearly interpreted after Lindley, Hutton and Brongniart especially by R. Zeiller and E. Bureau.

R. Zeiller speaks about strobili till 15 cm. long, cylindrical, 18—25 mm. wide, provided by an axis 2—5 mm. thick, the sporophylls of which exhibit sporangia cca. 7—8 mm. long and free distal leafy portions cca. 4—7 mm. long and about 3 mm. broad. Zeiller's specimens came from the district of Pas de Calais (Bully Grenay, fosse no. 1, vein de Petit —Saint-Jean; faisceau gras; 1886/88, pp. 497, Pl. 76, fig. 5,6). The rather very similar Bureau's specimen (1914, pp 164, Pl 37, fig. 6) was collected in the district of Basse Loire at Mouzeil (la Tardivière, mine Henri).

To complete[5]) the above lines, I present in the following table also the respective dimensions of those Brongniart's (1838) *Lepidostrobi*, which by various palaebotanists have been regarded as *L. ornatus:*

Brongniart's figures	Width in cm of the		Length of the sporangia in cm.	Regarded as *L. ornatus* by
	strobilus	cone axis		
Pl. 22, fig. 5	2.2	0.5	0.6	E. Bureau, 1914
Pl. 22, fig. 6	1.9	0.4	0.6	E. Bureau, 1914
Pl. 23, fig. 1	2.-	?	?	R. Zeiller, 1886/8 W. J. Jongmans, 1930
Pl. 23, fig. 2	2.35	0,6	0.75	R. Zeiller, 1886/8 W. J. Jongmans, 1930
Pl. 25, fig. 4	1.8—2.1	0.3—0.4	0.65	(-is a copy from Lindley and Hutton's work - Pl. 163) — R. Zeiller, 1886

[5]) I am not able to demonstrate, whether we have also to join hereto several equally thin strobili, which have been described and figured by Zalesskij 1904 and by K. Novik 1931 (from the coal basin of Doněc) under the name of *L. variabilis.* Their dimensions and stratigraphical occurence are as follows:

Name and fig.	Width in cm. of the		Length of the sporangia	Occurrence
	strobilus	cone axis		
L. variabilis Zal., 1904, pp. 40:				
Pl. VI, fig. 5	1,8	?	?	Mines of the Co. Berestovo Bogoduchovskoje, pit 3. (Juzovka). — Hor.: C_2^6
Pl. VI, fig. 7	2,3	0,3	0,7	Sofievka near the railway station of Chacepetovka. — Hor.: detto.
L. variabilis Novik, 1931, pp. 89:				
Pl. 20, fig. 1	2,1	0,25—0,3	0,8	Něstěrivska rudnja, pit 5. — Hor.: $C_2^1b - C_2^1c$ (i. e. $C_2^3 - C_2^4$.)

As to their size and outer appearence they agree well with the *L. ornatus* (especially Zalesskij's fig. Pl. 6, fig. 5). But, as far as visible in the figures, the distal free portions (blades) of their sporophylls are too elongated and narrow, whereas in the true *L. ornatus* these organs are considerably broad an short. By this way they remind rather strongly another Zalesskij's *Lepidostrobi,* which are but slightly thicker, the so called *L. Kidstoni.* — Another stobilus described in the present literature also under the name of *L. ornatus,* but which certainly has nothing in commen with the true *L. ornatus* of Brongniart, is a specimen collected in the mine František at Karviná (hanging shales of the seam no. 18 of the beds of Suchá) and mentioned by V. Šusta (1928, Pl. IX,

As evident, all these Brongniart's specimens agree also well with the strobili which I identify as *Lepidostrobus ornatus* in the Central Bohemian coal districts.

A different point of view as to the sense of the term of *Lepidostrobus ornatus* was expressed, as already pointed out, by W. J. Jongmans, 1930. W. J. Jongmans drew attention to a certain inaccuracy and deficiency of the figures (resp. of the type specimens) by Parkinson and by Lindley and Hutton and expressed the opinion that under the term of *L. ornatus* we have to understand some rather short cones, for instance such as were described by him (Jongmans, 1928, Pl. 8, fig. 3) from the coal districts of Netherland or by A. Renier (1910, Pl. 3) from the districts of Belgium in direct connection with leafy shoots of *Lepidodendron obovatum* Stbg. He believes that it is hardly possible to distinguish *L. ornatus* from the forms regarded mostly as *L. variabilis* if imagining both these "species" as long cylindrical cones. Evidently, as explained more in detail in the above note on *L. variabilis*, we meet just here all difficulties connected with the obscurity of the term of *L. variabilis* as defined by most of the authors. As to this problem, I think, the most decisive is Kidston's point of view expressed in his papers from 1890/91 pp. 357 as well as 1892/93, pp. 342. According to this Kidston's point of view there is absolutely no difference between Lindley and Hutton's species of *L. variabilis* and Brongniart's *L. ornatus* in their original conception. Besides even Lindley and Hutton are speaking in their original descriptions about a considerable similarity of both these species (see also in the foregoing notes on *L. variabilis).*

If regarding the species of *L. ornatus* Bgt. identical with *L. variabilis* L. — H. we have to join hereto also several specimens figured by A. Brongniart which by most of the palaeobotanists have been generally identified as *L. variabilis*; these are especially strobili figured in Brongniart's Pl. 22, fig. 5, 6, 7, Pl. 23, fig 4, Pl. 24, fig. 4 and 25, fig. 4 (see the tabellary review of Brongniart's specimens in the foregoing chapter on *L. variabilis).* For the same reason we have to join hereto also several strobili figured in the well known work by Binney (1871) which have been also already mentioned with relations to the term of *L. variabilis* i. e.: *L. hibbertianus, dubius, levidensis* and *russelianus* (see the tabellary review of these Binney's species in the foregoing chapter on *L. variabilis).*

If there are any true relations of these long cylindrical strobili regarded in this paper (in agreement with Kidston's opinion) as the true *L. ornatus* Bgt. to the equally thick but considerably shorter cones regarded as *L. ornatus* by W. J. Jongmans (and collected often in direct connection with twigs of *Lepidodendron obovatum* Stbg.), cannot be decided with utter certainty at present, because we do not know the strobili of *L. ornatus* in direct connection with leafy shoots of any *Lepidodendron* species. I shall return to this task in the chapter on the strobili of *L. obovatum* Stbg.

fig. 1). It is more than 15 cm. long and measures cca 3 cm. across. This specimen is no doubt to be compared with Zaleskij's *L. kidstoni.*

Stratigraphical distribution:

Strobili of the form of *Lepidostrobus ornatus* (Park.) Bgt. were found in Central Bohemia only in the Radnice coal measure series.

The coal districts of Plzeň:

Tlučná. — Mine Krimich II. —Hor: Hanging shales of the coal measure no. II (i. e. the Upper Radnice coal measure).

Nýřany. — Mine Krimich. — Hor.: unknown (dark grey hanging shales of the coal seam).

Nýřany. — Mines at the place "Pankrác" N. of Nýřany. — Hor.: unknown (iron stone nodules).

Plasy (this name is often cited in Sternberg's works, but the precise position of the locality hidden under it is unknown); impressions in iron stone concretions.

The coal dictrict of "Na Lísku" at Zdejciná near Beroun:

Zdejciná. — In the hanging black shales of the coal seam (correlated with the Upper Radnice coal measure).

The coal districts of Radnice:

Břasy. — Various mines of the surroundings (mostly between Stupno, Břasy and Vránovice). — Hor.: Hanging shales of the Upper Radnice coal measure and the Tonsteine bed ("Schleifsteine", "brousky") between the Upper and Lower Radnice coal measure.

Vranovice. — The Tonsteine bed ("Schleifsteine", "brousky") between the Upper and Lower Radnice coal measure.

The coal districts of Kladno and Rakovník:

Votvovice. — Hor.: The Tonsteine bed (interlayer called "Opuky") within the Main Kladno coal measure (i. e. Upper Radnice coal measure).

Kralupy. — In a series of shales containing iron stone nodules at the hill Červená Hůrka representing here the niveau of the Main Kladno coal measure (i. e. the Upper Radnice coal measure).

Kladno. — Mine Zápotocký (Prago) at Dubí. — Hor.: Hanging shales of the Main Kladno coal measure (i. e. Upper Radnice coal measure).

3. Notes on *Lepidostrobus squarrosus* Kidst.

This type of strobili was not yet collected in the coal districts of Central Bohemia. I mention it here chiefly to complete the above notes on *Lepidostrobus variabilis* L. H., for which it was very often mistaken. Several authors have even erroneously taken just this type of strobili as the basis for the definition of the term of *Lepidostrobus variabilis*. As already mentioned, this was especially clearly pointed out by R. Kidston.

The type of *L. squarrosus* was defined and figured by R. Kidston in 1892/93, pp. 342 (loc.: Bonnyton pit, Kilmarnock: shales over Whistler coal), Pl. IV, fig 13, 14. Kidston emphasized especially its identity with some Zeiller's (1886/88) specimens of *L. variabilis* from the

Carboniferous of Northern France (loc.: Nord, Faisceau gras de Douai, Escarpelle, fosse no. 5, vein 17; Pas de Calais, Faisceau gras, Mine de Marles). It differs from the most of our *Lepidostrobi* by a rather strange orientation of its sporophylls. Their basal sporangia portions are attached to the cone axis obliquely (not vertically as generally in all our *Lepidostrobi)* and their free leafy distal parts are rather declined from the cone body and not adpressed to it, which is the reason of their squarrose outer appearence. The axis of these strobili are about 0,3 mm. thick, the sporangia cca. 0,6—0,7 mm. long. The whole strobili as figured by R. Kidston measure 1,8—2,1 cm. across. The specimen figured by R. Zeiller (under the name of *L. variabilis)* is 2—2,4 cm thick.

By these features Kidston's strobili of *L. squarrosus* are well distinguished from our *L. ornatus*. Their relations to the term of *L. variabilis* were already discussed in the foregoing chapters. Until present I do not know any specimen from the coal districts of Central Bohemia, which should be identical with this Kidston's form.

4. *Lepidostrobus kidstoni* Zal. Pl. I, fig. 5, 6, 7, Pl. II, fig. 1.

This name was established by M. D. Zalesskij (1904, pp. 104) for strobili considerably bigger than are those which we are generally joining with the name of *L. variabilis*. His figure Pl. 7, fig. 3 measures cca. 2,6 cm. and that of Pl. 7, fig. 4 cca. 2,9 cm. across. Their axis is cca. 3—4 mm. thick and the sporangia 0,9 mm. long. An utterly identical strobilus was later described under the same name and from the same region (Doňec coal districts) by K. Novik (1931, pp. 90, Pl. 20, fig. 2). This strobilus is not as well preserved; it measures ca. 2,5 cm. across, its axis is 3 mm. thick and the sporangia are 9 mm. long. Zalesskij's specimens were collected at the mine No. 2 near the village of Krasnopolje (coal measures of the horizon C_2^5), Novik's strobilus -as found at the Vorovski's mine of the collieries "doněckogrušivskaja rudnja" (in the coal measure II ["grušivskij] of the horizon C_2^3 [i. e. C_2^2 a]). These strobili exhibit sporophylls rather vertically attached to the cone axis by their basal sporangia bearing portions; their free distal parts are bent upwards and adpressed rather closely to the cone body.

As already mentioned in the chapter dealing with the term of *L. variabilis* L. H., we have to do here with one of the various forms, which by many paleabontanists have been joined just to this Lindley and Hutton's species, but which is to be distinguished from the true *L. variabilis* L. H. by an essentially bigger (thicker) shape. Zalesskij's specimens are 2,5—3 cm. thick, whereas true Lindley and Hutoon's *L. variabilis* (i. e. our *L. ornatus* Bgt.) measures mostly only 1,8—2,3 cm. across (generally about 2 cm). This is also the reason, why Zalesskij defined this strobili as a new independent species of *Lepidostrobi.*

With these specimens of the coal basin of Doněc we easely may identify a series of Lepidostrobi casts collected as impressions in various horizons of the Radnice coal measure series in Central Bohemia. These Bohemian specimens measure cca. 2,5 till 3 cm across (according to how closely the free end portions of the sporophylls are adpressed to

the cone body), their axis is 2,3—4 mm. thick. The basal sporangia bearing parts of their sporophylls are about 9 mm. long; the free distal portions of the sporophylls are rather narrow, long, lanceolate and about 1 cm long (but only very rarely they are in our impressions well preserved).

In the classical literature of abroad we find, as already mentioned, similar strobili often mentioned under the term of *L. variabilis*. Before all we have to point out several specimens described by E. Bureau (1914, Pl. 37): especially his fig. Pl. 37, fig. 2 exhibits all features characterising Zalesskij's *L. kidstoni*. Further we have to join hereto also a strobilus cca. 3 cm. thick which was figured under the name of *L. ornatus* from the coal districts of Ostrava-Karviná by V. Šusta (1928, Pl. 60, fig. 1) from the coal measures of the Karviná coal series. Finally to this Zalesskij's species stand very near also several strobili described and figured from the Carboniferous of Central Balkan mountains (loc. Carecal) in Bulgaria by W. Hartung (1935: *L. variabilis*) as well as by the author of this paper (F. Němejc, 1942: *Lepidostrobus* sp. B.). Němejc's specimen (Pl. 4, fig. 7) is about 2,5 cm. thick and bears an axis cca. 3 mm. thick and sporangia about 9 mm. long. It is therefore quite identical with Zalesskij's *L. kidstoni*. Hartung's specimens (Pl. 15, fig. 74, 75) seem to be still much bigger wherefore they stand much nearer to our following strobili of *Lep. meunieri* Ren. Zeiller, which are to be met also very often in the Central Bohemian coal districts associated to the true *L. kidstoni* (for instance at the well known Feistmantel's locality Červená Hůrka in Kralupy).[6])

To complete all previous statements I have still to mention that even among the strobili figured by Ad. Brongniart in 1838 as well as by Binney in 1871 there are several specimens of strobili, which may be also in a certain measure compared with the just mentioned Zalesskij's type of *L. kidstoni*. From Brongnart's work we have to take account especially specimens (see our table in the chapter about *L. variabilis*) figured in Pl. 22, fig. 1, 3, Pl. 23, fig. 3, Pl. 24, fig. 1, 2, 3, Pl. 25, fig. 1. From Lepidostrobi specimens figured by Binney the following ones may be compared with Zalesskij's form:

Name	Width in cm of the		Length of the sporangia	Locality
	strobilus	axis		
L. harcourti Pl. 7, fig. 1, 2, 3 etc.	3.1	0.3	1.2	Oldham: Upper foot coal. — Coal balls
L. vasculare Pl. 8, fig. 1, 2, 3 etc.	2.7	0.3	1.-	

[6]) In my study of the plant remains from the Balkan Carboniferous from 1942 I regarded both forms as rather identical, having notyet sufficient knowledge about the various strobili of the Lepidostrobus types of our Central Bohemian Carboniferous.

Both have been later united under only 1 species name by W i l l i a m s o n, the *L. oldhamius*, a *Lepidostrobus* type characterised before all on the bases of its anatomical features. On account of a quite different state of preservation (dolomitic incrustation) it is very difficult to compare it in detail with our specimens from Central Bohemia, which are only mere impressions. It seems however that B i n n e y's specimens are still somewhat bigger and that they exhibit at the other hand also certain similarities to the bigger strobili of *L. meunieri* R e n. Z e i l. The same holds also for Arnold's strobilus of *L. bartleti* (1930, pp. 1028—1032, fig. 1) preserved in a dolomitic coal ball from the Pottsville series of the pennsylvanian Carboniferous of N. America. By its dimensions this strobilus stands still nearer to our Bohemian specimens of *L. kidstoni* Z a l, than the just cited B i n n e y's (resp. W i l l i a m s o n's) species. It measures cca. 2,4 cm. accross, its axis is 3—4 mm. thick and its sporangia 8 mm. long. Its total length according to Arnold is at least 11,5 cm.

S t r a t i g r a p h i c a l d i s t r i b u t i o n:

Strobili of the type of *L. kidstoni* Z a l. have been collected till present only in the Radnice coal measure series.

Kralupy. — Shales containing iron stone nodules of the hor. of the Main Kladno coal-measure (i. e. Upper Radnice coal measure) at the hill Červená Hůrka.

Lužná (near Rakovník), — Mines at the place "Na Belšance". — Hor.: Hanging shales of the Lubná coal measure.

Nýřany. — Mine Krimich. — Hor.: Hanging shales of the coal measure No. II (i. e. Upper Radnice coal measure).

4. *Lepidostrobus meunieri* R e n. Z e i l. Pl. I, fig. 5, 6, 7.

This name appears in the more recent literature rather rarely. It was for instance mentioned from the Saar coal districts in the Upper Ottweiler series (by H e m m e r, 1920; see also the note in S i m s o n - S c h a r o l d, 1934). The original description is to be found in M. B. R e n a u l t and R. Z e i l l e r 1888/90 (pp. 524, Pl. 61, fig. 2). Unfortunately the specimen described by them is very deficient; especially its top part is very unconveniently compressed. Nevertheless it shows many of the details important for the taxonomy of the lepidodendroid strobili. A very similar specimen was described and figured already long ago by L i n d l e y and H u t t o n (1831/37, vol. III, Pl. 162) under the name of *Lepidostrobus comosus* (see also notes in: W. J. J o n g m a n s, 1930, pp. 480; R. K i d s t o n, 1866, pp. 196 and 1890/1, pp. 375). Also this specimen shows a very unconveniently compressed top.

Both these strobili as to their shape and dimensions stand no doubt between our just described *Lepidostrobus ornatus* Bgt. (resp. *L. variabilis* L. H.) and between several of the following larger forms mentioned in the literature generally under the term of *Lepidostrobus Geinitzi* S c h i m p. This is also the reason, why certain palaebotanists regarded L i d l e y and H u t t o n's strobili of *L. comosus* as identical with S c h i m p e r's *L. geinitzi* (though with some doubts; e. g. R. S c h i m p e r), others believed it to be very nearly related with *L. variobilis* L. H.

(W. J. Jongmans, 1930). The dimensions and the stratigraphical distribution of both these strobili is as follows:

Name and fig.	Width of the		Length of the sporangia	Locality and strat. horizon
	strobili	cone axis		
L. comosus L. H., 1831/37: Vol. III, Pl. 162	3.9 cm. (at the top: 2.1)	0.5 cm.	1.2 cm. (at the top: 0.8)	Burdiehouse near Edinburgh: Calciferous sandstone series
L. meunieri Ren. Zeil., 1888/90: Pl. 61, fig. 2	3.6 (at the top: 2.-)	0.4—0.5	1.- (at the top: 0.7)	Commentry: Stephanian

The difference of the geological age of these two specimens is indeed here so great, that it is very possible, that we have to do with strobili of two different *Lepidodendron* species, which are of a nearly equal outer appearence. It is therefore extremely difficult to distinguish one from the other according to mere impressions. Because our specimens of Central Bohemia were collected in upper westphalian or in staphanian horizons, I prefer to use in our cases Renault-Zeiller's term of *L. meunieri,* which is relating also to rather young specimens.

Strobili of the type of *L. meunieri* Ren. Zeil. are in our Central Bohemian coal districts very frequent. It is very interesting that their stratigraphical distribution is a very large one; they are to be found numerously in all three coalbearing divisions of our Central Bohemian Carboniferous, i. e. in the Radnice coal measure series as well as in that of Nýřany or of Kounov. Utterly in vain I attempted to find out whether there are in their shape, dimensions or arrangement and shape of their sporophylls some differences between the specimens collected in deeper (i. e. westphalian) horizons and those collected in higher levels (i. e. stephanian). Of course it is not excluded that further, especially microscopical studies, will reveal some convenient diagnostic marks (especially between the two mentioned foreign specimens).

Our *Lepidostrobus meunieri* Ren. Zeil. specimens are about 3,5 cm. wide provided with an axis cca. 3—4 (or even 5) mm. thick. The basal sporangium bearing parts of the sporophylls are nearly vertically attached to the cone axis being cca. 1—1,2 cm. long. The free leafy portions of them are lanceolate and sharply pointed, broadest in the basal part (cca. 4 mm.), slowly narrowed to the top, one nerved, 1,5 till 1,75 cm. long, bent upwards and not closely adpressed to the cone body but rather slightly standing off.

This type of cones is in our Radnice coal measure series often associated (f. inst. at Kralupy) with our *Lepidostrobus kidstoni* Zal., but not so in the younger horizons of our Carboniferours. Here i. e. in the Nýřany or Kounov coal measures we may find it often accompanied by some very similar strobili, which differ from the true *L. meunieri* Ren. Zeil by essentially thicker axis (I am describing them in the following under the new name of *Lepidostrobus stephanicus*). According to my experiences

Lepidostrobus meunieri Ren. Zeil. and *L. kidstoni* Zal are often to be met together also in the westphalian series of the Carboniferous of various foreign countries.

As to the various Lepidodendroid strobili figured hitherto from our Bohemian coal districts, I believe that we have to identify with this type before all Hofmann-Ryba's specimen of *Lepidostrobus variabilis* from 1899, Pl. 16, fig. 3, which is cca. 3—4 cm. thick and provided by an axis cca. 5—6 mm. thick. It was found at Nýřany in the mine Krimich. Further we have to join hereto also Purkyně's specimen from 1920, Pl. 4, fig. 2 described also under the name of *Lepidostrobus variabilis*. This specimen was found in the permian shales at Ploužnice (in the region of Lomnice nad Popelkou); it measures cca. 3,5 cm. across.

As to the strobili mentioned in the foreign literature, I may join to this type before all several strobili figured and described under the name of *L. variabilis* by E. Bureau (1914) from the coal district of Basse Loire (especially his Pl. 37, fig. 5 and perhaps also Pl. 37, fig. 7), and further several specimens figured by W. Hartung (1935, Pl. 15, fig. 74 and 75) from the Carboniferous of Central Balkan in Bulgaria (Loc. Carecal).[7]) It is very interesting to note, that even here (France, Bulgaria) just as in the Carboniferous of Central Bohemia *L. meunieri* type occurs in the same beds as *L. kidstoni Z a l.*

I suppose that from the various Lepidostrobi described by A. Brongniart in 1838 the most similar to our *L. meunieri* Ren. Zeil. are those strobili, which were compared by R. Kidston with his *L. spinosus* and which measure cca. 3,3 cm across (see the table in the chapter about *L. variabilis).* As to the classical petrified Lepidostrobi specimens from England we have to compare with our *L. meunieri* perhaps (as already pointed out in the chapter about *L. kidstoni)* Williamson's *L. oldhamius* (1893) i. e. Binney's specimens (1871) of *L. harcourti* and *vasculare.*

Stratigraphical distribution:

The coal district of Plzeň:

The Radnice coal measure series:

Žebnice near Plasy. — Shales accompanying the coal measure corresponding with the Upper Radnice coal measure.

The Nýřany coal measure series:

Nýřany. — Hanging shales and cannel coal seam of the Nýřany coal measure.

The Kounov coal measure series:

Perhaps we have to join hereto several casts of strobili collected at the mines of the place "Na Čabalkách" near Horní Bříza in the Tonsteine shales of the Kounov coal measure.

The coal district of Kladno and Rakovník:

The Radnice coal measure series:

Kralupy n./Vlt. — Shales (containing iron stone nodules) corresponding to the Upper Radnice coal measure (Main Kladno c. m.) of the Červená Hůrka.

[7]) The respective dimensions of both these specimens see in the table in the chapter about *L. variabilis.*

The Kounov coal measure series:

Kounov. — In the sapropelic coaly shales called "švartna" (Schwarte) of the hanging of the Kounov coal measure.

The coaldistrict of Radnice:

Břasy. — In the hanging shales of the Upper Radnice coal measure. Perhaps hereto belongs also a slightly bigger specimen collected in the well known Tonsteine horizon (brousky, Scheifsteine) at Svinná.

The coal destrict "Na Lísku" at Zdejcina near Beroun:

Zdejcina. — Mines in the forests "Na Lísku". — Hor.: Black hanging shales of the coal measure (Upper Radnice coal measure).

5. *Lepidostrobus stephanicus* n. sp. Pl. II, fig. 2, 3, 4, 5, 6.

In the Nýřany and in the Kounov coal measure series of Central Bohemia certain strobili are to be found, which are very similar to *Lepidostrobus kidstoni* Z a l., but which differ from this last "species" by an essentially thicker axis, which is a very remarkable feature of these rather thin strobili. Quite identical strobili are known to me also from the lower stephanian beds (the Upper Svatoňovice coal measures) of the Carboniferous in the coal district of Svatoňovice near Trutnov. The width of these strobili is about 2, 6 cm. till 3 cm., their axis measures cca. 0,5—0,7 mm. across. The basal sporangium bearing portions of the sporophylls are 1 cm. long, their free distal leafy parts are upwards bent like in *L. kidstoni* Z a l. and slightly adpressed to the cone body.[8])

In the present literature I do not know any *Lepidostrobus* "species" which might be precisely compared with our form. Perhaps some similarity is to be observed in B r o n g n i a r t's *Lepidostrobus sp.* from 1938, Pl. 22. fig. 4, which measures cca. 2,75 cm. across, is provided with an axis 6,5 mm. thick and bears sporangia cca. 1 cm. long. Unfortunately just as in so many B r o n g n i a r t's figures a precise comparision is hardly possible.

[8]) In the specimens conserved in the Nat. Museum, Prague, the following dimensions have been stated:

	Width in cm. of the		Length in cm of the sporangia
	strobili	cone axis	
Specimens from the Nýřany coal m. ser. (cannel coal):	2.6, 2.8 till 3.-	0.6, 0.8	cca. 1
Specimens from the Kounov coal m. ser.:	2.7, 3.1	mostly 0.5	0.8, 0.9
Specimens from the Upper Svatoňovice coal m. ser. (coll. O. Feistmantel):	2.9	0.5	0.8

Stratigraphical distribution:

The coal district of Plzeň:

The Nýřany coal measure series:

Nýřany. — Coal mines in the surroundings. — Hor.: Cannel coal seam of the Nýřany coal measure.

The coal district of Kladno-Rakovník:

The Nýřany coal measure series:

Rakovník. — Coal mines of the Comp. Moravia eastward from the town: pit Moric. — Hor.: Hanging shales of the coal seam called "věnec".

The Kounov coal measure series:

Studňoves near Slaný. — Hor.: hanging shales of the Kounov coal measure.

Kounov. — Hor.: the sapropelic coal seam called "švartna" (Schwarte) in the hanging of the Kounov coal measure.

6. *Lepidostrobus obovatus* A. R e n. sp.

Pl. III, fig. 7, Pl. IV, fig. 3, 4, Pl. VI, fig. 1.

Under this term I am describing several considerably short and cylindrical strobili, which as to their width and other features are very similar to our *Lepidostrobus ornatus* B g t. or *kidstoni* Z a l., and which not only in our coal districts but also in various foreign countries were collected often in direct connection with thinner shoots of *Lepidodendron obovatum* S t b g. Judging according to the notes in W. J. J o n g m a n s 1930 (pp. 504), they represent no doubt those strobili which this author treated (1928, 1930) under the term of *Lepidostrobus ornatus*. But as mentioned already above the term of *L. ornatus* was applied originally by L i n d l e y and H u t t o n as well as later by R. Z e i l l e r to some rather elongated strobili, essentially differing from our short ones. We cannot therefore use it at the same time for our shorter strobili of *L. obovatum*. A. R e n.

As far as I know these strobili from our Central Bohemian regions, they are about 6 till more than 9 cm. long at a width of cca. 2,2 till 27 cm. They hardly attain a length of 1 dm. The basal sporangia bearing part of their sporophylls are about 7—8 mm. long. The distal leafy parts of the sporophylls are like in *L. kidstoni* Z a l. or *ornatus* (P a r k.) B g t. bent upwards and more or less adpressed to the cone body. The cone axis is nearly of the same features as in *Lepidostrobus kidstoni* Z a l, cca. 3—4 mm. thick.

On account of the striking similarity (without regard to their length) between the strobili described just here and between those known as *L. kidstoni* Z a l. (which are only slightly thicker), the question may arrise, if perhaps between both do not exist some very close relations (young cones, mature cones). But fossils known till present do not yet allow any solution of this task at the mean time.

From foreign coal districts a similar specimen was figured also in direct connection with *L. obovatum* S t b g. shoots by A. R e n i e r 1910,

Pl. 3 a, b from the coal district of Charleroi in Belgium (mine: puits des Hamendes, coal seem Duchesse). It is cca. 2 cm. thick and cca. 4,5 cm. long, i. e. still shorter than in our discoveries from Central Bohemia.

S t r a t i g r a p h i c a l d i s t r i b u t i o n: Specimens of *Lepidostrobus obovatus* A. R e n. were collected just as its mother plant *Lepidodendron obovatum* S t b g. only in various horizons of the Radnice coal measure series.

The coal district of Merklín:

Merklín. — Coal mines at the place "Na Výtoni": pit Holzner. — Hor.: Hanging shales of the Plzeň coal measure.

The coal districts of Plzeň:

Nýřany. — Mines at the place "Pankrác" (N. from Nýřany). — Tonsteine-horizon (brousky, Schleifsteine) between the Lower and Upper Radnice coal measure.

Nýřany. — Coal mine Josef. — Hor.:?

Tlučná. — Coal mine Krimich II. — Hor.:?

The coal district of Kladno-Rakovník:

Kladno. — Coal mines in the surroundings: Fierlinger II. (Max) near Libušín, Fierlinger I. (Mayrau) at Vinařice a o. — Hor.: hanging shales called "mydláky" of the Main Kladno coal measure (i. e. Upper Radnice coal measure).

Perhaps hereto may be joined also several impressions of transversally broken strobili collected at the following localities:

Nýřany (mine Krimich, hor.?), "Pankrác" N. from Nýřany (hor.?), Břasy near Radnice (hor.: hanging shales of the Upper Radnice coal measure), Pejpina (at Zdejcina near Beroun; hor.: the Tonsteine-horizon [brousky, Schleifsteine] below the Upper Radnice coal measure), Kladno (mine Gottwald [Ronna] at Hnidousy; hor.: the Tonsteine interlayer [opuka] within the Main Kladno coal measure [i. e. Upper Radnice coal measure]), Rakovník (mines of the Comp. Moravia eastward from the town; hor.: the Upper Radnice coal measure).

7. *Lepidostrobus brongniarti* G o e p p. (in B e r g e r).

Pl. V, fig. 1, 2, 3, Pl. VIII, fig. 2.

R. B e r g e r 1848 (pp. 22, Pl. 3, fig. 39, 40) and H. R. G o e p p e r t 1852 (pp. 177, Pl. 39, fig. 2,3) described from the Carboniferous of Upper Silesia from the mines at Zalenze some strobili (partly in a noncompressed state in the iron stone nodules), which by their slenderness exhibit a certain similarity with the strobili of *Bothrodendra,* being however always slightly thicker than true *Bothrostrobi.* On the other hand they are very similar to the strobili described by O. F e i s t m a n t e l from the Carboniferous of Central Bohemia under the name of *Lepidostrobus lycopoditis;* but true G o e p p e r t's *L. brongniarti* is an essentially thinner form.

The figures in G o e p p e r t's as well as B e r g e r's papers are relating to only one and the same specimen. Unfortunately they offer only a very insufficient idea of the shape and particularities of this "species".

They suffice perhaps only for the statement, that we have here a *Lepidostrobus* (see especially the cross section fig. 40 in Berger 1848 resp. fig. 3 in Goeppert 1852) very similar as to its outer appearence to *L. ornatus* or *lycopoditis* but of an essentially thinner shape measuring only about 1,4 cm in cross section.

In the material of fossils coming from our Central Bohemian Carboniferous we may find (in the Radnice coal measure series) also several very thin strobili associated often to the rather thin *Lepidostrobi* which belong to *Lepidodendron similis* Kidst., *acutum* Presl. or *ophiurus* Bgt. These are certainly very similar to those mentioned by Berger and Goeppert from Upper Silesia as *L. brongniarti*. They are cca. 1,1 till 1,4 mm. thick and are provided by a very thin axis (only about 2 mm. across). The axis of several specimens of these very thin strobili is passing at its base into sterile twigs, which are provided by a foliage wholly similar to that of the more slender leafy shoots of *Lepidodendron simile Kidston*. But well developed strobili found in connection with leafy twigs of *Lepidodendron simile* Kidst. are in fact considerably thicker measuring about 1,6 till 1,8 cm. (see in the following chapter on *Lepidostrobus lycopoditis* O. F.). I think therefore that we are standing here before a very delicate task, whether perhaps *Lepidodendron simile* Kidst. did not bear strobili of two kinds (perhaps thinner male cones and bigger female cones) or whether perhaps our *brongniarti* forms do not represent only immature strobili. Of course on the bases of mere impressions this problem cannot be solved.

Similar (rather thin) strobili are mentioned also from various coal districts of abroad under various names in the literature.

An evidently identical *Lepidostrobus* specimen was figured by the author of this paper (F. Němejc 1942, Pl. 3, fig. 18) from the Bulgarian Carboniferous (from the anthracitic coal seams of the mines at Carecal near Svoge in Central Balkan mountains) as *Lepidostrobus sp. A*. This specimen measures cca. 1 cm. across. It was found here also in shales where the fragments of *Lepidodendron simile* Kidst. are very abundantly present (of course simultaneously along with other *Lepidodendron* species as well as with several *Bothrodendron* specimens).

Similar specimens have been figured by Binney (1871) from the Lower Carboniferous of the Isle of Aran, Scotland (loc.: Logan Bay; trappean ash beds) under three various names. Their dimensions are as follows: -see the table on pp. 32.

Further also several specimens known as incrustations (e. g, in the dolomitic coal balls) may be compared with this species. Especially similar seems to be a specimen described under the name of *Lepidostrobus Masleni* Jongm. (i. e. *L. foliaceus* Maslen 1899) by Koopmans 1928 (pp. 14, fig. 71) from the coal balls of the Carboniferous of Holland. This specimen measures hardly 1,5 cm across.

Very similar to Goeppert's *L. brongniarti* are also strobili, which by several english palaeobotanists are ascribed to *Lepidodendron veltheimii* from the lower carboniferous beds (see D. H. Scott 1900 [Studies etc. 1. edd.] pp. 170, fig. 67—70, resp. 1920 [Studies etc. 3. edd.] I. Vol., pp. 163—169, fig 75—77, 78 C, D, 81, 83; W. C. Williamson

Name and figure	Width in cm. of the		Length of the sporangia in cm.
	strobilus	axis	
L. ambiguus pp. 55, Pl. 11, fig. 1	1.3	0.15	0.45
L. latus pp. 57, Pl. 11, fig. 3	1.4—1.5	0.1	0.5—0.6
L. wiinschianus pp. 56, Pl. 11, fig. 2 (at the base with leaves like on shoots of *Lepidodendron simile* K i d s t.)	1.15 (without the leafy distal parts of the sporophylls only 0.8)	0.1	0.4

1872 [Organ. XIX] Pl. 8, fig. 51, 52) and which were named by W. J. J o n g m a n s in 1930 (pp. 350—352) as *Lepidostrobus scotti.* According to S c o t t's figures they are about 1,3 cm. thick with an axis measuring cca. 1,5 mm. across. Their sporangia are cca. 0,5 cm. long and are evidently heterosporous. By these features they agree well with B i n n e y's *L. wiinschianus.* The other two B i n n e y's species (i. e. *L. latus* and *ambiguus*) are also very similar but hitherto no heterospory were stated within them.

Finally further similar specimens of *Lepidostrobi* were mentioned from the Russian coal districts. H. Čirkova described such a strobilus (1934 pp. 532, fig. 9) from the Carboniferous of the coal districts of the eastern slope of the Ural mountains under the name of *Lepidostrobus zalesskiji.* She ascribes it to the lower carboniferous species of *Lepidodendron acuminatum* G o e p p. It is nearly 1,3 cm. thick and provided by an axis 1,5 mm. thick and bearing sporangia cca. 5,5 mm. long. Nearly equal strobili were described by W. J. J o n g m a n s (1939, Pl. 21, fig. 46—48) from the Doněc coal district (loc.: Papas Tarama; zone C till $C_1^?$ — Beševien series i. e. according to J o n g m a n s viséen series). These last strobili are also very thin measuring only 1,2—1,4 cm. across; they were regarded by W. J. J o n g m a n s as strobili of *Lepidodendron lycopodioides* in the sense of Bureau's monographical work from 1914 (i. e. our *Lepidodendron simile* K i d s t o n).

According to all preceeding statements I believe that this very thin form of strobili known as *L. brongniarti* G o e p p. (in B e r g e r) is proper to more species of the genus of *Lepidodendron* and that the true nature of such strobili may be recognized only after a very thorough study of the spores contained in their sporangia, which in the case of mere impressions is quite excluded.

S t r a t i g r a p h i c a l d i s t r i b u t i o n:

Strobili of the form of *L. brongniarti* G o e p p. (in Berger) were collected in the Central Bohemian coal districts only in the various hori-

zons of the Radnice coal measure series, mostly associated with remains of *Lepidodendron simile* K i d s t.

The coal district of Plzeň:

Blatnice, the old abandoned gallery N. E. of Blatnice. — In the iron stone nodules of the Plzeň coal measures.

Kamenný Újezd, mine Lazarus.

Nýřany, mine Krimich.

Nýřany, mine Sylvia at the place "Na Pankráci" (N. from Nýřany).

The coal district of Kladno-Rakovník:

Kladno, various mines in the surroundings (e. g. mine Gottwald [Ronna] at Hnidousy). — In the whitish Tonsteine interlayer (Velká opuka) of the Main Kladno coal measure (i. e. Upper Radnice c. m.).

Příčina (W. from Lubná near Rakovník), mine Ludvík at the place "Na Brantech". — Shales of the Upper Radnice coal measures.

8. *Lepidostrobus lycopoditis* O. F e i s t m.

Pl. III, fig. 4, 5, 6, Pl. IV, fig. 1, 2, Pl. VII, fig. 1, Pl. VIII, fig. 3, 4, 5, 6.

O. F e i s t m a n t e l mentioned in his papers from 1871 (pp. 58) and 1883 (pp. 271) under the name of *Lepidostrobus lycopoditis* some rather thin and long cylindrical strobili, which he found always associated to the remains of the slender *Lepidodendron* leafy shoots regarded by him as *Lepidodendron selaginoides* S t b g. He supposed them therefore to be the fructifications of this *Lepidodendron.* O. F e i s t m a n t e l knew such strobili from the coal mines at "Pankrác" N. from Nýřany as well as from the mine Lazarus at Kamenný Újezd (near Nýřany), but unfortunately he never figured them. Several specimens of these strobili from his own collections are conserved in the geological department of the National Museum, Prague.

Revising the old F e i s t m a n t e l's material of fossils from the Nýřany region as well as other later collections from the same places as far as conserved in the National Museum, Prague, I stated that these thin strobili are not associated to the true S t e r n b e r g's *Lepidodendron selaginoides,* but indeed to *Lepidodendron simile* K i d s t., which very often was confused with the just named S t e r n b e r g's species. And as I stated already in my study on the *Lepidodendra* from the Central Bohemian coal districts (F. N ě m e j c 1947), O. F e i s t m a n t e l used the name of *L. selaginoides* erroneously for at least 3 or even 4 various shortleafy types: *Lepidodendron simile* K i d s t., *ophiurus* B g t., *selaginoides* S t b g. and even for several fragments of leafy shoots of *Bothrodendra* (for instance his *L. selaginoides* of 1875/6, Pl. 31, collected at Kladno is a typical specimen of *L. simile* K i d s t).

The strobili in question are rather similar to the above described *Lepidostrobus ornatus* L. H. (i. e. *L. variabilis* in K i n d s t o n's sense). But they are essentially thinner and are provided by a more slender axis. On the other hand they exhibit also a strong similarity with the strobili, which in the foregoing chapter of this paper are described under the name of *L. brongniarti.* They measure mostly 1,6—1,7 cm. (several of them only 1,5, other ones till 1,8 cm.) across and their axis is hardly 3 mm. thick.

Their sporangia are 5—6 mm. long and nearly vertically orientated to the cone axis. The distal leafy portions of their sporophylls are bent upwards and rather closely adpressed to the cone body.

Such strobili may be very often met in association with remains of *Lepidodendron simile* Kidst. But besides I have found quite similar strobili also associated to shoots of other shortleafy *Lepidodendra* as for instance to *Lepidodendron acutum* Presl and also to *L. ophiurus* Bgt. Directly in connection with leafy shoots I found them in several specimens of *L. simile* Kidst (specimens from Nýřany and from Kladno) as well as in those of *L. acutum* Presl (specimens from Kladno). This statement attests well that in some cases strobili of quite similar outer appearence and size may belong to different Lepidodendron species. A precise determination and definition of such strobili is then possible only by means of microscopical features (especially according to the shape and size of their spores), which in the case of our mere impressions is quite excluded.

As to the foreign literature, our *L. lycopoditis* O. Feistm. are mentioned by W. J. Jongmans in 1930 (pp. 495), who on account of Feistmantel's notes concerning its relations to Sternberg's *L. selaginoides* expressed the suspicion of its possible *Bothrostrobus* nature. But their true *Lepidostrobus* nature is now well attested not only by the statement that O. Feistmantel joined under Sternberg's name of *Lepidodendron selaginoides* also several short leafy true *Lepidodendra,* but also by the discovery of such cones in direct connection with such short leafy *Lepidodendra.*

From the various strobili described and figured from abroad, which are very similar (or identical) with our *L. lycopoditis* O. Feistm., especially several strobili mentioned by E. Bureau in 1914 from the coal district of Basse Loire are to be taken into consideration. They were found also partly in association partly in direct connection with specimens of the shortleafy *Lepidodendron,* called by him *L. lycopodioides,* which is our *Lepidodendron simile* Kidst. The width of Bureau's specimens is as follows:

Pl. 33, fig. 2 ... 1,5—1,7 cm. (isolated specimen)
Pl. 33, fig. 3 ... 1,5 cm. (isolated specimen)
Pl. 34. fig. 2 ... 0,9 cm. (basal part of a strobilus at the top of a leafy shoot)
Pl. 34, fig. 3 ... 1,3 cm. (in connection with a leafy shoot)
Pl. 34, fig. 4 ... 1,5 cm. (in connection with a leafy shoot)
Pl. 34, fig. 5 ... 1,4 cm. (in connection with a leafy shoot)
Pl. 34, fig. 6 ... 1,4 cm. (in connection with a leafy shoot)

W. J. Jongmans expressed the following opinion about these Bureau's specimens: ... "Die Strobili haben große Ähnlichkeit mit denen, welche er bei *L. selaginoides* abbildet und können sehr gut zu dem gleichen Typus gehören. Diese Form muß näher studiert werden." I believe that this opinion is not quite just, because both Bureau's types belong to two essentially different mother plants and exhibit evidently also different dimensions: the strobili of Bureau's *L. selaginoides* are

essentially thinner than those of his *L. lycopodioides* (i. e. our *L. simile* K i d s t.) The second bigger type of both is no doubt F e i s t m a n t e l's *Lepidostrobus lycopoditis*. Among the just mentioned B u r e a u's specimens is also one (Pl. 34, fig. 2) unusually thin (only 0,9 cm.) strobilus (similar to Schimper's *L. parvulus*). But just such forms have been found also in our Bohemian coal districts associated to other normal specimens.

Further we may compare our *L. lycopoditis* O. F e i s t m. also with the following foreign specimens:

1. *Lepidostrobus brongniarti* G o e p p. — This species was first described by B e r g e r in 1848, pp. 22, Pl. 3, fig. 39, 40 as "*Cardiocarpon: Lepidostrobus* and later defined by H. R. G ö p p e r t in 1864/5 (pp. 177) on the bases of specimens conserved in iron stone nodules from the mines of Zalenze (Upper Silesia). According to G o e p p e r t's figures and description (Pl. 39, fig. 2,3) these strobili are only 1,3—1,4 cm. thick, their axis cca. 2 mm. thick and sporangia about 0,5 cm. long. They are thus very similar to the most slender specimens of *Lepidostrobus lycopoditis*. But the mutual relation of these both forms cannot be cleared up on the bases of mere impressions (see also in the foregoing chapter dealing with *L. brongniarti* G o e p p.).

2. A strobilus figured by A. B r o n g n i a r t under the name of *Lepidostrobus sp.* in 1838, Pl. 24, fig. 5. This specimen is cca. 1,5 cm. thick and provided by an axis measuring about 2 mm. across. W. J. J o n g m a n s expressed the opinion, that this strobilus belongs perhaps to *Lepidodendron ophiurus* B g t. It is no doubt also very similar to the more slender specimens of our *Lepidostrobus lycopoditis* O. F e i s t m.

3. *Lepidostrobus tenuis* B i n n e y. — This "species" desmribed by B i n n e y in 1871 (Pl. 9, fig. 4) represents strobili, which as to their shape and size are especially similar to our form of *L. lycopoditis*, measuring about 1,7 cm. across. But their axis is only cca. 1 mm. thick and the sporangia bearing basal parts of the sporophylls are 0,75 cm. long. — Also several other thin strobili described by B i n n e y in the same paper exhibit strong similarities with our *L. lycopoditis*. I may point out especially his *L. ambiguus, latus* and *wünschianus*. The same holds also of S c h i m p e r's *Lepidostrobus parvulus*.

4. The same relations to our *L. lycopoditis* as in the just mentioned three cases, may be pointed out also in several rather thin strobili, which the author of this paper has described and figured under the name of *Lepidostrobus sp. A* from the Bulgarian Carboniferous of the region of Svoge and which we have compared in the present paper already with our *L. brongniarti* G o e p p.

5. As to the various specimens described as incrustated strobili (e. g. in the dolomitic coal balls or in a silicified state with conserved inner structures, we have especially to point out B a s s l e r's *L. masleni* (1919, pp. 103; i. e. *L. foliaceus* M a s l e n 1899). K o o p m a n s in 1928, pp. 14, Fig. 71 described under this name a strobilus about 1,5 cm. thick (see also in W. J. J o n g m a n s 1930; pp. 483) which agrees wholly with our specimens of *L. lycopoditis* from Bohemia, especially if these specimens are preserved as sculptural impressions resp. partly incrustated in iron stone nodules.

In all these just mentioned cases it is very difficult to trace some more reliable marks by which these specimens could be safely recognized from our form of *L. lycopoditis* O. F e i s t m. or at the other hand from the previous form of *L. brongniarti* G ö p p. (of course if present as mere impressions).

There is finally still one *Lepidostrobus* form, which is in a high measure similar to our *L. lycopoditis* O. F e i s t m. and which therefore must be taken also into consideration: the strobili, which have been described and figured by R. Z e i l l e r (1886/8, pp. 458, Pl. fig. 2 and 3) in direct connection with *Lepidodendron ophiurus* B g t. leafy shoots. These Z e i l l e r's strobili are nearly of the same dimensions as our *L. lycopoditis* O. F e i s t m.: his fig. Pl. 68, fig. 2 (found in connection with a leafy shoot) measures cca. 1,8 cm. across, another fig. Pl. 68, fig. 3 (an isolated strobilus) only 1,4 cm. But compared with our *L. lycopoditis* strobili, they exhibit a different outer appearence having the leafy distal parts of their sporophylls rather declined from the cone body, which causes a squarrose appearence. In contrary strobili which were ascribed to the same *Lepidodendron* species by R. K i n d s t o n 1914, Pl. 11, fig. 2,3 (the second one in connection with a leafy shoot) and which partly have been found also in direct connection with shoots of that species, exhibit upwards bent free sporophylls parts, which similarly as in our *L. lycopoditis* O. F e i s t m. are rather closely adpressed to the cone body. W. J. J o n g m a n s justly points out (1930, pp. 213) that in this case we have not to do with two different forms of Lepidostrobi, but merely with two different stages — young and mature strobili — of only one "species". Similar stages have been observed also in several rare cases on our Bohemian *L. lycopoditis* O. F e i s t m. (also in cases when found still attached terminally to the leafy Lepidodendron shoots) e. g. several specimens collected in the Tonsteine interlayer (Velká opuka) of the Main Kladno coal measure and conserved in the collections of the geological dep. of the Nat. Museum, Prague. I believe therefore that the strobili of *Lepidodendron ophiurus* B g t. are of the same general type as those of other our short leafy *Lepidodendra (L. similis* K i d s t. and *acutum* P r e s l). All are evidently very nearly allied with the foregoing form of *L. brongniarti* G o e p p. Many circumstances point also to the possibility of some near relations between these very narrow strobili to our bigger type of *Lepidostrobus ornatus* (P a r k.) B g t.[9]) But on the bases of mere impressions we are unable to distinguish their true nature.

S t r a t i g r a p h i c a l d i s t r i b u t i o n:

Strobili of the form of *Lepidostrobus lycopoditis* O. F e i s t m a n t e l occur in the same stratigraphical horizons as the foregoing *L. brongniarti* G o e p p. or *L. ornatus* (P a r k). B g t. i. e. in various beds of the Radnice coal measure series of the Lower grey beds.

The coal district of Plzeň:

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[9]) See the discoveries of micro and macrospores of several strobili of the type of *L. ornatus* resp. *L. lycopoditis* from the British coal districts as described by W. G. C h a l o n e r in 1935 *Lepidostrobus dubius* B i n n e y, *allantonensis* C h a l o n e r and *russelianus* BINNEY).

Bílá Hora. — Iron stone nodules of the coal measure which is most probably to be correlated with the Plzeň coal measures.

Nýřany. — Coal mines at the place "Pankrác" N. from Nýřany. — In the Tonsteine beds (brousky, Schleifsteine) between the Lower and Upper Radnice coal measure.

Nýřany. — Coal mines at the place "Pankrác"; specimens in various greyish shales of unknown horizons.

Nýřany. — Mine Krimich, greyish shales from the roof of the coal measure No. II. (Upper Radnice coal measure).

Nýřany. — Various specimens in greyish shales from nearer unknown coal mines.

The coal districts of Radnice:

Břasy. — Shales of the roof of the Upper Radnice coal measure.

The coal district of Kladno and Rakovník:

Kladno. — Various mines in the surroundings (Gottwald [Ronna] at Hnidousy, Fierlinger II. [Max] at Libušín, Fierlinger I. [Mayrau] at Vinařice a. o.). — Mostly in the whitish Tonsteine interlayer (called "velká opuka") within the Main Kladno coal measure (i. e. the Upper Radnice c. m.).

Kladno. — Mine Zápotocký [Prago] near Dubí. — In the iron stone nodules coming most probably from the Lower Radnice coal measure ("Grundflöz" of Kladno).

9. *Lepidostrobus ovatus* n. sp.

Pl. II, fig. 7, 8.

Under the name of *Lepidostrobus ovatus* I am describing here several small elongated egg shaped strobili collected in the cannel coal seam of Nýřany, which in various collections have been signed mostly by the name of *Lepidostrobus attenuatus* Goepp. They measure untill about 1,2 cm. across, their axis is cca. 2 mm. thick, the sporangia are about 5 mm. long. Their length attains about 3 cm. In several rare cases, when the strobili are broken across, their sporophylls exhibit well the shape of their free leafy distal pertions: these are at the base cca. 1,5 mm. broad and from here up slowly narrowed to the top, exhibiting thus a narrow obcuneate shape, cca. 4 mm. long.

These strobili remind indeed very much several of the conelike fructifications described by H. R. Goeppert under the name of *Lepidostrobus attenuatus* from the permian beds at Broumov (1864/5, pp. 141, Pl. 19, fig. 8—13, Pl. 52, fig. 4,7), to which various authors are often joining also Goeppert's *Lepidostrobus gemmaeformis* (Goeppert, 1864/5, pp. 142, Pl. 52, fig. 3). According to the general appearence of Goeppert's figures I believe that not all Goeppert's specimens are true Lepidostrobi; many of them are perhaps more probably cones of the permian gymnospermous Walchiae (e. g. *L. attenuatus* of his Pl. 19, fig. 11, 12, as well as *L. gemmaeformis* of his Pl. 52, fig. 3). The true nature of the other Goeppert's specimens cannot be clearly stated on the bases of mere Goeppert's pictures. Certainly they do not represent only

a single type. Several of them seem to have attained a considerable length, for instance his fig. Pl. 52, fig. 7 (an elongated cylindrical strobilus). The dimensions of Goeppert's specimens (except of those, which represent true Walchia cones) are similar to our cannel coal specimens from Nýřany. According to Goeppert's figures they are as follows:

	Width in cm. of the		Length of the sporangia in cm.
	strobili	axis	
Pl. 19. fig. 8	1.1		
Pl. 19, fig. 9	1.5		
Pl. 19, fig. 10	1.3		
Pl. 19, fig. 13	1.2	0.2	0.5
Pl. 52, fig. 4	1.2		
Pl. 52, fig. 7	1.2		

As already mentioned it is very difficult to define more precisely the mutual relations between the various Goeppert's specimens, which makes a comparison with our cannel coal specimens from Nýřany still more problematic. Further we must take in mind that both types of strobili are separated one from the other by a very long stratigraphical time space: our cannel coal specimens are coming from beds of the Westphalian D, whereas Goeppert's specimens from the Lower Permian. That means that both forms inspite of their considerable similarity may belong to utterly different mother plants. Therefore taking into consideration all these circumstances, I regard at present as most suitable to assign our specimens from Nýřany by a special name (that of *Lepidostrobus ovatus)* and not to join them with the mentioned meanwhile rather problematic Goeppert's permian "species" of *Lepidostrobus attenuatus.*

Stratigraphical distribution:

All specimens of *Lepidostrobus ovatus* Njc. hitherto known have been collected only in the cannel coal seam of the Nýřany coal measures in the mines at Nýřany (mostly the old abandoned mine Humboldt), i. e. only in the Nýřany coal measure series of our Lower grey beds (Westphalian D).

10. Remarks on *Lepidostrobus geinitzii* Schimp. et auct.

This name was applied by Schimper (1870, pp. 62, Pl. 61, fig. 6,7; — only a schematical design of the sporophylls) to several very large strobili described previousely by H. B. Geinitz from Saxony, in which the free distal leafy upwards bent portions of the sporophylls are rather adpressed to the cone body or only very slightly declined from it, which is the chief difference from another still larger Schimper's type of strobili, the *Lepidostrobus goldenbergi,* where the distal leafy free

portions of the sporophylls are always very much declined from the cone body.

This Schimper's term, as already mentioned by W. J. Jongmans (1930 pp. 485), is not enough clear. Schimper, as told, has applied it to the large Lepidostrobi described by Geinitz (1855, pp. 50, Pl. 2, fig. 1—4) under the name of *Lepidostrobus variabilis* from the Saxonian coal districts of Zwickau and Lugau. But he has not add to his description any new figure of the cited Geinitz's specimens. His mere schemes are showing only the shape of the sporophylls as well as several details concerning their attachement to the cone axis.

Later various palaeobotanists brought into relations with this Schimper-Geinitz's saxonian type still many other more or less similar specimens (several of the authors are speaking only of a striking similarity, other ones directly of an identity). Besides many similar or even identical specimens were also described under special new names, several even under the very large and confused term of *Lepidostrobus variabilis*. With the aim to understand well the real sense of the term of *Lepidostrobus geinitzi* as used by most of the palaeobotanists, we must revise at least the following species mentioned (eventually figured) in the literature: -see the table on pp. 40 and 41.

The numeric data in this table are relating to the figures presented by the various authors in their descriptive works and not directly to the respective original type specimens, which mostly were not accessible to me. They are therefore not in all cases quite precise — especially as to the older works, which contain no photos but drawings. But nevertheless according to the width of the various cited strobili as well as according to the thickness of their axis we may easely state, that with the original term of *L. geinitzi* were joined by various later authors at least 2 or even 3 well distinguishable form species. But without a very detailed study of the single original type specimens a definitive delimitation of such form species will be hardly possible. Only in several few cases, where the figures are more carefully executed, a more precise and reliable definition is possible. Meanwhile I believe that we have to distinguish among them especially the following three types:

a) Before all we may state here a very big type, the axis of which attains nearly 1 till 1.5 cm. in cross section. This form was well figured by A. Hofmann and F. Ryba in 1899 as *L. variabilis* from the westphalian D series of Central Bohemia. It agrees well with several very big strobili which are figured by D. White from the Carboniferous of North America under the name of *L. princeps* Lsqx. In the following chapters I am describing it under the name of *L. crassus*.

b) Further we may distinguish here several also very big strobili, which are provided with considerably thinner axis attaining hardly 0.8 cm. across. To this type belongs no doubt the greatest part of strobili described in the literature under the name of *L. geinitzi* from the youngest westphalian series (Westphalian D) as well as from the stephanian beds (e. g. Renault's and Zeiller's [1888/90] *L. geinitzi* and *fischeri* from the Stephanian of Central France, Simson-Scha-

Name and fig.	Width in cm. of the		Length in cm. of the		Locality, horizon. — Remarks
	strobilus	cone axis	sporangia	distal sporophyll portion	
L. variabilis H. B. Geinitz, 1855, pp. 50:					Oberhohndorf: Scherbenkohlflöz (Saxony). Geinitz compared them with *L. comosus* L. H. (which is but a much thinner type).
Pl. 2, fig. 1	5.6	0.8	1.8	3	
Pl. 2, fig. 3	5.7	?	?	?	
Pl. 2, fig. 4	?	0.8	1.5	?	
L. variabilis v. Roehl, 1868/9: only Pl. 7, fig. 2	6	?	?	?	Gelsenkirchen, Zeche Hibernia (W. Germany) Roehl's Pl. 2, fig. 4 is a seed, Pl. 22, fig. 2 is most likely no strobilus and Pl. 29, fig. 17 is perhaps top of a leafy shoot.
L. variabilis O. Feistmantel, 1875/6:					
Pl. 43 (14), fig. 1	4.5	?	?	?	Žacléř
Pl. 44 (15), fig. 1	4.7	0.6	1.5-1.6	?	Žacléř
Pl. 44 (15), fig. 2	6.-	0.7 (-1.7)	1.7-2.3	?	Rakovník
Pl. 44 (15), fig. 3	4.5 (-1.5)	0.3 (-1.2)	0.6 (-1.6)	?	Rakovník
Pl. 44 (15), fig. 4	5.8 (-1.6)	0.5	0.5 (-2.5)	?	Rakovník
L. geinitzi R. Zeiller, 1886/88, pp. 501: Pl. 76, fig. 2	4.7	cca. 0.8	1.4	?	Nord: Mines de l'Escarpell, fosse No. 5, vein No. 17.
L. geinitzi M. B. Renault— R. Zeiller, 1888/90, pp. 527:					
Pl. 61, fig. 6	5.7	1.-	1.7	?	} Commentry
Pl. 61, fig. 6	? (more than 5.-)	0.9	1.6	2.6	
L. gaudryi M. B. Renault R. Zeiller, 1888/90, pp. 528: Pl. 61, fig. 4	8.-	0.7	cca. 1.5 —2.-	3.0—3.5	Commentry
L. gaudryi R. Zeiller, 1906, pp. 151: Loc.: Blanzy	—	—	—	—	According to the new Zeiller's point of view, we have to join to this species also other big Lepidostrobi described in 1888/9 under the name of *L. Geinitzi.*

Name and fig.	Width in cm. of the		Length in cm. of the		Locality, horizon. — Remarks
	strobilus	cone axis	sporangia	distal spo-rophyll portion	
L. fischeri M. B. Renault— R. Zeiller, 1888/90: Pl. 61, fig. 3	5.5	0.8	cca. 1.5	?	Commentry
L. fischeri R. Zeiller, 1892:	In this paper Zeiller expressed some doubts about the independence of this species: "... on peut, au surplus, se demender si ces trois espèces de Commentry (i. e. *L. fischeri, geinitzi* et *gaudri*) sont bien distinctes les unes des autres et si les differences que l'on peut constater entre elles ont réellement une valeur specifique."				
L. geinitzi R. Kidston, 1892/3: Loc.: Kilmaurs, Busbie pit (two fathoms below Ell-coal)	R. Kidston regards here as true *L. geinitzi* the following forms: *L. geinitzi* Schimper: 1870 *L. geinitzi* Zeiller: 1886/8 *L. variabilis* Geinitz: 1855 (Pl. 2, fig. 1, 3, 4) *L. variabilis* v. Roehl: 1868/9 (Pl. 7, fig. 2) *L. variabilis* O. Feistmantel: 1875/6 (Pl. 14, Pl. 15, fig. 1, 2)				
L. variabilis A. Hofmann— F. Ryba, 1899, pp. 86: Pl. 16, fig. 5	6.5	1.5	1.7	?	Kamenný Újezd. — According to W. J. Jongmans (1930) this specimen is identical with *L. geinitzi.*
see also: Pl. 16, fig. 16	Impression of a strobilus from Mirošov broken across, which is identical with our *L. (Lepidophyllum) hofmanni* Njc. from the cannel coal of Nýřany.				W. J. Jongmans (1930) regards this specimen as *L. lanceolatus.*
L. geinitzi Simson— Scharold, 1934, pp. 6: Pl. 1, fig. 7, 7a	7.3	1.1	2.-	3.2	Sulzbach, Fettkohle.
L. sp. A. Brongniart, 1838: Pl. 23, fig. 5	cca. 4.5	cca. 0.7	till 2	?	According to R. Kidston (1886) and W. J. Jongmans (1930) both these forms are identical with *L. goldenbergi.*
Pl. 24, fig. 6	cca. 6.5	?	?	?	
L. variabilis C. Purkyně, 1929, pp. 17 (resp. 33): Pl. 4, fig. 1	4.5—5	cca. 0.7	cca. 1.7	?	Ploužnice. — According to W. J. Jongmans (1930) both these specimens stand very near to *L. geinitzi.*
Pl. 4, fig. 2	3.5	0.5—0.6	1.-	?	

rold's [1934] *L. geinitzi* from the Fettkohle and Ottweiler Schichten of the Saar coal district as well as Geinitz's [1855] *L. variabilis* from the westphalian D series in Saxony). Many specimens of this type are known also from deeper westphalian horizons, their impressions are hardly to be distinguished by anything more important from the just mentioned younger discoveries. Such strobili were described from our Central Bohemian coal districts by O. Feistmantel (1875/6) under the name of *L. variabilis* from the surroundings of Rakovník (Westphalian C), by Ad. Brongniart (1838: *L. sp.* — Pl. 23, fig. 5 and Pl. 24, fig. 6) as well as by R. Zeiller (1886/9: *L. geinitzi* from Northern France (middle westphalian beds). Perhaps we have to join hereto also Roehl's *L. variabilis* (1868/9) from the westphalian beds of the Westphalia as well as at least a part of the specimens described by D. White (1899) from North America under the name of *L. princeps* (except Pl. 63, fig. 1, which belongs no doubt to the just foregoing form series). To this type of strobili belongs no doubt also Corda's *Lepidostrobus sternbergi* (1842), which is perhaps the oldest name, which ever has been applied to it. Therefore in the following chapters I am describing this type of strobili under this last Corda's name.

c) Finally we have to pay attention to a third type, which is represented by Zeiller's and Renault's (1888/90) *L. gaudryi* from the stephanian beds of Central France. This is also a very big form resembling very to the mentioned strobili described by Hofman and Ryba (1899) from the Nýřany coal measure series of Bohemia (Westphalian D), but differing from it by an essentially thinner axis attaining according to the pictures by Renault and Zeiller hardly 8 mm. across. This type of strobili is not yet known to me from the Central Bohemian coal basins.

As evident the term of *L. geinitzi* Schimp., especially in the sense given to it by the later authors, is not at all clear and I am not using it therefore in this paper. Various very big strobili, which were collected in the Bohemian coal districts and which belong to the types joined generally with this name, are described here under the names of *Lepidostrobus sternbergi* Cda. or *L. crassus* Njc. The third type i. e. that of *L. gaudryi* was not yet stated by me in the Central Bohemian basins.

11. Remarks on *Lepidostrobus goldenbergi* Schimp.

Until present I have not yet seen any true *Lepidostrobus goldenbergi* Schimp. from the coal districts of Central Bohemia. In 1886 J. Kušta (pp. 5—11) mentioned under this name some very large strobili from the coal mines at Lubná near Rakovník. Several of these specimens are conserved in the collections of the geol.-pal. dep. of the National Museum, Prague. They are considerably thinner, than the strobili cited originally by Schimper under that name and I regard them therefore to be identical with another big type of strobili, which was described from the Central Bohemian Carboniferous by A. Corda under the name of *Lepi-*

dostrobus sternbergi in 1842 (see in the next chapter about this "species").

It seems to me that there is in the literature no certainty, which of the various very big strobili are to be compared with the true *L. goldenbergi* Schimp. W. J. Jongmans in the Fossilium Catalogus from 1930 and 1936 pointed out, that various strobili, which have been regarded by some palaeobotanists as *L. goldenbergi* or which have been directly described under this name, are to be found in the following papers: A. Brongniart 1838, O. Feistmantel 1875/76, von Roehl 1868, R. Kidston 1886 (see also 1891/93: *L. geinitzi*), J. Kušta 1886 and E. Simson-Scharold 1934.

Lepidostrobus goldenbergi according to the figures presented by Schimper represents strobili till about 7 cm. thick (incl. the free sporophyll end portions turned slightly away from the cone body). Their bare cone body (i. e. the axis with the basal sporangia bearing sporophyll portions) measures only cca. 4 cm. across and the declined sporophyll end portions are about 3 cm. long.

Specimens figured in Brongniart 1838 (Pl. 23, fig. 5, Pl. 24, fig. 6) are essentially thinner than true Schimper's *L. goldenbergi* (R. Schimper, 1870. Pl. 61, fig. 3, 4, 5). Their dimensions are as follows:

Fig.	Width in cm. of the		Length of the sporangia in cm.	Length of the free portion of the sporophylls in cm.
	strobilus	axis		
A. Brongniart, 1838:				
Pl. 23, fig. 5	4.9	0.6	1.8	?
Pl. 24, fig. 6	6.4 (but without the free parts of the sporophylls only 3.6)	0.6	?	3

big strobilus measuring cca. 6 cm. across, the second one (Pl. 29, fig. 17)

Nevertheless they have been regarded by R. Kidston (1866, 1892/93) as identical with the named Schimper's species. In fact they agree much more precisely with Corda's *L. sternbergi* from the Bohemian Carboniferous, with which also Kušta's specimens (1866) and those by O. Feistmantel (1875/76) evidently are to be compared (see in the next chapter on *Lepidostrobus sternbergi*). All these specimens (incl. Brongniart's specimens) differ from Schimper's type not only by their thinner shape but also in having the free portions of their sporophylls not as much declined from the cone body as it is the fact in Schimper's form.

R. Kidston regarded in his paper from 1886 also the rather inaccurately figured specimens of von Roehl (1868, Pl. 7, fig. 2 and Pl. 29, fig. 17) as very probably identical with the named Schimper's type. The first of both Roehl's specimens (Pl. 7, fig. 2) is indeed a very

represents only the conical top of a big strobilus measuring in its widest part only 3.2 cm. Both are no doubt also thinner than the true *L. goldenbergi*. Just for that reason R. Kidston in his later paper from 1892/93 changed his opinion and regarded these Roehl's strobili as possibly more related with the slightly thinner, but not well defined (see our chapter on L. geinitzi) forms of the confused "species" of *Lepidostrobus geinitzi* Schimper et auct. The inaccuracy of Roehl's figures does not allow any definitive and more precise determination. Nevertheless I believe that a nearer relation to Schimper's *L. goldenbergi* is excluded.

Finally we have to take into consideration the very big specimens described and figured excellently by E. Simson-Scharold (1934, pp. 7, Pl. 1, fig. 8) under Schimper's name of *L. goldenbergi* from the Fettkohlen series of the mines at St. Ingbert in the Sarr coal district. The figured specimen shows very declined free parts of the sporophylls, which are about 3—3.5 cm. long. Including these free sporophyll portions it measures nearly 9.5 cm. across, its cone body (i. e. axis with the sporangia bearing lower sporophyll portions) only 6 cm. On account of these features it must be regarded as wholly identical with the original Schimper's type.

Summarising all we have to state that from all hitherto described rather big Lepidostrobi, only Simson-Scharold's form from 1934 is safely identical with the true *L. goldenbergi* Schimper, and I believe that this statement agrees also with the chief opinions expressed on this problem by W. J. Jongmans (1930, 1936) in the Fossilium Catalogus.

12. *Lepidostrobus sternbergi* Cda.

Pl. V, fig. 4, 5, 6, 7, Pl. VI. fig. 2, 3, 4, 5, Pl. XII, fig. 7.

This type of lepidodendroid strobili was first described and figured by A. J. Corda in 1842 (pp. 63, Pl. I). He regarded it as the top of a very big coniferous twig. Corda's original type specimen is conserved in the collections of the geological department of the Nat. Museum, Prague. It represents a very flattened cast of a rather big strobilus in a slab of the whitish fine grained caolinic shales, the Tonsteine rocks ("Schleifsteine", "brousky") from Chomle near Radnice (between the Lower and Upper Radnice coal measures). Its inner structures are very badly preserved (no doubt mostly on account o its very strong compression). It measures cca. 4.8 cm. across. The free upwards bent distal portions of its sporophylls are mostly adpressed to the cone body or only very slightly declined from it, about 2.5 cm. long and at the base cca. 0.4 mm. wide. Very similar cones (mostly mere impressions or carbonised and very flat compressions) were later collected also at other places of the Central Bohemian Carboniferous (especially in the districts of Kladno and Rakovník), mostly in deeper horizons (in the Radnice coal measure series). But several specimens, which cannot be distinguished by any essential features from specimens coming from those rather deep zones (Westphalian C), were found also in essentially

younger series. They have been collected for instance in the cannel coal of the Nýřany coal measure of the mines at Nýřany as well as in the hanging shales of the thin coal seam called "věnec" of the abandoned coal mines E. from Rakovník (i. e. both in the Westphalian D). And finally in the collections of the Nat. Museum, Prague, is conserved also an impression of a quite similar strobilus from the lowermost shaly beds of the Lower Permian at Ploužnice in N. E. Bohemia, which was described in 1929 by C. P u r k y n ě (pp. 17 [resp. 33], Pl. 4, fig. 1) under the name of *L. variabilis.*

Taking into consideration especially the typical specimens from the deeper zones of the Central Bohemian Carboniferous, we may characterise this Corda's "species" as rather long, cylindrical cones, measuring across about 4.5 till over 5 cm. with often slightly declined sporophyll ends from the cone body. Their axis are about 0.5—0.7 cm. thick, their sporangia 1.6—1.7 cm. (in several especially big specimens nearly 2 cm.) long. The distal free portions of their sporophylls are 2.5 till 3 cm. long, at the base 3—4 mm. wide and slowly narrowed toward the end, of a very narrow triangular shape.

In the later (i. e. after A. J. C o r d a) czech literature specimens of strobili quite identical with C o r d a's form have been described and figured especially by O. F e i s t m a n t e l (1875/76, Pl. 44, fig. 2, 3, 4; — their dimensions see in the chapter on *L. geinitzi*) under the name of *L. variabilis.* They were collected in the Radnice coal measure series in the surroundings of Rakovník. Further, according to specimens conserved in the collections of the Nat. Museum, Prague, we have to join hereto also several strobili relating to K u š t a's lists of plants (1886, pp. 5) from the coal mines at Lubná near Rakovník. K u š t a mentioned them under the name of *L. goldenbergi,* but as already told (in the chapter on *L. goldenbergi*), they are essentially thinner agreeing thus wholly with our C o r d a's form. They were collected in the Lubná coal measures (i. e. the uppermost zone of the Radnice coal measure series). All these strobili (F e i s t m a n t e l's as well as K u š t a's ones) are coming thus from the Westphalian C.

In the foreign literature we find also many specimens, which by their dimensions agree well with C o r d a's form. They are mostly described under the rather obscure name of *Lepidostrobus geinitzi,* partly also as *L. variabilis.*

Before all I have to pay attention especially to several strobili, which have been described from deeper carboniferous horizons (lower, middle as well as the lower part of the upper westphalian series) and which by this fact agree with C o r d a's form also from the stratigraphical point of view.

From specimens conserved as mere impressions we have to compare with our *L. sternbergi* C d a the already mentioned (see in the chapter on *L. geinitzi*) von R o e h l's *Lepidostrobus variabilis* from Westphalia (1868/9, Pl. 7, fig. 2), as well as the rather big strobili described by R. Z e i l l e r under the name of *L. geinitzi* (1886/88, Pl. 76, fig. 2) from the coal district of Valencienne. Finally it seems that also B r o n g n i a r t's specimens from 1838 (Pl. 23, fig. 5 a, b and

Pl. 24, fig. 6) may be joined hereto (see the discussion in the chapter on *L. geinitzi*). Several very similar large strobili were also described from the Carboniferous of N. America (younger westphalian beds) by D. White in 1899 under the name of *L. princeps*. But according to their size and shape I do not believe that all these White's big specimens are mutually identical. There are at least two different types: an especially large form (Pl. 63, fig. 1), which may be compared with our *L. crassus* Njc. (see in the next chapter), and a slightly more slender from (Pl. 62, fig. h, Pl. 63, fig. 2, Pl. 64, fig. a), which corresponds in the whole with Corda's type, but the figured specimens of which are less conveniently preserved. Therefore only part of White's specimens may be regarded as related with Corda's *L. sternbergi*.

As to the various specimens described in a petrificated state, some similarity with our *L. sternbergi* may be pointed out in several strobili described by R. Zeiller in 1911 under the names of *L. brownii* (Pl. I, fig. 1, 2; non the other fig.!) and *L. delagei* (Pl. 1, fig. 10, Pl. 14, fig. 1—14; both have the axis 0.4—0.7 cm. thick, differing thus from the true *L. brownii* [Unger] Schimp. which exhibit very big axis, cca. 1—1.3 cm. across; see also in the next chapter on *L. crassus*). But these Lepidostrobi were collected in beds of the Lower Dinantian of France, wherefore it is certainly impossible to speak seriousely on a true mutual identity (Corda's specimen came from beds of the Middle Westphalian).

Finally we have to pay attention still to several strobili, which were described in the foreign literature from essentially younger beds i. e. from the Westphalian D, Stephanian as well as from the Permian. Very similar to our *L. sternbergi* are specimens described by M. B. Renault and R. Zeiller under the names of *L. geinitzi* and *fischeri* (1888/90), from the stephanian beds of Central France (Commentry), specimens described as *L. geinitzi* by E. Simson-Scharold (1934) from the Fettkohlen series of the coal district of Saarbrücken (Sulzbach) (according to Simson-Scharold's statements these forms were found here also in the beds of the ottweiler series) and finally also the large strobili described as *L. variabilis* by Geinitz (1855) from the Saxonian coal basins (Westphalian D). Several of them seem to be still slightly bigger than the normal form of *L. sternbergi* Cda. from our Bohemian westphalian C beds. We have to do here with strobili (especially those from Saxony), which served to R. Schimper as the bases of his *L. geinitzi;* but till now it was not yet safely stated, whether the specimen, which was figured by Schimper under this name, really corresponds with Geinitz's saxonian specimens. It seems to me that a mere comparing of the respective figures does not allow to resolve this task (see also in W. J. Jongmans, 1930, pp. 485).

According to all above mentioned facts, we have here evidently to do with a rather artificially defined "species", a type of strobilus, which represents the fructification of perhaps more than only one species of the genus *Lepidodendron* and which therefore occurs in very different stratigrafical zones beginning with the Lower Carboniferous up until to the Lower Permian. Defined in this way this term is synony-

mous with the term of *L. geinitzi* as used by the most of the palaeobotanists. But because this last term is not quite clear as pointed out in the above chapter on L. geinitzi and because our Bohemian strobili in consideration were described already in 1842 by A. J. C o r d a under the term of *L. sternbergi,* I make here use of Corda's name, which is also in accordance with the nomenclatorical rules.

S t r a t i g r a p h i c a l d i s t r i b u t i o n:

In the coal districts of Central Bohemia the type of *Lepidostrobus sternbergi* C d a. was collected mostly in the Radnice coal measure series (Westphalian C) of the Lower grey beds. Several specimens were found also in the Nýřany coal measure series (Westphalian D) of the same beds. Until present I do not yet know it from the higher i. e. stephanian or permian beds in Central Bohemia.

The coal district of Plzeň:

The Radnice coal measure series:

Třemošná. — Hanging shales of the Upper Radnice coal measure.

Mantov. — Shales of the Radnice coal measures.

The Nýřany coal measures series:

Nýřany. — Cannel coal of the Nýřany coal measure.

The coal districts of Radnice:

The Radnice coal measure series:

Břasy. — The Upper Radnice coal measure.

Chomle. — The Tonsteine bed ("Schleifsteine", "brousky") between the Loer and Upper Radnice coal measure.

Svinná. — The Tonsteine bed ("Schleifsteine", "brousky") between the Loer and Upper Radnice coal measure.

The coal districts of Kladno and Rakovník:

The Radnice coal measure series:

Kladno. — Mine Gottwald (Ronna) at Hnidousy. — The whitish Tonsteine interlayer called "velká opuka" within the Main Kladno (i. e. Upper Radnice) coal measure.

Lužná (near Rakovník). — Mine "Lužná". — Hor.: The Upper Radnice coal measure.

Rakovník. — Type specimens of O. F e i s t m a n t e l (collected most probably in the abandoned coal mines E. from the town [Comp. Moravia], in the clayish interlayers of the Upper Radnice coal measures).

Lubná. — K u š t a's collections from the Lubná coal measures.

Příčina (near Lubná). — Mine Ludvík at the place "Na brantech". — Hor.: In the shales of the Upper Radnice coal measures.

The Nýřany coal measure series:

Rakovník. — Coal mines of the Comp. Moravia E. of Rakovník: Mine Moric. — Hanging shales of the coal seam called "věnec".

13. *Lepidostrobus crassus* n. nom.

(i. e. *L. princeps* (L e s q x) D. W h i t e ex p., *L. geinitzi* S c h i m p. et auct. ex. p.) Pl. VI, fig. 5, 6, Pl. VII, fig. 2, 3, 4, 5, 6, 7.

Under this new name of *L. crassus* I am describing several of the biggest lepidodendroid strobili found hitherto in the Permocarboniferous of Central Bohemia. They may be best compared with several of the very large strobili described from the Carboniferous of N. America by D. W h i t e (1899, pp. 212), under the name of *Lepidostrobus princeps* L. L e s q x. But not all W h i t e's specimens seem to be quite identical with our form. Only his biggest type as figured on Pl. 63, fig. 1 agrees wholly with our specimens. W h i t e's other figures (Pl. 62, fig. h, Pl. 63, fig. 2 and Pl. 64, fig. a) represent no doubt a slightly thinner type (perhaps our *L. sternbergi* C d a.).

The strobili of our *L. crassus* type are of a long cylindrical shape measuring about 5—6 (or even more) cm. across. Their axis is cca. 11—12 (or even 13) mm. thick. The basal parts of the sporophylls with their sporangia are cca. 2 cm. long. The distal free portion of the sporophylls are about 3 cm. long and more or less adpressed to the cone body forming thus a cover 0.5 till 1 cm thick. In the Bohemian Permocarboniferous such big strobili have been most frequently collected in beds of the Westphalian D.

Among the various big strobili described and figured in the literature dealing with the flora of the Bohemian coal districts especially the following specimens show more or less similar features with our *L. crassus:* -see the table on pp. 49.

Excluding the last of them, i. e. P u r k y n ě's *L. variabilis* from 1929, which evidently represents a considerably thinner type, all other just named specimens are no doubt typical representants of our type *L. crassus.*

More problematical seems to me the eventual comparision of F e i s t m a n t e l's big specimens from 1875/76 (see cited in our chapter on *L. geinitzi*!). They have an essentially thinner axis, wherefore I believe that they are better to be compared with C o r d a's *L. sternbergi.*

Finally we have to mention here also the strobili cited (but not figured nor nearer described) in a paper by J. K u š t a (1886) under the name of *Lepidostrobus goldenbergi,* which were already discussed in our chapter on *L. geinitzi* and *goldenbergi.* These strobili were collected at Lubná near Rakovník and several of them are conserved in the coll. of the Nat. Museum, Prague. They do not attain the large dimensions of the true *L. goldenbergi* S c h i m p. They agree well with the just named F e i s t m a n t e l's specimens of 1875/76, but not so with our *L. crassus,* wherefore I believe too that they may be best compared only with C o r d a's *L. sternbergi.*

Among specimens mentioned in the foreign literature, I believe that the nearest relations to our *L. crassus* may be pointed out as already stated above in D. W h i t e's *L. princeps* from 1899, Pl. 63, fig. 1 (non the other fig.!, which on account of their thinner shape and the

Name, figure and locality	Width in cm. of the		Length in cm. of the sporangia	Notes
	strobilus	axis		
L. sp. O. Feistm., 1874, pp. 174: Pl. 3, fig. 3, 3a "Böhmen, Schaumburg-Lippesche Bergwerke".	5.6 (with the sporophyll cover)	1.4	2	According to W. J. Jongmans, 1930: *L. goldenbergi.*
L. variabilis O. Feistm., 1873, pp. 598, 601: Pl. 18, fig. 19 Nýřany, cannel coal.	4.8 (without the sp. c.)	1.3	1.8	According to W. J. Jongmans, 1930: "wertlos"
L. variabilis Hof.—Ryba, 1899, pp. 86: Pl. 16, fig. 4 Pl. 16, fig. 5 Loc.: Kamenný Újezd.	7—7.5 6.5 (both with the sp. c.)	1.2—1.3 1.3	1.8—2 1.7	According to W. J. Jongmans, 1930: Fig. 4: "Eine eigenartige Form welche näher studiert werden muss." — Fig. 5: *L. geinitzi.*
L. variabilis Purkyně, 1929: Pl. 4, fig. 1	4.9	0.9—1.1	1.5—1.7	According to W. J. Jongmans, 1930: perhaps *L. geinitzi.*

slightly declined sporophylls seem to stand rather near to Corda's *L. sternbergi*). White's specimens were collected in the coal district of Missouri. Similar cones were in N. America for the first time described by L. Lesquereux (*L. princeps*, 1866, pp. 455, Pl. 45, fig. 1—4) from the coal formation of Illinois, but his rather inaccurate figures do not allow any more precise comparative study.

About the possible relations of our *L. crassus* to the various strobili joined generally by most of the palaeobotanists to Schimper's term of *L. geinitzi* the most important was already told in the chapter dealing with this Schimper's term. We have here only to state briefly that our *L. crassus* exhibits a great similarity with Simson-Scharold's *L. geinitzi* from the coal district of Saarbrücken (1934), with Renault and Zeiller's *L. geinitzi, gaudrii* and *fischeri* (1888/90, resp. 1892 and 1906) from the stephanian beds of Central France (Commentry, Blanzy a. o.) and in a certain measure also with Geinitz's *L. variabilis* (1855) from Saxony (Oberhohndorf). But it is hardly possible to speak here about an identity: most of these specimens are considerably thinner and also their axis is mostly more slender.

There remains still to discuss the eventual relations of our *L. crassus* to some forms described in the foreign literature as petrified casts. I may point out especially the following ones:

a) *Lepidostrobus bertrandi* Zal. 1908. — This specimen was de-

scribed by M. D. Zalesskij in 1908, pp. 1—32, Pl. 1—9 and Text-fig. 1—2, on the basis of a calcified specimen from the limestones ("M" — XXVI) of the coal series C_2^4 (i. e. transition beds between the Westphalian A and Westphalian B) in the mines of the Comp. "Almaznoje obščestvo" in the district of Nižnij Kamiševachy of the Doněc coal basin. This specimen represents an elongated cylindrical strobilus measuring cca. 5 cm. across and provided with an axis 12—13 mm. thick and with sporangia 1.5—2 cm. long. The free distal portions of the sporophylls are bent upwards and rather adpressed to the cone body. All these features remind strongly our type of *L. crassus.*

b) *Lepidostrobus coulteri* Jongm. — This form was described first by J. M. Coulter and W. J. Land in 1911, pp. 449—453, Pl. 28—29, without any specific name *(Lepidostrobus sp.).* As to its shape and size, this specimen belongs no doubt among the rather big forms regarded mostly by various palaeobotanists as *Lepidostrobus geinitzi.*

c) Several forms standing very near to Unger's *Lepidostrobus braunii* (i. e. *L. braunii* Schimp.): *L. dabadianus* Schimp., *rouvillei* Sap., *laurenti* Zeil., *delagei* Zeil., *schimperi* Zeil. — All these specimens were already discussed in detail by R. Zeiller in his paper from 1911. Taking into consideration several anatomical details (which of course in the case of mere impressions cannot be verified) Zeiller united the first 4 specimens (i. e. *L. brownii, dabadianus, rouvillei* and *laurenti*) under the term of *L. brownii.* On the other hand he regarded as specifically independent the other two specimens called *L. delagei* and *schimperi.* The numerical data, (dimensions), which may tell us something about the eventual relations of these petrifications to several of our "impression species", are as follows: -see the table on pp. 51.

These data show, that even several of these specimens, which according to the internal anatomy have been considered by Zeiller as specifically identical, show considerable differences as to their outer appearence. *L. laurenti* is a type with a considerably slender axis, but with relatively large sporangia. By these features it shows a certain similarity with our *L. sternbergi* Cda. *L. braunii, dabadianus* and *rouvillei* are no doubt very similar to our *L. crassus* (except *L. brownii* Pl. 1, fig. 1, 2, which has a too slender axis). The same holds to *L. schimperi,* whereas *L. delagei* on account of its rather thin cone axis resembles more to our *L. sternbergi* Cda. But I do not believe, that we have here to do with a true identity either with our *L. crassus* or with our *L. sternbergi.* Zeiller's specimens according to his notes were collected in very deep stratigraphical horizons, in the Lower Carboniferous (Dinantian), whereas our specimens of *L. crassus* Njc. and *L. sternbergi* Cda. were found in much younger beds, partly in the Radnice coal measures series, partly in the Nýřany coal measure series i. e. in the Upper Westphalian (Westphalian C and D). The time space between both is too large and I suppose therefore that we can speak here only about a mere similarity of their outer appearence (morphological convergence).

Stratigraphical distribution:

These big strobili exhibiting axis more than 1 cm. thick have been collected in the Central Bohemian Carboniferous most frequently in the

Name	Width in cm. of the		Length in cm. of the	
	strobilus	axis	sporangium	free sporophyll portion
P. braunii, orig. sp. (loc. ?)	5.5, 4.5			
L. dabadianus, orig. sp. (loc. ?)	5.5			
L. rouvillei, orig. sp. (loc.: Cabrière [Hérault], dinantien inf.)	5, 4	1.3, 0.9		
L. brownii, later collected cotypes (loc.: Cabrière, Rimont [phosphates] a. o.; dinantien inf.):				
Pl. I, fig. 1, 2	6.2, 5.5	0.5, 0.7	1—1.2 (but the whole lower sporophyll part: 1.2—1.5)	1.5—2
Pl. I, fig. 3	7.5	1.1	1.7	
L. schimperi (loc. ?)	5.8, 4.9	1.1		
L. delahei (Cabrière [Hérault], dinantien inf.)	4.3	0.7, 0.4	1.3	
L. laurenti (dinantien inf.)				
Pl. 1, fig. 4, 5	3.5	0.6	1.6	
Pl. 1, fig. 7	—	indistinct	—	
Pl. 1, fig. 8	3.4	?	?	

Nýřany coal measure series (Westphalian D). Rarer they occur also in deeper zones i. e. in the Radnice coal measure series (Westphalian C).

The coal district of Plzeň:
The Nýřany coal measure series:
Nýřany, mine Krimich. — In the shales of the hanging wall as well as in the cannel coal of the Nýřany coal measure.
Tlučná, mine Krimich II. — In the shales of the hanging wall of the Nýřany coal measure.
Stratigraphical horizon unknown:
Kamenný Újezd, mine Lazarus.

The coal district of Mirošov:
The Nýřany coal measure series:
Mirošov. — Black shales accompanying the coal seams.

The coal district of Malé Přílepy:
The Radnice coal measure series:
Malé Přílepy (between Beroun and Lodenice). — In the Tonsteine beds ("Schleifsteine", "brousky") in the hanging of the coal measure (= Lower Radnice coal measure).

The coal district "Na Lísku" at Zdejciná near Beroun:

The Radnice coal measure series:

Zdejciná (near Beroun), mines in the forests "Na Lísku". — In the black shales of the hanging wall of the coal measure (= Upper Radnice coal measure).

The coal district of Kladno and Rakovník:

The Radnice coal measure series:

Lubná near Rakovník. — In the shales accompanying the coal seams correlated with the Upper Radnice coal measure.

Lužná near Rakovník. — Mines at the place "Na Belšance". — Hor.: In the hanging shales of the Lubná coal measure.

14. *Lepidostrobus (Lepidostrobophyllum) cernuus* S t b g.

Pl. IX, fig. 1, 2, 3, 4, 5, Pl. X, fig. 1, 2, 3, 4, 5; Textfig.

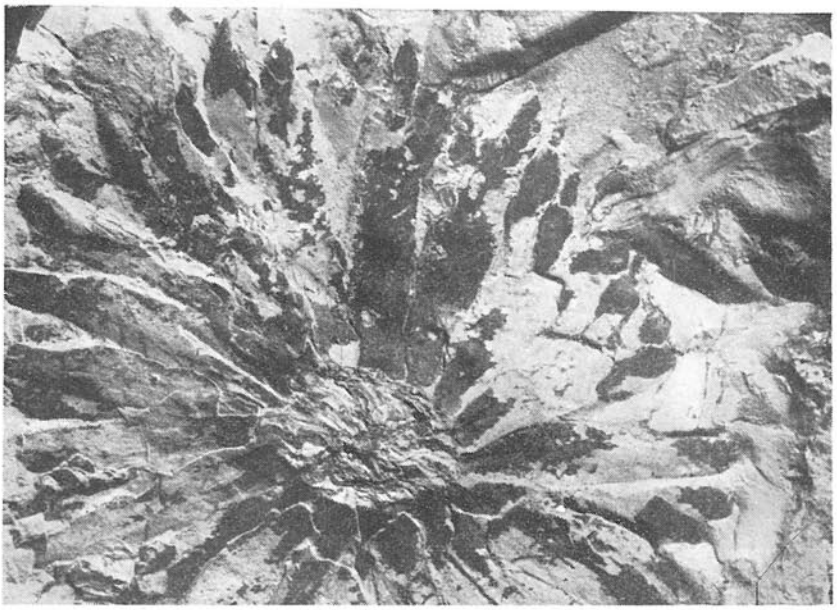
This "species" on account of its distal rather large free sporophyll parts may be joined already to the type of *Lepidostrobophylla* (or "*Lepidophylla*") though the impressions of its sporophylls in an isolated state are very rare. In the Central Bohemian Carboniferous mostly casts of whole strobili are to be found as in all foregoing forms. No doubt we have here to do with a transition form between both above mentioned lepidostrobi types (i. e. the typical *Lepidostrobi* and the *Lepidostrobophylla*).

L. cernuus S t b g. was described by K. c. S t e r n b e r g in 1826/36, pp. XXXIX, Pl. 29, fig. 1, 2 under the name of *Conites* (or also *Antholithes) cernuus* from the Tonsteine horizon ("Schleifsteine", "brousky") in the hanging wall of the Lower Radnice coal measure at Svinná near Radnice. K. c. S t e r n b e r g regarded it as a cycadaceous strobilus. Later part of an identical strobilus was figured and described by C. v. E t t i n g s h a u s e n in 1855, Pl. 21, fig. 4 and 5 as "*Lepidodendron crassifolium*" from the same locality and horizon. E t t i n g s h a u s e n called attention to the similarity of the branch bearing this strobilus with the shoots of his *Lepidodendron brevifolium*. He regarded its sporophylls as mere sterile leaves, wherefore he believed to have to do only with the top of a sterile branch. Finally a third specimen was figured, unfortunately only rather schematically sketshed, by O. F e i s t m a n t e l in 1875/76, pp. 188, 218 and 274, Pl. 32, fig. 5 (also from the Tonsteine horizon at Svinná near Radnice). O. Feistmantel regarded his specimen as only a cast of the leafy branch of the rather obscure *Lepidodendron dichotomum* S t b g. (see in F. N ě m e j c, 1947), with which he identified also the just mentioned E t t i n g s h a u s e n's specimen of *L. crassifolium* but not S t e r n b e r g's *Conites cernuus*; this last was regarded by him as a basal part of *Lepidostrobus variabilis* (this last name was used by O. F e i s t m a n t e l in a very wide sense).

During later times, as evident from the collections in the geological department of the National Museum, Prague, a large series of identical specimens was found in the Carboniferous of Central Bohemia also in

the other coal districts. They are especially frequent in the whitish Tonsteine interlayers ("opuky") of the Main Kladno coal measure in the districts of Kladno and Rakovník.

L. cernuus S t b g. is a very large kind of lepidodendroid strobili. Their total length is not yet konwn to me as I never have seen any whole specimens, always only smaller casts. These measure about 6—7 cm.



Lepidostrobus (Lepidostrobophyllum) cernuus S t b g. (a transversally broken strobilus). Loc.: Motyčín near Kladno (most probably mine President Gottwald [Ronna] at Hnidousy); from the whitish Tonsteine interlayer (called »velká opuka«) of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal dep. of the National Museum, Prague; leg. J. Č i h á k.

across. Their distal free sporophyll portions are bent upwards and loosely adpressed to the conebody, which measures 3—3.5 cm. across. The sporangia bearing sporophyll basis are cca. 1 cm. long. The free distal leafy sporophyll portions are about 3.2 cm. long, they are widest in their middle part (cca. 0.6 cm.) and provided by a very big central longitudinal vein. At the very base of the strobili the sporophylls are considerably shorter. In an isolated state the sporophylls of *L. cernuus* S t b g. are very similar to the following well known *Lepidostrobophyllum lanceolatum* L. H., but they are in all respects much smaller.

In many cases I found these strobili attached terminally to *Lepidodendron* shoots which are 0.6 till 1.2 cm. thick and which are provided by leafcushions exhibiting identical sculptures like sterile shoots of *Lepidodendron longifolium* P r e s l. Several of the studied cone bearing shoots measure till 1 dm. in length. It is therefore no doubt that our *L.*

cernuus Stbg. represents strobili of Presl's *Lepidodendron longifolium.*

Quite similar strobili like our *L. cernuus* Stbg. were described and figured very thoroughly also from the coal districts of Great Britain especially by J. A. Morris (in Prestwich) 1840 and R. A. N. Arber 1922/24 under the name of *L. longibracteatus.* It is very interesting that even here the branches bearing terminally such strobili exhibit leafcushions of the same features like our specimens from Bohemia. But in several of them the English authors observed that in the direction downwards they show evident transition to leafcushions of the type of *Lepidophloios acerosus* L. H. This is especially well visible in Arber's figure from 1922/24, Pl. 8, fig. 18 A, where in connection with such strobilus is preserved a cca. 11 cm. long. lepidodendroid branch. The leafcushions in the upper third (i. e. just below the strobilus) of this branch are of the same shape as in our specimens from Bohemia, but further downwards their shape becomes altered: in the middle part of this branch the leafscars are situated nearly in the centre of the leafcushions and in the lower third of the same branch the leafcushions are evidently reversed like in the genus of *Lepidophloios.* They are evidently scale like prolonged and bent downwards, wherefore their leafscars are situated on the lower part of their surface; they are then very similar to the leafcushions of *Lepidophloios acerosus* L. H. On account of all that E. A. N. Arber ascribed these strobili to *Lepidophloios acerosus* L. H. Besides it seems according to Kidston's studies (1893/94) that the character of the leafcushions even on sterile twigs of *Lepidophloios acerosus* is not always quite normal (i. e. reversed). R. Kidston observed often on younger or more slender shoots of *Lepidophloios acerosus* rather flat and therefore not reversed leafcushions, which by no means are to be distinguished from leafcushions of the genus of *Lepidodendron* Stbg. We may suppose therefore that *Lepidophloios acerosus* L. H. bore quite similar strobili like our *Lepidodendron longifolium* Presl. Perhaps future investigations will elucidate this task still more clearly.

A specimen very similar to our *L. cernuus* Stbg. was figured also from Saxony by H. B. Geinitz (1855, Pl. 2, fig. 7; also his specimen fig. 6 exhibits similar features, but is still bigger and reminds therefore at the same time *L. lanceolatus* L. H.) from the coal mines of Bockwaer Communwald near Niedercainsdorf. But its precise determination needs a thorough revision of all Geinitz's type specimens in consideration. Geinitz ascribed this strobilus (just as that of fig. 7 and the sporophyll of fig. 8) to his *Lepidodendron dichotomum* (i. e. *Lepidodendron subdichotomum* Sterzel).

Further at least slightly similar forms have been described from the Carboniferous of North America. But none of them seems to be quite identical with our form. We have to point out especially *L. oblongifolium* Lsqx, which was collected at the well known locality Manzon Creek, Illinois, and which at the other hand reminds slightly *L. lanceolatum* L. H. (see more in the following chapter about *L. lanceolatum* L. H.). The free portions of its sporophylls measure about 3 cm, but they are too

wide, cca. 7 till 8 mm., wherefore E. A. N. Arber 1922/24 regarded it as directly identical with *L. lanceolatum* L. H. Some still more remote analogies with our *L. cernuus* Stbg. exhibit certain smaller forms like *L. ovatifolius* Lsqx, *obtusus* Heer and *spathulatus* Lsqx. All such Lepidostrobi stand certainly nearer (by their shape as well as by their size) to Arber's *L. moyseyi* (1922/24) than to our *L. cernuus* Stbg.

In the whole we may state that among the various *Lepidostrobi* resp. *Lepidostrobophylla* described in the foreign literature only specimens known from Great Britain as *L. longibracteatus* Arber are strictly comparable with our *L. cernuus* Stbg. As to the mother plant, which bore strobili of that kind, it is at present rather difficult to tell, whether it is only Presel's *Lepidodendron longifolium*[10]) or whether also *Lepidophloios acerosus* L. H. bore strobili of the same external features.

Stratigraphical distribution:

Strobili of the type of *Lepidostrobus cernuus* Stbg. were collected in Central Bohemia till present only in the deeper coal measure zones of the Lower grey beds, i. e. in the Radnice coal measure series (Westphalian C).

The coal district of Kladno and Rakovník:

Kladno, coal mines in the surroundings (Gottwald [Ronna] at Hnidousy a. o.). — The whitish Tonsteine interlayers ("opuky") of the Main Kladno coal measure (i. e. Upper Radnice coal measure).

Kralupy. — Shales accompanied by iron stone nodules at the hill Červená Hůrka (correlated with the horizon of the Main Kladno coal measure [i. e. the Upper Radnice coal measure]).

Příčina near Lubná. — Mines at the place "Na Brantech". — In the shales accompanying coal seams correlated with the Upper Radnice coal measure.

The coal districts of Radnice:

Břasy. — In the shales of the hanging wall as well as of the interlayers ("Firstenstein") of the Upper Radnice coal measure.

Svinná. — In the Tonsteine horizon ("Schleifsteine", "brousky") of the hanging wall of the Lower Radnice coal measure.

The coal district called "Na Lísku" at Zdejciná near Beroun:

Strádonice. — In the Tonsteine beds of the ravines between Zdejciná and Strádonice.

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[10]) In my papers from 1931 and 1943 I ascribed by error to our *Lepidodendron longifolium* Presl (resp. to Sternberg's *L. dichotomum*) the very curious strobili of *Sporangiostrobus feistmanteli.* Revising later (1946) the taxonomical value of Sternberg's term of *L. dichotomum* and afterwards also all our Central Bohemian Lepidodendra (1947) I went to the conviction, that *Lepidodendron longifolium* Presl may be regarded as the mother plant of *L. cernuus* Stbg. and that the *Sporangiostrobi* are most probably fructifications of some species of the genus of *Ulodendron.*

15. *Lepidostrobus (Lepidostrobophyllum) intermedium* (L. H.?) Arber et auct.

This type was very often interpreted in the descriptive literature rather unjustly. Various specimens were often united with it, which are better to be joined to the following "species" of *L. lanceolatus* L. H. The main reason of that consists no doubt in the fact, that the figure in Lindley and Hutton's work (1831/37, Vol. I, Pl. 43, fig. 3) represents only a very imperfectly preserved specimen (perhaps casts of two sporophylls) measuring about 1 cm. across. It is therefore considerably wider than other specimens described under the same name by other authors during the later time after Lindley and Hutton. I believe therefore that it is not excluded, that Lindley and Hutton's *L. intermedium* is only a badly preserved cast of the same "species" of which the same authors have figured well preserved specimens under the name of *L. lanceolatus*. Lindley and Hutton's figure of *L. intermedium* cannot be therefore regarded as a reliable bases for the definition of this "species". As to the problem of *L. intermedium* in the sense given to this term by most of the later authors, we have to draw attention especially to the very detailed studies by E. A. N. Arber (1922/24), who revised critically all *Lepidophylla* and *Lepidostrobi* known to him from the various collections in Great Britain. Specimens, which are figured and described by Arber in this paper as *L. intermedius* are nearly just as long as the very common *L. lanceolatum* L. H. (i. e. about 5 cm.), but they are much narrower, only cca. 3—6 mm. (whereas *L. lanceolatus* mesures mostly cca. 1 cm. across). The true *L. intermedius* Arber et auct. is therefore a considerably narrower form than *L. lanceolatus* L. H.

Further specimens, which are to be joined without any doubt to Arber's *L. intermedius*, are mentioned by E. Bureau (1914) from France and by R. Crookall (1929) from Great Britain. These specimens exhibit the following dimensions:

Fig. and loc.	Distal free portion of the sporophyll		Length of the sporangium
	Length	Width	
M. E. Bureau, 1914, Pl. 74, fig. 2. — Loc.: Puit St. Georges la Tardivière, Mouzeil (Basse Loire)	5.2 cm.	0.6 cm.	1.- cm.
R. Crookall, 1929, pp. 116, Pl. 1, fig. 1	4.2	0.6	
E. A. N. Arber, 1922/24, Pl. 8, fig. 11, 12 (from the Middle coal. m.; Dig by clay Pit, Kimberley, Notts. and Brindsley clay Pit, Langley Mills, Notts.) Pl. 8, fig. 13 (from the Lower coal m.: Trowell coll., Notts.)	cca. 5.- (he cites 3 till 9 cm.)	0.5	1.-

Finally I regard as identical with A r b e r's form also the specimen described under the name of *L. lanceolatus* L. H. from the coal basin of Doněc by K. N o v i k in 1931 (Pl. 19, fig. 4). It is cca. 4.4 cm. long and only about 5.5 mm. broad.

Less acceptable seems to be the opinion of several palaeobotanists (W. J. J o n g m a n s, 1930, a. o.) about certain specimens of *Lepidophylla* described by M. B. R e n a u l t and R. Z e i l l e r (1888/90) from the Stephanian of Central France (under the name of *L. majus*) as well as by M. D. Z a l e s s k i j (1904) from the Doněc coal district also (under the name of *L. majus*). In spite of their considerably broad shape (8—10 mm.) these specimens are regarded as *L. intermedium* A r b e r. But as evident from their dimensions we have to do here either with *L. lanceolatus* L. H. or with smaller specimens of *L. majus* B g t.:

Fig. and loc.	Distal free portion of the sporophyll		Length of the sporangium
	Legth	Width	
M. B. R e n a u l t—R. Z e i l l e r, 1888/90, Pl. 59, fig. 8, 9. — Loc.: Commentry	5.- cm.	0.8—1.- cm.	1.5 cm.
M. D. Z a l e s s k i j, 1904. From the hor. C_2^5 under the limstone bed L.			
Pl. 7, fig. 6 (loc.: Černogorovka)	5.3	0.8	—
Pl. 7, fig. 9 (loc. ?)	4.9	0.9	—
Textfig. 10 (loc.: Černogorovka)	over 5 cm.	1.1	1.2

On account of the same reasons I do not regard as true *L. intermedium* the specimen, which was described and figured by K e r n e r (1897) from the alpin Carboniferous at the famous locality of Steinacherjoch (pp. 383, Pl. 10, fig. 3) under the name "*L. majus (vel intermedium)*". It reaches more than 5 cm. in length and measures about 0.75 cm. across. Evidently it belongs also to the series of forms of *L. lanceolatum* L. H. or at least to some smaller forms of *L. majus* B g t.

From the coal districts of Central Bohemia I do not know hitherto any specimens, which should be interpreted without hesitation as true *L. intermedius*. In the collections of the Nat. Museum, Prague, I found only one specimen which looks like an impression of a larger fragment of a whole strobilus; but as there are absolutely no sporangia visible it is a question, whether this specimen do not represent only a sterile leafy Lepidodendron shoot (for instance of *L. acutum* P r e s l). Its densely and spirally arranged leafy appendages (sporophylls?) are cca. 5—6 mm. broad and provided with a strong central vein. The specimen was collected in the Radnice coal measure series of the mine Krimich at Nýřany (coal district of Plzeň).

16. *Lepidostrobus (Lepidostrobophyllum) lanceolatus* L. H.
Pl. VIII, fig. 7, 8, 9 (see alco Pl. XI, fig. 3, 4).

Lepidophyllum lanceolatum L. H. is the most frequent "species" of *Lepidostrobophylla* in the deeper zones of the Central Bohemian Carboniferous (especially in the Radnice coal measure series of the Lower grey beds). It is rather similar to the already described *L. cernuus,* but at the other hand it is also sometimes very difficult to trace precise limits between *L. lanceolatus* L. H. and the smaller forms of our largest *Lepidostrobophyllum* type, the *L. majus* B g t.

The original description and figures may be found in L i n d l e y and H u t t o n's work from 1831/37, Vol. I, Pl. 7, fig. 3 and 4. These specimens were collected in Great Britain in the hanging shales of the coal seam Bensham of the famous palaeontological locality Jarrow colliery, Durham. In both specimens, which represent only isolated sporophylls, the basal sporangia bearing portions are missing. The preserved distal leafy part is in Pl. 7, fig. 3 cca. 4.5 cm. long and 0.8 cm. broad, in Pl. 7, fig. 4, about 4 cm. long and 0.6 cm. broad. Both are of an elongated lanceolate shape.

Specimens, which were collected in Central Bohemian coal basins and which according to my opinion are to be joined to this L i n d l e y-H u t t o n's "species", are mostly about 1 cm. broad (0.8 till 1.2 cm.) and generally 4 till 5 cm. long, sometimes even longer. But in this last case it is not quite sure, whether such extremely large specimens are not to be regarded perhaps already as smaller specimens of *L. majus* B g t, especially those, which are provided with unusually long sporangia (see also in W. J. J o n g m a n s, 1930). The basal sporangia bearing parts of our *L. lanceolatus* L. H. specimens are generally 1—1.2 cm. (sometimes only 0.8 cm.) long. In several specimens they measure till 1.5 cm. and just in such cases it is very difficult to decide, whether we have not to do with smaller forms of *L. majus* B g t.

In the Bohemian coal districts we meet *L. lanceolatus* L. H. mostly as isolated sporophylls. Whole cones were found only very rarely, for instance several rare specimens are known from the whitish Tonsteine interlayers (called "velká opuka") of the Main Kladno coal measure in the districts of Kladno (conserved in the collections of the National Museum, Prague).

As to the various specimens of *Lepidostrobophylla* described and figured in the older literature from the coal districts of Central Bohemia, we have to join to the true L i n d l e y - H u t t o n's *L. lanceolatus* before all several forms figured and described as *L. majus* B g t. by O. F e i s t m a n t e l (1871 and 1875/76). Unfortunately these specimens are not quite typical representants of this species. W. J. J o n g m a n s in 1930 pointed out, that they might represent only smaller forms of *L. majus* B g t. Indeed, as to their dimensions, they stand just on the limits between both these forms. Other specimens described by the same author (-ibid.-) under the same name are no doubt true large *L. majus* B g t. The dimensions of all these F e i s t m a n t e l's forms are as follows:

Fig. and loc.	Length	Width	Sporangium	Identification
1871, Pl. 1, fig. 2 (i. e. 1875/76: Pl. 13 [42], fig. 3); loc.: Kralupy	5 cm.	1.1 cm.	1.5 cm.	=L. lanceolatus
1871, Pl. 1, fig. 3 (i. e. 1875/76: Pl. 13 [42], fig. 4); loc.: Kralupy	5.5	1.1	1.4	=L. lanceolatus
1875/76, Pl. 13 [42], fig. 2; loc.: Kralupy	6.7	1.2	1.6	= L. majus
1875/76, Pl. 13 [42], fig. 1; loc.: Břasy	7	1.2	1.6	= L. majus

As noted in this table, I regard the first two Feistmantel's specimens rather as some unusually large forms of *L. lanceolatus* L. H., whereas the last two specimens as true *L. majus* Bgt.

From the *Lepidostrobophyllum* specimens described from other Bohemian coaldistricts out of Central Bohemia, I regard as identical with *L. lanceolatus* L. H. Purkyně's *L. lanceolatum* from the Lower Permian below the Krkonoše mountains (1929, Pl. 2, fig. 5) as well as two specimens cited by O. Feistmantel as sporophylls of *Lepidodendron veltheimianum* Stbg. from Rothwaltersdorf in the coal basin of Lower Silesia (1873, Pl. 17, fig. 34, 35). As to the last of both these cases also W. J. Jongmans (1930) pointed out that they cannot be distinguished by any essential feature from the true *L. lanceolatus* L. H. In Purkyně's permian specimen (1929, Pl. 2, fig. 5) the top of the distal leafy portion is not preserved. Its total length measures no doubt more than 4 cm. It is cca. 0.9 cm. broad, its sporangium about 1.2 cm. long. Of the two Feistmantel's Lower Silesian specimens (1873) only one (Pl. 17, fig. 34) is wholly preserved; it is 4.4 cm. long, 0.6 cm. broad and its sporangium measures about 0.8 cm. The second not wholly preserved Feistmantel's specimen (Pl. 17, fig. 35) is cca. 0.75 cm. broad.

From foreign countries already a large series of specimens was figured, which agree well with the original description by Lindley and Hutton. I mention several of them (mainly specimens figured in the older classical literature) in the following lines for comparative purposes.

Upper Silesian coal basin: From this region especially V. Šusta's specimen (1928, Pl. 59, fig. 5) identified by this author as *L. majus* Bgt. may be mentioned. It was collected in the coal series of Suchá of the Karviná beds at Karviná (colliery Hlubina, hanging shales of the coal seam no. 17). It is 5 cm. long 0.8 cm. broad and its sporangium measures about 1 cm. It agrees by its shape as well as by its dimensions wholly with Lindley and Hutton's *L. lanceolatus;* in all respects it is much smaller than the true *L. majus* Bgt.

Alpin Carboniferous: From the alpin regions a specimen of the true

L. lanceolatus L. H. was described already by Kerner in his paper on the carboniferous flora of the famous Austrian locality Steinacherjoch (1897, Pl. 10, fig. 3) under the name of "*L. majus (vel. intermedius)*". The impression is incompletely preserved showing only its distal leafy portion, which is over 5 cm. long and cca. 0.75 cm. broad. Evidently it is also to be joined to *L. lancolatus* L. H. and not to *L. majus* Bgt.

Saxony: From the Saxonian coal districts several specimens, which very often are compared with Lindley and Hutton's *L. lanceolatus*, were described by H. B. Geinitz (1855) as fructifications of his "*Sagenaria dichotoma*" (i. e. our *Lepidodendron subdichotomum* T. J. Sterzel) under the name of *Lepidostrobus lepidophyllaceus* (pp. 34 and 50, Pl. 2, fig. 6, 7, 8) or as *L. veltheimianum* (ibid. Pl. 2, fig. 9). Their dimensions are as follows:

Fig.	Length	Width	Sporangium	Notes
Pl. 2, fig. 6	3.75 cm.	0.6 cm.	—	joined together into a strobilus
Pl. 2, fig. 7	2.5	0.6	—	joined together into a strobilus
Pl. 2, fig. 8	4	0.75	0.9 cm.	isolated sporophyll
Pl. 2, fig. 9	5.4	0.8	0.65	isolated sporophyll

At first sight it is evident that the specimen figured on Pl. 2, fig. 7 is considerably smaller than the others and at the same time essentially smaller than Lindley and Hutton's *L. lanceolatus*. As to its dimensions we may compare it either with *L. cernuus* Stbg. from the Radnice coal measure series (Westphalian C) or with *L. hofmanni* Njc. from the Nýřany coal measures (Westphalian D) of Central Bohemia; its shape corresponds better with the first of both.

Westphalia: Rather typical specimens of *L. lanceolatus* L. H. were known already to v. Roehl (1868, pp. 141, Pl. 28, fig. 10). The specimen figured by him is 4 cm. long and 0.8 cm. broad. It was collected in the large coal basin of Ruhr.

Great Britain: In England specimens belonging to *L. lanceolatus* L. H. were studied very carefully by E. A. N. Arber (1922/24, pp. 179), who defined it nearly in the same manner as done by the author in the present paper: "between 4 and 5 cm. long and 5 till 10 mm. (usually 7 or 8 mm.) broad, lanceolate or slightly ovate lanceolate, acute and sometimes distinctly acuminate." With specimens joined by Arber to Lindley and Hutton's *L. lanceolatus* agree wholly also specimens described under the same name in the well known textbook on carboniferous plants by R. Crookall (1929, pp. 32, Pl. 9, fig. f, Pl. 22, fig. c) as apparent from the following data: -see the table on pp. 61.

France: From various forms of Lepidostrobophylla described in the older classical french literature, we have to regard as true *L. lanceolatus* L. H. in the first range Zeiller's *L. lanceolatum* from the coal district of Valencienne in Northern France (1886/88, Pl. 77, fig. 7, 8) as

Fig.	Length	Width	Sporangium	Notes
E. A. N. Arber, 1922/24:				
Pl. 8, fig. 14	4 cm.	1 cm.	—	A whole strobilus. — Loc.: Radstock, Sommerset.
Pl. 8, fig. 15	3	0.5	0.7	Stone Hall Boring, Kent (Transition ser.)
Pl. 8, fig. 16	3.9	0.7	0.9	Ricket's Head, Pembroke (? Pennant Grit)
Pl. 8, fig. 17	—	0.7	0.8	Loc. as in fig. 15; the sporophyll is not whole.
R. Crookall, 1929:				
Pl. 9, fig. f	4.2	0.65	—	Only a schematical sketch.
Pl. 22, fig. c	3	0.8	—	A photo.

well as the specimens by E. Bureau (1914, Pl. 52, fig. 2, Pl. 65, fig. 5) from the coal district of Basse Loire. Their identity with Lindley-Hutton's species is well attested by their dimensions:

Fig.	Length	Width	Sporangium	Locality	
R. Zeiller:					
Pl. 77, fig. 7	4 cm.	0.75 cm.	0.95 cm.	Mines de Ferfay, fosse no. 3, v. Marsy.	Pas de Calais
Pl. 77, fig. 8	3.6	0.6	0.65	Mines d'Annoellin.	
M. Bureau:					
Pl. 52, fig. 2	3	0.8	0.8	La Tardivière, near Mouzeil.	Basse Loire
Pl. 65, fig. 5	5.3	1	1.3	Mines de St. George-Chatelaison, puits du Bel-Air.	

Most probably we have to join to this type of *Lepidostrobophylla* also specimens figured under the name of *L. fuisseense* by Vaffier (1901, pp. 137, Pl. 10, fig. 3, 4 and Pl. 11, fig. 1 a) from the Lower Carboniferous at Macconais, as well as Carpentier's *L. laricinus* (1918, pp. 243, Pl. 4, fig. 7) from the Carboniferous of the coal basin of Basse Loire, which by any serious means cannot be distinguished from the other already mentioned specimens of the true *L. lanceolatus* L. H. (see also in W. J. Jongmans, 1930, pp. 451, 493).

Finally according to my opinion we have to join hereto (at least as very nearly related forms) also several specimens figured under the name of *L. majus* by M. B. Renault and R. Zeiller from the stephanian strata at Commentry, which by other palaeobotanists were compared also with *L. intermedius* Arber (W. J. Jongmans, 1930). A quite similar specimen was described by R. Zeiller (1906, Pl. 41, fig. 1) also from the districts of Blanzy and Creusot (stephanian beds)

as *L. acuminatum* L s q x. All these specimens are considerably smaller than the true *L. majus* B g t. but at the same time broader than *L. intermedium* A r b e r. Their dimensions are as follows:

Fig. and loc.	Length	Width	Sporangium
R e n a u l t—Z e i l l e r, 1888/90, Pl. 59, fig. 8, 9. Commentry.	5—5.5 cm.	0.8—1 cm.	1.5 cm.
Z e i l l e r, 1906, Pl. 41, fig. 1. Blanzy—Creusot.	4.5—6	1	1.2

South-eastern Europe: Specimens which are easely to be compared with *L. lanceolatus* L. H. were figured in several classical works also from the Doněc coal basin in Southern Russia, from the districts of Eregli in Asia Minor as well as from the Carboniferous of Bulgaria. They were mostly justly idendified by the respective authors as *L. lanceolatus* L. H. They exhibit the following dimensions:

Fig.	Length	Width	Sporangium	Loc. and hor.
M. D. Z a l e s k i j, 1904:				Doněc coal basin:
Pl. 6, fig. 2	3.7 cm.	0.9 cm.	0.85 cm.	Gruševka, mine Čechirovoj, C_2^3
Pl. 7, fig. 10	over 3.5	0.7	0.9	Krasnopolje, C_2^5
K. N o v i k, 1931:				Doněc coal basin:
Pl. 19, fig. 4	4.4	0.55	—	Colliery Bokivska, mine 20. C_2^3 (This specimen show some similarity *with L. intermedius)*
R. Z e i l l e r, 1902 [1899]:				Asia Minor:
Textfig. 11	over 3.8	0.8	0.95	Coslou
F. N ě m e j c, 1942:				Bulgaria, Balkan Mts.:
Pl. 4, fig. 8	4.2	0.9	1.4	Caričina } Namurian
Pl. 4, fig. 9	4.4	1.0	0.8	Caričina } Namurian
	?	0.7	1.1	W. H a r t u n g in 1935 figured from the same loc. only the top of a similar sporophyll)
Pl. 4, fig. 10	?	0.9	1.5	Cârecâl, Westphalian A—B.

It is not excluded that to the true *L. lanceolatus* L. H. belong also specimens, which have been mentioned by M. D. Z a l e s s k i j (1904) from the Doněc coal basin under the name of *L. majus* B g t. They represent perhaps only larger varieties of that "species". I do not see

any essential difference with regard to all other already mentioned *L lanceolatus* specimens. They have been collected at Černogorovka, in the series of C_2^5 below the limestone bed L. Zalesskij's specimen of the fig. Pl. 7, fig. 6, is 5.5 cm. long and 0.8 cm. broad, that of the text-fig. 10, is over 5 cm. long and 1 cm. broad (its sporangium measures 1.2 cm.) and finally that of the fig. Pl. 7, fig. 9, is 4.8 cm. long and 1 cm. broad.

North America: In the classical literature dealing with the floras of the Carboniferous of North America we meet this type only very rarely. It is, I believe, not quite sure whether even specimens described there under this name are really identical with the true Lindley-Hutton's form. For instance the specimen described under this name by L. Lesquereux (1879—1880/1884, pp. 786, Pl. 107, fig. 4, 5) from Cannelton in Pennsylvania agrees with our species well by its dimensions, but its distal leafy portion is widest below its middle part (which is not the case in the true *L. lanceolatum*). The specimen described by the same author (1870; 1879/80, pp. 437, Pl. 69, fig. 29) as *L. oblongifolius* and identified by E. A. N. Arber (1922/24, pp. 180) with *L. lanceolatus*, exhibits, I suppose, a too short distal leafy blade compared with the true *L. lanceolatus*. It agrees rather with our *L. hofmanni* Njc. of our Nýřany coal measure series or still more probably with the *L. cernuus* Stbg. of our Radnice coal measure series. It was collected at the famous locality Mazon Creek, Illinois. It is hardly 3 cm. long and 7—8 mm. broad. From our *L. hofmanni* Njc. it differs by its shape, which remembers more the shape of the *L. lanceolatus* or *L. cernuus*. I believe that all North American specimens of that kind represent a special independent type, which cannot be identified either with the true *L. cernuus* Stbg. or with *L. hofmanni* Njc.

Stratigraphical distribution:

L. lanceolatus L. H. is most frequent in the Radnice coal measure series (Westphalian C). Several specimens, which by no essential features are to be distinguished from specimens coming from the Radnice series, have been stated also in the Nýřany coal measure series (Westphalian D). Whether true *L. lanceolatus* L. H. occurs also in higher zones (stephanian beds) of the Central Bohemian Carboniferous is not yet safely stated.

The Radnice coal measures series.

The coal district of Kladno and Rakovník:

Kladno, coal mines in the surroundings (Gottwald [Ronna] at Hnidousy a. o.). — The whitish Tonsteine interlayers (opuky) of the Main Kladno coal measure (i. e. Upper Radnice coal measure).

Kralupy, shales accompanied by iron stones at the hill Červená Hůrka (correlated with the horizon of the Upper Radnice coal measure).

Lužná (near Rakovník). — Mine "Lužná". — Hor.: In the shales of the Upper Radnice coal measure.

The coal district of "Na Lísku" at Zdejciná near Beroun:

Strádonice. — In the Tonsteine beds of the ravines between Zdejciná and Strádonice.

Zdejciná. — In the hanging black shales of the coal seam (correlated with the Upper Radnice coal measure).

The coal districts of Radnice:

Břasy. — At various mines in the hanging shales of the Upper Radnice coal measure.

The coal district of Merklín:

Coal mines at the place "Na Výtoni" between Merklín and Skrchleby. — Hanging shales of the coalmeasures correlated with the Plzeň coal measures (the deepest seams of the Radnice coal measure series).

The coal district of Plzeň:

Nýřany. — Mine Krimich. — Hor.: In the hanging shales of the coal measure No. III. (the Plzeň coal meusures).

The Nýřany coal measure series.

The coal district of Plzeň:

Nýřany, in the cannel coal seam of the Nýřany coal measure.

17. *Lepidostrobus (Lepidostrobophyllum) majus* (B g t.) A r b e r emend.

Pl. XI, fig. 3, 4 (see also 1, 2), 5, 6, 7, 8, 9, 10, Pl. XII, fig. 1, 2, 3, 4, 5.

The term of *L. majus* was defined by A. B r o n g n i a r t (1828, pp. 87, 174), who applied it to a rather uncomplete specimen, which he has figured some years before under the name of *Filicites dubius* (1822, Pl. 2, fig. 4). This specimen represents only a fragment (cca. 6.8 cm. long), the top of the distal leafy portion of a very large sporophyll, which attains a width of cca. 1.8 cm. By its shape the whole conserved part of this sporophyll agrees in a high measure with the preceeding *L. lanceolatus* L. H., but it is much larger.

I believe that it is quite hopeless to attempt only on the bases of the just mentioned B r o n g n i a r t's fragmentary type specimen a critical revision of the various specimens described hitherto under the name of *L. majus* or eventually also of other specimens, which by many palaeobotanists are regarded as identical or nearly allied with B r o n g n i a r t's *L. majus* (see especially the following North American forms: *L. auriculatum* L s q x. [1866; 1879/80, pp. 450, Pl. 68, fig. 5; see also in E. B u r e a u, 1914, pp. 180, Pl. 74, fig. 4], *L. acuminatum* L s q x. [1854; 1879/80, pp. 450, Pl. 69, fig. 37; see also in R. Z e i l l e r 1906, pp. 154, Pl. 41, fig. 1, as well as in R. C r o o k a l l, 1929, pp. 32, Pl. 9, fig. 1], *L. mansfieldi* L s q x. [1879/80, pp. 449, Pl. 69, fig. 34], *L. missouriensis* D. W h i t e [1899, pp. 216, Pl. 58, fig. 2, Pl. 60, fig. 1, 2, 3, Pl. 61, fig. 1 a—b, Pl. 62, fig. a—e and Pl. 63, fig. 3], *L. rostellatum* L s q x. [1870; 1879/80,

pp. 451, Pl. 69, fig. 35], *L. striatum* L s q x [1870; 1879/80, pp. 452, Pl. 69, fig. 36] a. o.). We have, I believe, to take into account also the opinion of several later palaeobotanists, which united resp. identified with the original uncomplete B r o n g n i a r t's specimen several better preserved and similarly very big *Lepidostrobophylla*. In this respect especially important seems to me the point of view of E. A. N. A r b e r as expressed in his work from 1922/24, pp. 182. *L. majus* B g t represents according to his opinion rather large sporophylls, of a broad lanceolate and acuminate shape, until 12 cm. long and 10—15 mm. broad (specimens figured by him on Pl. 9, fig. 20 and 21 are about 8.5 cm. long and 13 mm. broad; their sporangium bearing basal portion is cca. 1.9 cm. long. His definition of *L. majus* is no doubt in agreement also with the opinions of other european palaeobotanists, especially with that of R. K i d s t o n.

Specimens, which agree wholly with A r b e r's definition of this "species" are known to me nearly from all horizons of the Central Bohemian coal districts. They are most frequent in the Lower grey beds, wherefrom came also nearly all specimens conserved in the classical collections of the Nat. Museum, Prague. Their distal leafy free part is of a lanceolate shape, broadest in its middle third and slowly narrowed into a rather short top, which is never narrowly prolongated. By this last feature it differs from the often enough similar "species" of *L. acuminatus* (see in R. C r o o k a l l, 1929, Pl. IX, fig. k, l). It is mostly 1—1.6 cm. broad and 7—8.5 cm. long, but we know also specimens still longer as well as essentially shorter ones (in this last case they are rather difficult to be distinguished from *L. lanceolatus* L. H.). True *L. majus* specimens are always provided by a very thick central nerve, the imprint of which often seems as composed of 2 or 3 parallel lines. The basal sporangium bearing portion of these sporophylls are about 1.7—2.2 (most frequently 1.8—2) cm. long.

Specimens of *L. majus* were known from Central Bohemia already to C. v. E t t i n g s h a u s e n, who described it from the Radnice coal fields under the name of *L. binerve* (1854). More specimens of that kind were mentioned and figured by K. F e i s t m a n t e l (1868) and especially by O. F e i s t m a n t e l (1871, 1873, 1875/6). But as already told I do not believe that all specimens described by O. F e i s t m a n t e l under the name of *L. majus* correspond really with the true A r b e r-B r o n g n i a r t's form. There are among them several essentially smaller forms, which are perhaps better to be joined to *L. lanceolatus* (W. J. J o n g m a n s in 1930 speaks about smaller forms of *L. majus* ("kleinere Form"). Finally specimens of true *L. majus* were also figured from Central Bohemia by A. H o f m a n n and F. R y b a 1899 (excl. the fig. of Pl. 16, fig. 9). The dimensions, which may serve as a safe basis for the identification of all these specimens cited from Central Bohemia, are as follows: -see the table on pp. 66.

Many broad and large leafy specimens, which have been taken often as comparative material at the taxonomical studies of the Lepidostrobophylla of the Central Bohemian coal districts, are figured in va-

Fig., loc. and hor.	Length	Width	Sporangium	Identification
O. Feistmantel: 1871, pp. 31, Pl. 1, fig. 2 (1875/6, pp. 213, Pl. 13 [42], fig. 3) Kralupy, Upper Radnice coal measures.	5 cm.	1.1 cm.	1.5 cm.	*L. lanceolatus* or an extremely small form of *L. majus*
1871, Pl. 1, fig. 3 (1875/6, Pl. 13 [42], fig. 4) Kralupy, Upper Radnice coal measures.	5.5	1.1	1.4	— detto —
1875/6, Pl. 13 [42], fig. 1 Kralupy, Upper Radnice c. m.	7	1.2	1.6	*L. majus*
1875/6, Pl. 13 [42], fig. 2 Břasy, Upper Radnice c. m.	6.7	1.2	1.6	*L. majus*
1873, Pl. 18, fig. 17 Nýřany, Nýřany coal measures.	both over 7 cm.	0.9	1.5	*L. majus*
1873, Pl. 18, fig. 18 Nýřany, Nýřany coal measures.		1.1	1.7	*L. majus*
K. Feistmantel: 1868, Pl. 2, fig. 9 Břasy, in the hangingshales of the Upper Radnice coal measure.	6.85	1.2	1.7	*L. majus*
C. v. Ettingshausen: 1854, pp. 56, Pl. 24, fig. 3 Svinna at Radnice, in the Tonsteine bed between the Lower and Upper Radnice coal measure.	?	1.2	?	*L.* cf. *majus*
A. Hofmann—F. Ryba: 1899, pp. 86, Pl. 16, fig. 7 Kamenný Újezd, hor.: ?	5.7	1.1	1.8	*L. majus*
— Ibid. —, Pl. 16, fig. 8 Nýřany (mine Krimich)	over 6 cm.	?	1.8	*L. majus* (the lamina very indistinctly preserved)
— Ibid. —, Pl. 16, fig. 9 Nýřany (mine Krimich)	1.7	0.6	1.1	*L. hofmanni*

rious classical palaeobotanical works mostly as *L. majus* Bgt. But even here many of them do not correspond with the true *L. majus* (Bgt.) Arber.

Before all I have to mention several broad and rather long specimens described by H. B. Geinitz (1854 and 1855) from Saxony, by F. Goldenberg (1855—1862) from the Saar coal fields and by H. R. Goeppert in his "Systema filicum fossilium" (1836). Several of them are justly described as *L. majus*, others under special names. But as evident from the following table all agree well with this "species":

Figure and name	Length	Width	Sporangium	Loc. and strat. hor.
H. B. Geinitz, 1854:				
L. majus (pp. 55)				
Pl. 14, fig. 12	?	1.65 cm.	?	Hainichen-Ebersdorf: Namurian
Pl. 14, fig. 13	9.5	1.4	1.8	
Pl. 14, fig. 14	5.6	1.4	1.9	
H. B. Geinitz, 1855:				
L. majus (pp. 37)				
Pl. 2, fig. 5	9.3	1.5	2.-	The coal fields of Zwickau. — Westphalian D
F. Goldenberg, 1855/62:				
Lepidostrobus laricinus (L. lepidophyllaceus) — Pl. 3, fig. 13	?	1.4	?	
Lomatophloios intermedius (L. majus) — Pl. 15, fig. 5	8.4	1.5	2.6	
Lepidophyllum majus Pl. 15, fig. 11	?	1.8	?	
Lepidophyllum (L. trinerve)				
Pl. 16, fig. 11	11.8	2.4	2.8	The Saar coal fields.
Pl. 16, fig. 12	? (much over 6)	1.6	1.7	
Lepidophyllum (L. glossopteroides)				
Pl. 16, fig. 13	? (much over 4.8)	1.4	1.8	
H. R. Goeppert, 1836:				
L. glossopteroides (pp. 431), Pl. 44, fig. 3	6.7	1.35	2.-	

To the true *L. majus* belong no doubt also several large specimens described from Great Britain by Lindley and Hutton (1831—1837, Vol. II, Pl. 152) as *L. trinerve*. The slightly schematical figures exhibit 3 approached parallel lines instead of one big central nerve, which as already mentioned may be found also in several specimens collected in Central Bohemia and which represents certainly only an exceptional state of preservation. Lindley and Hutton's specimens were collected in the coal measures of Blackwoodie (Monmouthshire); their dimensions according to Lindley-Hutton's figures are as follows: -see the table on pp. 68.

On the other hand it is a serious question, whether we have to join to the true *L. majus* also Lindley and Hutton's *L. binerve* (1837, pp. 103, Pl. 52), which too represents a similarly big Lepidostrobophyllum type. This specimen agree better with Leuquereux's North American "species" of *L. auriculatum*.

Fig.	Length	Width	Sporangium
Pl. 152, fig. 1	?	1.5 cm.	2 cm.
Pl. 152, fig. 2	6.2	1.1	2.1
Pl. 152, fig. 3 (only a scheme)	6.7	1.2	1.2

From the Doněc coal fields of Southern Russia several specimens of *Lepidostobophylla* have been described as *L. majus* by D. M. Zalesskij (1904). But all these specimens are too small compared with the true *L. majus*, wherefore I already have mentioned (see the chapter on *L. lanceolatus* L. H.) that they are better to be joined with *L. lanceolatus* L. H. W. J. Jongmans (1930, pp. 462) regards Zalesskij's specimens of Pl. 7, fig. 6 and of the textfig. 10 as *L. intermedius* Arber. But I believe that the distal leafy part of these specimens compared with the true *L. intermedius* Arber is too broad; it measures cca. 0.8 resp. 1 cm. across, which agrees much more with *L. lanceolatus* L. H. Zalesskij's specimen of Pl. 7, fig. 9 exhibits an intermediary shape between *L. lanceolatus* and *L. majus*. I believe we have to regard it at least as an extremely small variety of *L. majus* (Bgt.) Arber or perhaps also as a bigger form of *L. lanceolatus* L. H. (similarly as several specimens from Central Bohemia mentioned by O. Feistmantel, 1871, as *L. majus*).

For the same reason as in the case of the Doněc specimens, I believe that it is also impossible to unite with the true *L. majus* (Bgt.) Arber specimens described under this term by V. Šusta (1928, Pl. 59, fig. 5) from the Upper Silesian Carboniferous of Karviná: the figured specimen agrees by its dimensions (length: 5 cm., width: 0.8 cm.) evidently more closely with *L. lanceolatus* L. H. The same holds also to Kerner's specimen (1897, pp. 383, Pl. 10, fig. 3) from the Carboniferous of the Steinacherjoch in the Austrian Alps (see also in our chapter on *L. lanceolatus* L. H. and on *L. intermedius* Arber).

It is a very interesting fact, that we meet only very rarely specimens of the true *L. majus* (Bgt.) Arber mentioned in the classical older literature dealing with the floras of the french coalfields (especially of those of Central France, where higher carboniferous and permian beds are present). As I mentioned already in the chapter on *L. lanceolatus* L. H., some specimens of *Lepidostrobophylla* were mentioned under the name of *L. majus* from the coal field of Commentry by M. B. Renault and R. Zeiller (1888/90). But these specimens are essentially smaller than the true *L. majus* (Bgt.) Arber. Similar forms were described also from the coalfield of Blanzy and Creusot by R. Zeiller (1906) under the name of *L. acuminatum* Lsqx. I regard all these forms as belonging much more probably to the type of *L. lanceolatus* L. H. True *L. majus* (Bgt.) Arber was mentianed for instance by E. Bureau (1914) from the coal fields of Basse Loire (mine Puits Saint Georges la Hardivière at Mouzeil; pp. 173 and 174, Pl. 65,

fig. 4). This specimen is 6.6 cm. long and 1.2 cm. broad; its basal sporangium bearing part is cca. 1.8 cm. long. It agrees well with several smaller forms of *L. majus* (B g t.) A r b e r of our Central Bohemian coal districts.

Many rather large and broad *Lepidostrobophylla* reminding in a high measure *L. majus* (B g t.) A r b e r were described, as mentioned at the beginning of this chapter, from the coal fields of North America. But I believe that perhaps none of such specimens mentioned in the older classical literature belongs to the true european *L. majus* (B g t.) A r b e r. E. A. N. A r b e r regarded as most nearly allied with our type W h i t e's *L. missouriensis* (1899, pp. 216). R. C r o o k a l l regards it as utterly identical. I would agree rather with A r b e r's opinion, because W h i t e's specimens are still larger and unusually broad (mostly about 2 cm.) if compared with the european type, as evident from the following data:

Fig. in D. White 1899:	Length	Width	Sporangium
Pl. 58, fig. 2	over 6 cm.	2,3 cm.	2 cm.
Pl. 60, fig. 1	9.5	2	—
Pl. 60. fig. 2	9	2	2
Pl. 60, fig. 3	8.5	2	2
Pl. 61, fig. 1a—b	8,9—10	1.8—8	2
Pl. 62, fig. a—e	till over 6	1.5—2	—

Directly under the name of *L. majus* were described certain *Lepidostrobophylla* from North America by A. C. N o é (1925). But these specimens agree still less with our european forms of *L. majus* (B g t.) A r b e r than the just mentioned W h i t e's type of *L. missouriensis*. They are especially broad and relatively short:

Fig. in Noé 1925	Length	Width	Sporangium
Pl. 10, fig. 2	5 cm.	2.1 cm.	1.8 cm.
Pl. 10, fig. 3	5.6	2.7	1.8

I believe that all these data taken from the older classical literature demonstrate very clearly, that it is not always easy to distinguish it from several other allied types especially if the found specimens are not typically developed. As evident from the above lines, it is especially difficult to distinguish smaller forms of *L. majus* (B g t.) A r b e r from the larger forms of *L. lanceolatus* L. H.

Stratigraphical distribution:

Until present I know from this "species" only isolated sporophylls. These are especially frequent in the Nýřany coal measure series (Westphalian D), but we meet them also in various zones of the Radnice coal measure series. In the stephanian beds (Kounov coal measure series) they seem to be very rare (I did not find them in the older classical collections of the Nat. Museum from these beds at all).

The Radnice coal measure series:

The coal districts of Radnice:

Břasy. — The hanging shales of the Upper Radnice coal measure.

The coal district of Malé Přílepy near Beroun:

Malé Přílepy. — The Tonsteine bed in the roof of the coal measure (correlated with the Lower Radnice coal measure).

The coal districts of Kladno and Rakovník:

Kralupy. — In a bed of shales containing iron stone nodules of the hill Červená Hůrka (correlated with the horizon of the Upper Radnice coal measure).

Rakovník. — Mines of the Comp. Moravia eastward from the town. — Tonsteine interlayers of the Upper Radnice coal measures.

Rakovník. — Mines at the place "Na spravedlnosti". — In the hanging shales of the Upper Radnice coal measure.

Příčiná near Lubná. — Mines at the place "Na brantech". — At various zones of the Upper Radnice coal measures as well as in the Lubná coal measures (in the hanging shales of the coal seam No. Ia and in the Tonsteine bed of the roof of the coal seam no. Ib).

The coal districts of Plzeň:

Nýřany. — Mine Krimich. — In the hanging shales of the coal measure No. II (i. e. Upper Radnice coal measure).

The Nýřany coal measure series:

The coal districts of Plzeň:

Třemošná. — The outcrops of the Nýřany coal measure at the brickyard.

Nýřany, various mines in the surroundings (also at the place "Panrác" N. of the village). — In the cannel coal seam of the Nýřany coal measure.

Nýřany. — Mine Krimich. — In the hanging shales of the coal measure no. I (Nýřany c. m.).

Týnec. — Mine Masaryk. — In the hanging shales of the August coal seam.

Sulkov. — Mine Frischglück. — In the hanging shales of the Nýřany coal measure.

Tlučná. — Mine Krimich II. — In the hanging shales of the coal measure no. II (i. e. Nýřany coal measure).

18. *Lepidostrobus (Lepidostrobophyllum) hofmanni* n. nom.

Pl. II, fig. 9, 10, 11, Pl. XII, fig. 6.

Under this new name of *L. hofmanni* I mention here a relatively short form of *Lepidostrobophylla,* which sometimes were found united into very large strobili. Their basal sporangia bearing portions compared with their distal leafy blades are relatively large, cca. 0.8—1.2 cm. long and (with the sporangium) 0.6—0.8 cm. broad. Their distal leafy blade exhibits a narrow triangular shape and is provided by a rather strong central vein. In its broadest part i. e. at its very base their leafy part measures about 0.6—0.8 cm.; it attains a length only of 1.8—2.2 cm.

This rather short *Lepidostrobophyllum* form was mentioned and figured from the Bohemian coal fields by A. H o f m a n n and F. R y b a (1899) partly under the name of *L. majus* B g t. as an isolated sporophyll (Pl. 16, fig. 9) and partly under the name of *Lepidostrobus variabilis* as an impression of a whole strobilus broken across (Pl. 16, fig. 6). The locality of which originate the first named specimen is termed as Nýřany, mine Krimich, that of the second specimen as Mirošov.

In the accessible literature I did not find anything quite identical with this form. A rather similar type (especially with regard to its dimensions) was figured by H. B. Geinitz (1855, Pl. 2, fig. 7) from the Saxonian Carboniferous, as mentioned already in our chapters about *L. lanceolatus* and *L. cernuus.* But Geinitz's specimen differs from our form (presuming of course that the figurees by Geinitz are at least in coarse lines enough trustworthy) by the shape of its leafy blade, which is rather lanceolate and not so strictly triangular.

Slightly similar to our form seems to be also A r b e r's *L. moysei* (1922/24, pp. 183, Pl. 9, fig. 26) from the Middle coal measures of Great Britain. Even here both forms agree in their dimensions, but they exhibit essentially different shapes: the specimens from Great Britain (*L. moysei*) are not so strictly and narrowly triangular but rather shovel shaped. The more recent figures of *L. moysei* A r b e r by R. C r o o k a l l (1929, P. 9, fig. b) are still less similar to our *L. hofmanni* than the original A r b e r's figures. Further also several North American carboniferous *Lepidostrobophylla* exhibit a slight similarity with our present type. These are for instance *L. oblongifolius* L s q x, *ovatifolius* L s q x, and *spathulatus* L s q x (see in L. L e s q u e r e u x, 1879/80, and Noë, 1925). And the same may be said also of H e e r's *L. obtusus* from the arctic regions (Isle of Melville; see in O. H e e r, 1868). There exists but no true identity.

S t r a t i g r a p h i c a l d i s t r i b u t i o n:

Specimens of *L. hofmanni* N j c. are known to me until present only from the Nýřany coal measure series of the Lower grey beds.

The coal districts of Plzeň:

Nýřany. — Cannel coal seam of the Nýřany coal measure.
Sulkov. — Hanging shales of the coal seams of the Nýřany coal measure series.

The coal district of Mladotice:

Řemešín. — The old abandoned coal mines between the village of Řemešín and the forestery house of Potvorov. — Hanging shales of the coal measure correlated with the Nýřany coal measure.

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EXPLANATION OF THE PLATES

(All specimens are figured in natural size.)

Plate I.

Lepidostrobus kidstoni Zal.:

Fig. 1. Part of a strobilus showing the axis and the orientation of the basal sporangia-bearing as well as the distal free portions of the sporophylls. — Loc.: Kralupy, the hill Červená Hůrka; from the series of shales containing iron stone nodules correlated with the Upper Radnice coal measures ("Main Kladno coal measure"). — Coll.: Geol. pal. dep. of the National Museum Prague (ČGH 1177), leg. K. Feistmantel.

Fig. 2. Part of a strobilus showing its outer surface with well visible distal free portions of the sporophylls. — Loc. the same as in the fig. 1. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague ("Komité für Landesdurchforschung von Böhmen").

Fig. 3. and 4. Two variousely conserved specimens: 3. part of an impression, 4. terminal part of a coaly compression. — Loc. and coll. as in fig. 2.

Lepidostrobus meunieri Zeill.:

Fig. 5. Cast of an impression showing the cavity remaining after the decay of the axis and of the very bases of the sporophylls, the orientation of the basal sporangia-bearing portions of the soprophylls as well as the orientation and the shape of the free distal portions of the sporophylls. — Loc.: Břasy near Radnice, coal mines of bar. Riese; the hanging shales of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague (ČGH 1175); leg. K. Feistmantel.

Fig. 6 and 7. Parts of two specimens, of which Fig. 6 shows the axis and the orientation of the basal sporangiabearing portions as well as of the distal free portions of the sporophylls, fig. 7 shows the appearance of the outer surface. — Loc. and coll. as in the Fig. 2.

Plate II.

Lepidostrobus kidstoni Zal.:

Fig. 2. Part of a strobilus showing the very big axis and the orientation of the basal sporangia bearing sporophyll portions. — Loc.: Kralupy, the hill Červená Hůrka; from the series of shales containg iron stone nodules correlated with the Upper Radnice coal measures ("Main Kladno coal measure"). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. K. Feistmantel.

Lepidostrobus stefanicus Njc.:

Fig. 2. Part of a strobilus showing the very big axis the orientation of the basal sporangiabearing sporophyll portions. — Loc.: Nýřany, mine Krimich I.; from the hanging shales of the Hanging Nýřany coal seam. — Coll. Geol. pal. dep. of the Nat. Museum, Prague; leg. Dr. F. Němejc.

Fig. 3. Part of a strobilus showing the axis and the orientation of the basal sporangia bearing sporophyll portions. — Loc.: Kounov, from the bituminous coaly shales called "švartna" (Schwarte). — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 4 and 5. Impressions of the terminal parts of two strobili showing well their surface and partly also their axis. — Loc.: Studňoves near Slaný; hanging shales of the Kounov coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague (fig. 4: ČGH 1703), leg. K. Feistmantel.

Fig. 6. Part of an impression of a strobilus showing its outer surface. — Loc.: Nýřany; cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. O. Feistmantel.

Lepidostrobus ovatus Njc.:

Fig. 7. Impression of a longitudinally broken strobilus showing its axis. — Loc.: Nýřany, cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. O. Feistmantel.

Fig. 8. Impression of a transversally broken strobilus. — Loc. and Coll. as in fig. 7; leg. Ing. E. Krasický.

Lepidostrobus (Lepidostrobophyllum) hofmanni N j c.:

Fig. 9 and 11. Two isolated sporophylls bearing at their basis the rather short sporangia; in fig. 9 the central vein well visible. Loc. and coll. as in fig. 7; leg. O. F e i s t m a n t e l.

Fig. 10. An isolated sporophyll. — Loc. Sulkov; hanging shales of the Nýřany coal measures. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague.

P l a t e III.

Lepidostrobus ornatus L. H.:

Fig. 1. Part of a specimen conserved as impression and showing in its upper portion the orientation of the sporophylls. — Loc.: Otvovice near Kralupy, mine František de Paula; from the hanging shales (called "mydláky") of the Upper Radnice coal measure ("Main Kladno coal measure"). — Col. Geol. pal. dep. of the Nat. Museum, Prague; leg. Dr. J a r. Š e t l í k.

Fig. 2 and 3. Positive and negative impression of the basal part of a strobilus joined terminaly to a short fragment of a *Lepidodendron acutum* P r e s l twig with well preserved leaves. The cone axis as well as the orientation of the sporophylls are well visible. Loc. and coll. as in Fig. 1.

Lepidostrobus lycopoditis O. F e i s t m.:

Fig. 4. Basal portion of a strobilus joined terminally to a twig of *Lepidodendron ophiurus* B g t. showing well the characteristical form of the leaves. The impression shows the outer surface of the strobilus (the rather broad sporophyllends). — Loc.: Vinařice near Kladno, mine Fierlinger (Mayerau); from the whitish Tonsteine interlayer (called "velká opuka") of the Upper Radnice ("Main Kladno") coal measure. — Coll. Geol. pal. dep. of the Nat. Museum, Prague.

Fig. 5 and 6. Fragments of impressions of strobili associated to the twig of *Lepidodendron ophiurus* B g t. — Loc.: Hnidousy near Kladno, mine President Gottwald (Ronna); fro mthe whitish Tonsteine interlayer (called "velká opuka") in the Upper Radnice ("Main Kladno") coal measure. — Coll. Geol. pal. dep. of the Nat. Museum, Prague.

Lepidostrobus obovatus N j c.:

Fig. 7. A whole strobilus joined terminally to a twig of *Lepidodendron obovatum* S t b g. bearing well preserved and more than 10 cm. long leaves. In the strobilus the axis and the orientation of the sporophylls are well visible. — Loc.: Pankrác at Nýřany; from the whitish Tonsteine bed between the Upper and the Lower Radnice coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. Ing. R. R ů ž i č k a.

P l a t e IV.

Lepidostrobus lycopoditis O. F e i s t m.

Fig. 1. Impression of a strobilus in an iron stone nodule showing part of the cone axis and the orientation of the sporophylls. At its lower end the foliage type of *Lepidodendron similis* K i d s t. is well visible. — Loc.: Blatnice (from the abandoned gallery of Blatnice); Radnice coal measure series. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. O. F e i s t m a n t e l (1870).

Fig. 2. Impression of a strobilus showing the axis and the orientation of the sporophylls. The cone axis is directly connected with the end of a twig showing the foliage type of *Lepidodendron acutum* P r e s l. — Loc.: Libušín, near Kladno, mine Fierlinger II (Max), from the whitish Tonsteine (called "velká opuka") in the Kladno coal measure (correlated with the Upper Radnice c. m.). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. J. M a r e k.

Lepidostrobus obovatus N j c.:

Fig. 3. Top of a specimen showing the axis and the orientation of the sporophylls. — Loc.: Libušín near Kladno, mine Fierlinger II (Max); from the hanging shales (called "mydláky") of the Main Kladno measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Dr. Ing. G. M ě s k a.

Fig. 4. Top of an unusually deformed specimen. — Loc., stratigraphical hor. and coll. as in fig. 3.

Lepidostrobus crassus N j c.:

Fig. 5. Part of an impression of a specimen showing the outer surface and partly also the free end portions of the sporophylls. — Loc.: Malé Přílepy near Beroun, from the Tonsteine horizon ("Schleifsteine" "bělky", "brousky") above the Lower Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. M a r e k.

Fig. 6. Part of an impression of a longitudinally broken specimen showing well its very big axis and the orientation of its sporophylls. — Loc., stratigraphical hor. and coll. as in fig. 5.

Plate V.

Lepidostrobus brongniarti (G ö p p.) B e r g e r:

Fig. 1. Impression of the basal portion of a specimen showing at its very base foliage of *Lepidodendron simile* K i d s t. — Loc.: Nýřany, mine Krimich I; from the Radnice coal measure series. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. F. F r e i b e r g.

Fig. 2. Basal part of another specimen showing the outer surface and at the base the transition from fertile sporophylls into sterile leaves of the type of *Lepidodendron simile* K i d s t. — Loc.: Pankrác at Nýřany, mine Silvia; from the Radnice coal measure series. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. O. F e i s t m a n t e l (1870).

Fig. 3. Basal part of a specimen longitudinally broken and showing its axis, the orientation of the sporophylls as well as at its very base several leaves of *Lepidodendron simile* K i d s t. type. — Loc.: Kladno (coal mine unknown); from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice c. m.). — Coll.: Geol. pal. dep. of the National Museum, Prague.

Lepidostrobus sternbergi C d a.

Fig. 4. Portion from the top of a specimen showing the outer surface of the strobilus and at the top also the shape of the sporophyll ends. — Loc.: Chomle near Radnice (old abandoned sandstone quarries at the former pond "Malíkovec"); from the Tonsteine ("Schleifsteine", "brousky") horizon above the Lower Radnice coalmeasure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. O. F e i s t m a n t e l.

Fig. 5. Portion of a flattened and transversally broken specimen showing the cone axis and the basal sporangia bearing as well as the free end parts of the sporophylls. — Loc.: Rakovník, mine Moric (abandoned); from the shales of the coal seam called "věnec" (correlated with the Nýřany coal measures). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. P ě n k a v a.

Fig. 6. Part of a flattened and transversally broken specimen showing the outer surface as well as the orientation of the basal sporangia bearing sporophyll parts and part of the cone axis. — Loc.: Rakovník (the abandoned coal mines of the Comp. Moravia E. of the town). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. O. F e i s t m a n t e l (F e i s t m a n t e l's type specimen 1875/76, Pl. XLIV, fig. 2).

Fig. 7. Small part of a longitudinally broken strobilus conserved as a compression in the cannel coal and showing very distinctly the axis. — Loc.: Nýřany, from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. J. B e n d a.

Plate VI.

Lepidostrobus obovatus A. R e n. sp..

Fig. 1. Impression of a transversally broken strobilus showing the orientation of the basal fertile sporophyll parts and the transversally broken cone axis. — Loc.: Břasy (near Radnice), from the hanging shales of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague.

Lepidostrobus sternbergi C d a.:

Fig. 2. Part of a specimen showing very distinctly the cone axis and the orientation of the sporophylls, especially of their basal sporangia bearing portions. — Loc.:

Hnidousy (near Kladno), mine President Gottwald (Ronna); from the whitish Tonsteine interlayer (called "velká opuka"). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. Ing. J. Hummel.

Fig. 3. Part of a flattened compression with partly visible cone axis. At the left side the orientation of both parts of the sporophylls, at the right side the character of the outer surface of the strobilus is well visible. — Loc. stratigraphical hor. and coll. as in Fig. 2.

Fig. 4. Part of a flattened compression showing well the shape of the free sterile sporophyll portions. — Loc., stratigraphical horiz. and coll. as in Fig. 2.

Fig. 5. Impression of the terminal part of a strobilus showing the character of its outer surface. — Loc.: Malé Přílepy, from the Tonsteine ("Schleifsteine", "brousky") horizon above the Lower Radnice coal measure. — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. Marek.

Plate VII.

Lepidostrobus lycopoditis O. Feistm.:

Fig. 1. Part of a very big specimen (approaching nearly to the type of *Lepidostrobus ornatus* [Park.] Bgt.) showing at its very base the transition stages between the fertile sporophylls and the sterile leaves of the type of *Lepidodendron simile* Kidst. — Loc.: Kladno (coal mine unknown), from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague.

Lepidostrobus crassus Njc.:

Fig. 2. Part of an impression showing the very big cone axis and the orientation of the basal sporangia bearing sporophyll portions. — Loc.: Tlučná (near Nýřany), mine Krimich II; from the hanging shales of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Dr. F. Němejc.

Fig. 3 and 4. Parts of two specimens (impressions) with well visible cone axis. — Loc.: Kamenný Újezd (near Nýřany), mine Lazarus; from the hanging shales of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. O. Feistmantel (1870).

Fig. 5. Small part of an impression showing the shape of the free sterile ends of the sporophylls. — Loc.: Nýřany, mine Krimich I; from the hanging shales of the Hanging Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Dr. F. Němejc.

Fig. 6. Small part of an impression showing the orientation of the sterile free ends of the sporophylls: rather adressed to the cone body. Loc.: Příčina near Lubná, mine Ludvík (at the place "Na brantech"); from the greyish shales accompanying the coal seams no. III and IV (i. e. the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the Nat. Museum, Prague; leg. Dr. F. Němejc.

Fig. 7. Small part of a flattened compression showing the very big cone axis and the orientation of both (the basal fertile as well as the distal sterile) sporophyll portions. — Loc.: Nýřany, from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Plate VIII.

Lepidostrobus ornatus (Parkinson) Bgt.:

Fig. 1. Part of a strobilus showing its outer surface with well visible free ends of the sporophylls. — The coal mines at Břasy near Radnice; from the Tonsteine ("Schleifsteine", "brousky") horizon between the Upper and the Lower Radnice coal measures. — Coll.: Geol. pal. dep. of the National Museum, Prague; coll. K. c. Sternberg.

Lepidostrobus brongniarti Goepp. in Berger:

Fig. 2. Part of an impression of a strobilus, the axis of which bears at its very base several leaves of the type of *Lepidodendron simile* Kidst. — Kladno (coal mine unknown), from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice c. m.). — Coll.: Geol. pal. dep. of the National Museum, Prague.

Lepidostrobus lycopoditis O. F e i s t m.:

Fig. 3 and 4. Two small parts of flattened compressions longitudinally broken and showing their axis and the orientation of their basal sporangia bearing portions. — Loc.: Pankrác near Nýřany, mine Maria; from the Tonsteine ("Schleifsteine", "brousky") bed between the Upper and Lower Radnice coal measures. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Dr F. N ě m e j c.

Fig. 5 and 6. Two specimens with less distinctly visible sporophylls but with very distinctly preserved cone axis. The specimens are associated with slender twigs of *Lepidodendron simile* K i d s t. — Loc., horizon and coll. as in Fig. 3 and 4.

Lepidostrobophyllum lanceolatum L. H.:

Fig. 7 and 9. Impression of the sterile portion of an isolated sporophyll. — Loc.: Merklín (Na Výtoni), mine Andreas; from the hanging shales of the coal measures correlated with the Plzeň coal measures. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 8. Impression of a transversally broken strobilus showing several well preserved sporophylls radially arranged round the axis. — Loc.: Hnidousy (near Kladno), mine President Gottwald (Ronna); from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. J. H u m m e l.

P l a t e IX.

Lepidostrobus cernuus S t b g.:

Fig. 1. Impression of the basal part of a strobilus attached to a considerable portion of the shoot. S t e r n b e r g's original type specimen, 1825, Plate XXIX, fig. 1. — Loc.: Svinná near Radnice, from the Tonsteine ("Schleifsteine", "brousky") bed in tre roof of the Lower Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; coll. K. c. S t e r n b e r g.

Fig. 2. Negative impression of the specimen of fig. 1.

Fig. 3. Impression of the basal portion of a strobilus attached to a shoot showing rather well the shape of the leaf cushions. — Loc.: Kladno (mine unknown), from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 4. A similar specimen as in fig. 3. The leafcushions on the sterile part of the shoot are here less distinctly preserved than in fig. 3. — Loc. as in fig. 3. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. J. H u m m e l.

Fig. 5. Part of an impression of a strobilus transversally broken showing well the shape of the distal free portions of the sporophylls. — Loc., stratigraphical horizon and coll. as in fig. 4.

P l a t e X.

Lepidostrobus cernuus S t b g.:

Fig. 1. Terminal part of a specimen showing the shape of the end portions of the sporophylls, as well as their orientation on the outer surface of the strobilus. — Loc.: Hnidousy (near Kladno), mine President Gottwald (Ronna); from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. J. H u m m e l.

Fig. 2. Part of a transversally broken flattened compression showing distinctly the orientation of both parts (basal fertile and distal sterile) of the sporophyl's. — Loc., stratigraphical horizon and coll. as in fig. 1.

Fig. 3 and 4. Two impressions of the outer surface of the strobili showing the shape and the orientation of the distal portions of the sporophylls. — Loc., stratigraphical horizon and coll. as in fig. 1.

Fig. 5. Small part of an impression of a transversally broken specimen showing the shape and the orientation of both parts of the sporophylls. — Loc.: Břasy near Radnice, mines of bar. Riese; from the interlayer called "Firstenstein" of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. K. F e i s t m a n t e l.

Plate XI.

Lepidostrobophyllum cf. *lanceolatum* L. H. (or perhaps only very small forms [from the basal part of a strobilus] of *L. majus* B g t. ?):

Fig. 1 and 2. Two specimens from the loc. Červená Hůrka at Kralupy n. Vlt.; from the series of shales containing iron stone nodules and correlated with the Upper Radnice coal measures ("Main Kladno coal measure"). — Coll. Geol. pal. dep. of the National Museum, Prague; O. F e i s t m a n t e l (1875).

Lepidostrobophyllum cf. *majus* B g t. (or perhaps only unusually large specimens of *L. lanceolatum* L. H. ?):

Fig. 3. The leafy distal portion of an isolated sporophyll. — Loc.: Břasy near Radnice; from a shaly interlayer of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. O. F e i s t m a n t e l.

Fig. 4. An isolated sporophyll showing the basal fertile as well as the distal sterile portion. — Loc.: Červená Hůrka at Kralupy n. Vlt.; from the series of shales containing iron stone nodules correlated with the Upper Radnice coal measure ("Main Kladno coal measure"). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. O. F e i s t m a n t e l (at the explorations of the "Komité für Landesdurchforschung von Böhmen").

Lepidostrobophyllum majus B g t.:

Fig. 5. Loc.: Nýřany; from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 6. Loc.: Břasy near Radnice, Hochberg's mines; from the hanging shales of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; coll. K. c. S t e r n b e r g.

Fig. 7. Loc.: Břasy near Radnice, mines of bar. Riese; from the hanging shales of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 8. Loc.: Nýřany; from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 9. Loc.: Rakovník, mines at the place "Na spravedlnosti" E. from the town; from the hanging shales of the Upper Radnice coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. J. T r e y b a l.

Fig. 10. Břasy near Radnice; from the hanging shales of the Upper Radnice coal measure — Coll.: Geol. pal. dep. of the National Museum, Prague.

Plate XII.

Lepidostrobophyllum majus B g t.:

Fig. 1. Loc.: Nýřany; from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Fig. 2 and 33 Loc., stratigraphical horizon and coll. as in fig. 1. — Leg. M ö l z e r.

Fig. 4 and 5. Loc., stratigraphical hor. and coll. as in fig. 1.

Lepidostrobophyllum hofmanni N j c.:

Fig. 6. A transversally broken strobilus showing the shape of the sterile distal portions of the sporophylls. — Loc.: Nýřany; from the cannel coal of the Nýřany coal measure. — Coll.: Geol. pal. dep. of the National Museum, Prague.

Lepidostrobus sternbergi C d a.:

Fig. 7. A longitudinally broken specimen showing the axis and the orientation of both portions of the sporophylls. — Loc.: Hnidousy (near Kladno), mine President Gottwald (Ronna); from the whitish Tonsteine interlayer (called "velká opuka") of the Main Kladno coal measure (correlated with the Upper Radnice coal measure). — Coll.: Geol. pal. dep. of the National Museum, Prague; leg. Ing. J. H u m m e l.

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REDAKTOR IVAN KLÁŠTERSKÝ

F. Němejc:

TAXONOMICKÉ STUDIE O PLODNÍCH ŠIŠTICÍCH LEPIDODENDRACEÍ (LEPIDOSTROBUS BGT. INCL. LEPIDOSTROBOPHYLLUM HIRMER) STŘEDOČESKÝCH KAMENOUHELNÝCH PÁNVÍ

TAXONOMICAL STUDIES ON THE STROBILI OF THE LEPIDODENDRACEAE OF THE COAL DISTRICTS OF CENTRAL BOHEMIA

V říjnu 1954 vydalo svým nákladem v počtu 1100 výtisků Národní museum v Praze
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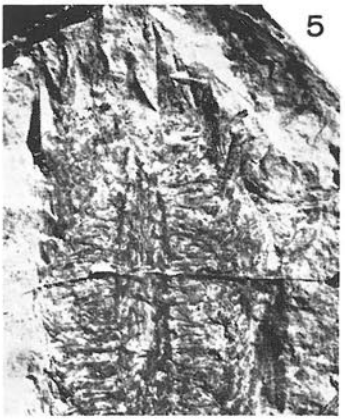
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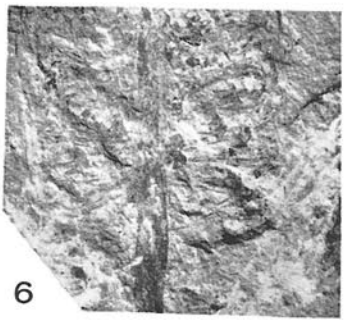
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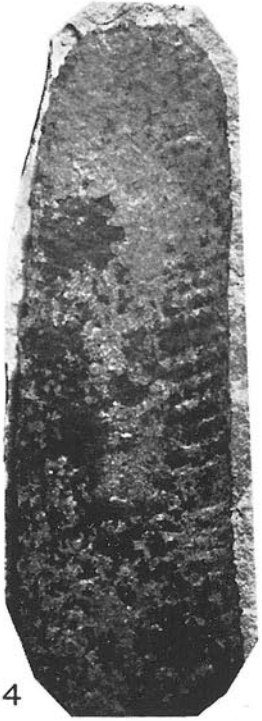
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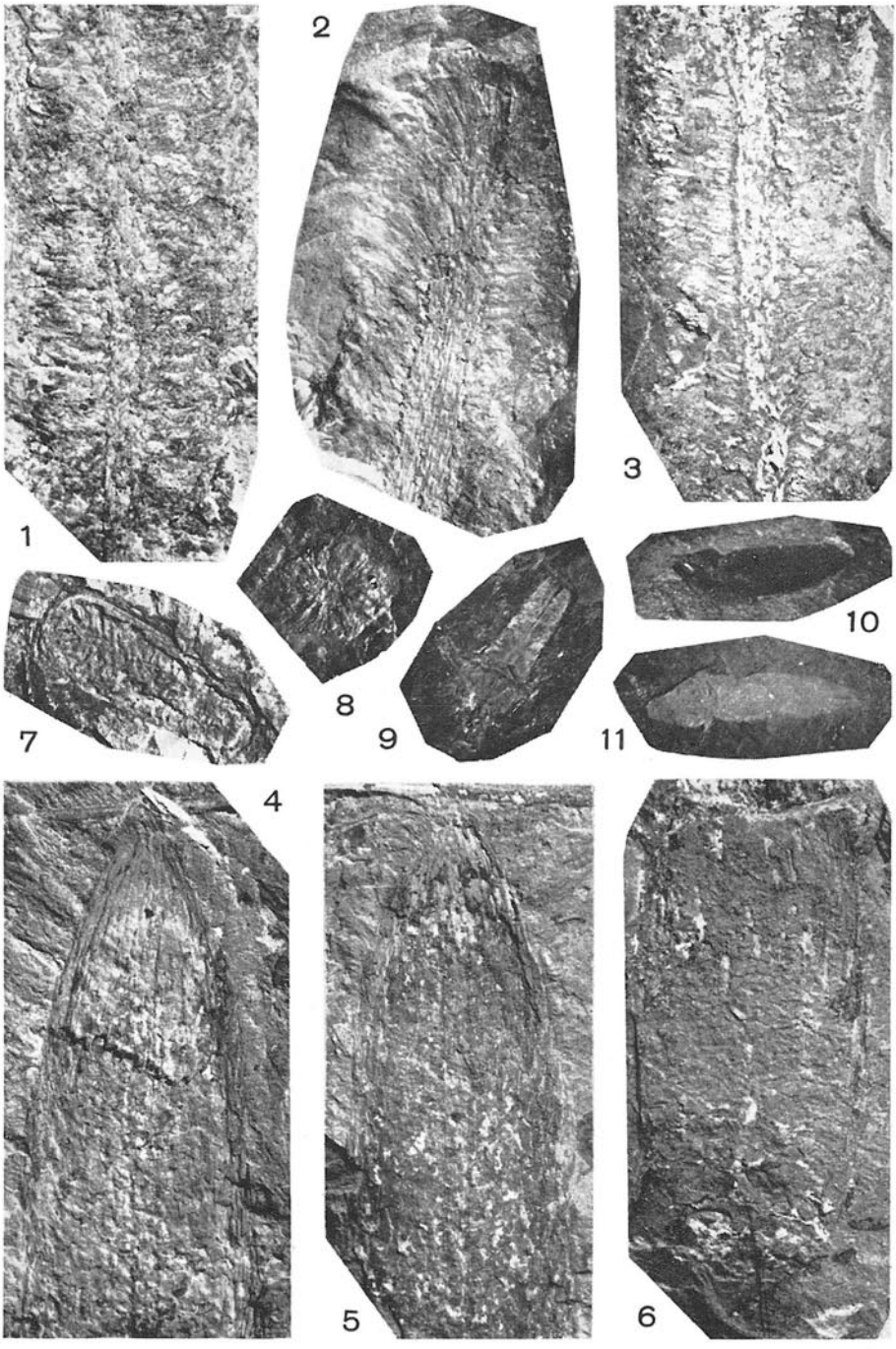
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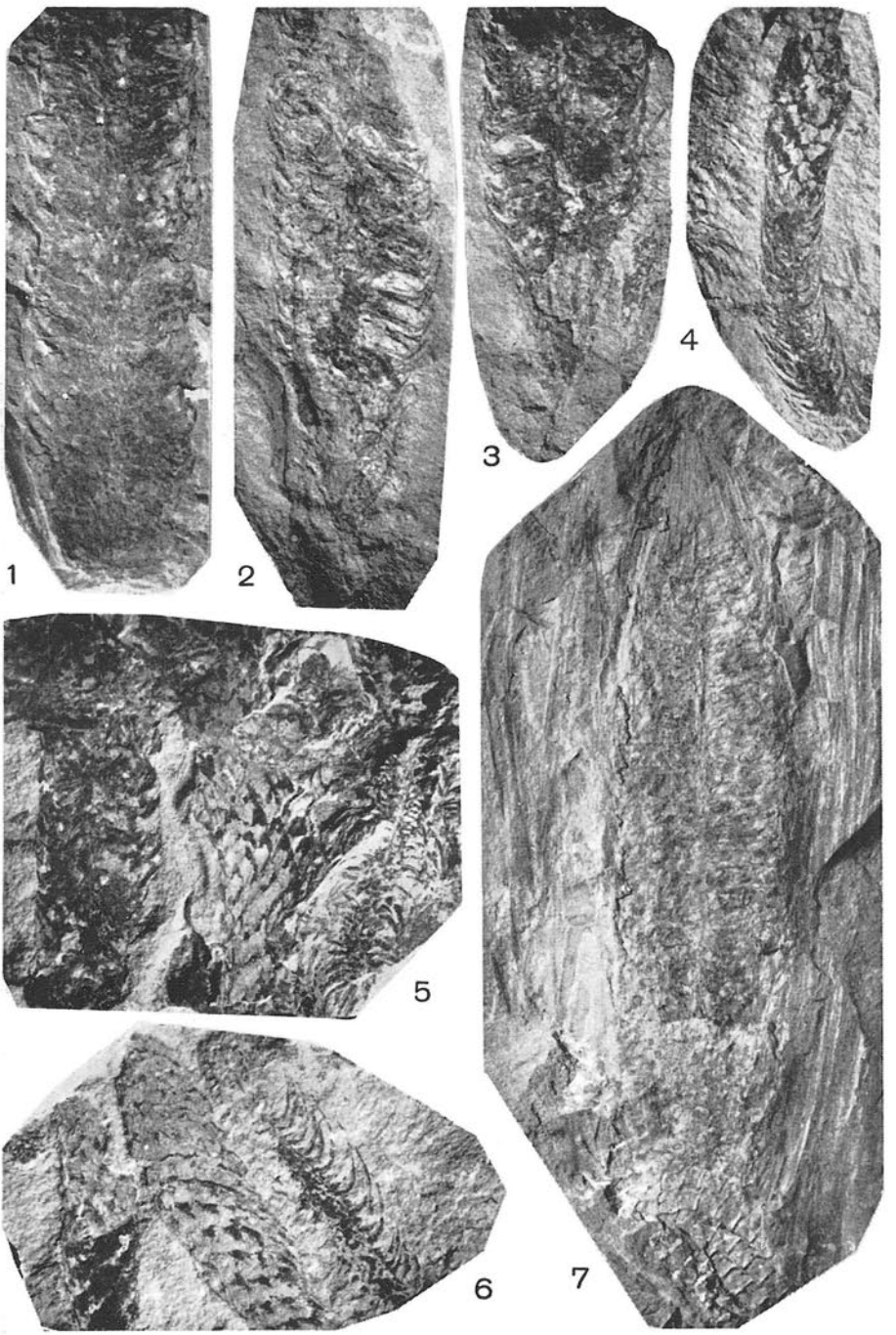
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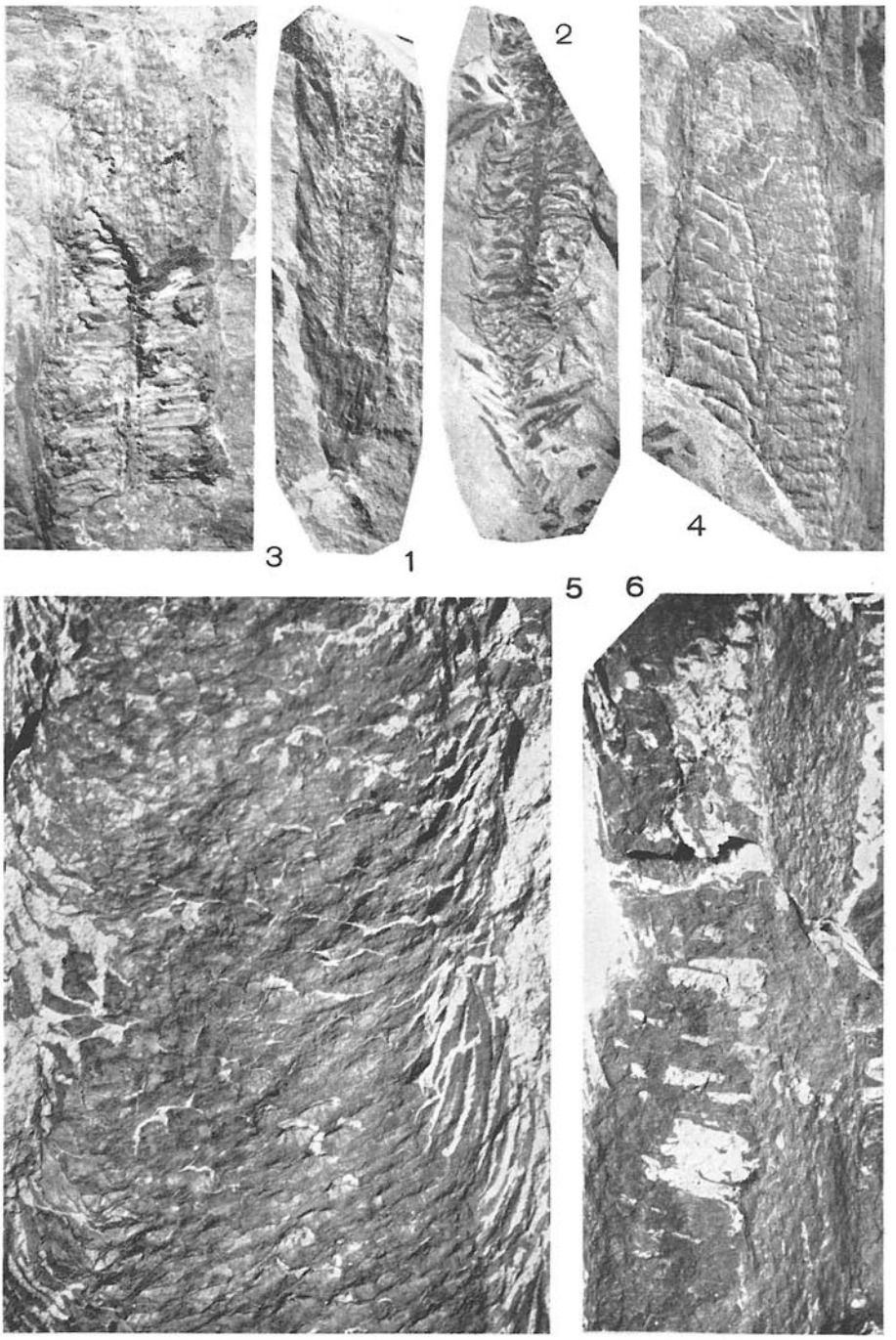
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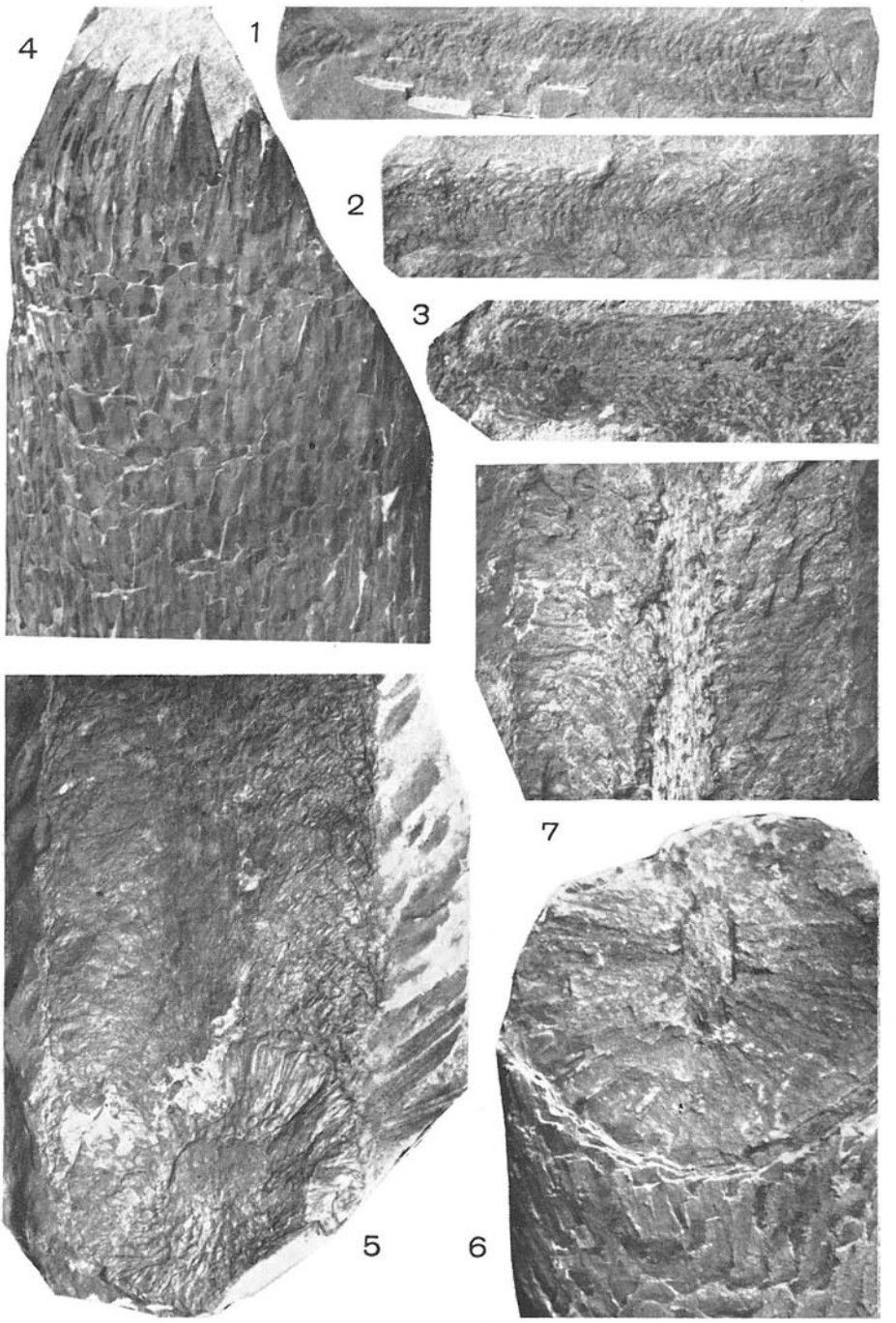
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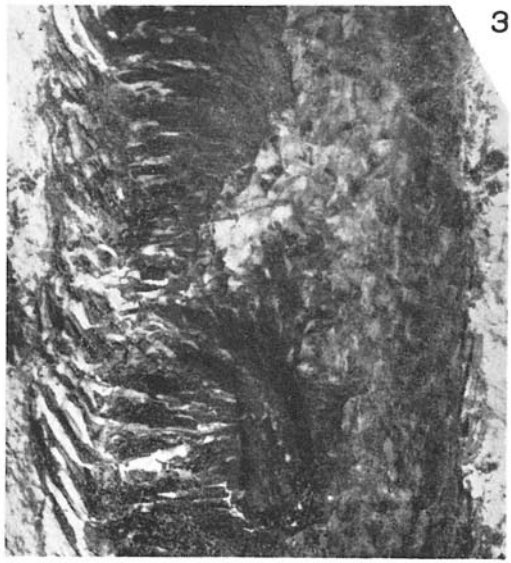
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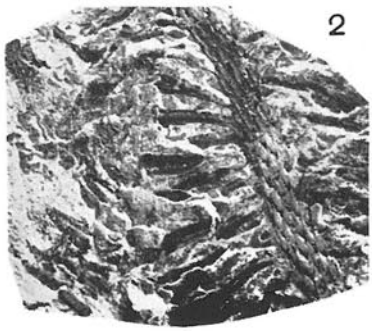
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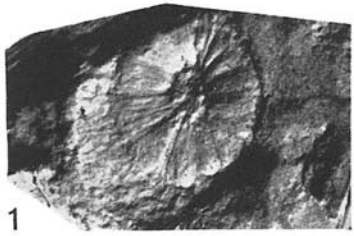
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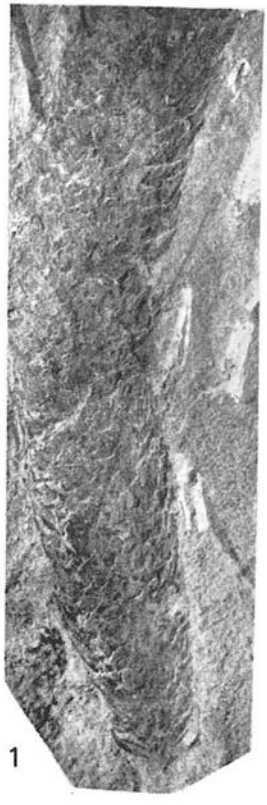
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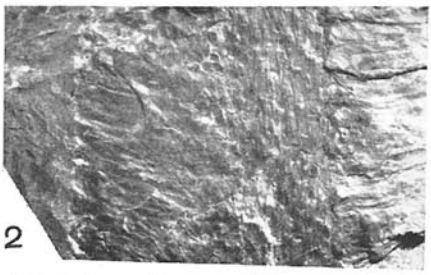
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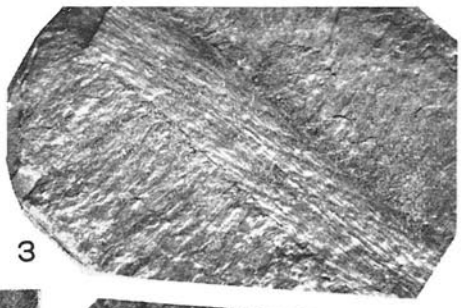
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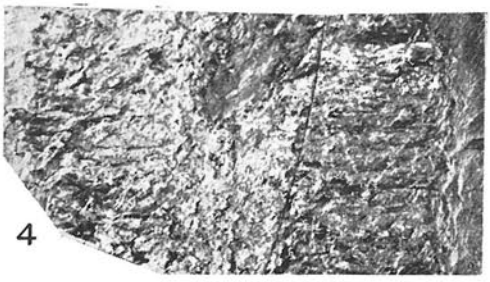
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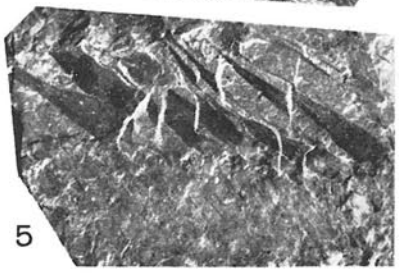
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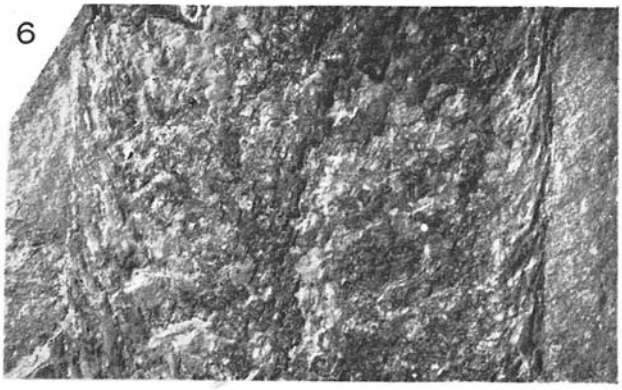
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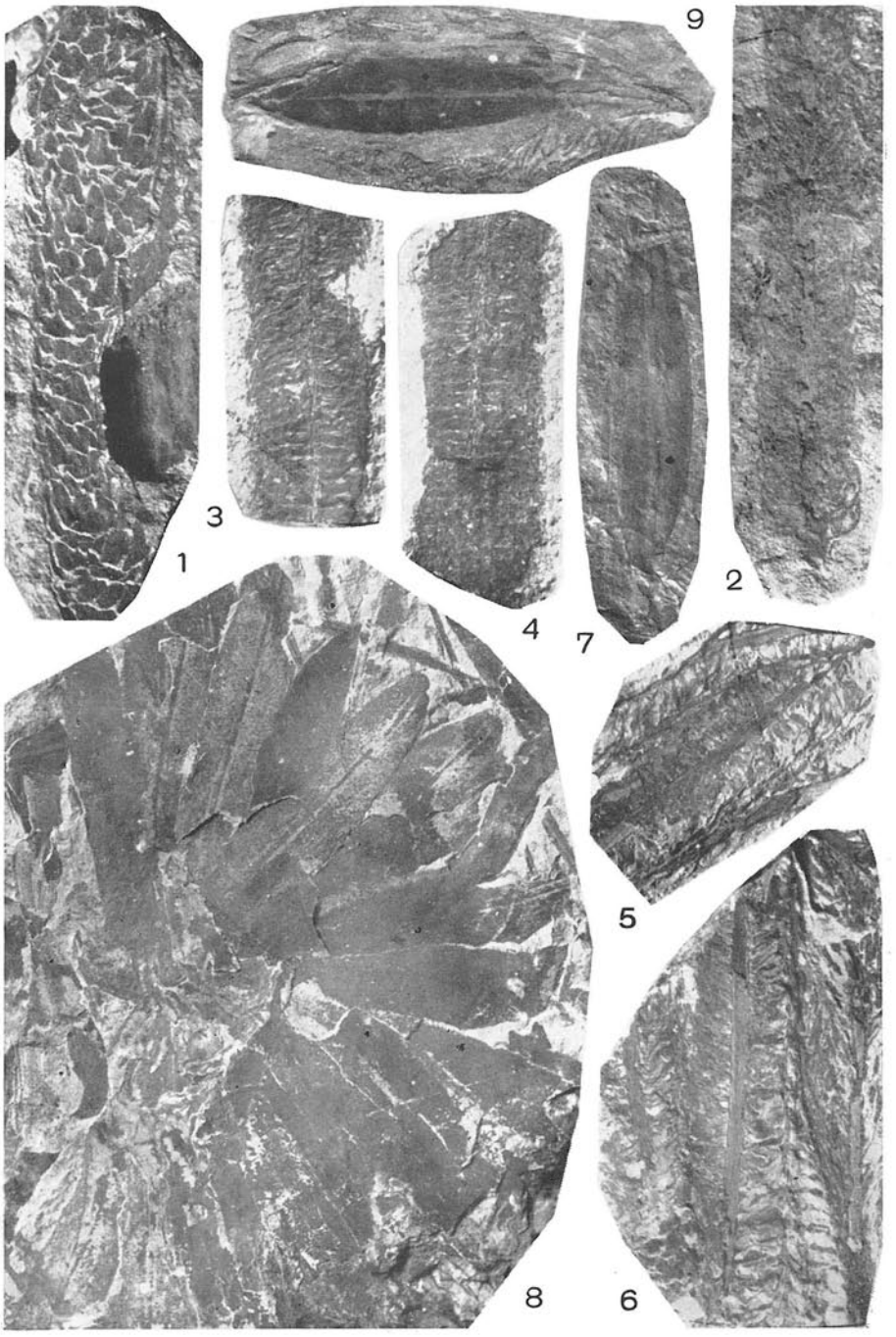
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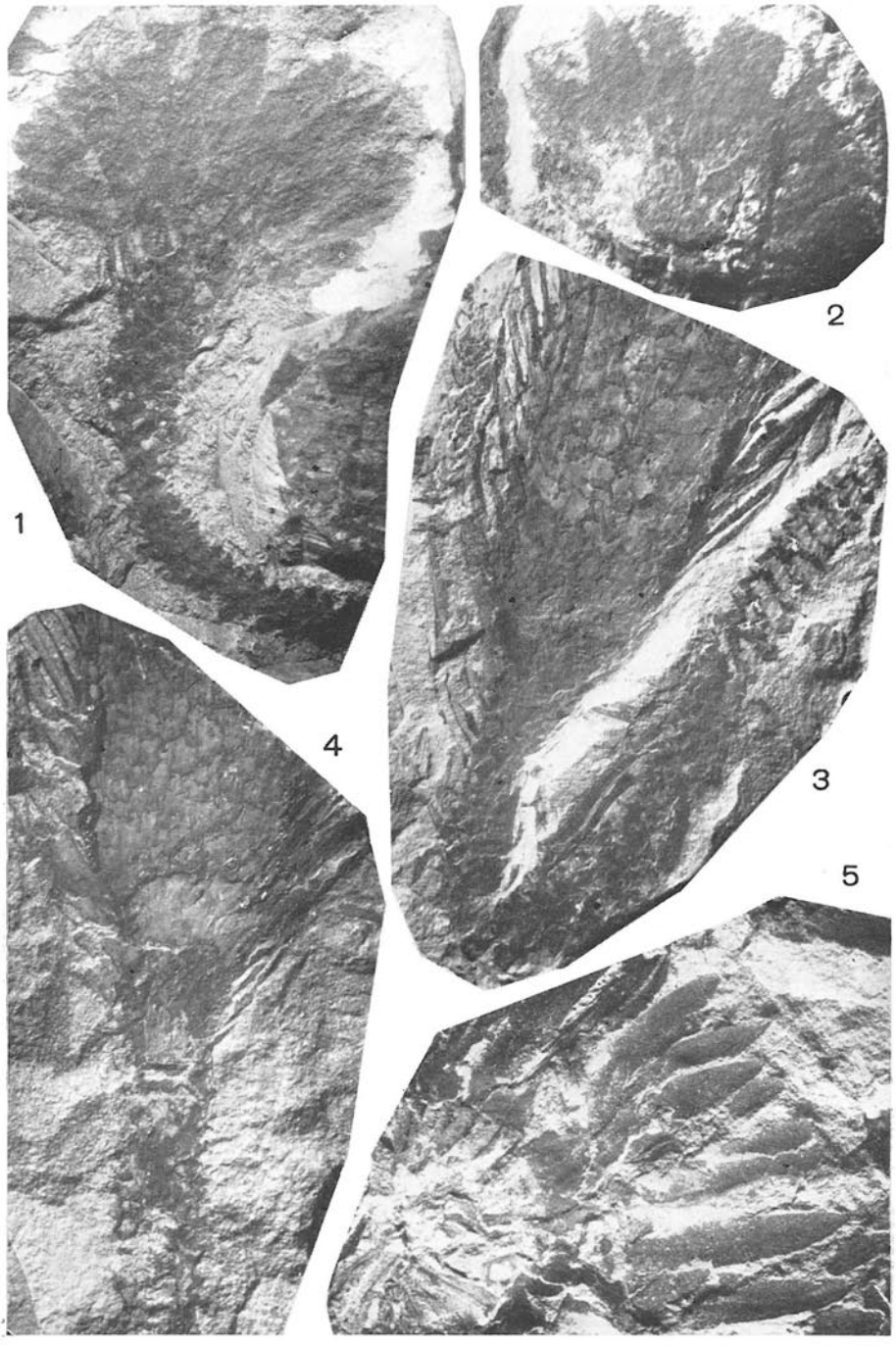
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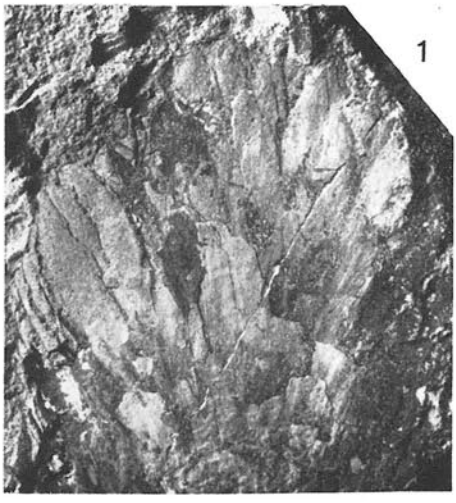
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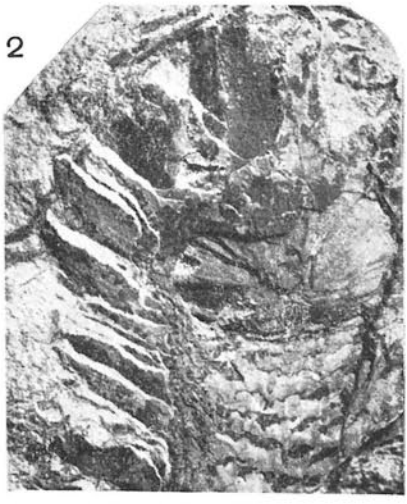
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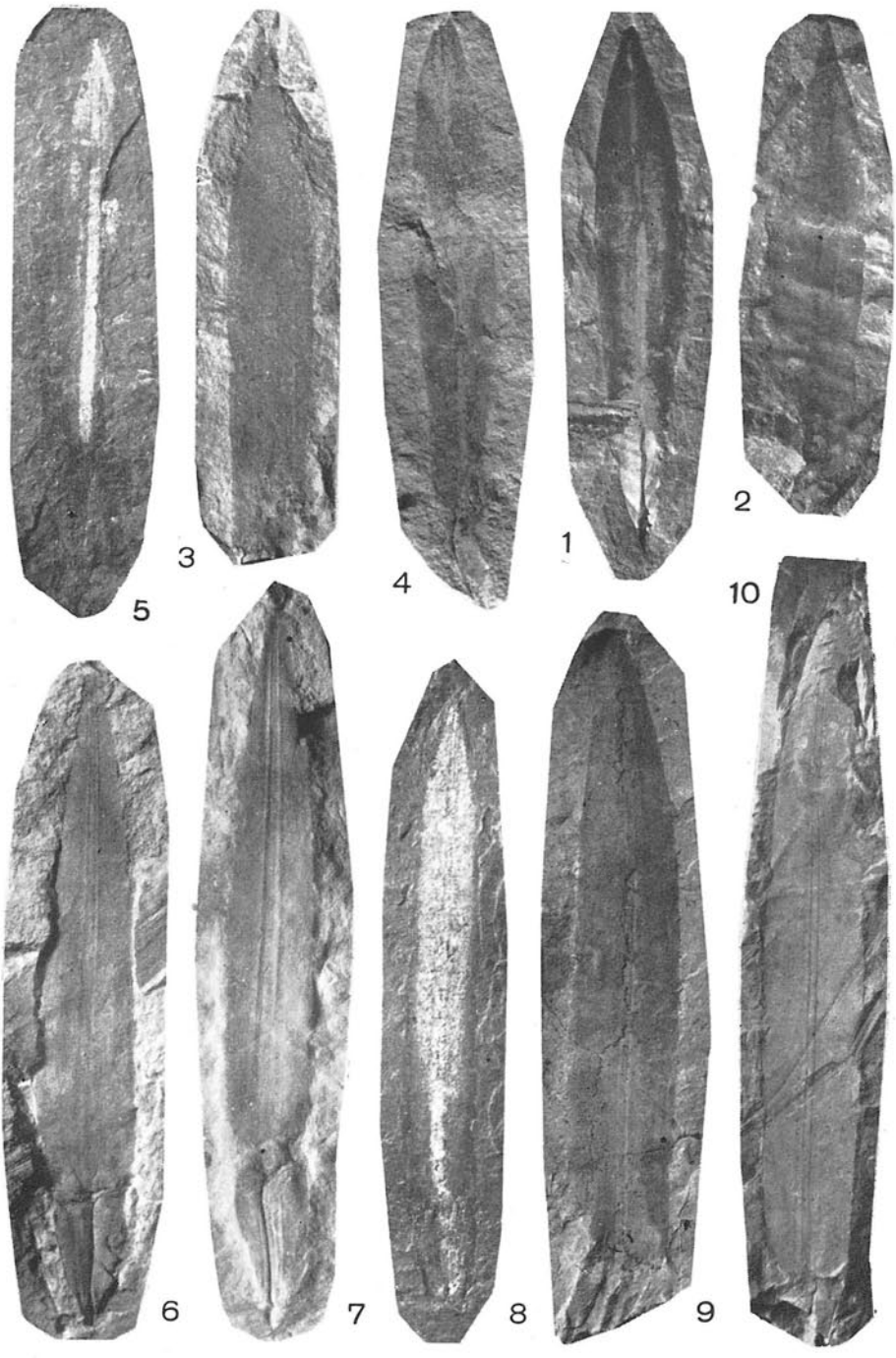
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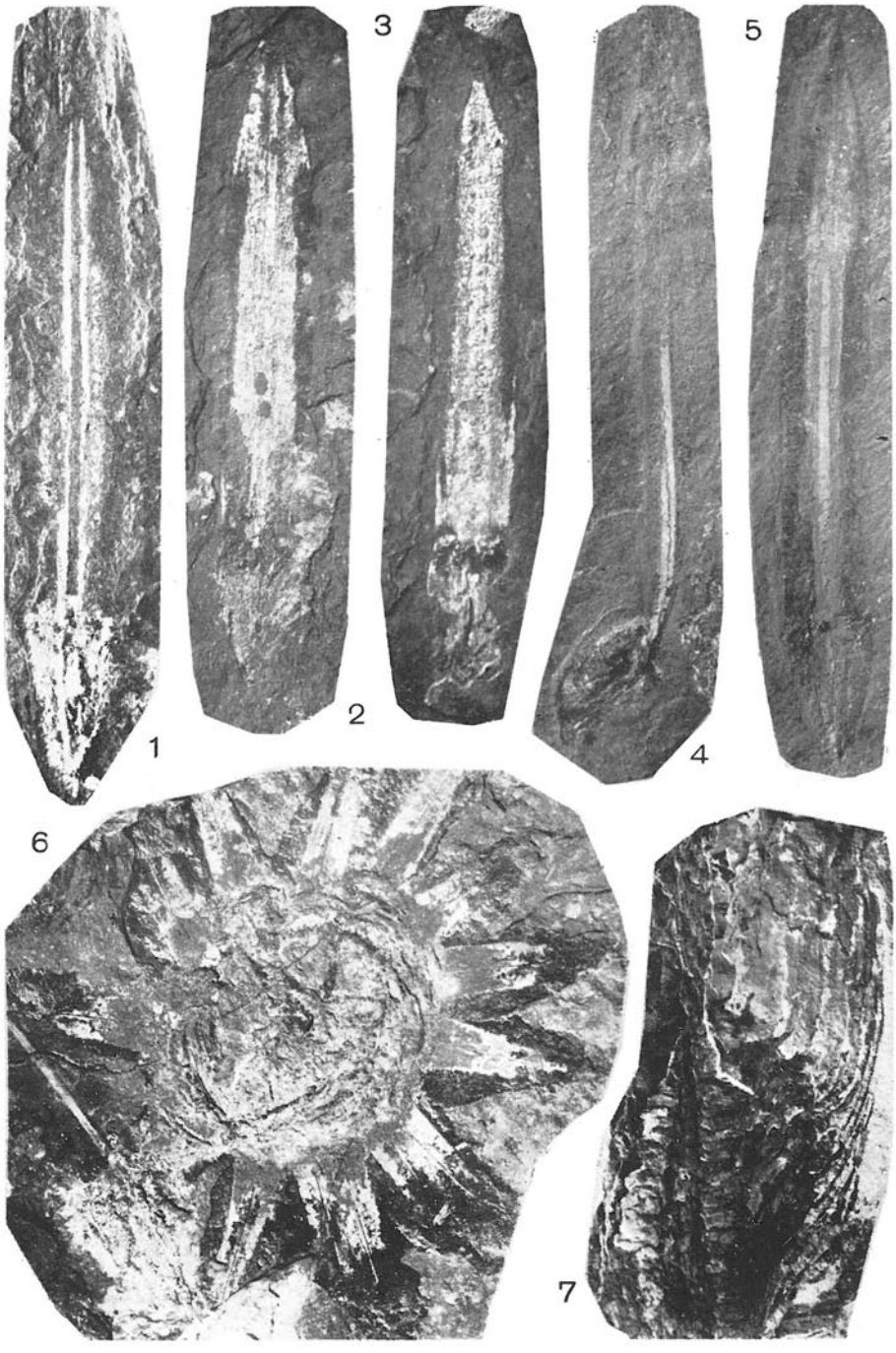
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