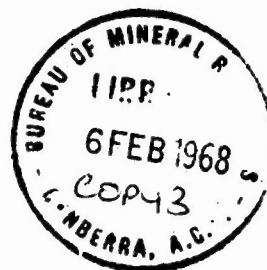


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REPORT ON 1966 COLLECTION OF PLANT FOSSILS FROM THE
DRUMMOND BASIN, QUEENSLAND.

by

Mary E. White

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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SUMMARY

Plant fossils were collected at 19 localities in the Drummond Basin in 1966.

At 14 localities in Drummond Group, Lower Carboniferous species of Lepidodendron occur with Stigmaria and in one instance a Lower Carboniferous pre-fern Rhacopteris digitata. No Upper Devonian forms were present.

At Locality 943, regarded as Telemon Formation equivalent, Lower Carboniferous species occur. The Telemon Formation had been regarded as Upper Devonian on the evidence of Leptophloeum australe (Records 1962/114). It has since been shown that Leptophloeum australe persists into Lower Carboniferous. It therefore appears likely that Telemon Formation is Lower Carboniferous.

INTRODUCTION

This large collection of Lepidodendroid fossils contains many well-preserved specimens. Illustration of the report with photographs of 23 of these is intended to supply reference material for future collections.

There is considerable difficulty attached to making accurate identifications of species of Lepidodendron. Unless examples of mature stems are present in abundance with complete suites of decortication forms, some doubt must always exist about the validity of the specific identification. Small, immature stems are particularly difficult to determine. Obviously the rate and stage of growth reached by each twig before fossilisation influences its morphology. Decortication forms complicate the picture, and there has been a tendency among palaeobotanists to give a name to every variety.

In order to determine the specimens from the Drummond Basin I have studied the reference collection at the National Museum in Sydney and examined illustrations in a large number of standard reference

books on Carboniferous Floras of Europe and America. I have also made comparisons with illustrations of Australia species.

The state of knowledge regarding Lepidodendron in Australia is far from satisfactory. It is usually not possible to say with any certainty whether a horizon was determined as Lower Carboniferous because it had Lepidodendron in it, or whether the Lepidodendron sp. at that horizon was dated as Lower Carboniferous by marine fossils or other means. Accurate recording and illustrating of the plants which occur at different horizons and accumulation of associated data will eventually clarify the position.

The "Lower Carboniferous" flora described from the Drummond Basin probably ranges from Upper Devonian, and the upward limits of the species have not been conclusively determined.

Description and illustration of examples of the collection follows:-

UNDIFFERENTIATED DRUMMOND GROUP

- Locality 20: Pt. 20; photo 5020, run 9 Charters Towers. 8 miles south-east of Arthur Plains Homestead.
- Specimen F22751: Two specimens of decorticated Lepidodendron sp., surface vertically striated, ascending spirals of indistinct leaf scars. No specific identification.
- Specimen F22752: Illustrated specimen. Figure 1. shows the large leaf bases surrounded by roughly sculptured tissue. No specific determination is possible.

Figure 1.

CPC 4393 Decorticated Lepidodendron sp.
 F22752 Natural size. Negative No.F.5036.



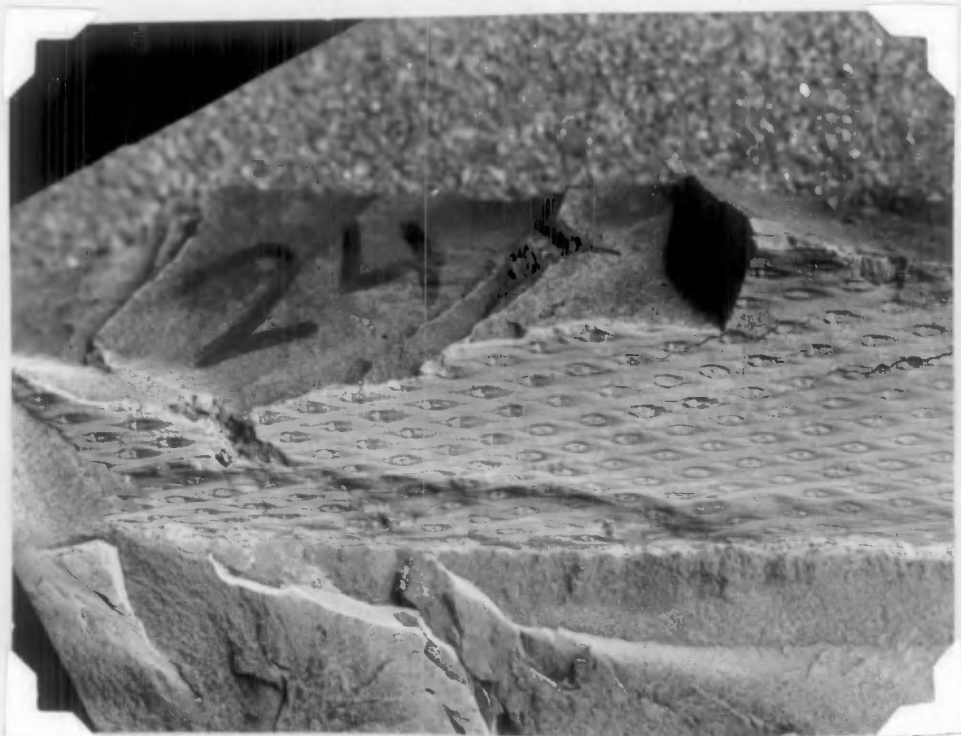
Locality 24: Pt. 24; photo 5009; run 8 Charters Towers.
 5 miles east of Lornesleigh Homestead.

These specimens are well preserved. There are impressions of many young stems, surface and decortication forms, and some casts of small stems. Lepidodendron veltheimianum Stbg., L. dichotomum Stbg. and L. mansfieldense M'Coy with Stigmara are present.

Specimen F22753: Illustrated in Figure 2, shows a stem of Lepidodendron veltheimianum Stbg. with details of leaf base scars.

Figure 2.

Lepidodendron veltheimianum Stbg. F22753. X2. Negative No.F./5038.



Specimen F22754. Illustrated in Figure 3. shows a surface impression of Lepidodendron mansfieldense M'Coy. The leaf bases are widely spaced, kite shaped, and have leaf trace scar near the top. This specimen matches type material in the Australian Museum. It does not appear to be distinct from "Lepidodendron osbornei Walk." which was described by Walkon in 1928, presumably in ignorance of M'Coy's species of 1890 which must be given precedence.

Figure 3.

C1C4377

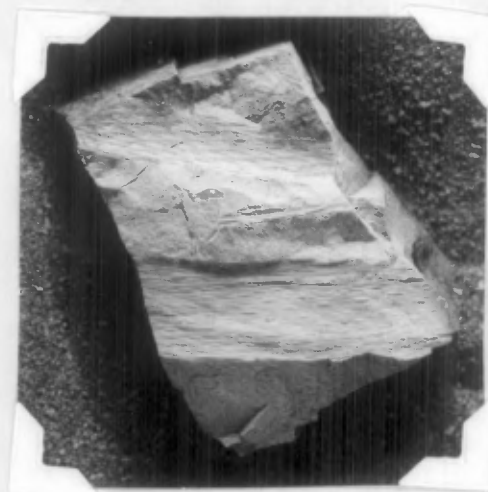
Lepidodendron mansfieldense M'Coy. F22754. Natural Size.
Negative No. F./5037



Specimen F22754A: Illustrated in Figure 4. shows stems of the type referred to Lepidodendron dichotomum Stbg. There is some doubt whether this is a valid species in this case and other Australian identifications. It could be a form of L. veltheimianum.

Figure 4.

L. dichotomum.
Natural Size.
Negative No. F./5035



Specimen F22755: Illustrated in Figure 5. shows a decortication form of an old stem of Lepidodendron with distortion of tissues by compression.

Figure 5.

Decortication Form. Lepidodendron sp.
F22755. Natural size. Negative No. F./5032



Specimen F22756: Illustrated in Figure 6., shows an impression of Stigmaria ficoides, part of a Lycopod root system. The circular scars are the points of attachment of rootlets, a vascular bundle supplying each rootlet is evident in the centre of each scar.

Figure 6.

Stigmaria ficoides Bgt.
Natural size.
Negative No. F./5033



Specimen F22757: Further examples of Stigmaria, not illustrated.

Specimen F22758: Bulk of collection at Loc. 24 - stems, decortication and surface views of L. veltheimianum.

SAINT ANNS FORMATION

Locality 324 A & F. Pt 324; photo 5093, run 3, Buchanan.
 3 miles south-east of St. Anns Homestead.
 Indeterminate stem impressions.

Age: Indeterminate.

Specimens F22759 - Loc. 324A and F22760 - Loc. 324F.

Locality 344: Pt. 344; photo 5093, run 3; Buchanan.
 2 miles south of St. Anns Homestead.

Specimen F22761: Decorticated Lepidodendron sp.
F22762: Lepidodendron veltheimianum Stbg. Young stem.
F22763: Indeterminate stem casts and impressions.
F22781: Lepidodendron veltheimianum Stbg., and stem casts
 and impressions, one finely striated, which might
 be a Calamite.

Locality 385: Pt. 385; photo 5091, run 3 Buchanan.
 1 mile south of St. Anns Homestead.

Specimens F22770: Indeterminate stems

Age: Indet.

Locality 600: Pt. 600; photo 5093, run 3 Buchanan.
 South-south-east of St. Anns Homestead.

Specimen F22839: is illustrated in Figure 7.
 A young forking stem of Lepidodendron veltheimianum Stbg.
 is associated with a larger, poorly preserved example of
Lepidodendron volkmannianum Stbg.

Figure 7.

Lepidodendron veltheimianum and L. volkmannianum
 F22839. Natural size. Negative No.F./5018.



Age of "St. Anns Formation".

The age of the formation is Carboniferous.

LLANARTH VOLCANICS

Locality 368A: Pt.368; photo 5093, run 3 Buchanan.

2 miles south-south-west of St. Anns Homestead.

Specimen F22769: Young branch of Lepidodendron veltheimianum Stbg.
 bearing fine leaves in "Bottle-brush" fashion.

The age of Llanarth Volcanics: Carboniferous.

SCARTWATER FORMATION

Locality 350: Pt. 350: photo 5008, run 2 Buchanan.
8 miles south of Scartwater Homestead.

Casts and impressions of stems of Lepidodendron veltheimianum Stbg. and of Stigmara ficoides Bgt. are present in these specimens.

Specimen F22764: Specimens with decortication forms and one surface impression of L. veltheimianum.

Specimen F22765: Examples of Stigmara ficoides.

Specimen F22766: is illustrated in Figure 8. The terminal section of a young branch of Lepidodendron veltheimianum has leaves attached in "bottle-brush" fashion.

Figure 8Lepidodendron veltheimianum Stbg.

Young branch with leaves attached in "Bottle-brush" fashion.
F22766. Natural size. Negative No.F./5034.

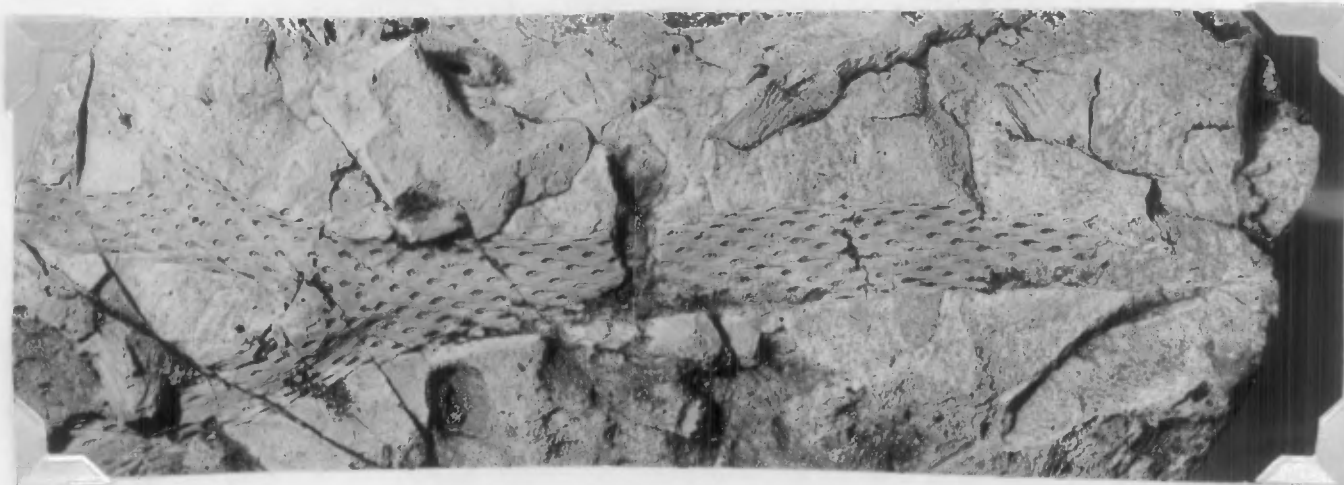


Locality 351: Pt. 351; photo 5008, run 2 Buchanan. 8 miles south of Scartwater Homestead.

Specimen F22767: is illustrated in Figure 9. It shows a young, branching stem which is referred to L. mansfieldense as the leaf base markings indicate that it is probably an immature example of that species, not of L. veltheimianum.

Figure 9.

Lepidodendron mansfieldense M'Coy. Young stem
F22767. Natural size. Negative No.F./5031.



Locality 359F: Pt. 359; photo 5089, run 3, Buchanan. 6 miles west of St. Anns Homestead.

Specimens F22768: Part of an impression of Stigmara ficoides and a considerable amount of plant material distorted and poorly preserved. Some ribbon-like impressions are probably leaves of Lepidodendron sp.

Locality 446: Pt. 446; photo 5107, run 1 Buchanan. 7 miles north-west of Scartwater Homestead.

An assemblage of considerable interest occurs at this locality and preservation is good.

Specimen F22782: Illustrated in Figure 10. It is referred to Lepidodendron aculeatum Stbg. (A collection of examples of this species was made in the Bowen Basin in 1960 from Drummond Group. Records 1961/60.)

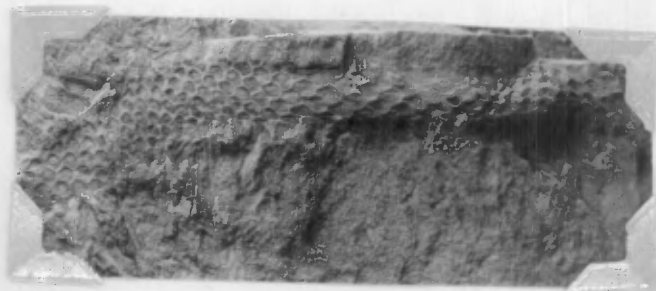
Figure 10

Lepidodendron aculeatum Stbg.
F22782. Natural size.
Negative No. F./5027



Figure 11

Lepidodendron volkmannianum Stbg.
F22784. Natural size.
Negative No. F./5026



Specimen F22783: Lepidodendron aculeatum Stbg. Not illustrated.

F22784: Illustrated in Figure 11 shows a young stem with a rhombic leaf base pattern. Leaf trace scars seem to be nearly central on a round pad within the rhombic border. The identification of this immature stem is difficult, but it corresponds to young material of L. volkmannianum Stbg. in the Sydney Museum.

F22786: Illustrated in Figure 12. Young Lepidodendron stems with an almost rhombic pattern of leaf bases are again assumed to be immature examples of L. volkmannianum. An associated stem in which circular scars are arranged in an ascending spiral is referred to Cyclostigma australe Feist. (I have strong doubts about the validity of Cyclostigma as a genus at all - probably all examples are forms of Stigmara but the name is useful as a descriptive term for organs of this appearance.)

Figure 12

Lepidodendron volkmannianum and Cyclostigma australe.

F22786. Natural size. Negative No. F./5025



Specimen F22787: Contains leaf and stem fragments of Lepidodendron sp.

F22788: Is illustrated in Figure 13. A terminal portion of a young branch with bottle-brush of leaves is associated with Lepidodendron leaf fragments.

Figure 13

Lepidodendron Sp.

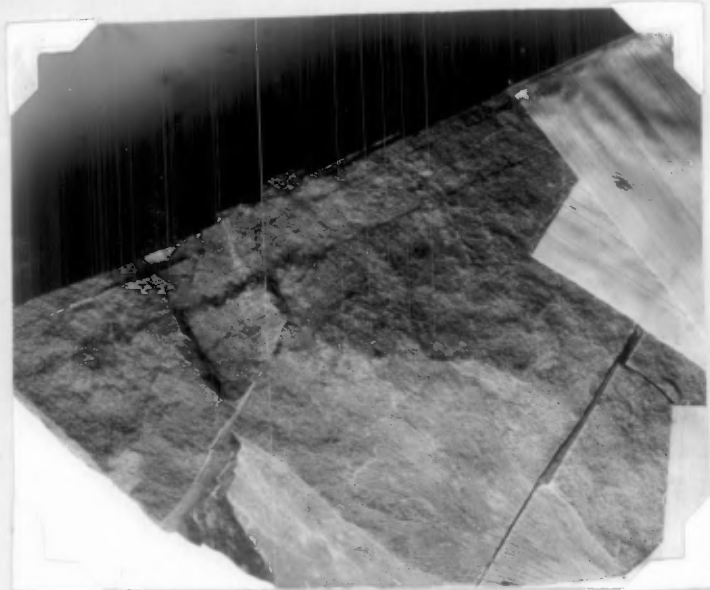
F22788. Natural size. Negative No. F./5024



Specimen F22789: Is illustrated in Figure 14. Part of a frond of Rhacopteris digitata type is present. It is incomplete and firm diagnosis is difficult. Although it is most likely part of a frond of Rhacopteris digitata it could be a fragment of Rhacophyllum diversiforme Eth fil. or even part of a large example of Cardiopteris polymorpha. However, all these forms are Lower Carboniferous so the exact determination does not affect the value of the specimen in dating the fossil horizon as Lower Carboniferous.

Figure 14

Part of frond of Rhacopteris digitata Eth. fil.
F22789. Natural size. Negative No. F./5023



Age of Scartwater Formation: Carboniferous

RAYMOND SANDSTONE

Locality 469: Pt. 469; photo 5177, run 5 Buchanan. 8 miles south-west of Dawson Vale Homestead.

Specimen F22778: Lepidodendron veltheimianum Stbg.

Specimen F22779: Stigmaria ficoides Bgt. and Lepidodendron sp.

Age of Raymond Sandstone: Carboniferous

STAR OF HOPE FORMATION

Locality 435: Pt. 435; photo 5407, run 1, Buchanan. 6 miles north-west of Scartwater Homestead.

Specimen F22771: Illustrated in Figure 15 is a very large example of a cast of Stigmaria ficoides.

Figure 15Stigmaria ficoides

F22771. Natural size. Negative No. F./5028



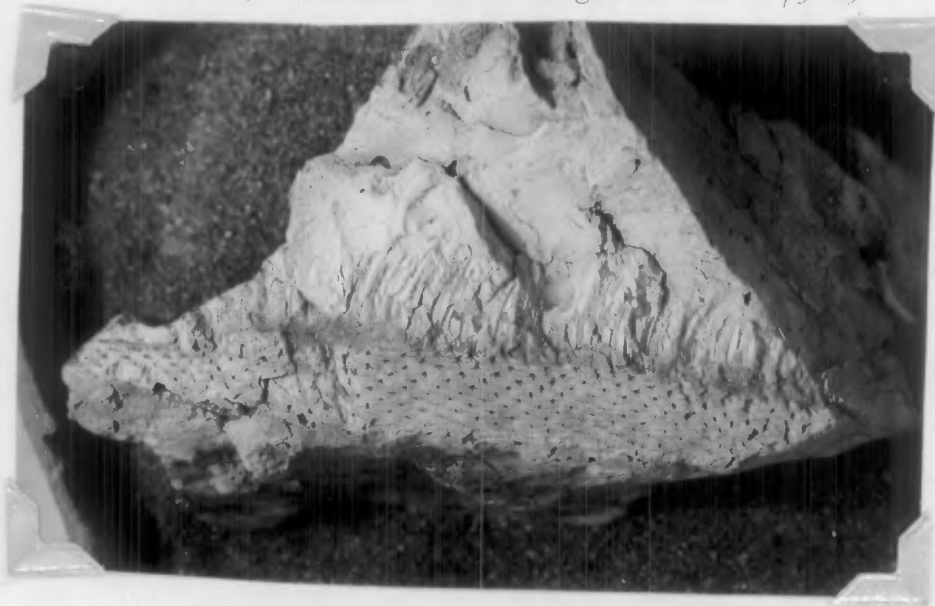
Specimen F22772: Other examples of Stigmaria ficoides casts and impressions.

F22773: Lepidodendron veltheimianum Stbg. - casts and impressions of surface and decortication forms.

F22774: Figure 16 illustrates this stem of Lepidodendron veltheimianum Stbg., in which fine leaves are attached to the stem in a characteristic "Bottlebrush" fashion.

Figure 16

Lepidodendron veltheimianum
F22774. Natural size. Negative No. F./5029



Locality 436: Pt. 436; photo 5107, run 1 Buchanan. 6 miles north-west of Scartwater Homestead.

A beautifully preserved collection of Lepidodendron veltheimianum occurs at this locality.

Specimen F22775: Bulk of collection.

F22776: Figure 17 illustrates an example of a very fine terminal shoot with leaves attached.

Figure 17

Lepidodendron veltheimianum small leafy shoot.
F22776. Natural size. Negative No. F./5030

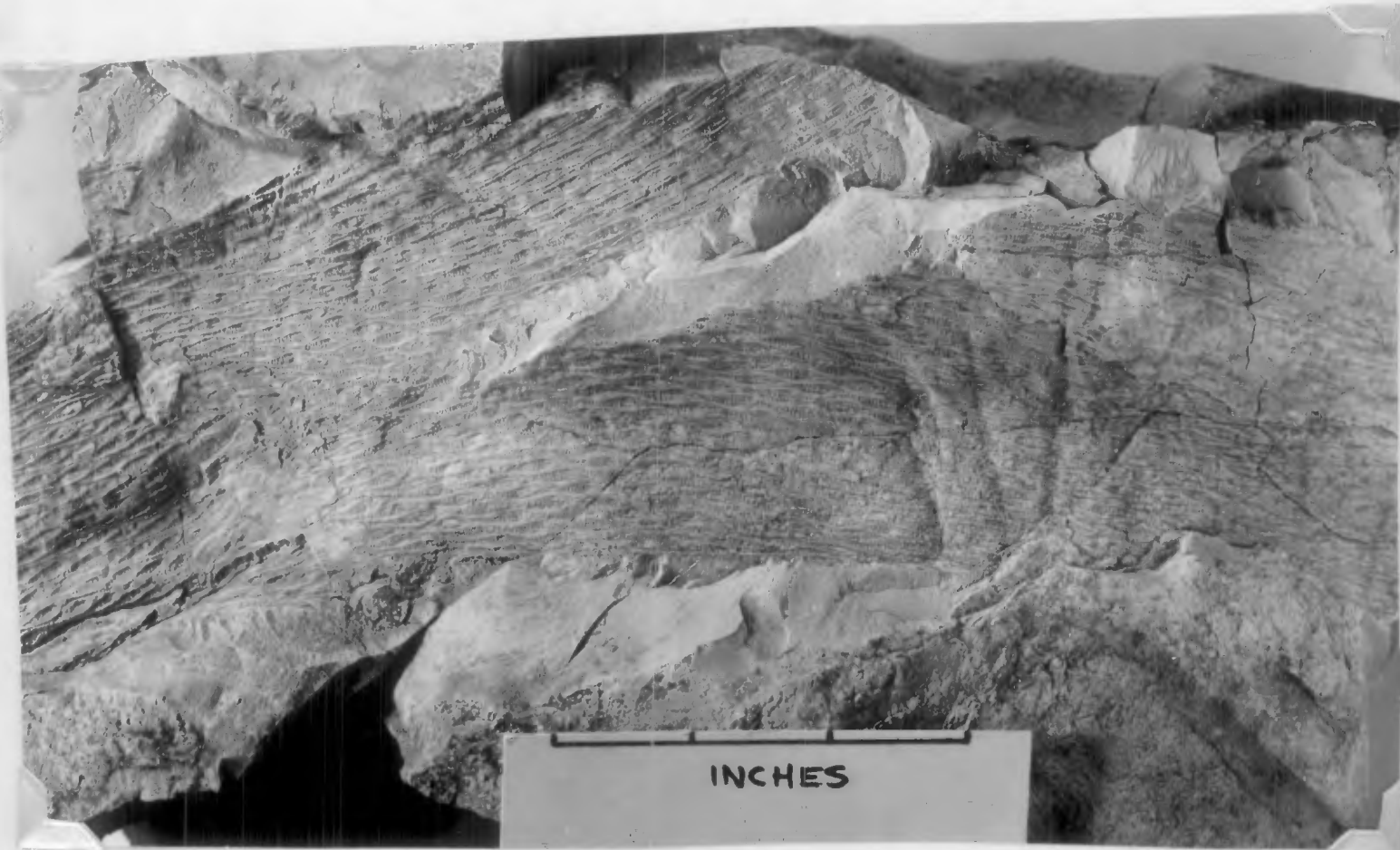


Specimen F22777: This very large specimen has a stem of Lepidodendron veltheimianum 14 inches long and $3\frac{1}{2}$ inches wide, forking into two parts 2 inches and 3 inches wide. It is somewhat decorticated and shows a fibrous marking of leaf bases. The leaf traces are in upper angles of the leaf bases. Figure 18 illustrates part of this specimen.

Figure 18

Lepidodendron veltheimianum Stbg.

Part of Spec. F22777. Natural size. Negative No. F./5039



Locality 484: Pt. 484; photo 5083, run 3 Buchanan. 4 miles north-north-east of Dawson Vale Homestead.

Specimen F22780: Indeterminate stems.

Age of Star of Hope Formation : Carboniferous

Notes on the Species occurring in the Drummond Group

1. Stigmaria ficoides:

This is the name given to the root buttress and root system of all Lycopods from Devonian to Permian and no age determination can be made on the presence of Stigmaria.

2. Lepidodendron veltheimianum:

This is a species of wide occurrence in the Carboniferous. In Australia the characteristic Lepidodendron veltheimianum Flora of so-called Lower Carboniferous is replaced by the Rhacopteris Flora in which it becomes increasingly rare in Middle Carboniferous. It is associated with L. volkmannianum, L. dichotomum, Cyclostigma, and Rhacopteris (of Rhacophyllum type) in the Newcastle Coal field, at Port Stephens, Smiths Creek, Arowa, N.S.W. It is associated with L. Osbornei (= L. mansfieldense) in Lower Kuttung Series in N.S.W. It occurs in the Volcanic stage of the Kuttung (Middle Carboniferous), and from the Lower Burindi of N.S.W.; and in the Star Series in Queensland.

It is by no means certain that one species is involved in L. veltheimianum. Probably a group of similar forms comprise the "species".

3. Lepidodendron volkmannianum Stbg.: is a Lower Carboniferous species in Europe. It occurs at Stroud in N.S.W. associated with Rhacopteris.
4. Lepidodendron aculeatum is a Lower Carboniferous form in Europe and America. It was recorded from Drummond Group in the Clermont 4-mile area of the Bowen Basin in 1960.

5. Lepidodendron dichotomum is a Lower Carboniferous species in Europe. It is recorded from Lower Carboniferous at Stroud in N.S.W.
6. Lepidodendron mansfieldense was recorded from Lower Carboniferous at Mansfield in Victoria. As L. osbornei it is recorded from the Volcanic Stage of the Kuttung in N.S.W. and other Carboniferous horizons.

In the 1960 collection from the Bowen Basin in Queensland, it occurs with decorticated Lepidodendron (wrongly identified as probable Protolepidodendron yalwalense) and Lepidostrobus at MC 21 F.

7. Cyclostigma australe ranges throughout Carboniferous and into Permian (in Africa and India). It is probably only a form of Stigmaria.
8. Rhacopteris digitata is a Lower Carboniferous form from N.S.W.

Conclusions on the Age of the Drummond Group

On plant evidence at the present stage of knowledge a Lower Carboniferous age is indicated for part at least of the Drummond Group in the 1966 collection. Too little is known at present to state categorically that it does not exceed the boundaries of Lower Carboniferous. An age determination of "Uppermost Devonian/Carboniferous" allows for all contingencies.

TELEMON FORMATION

Locality 943: Pt. 943; photo 5012, run 10 Galilee. North of Star of Hope Syncline.

These specimens of soft, disintegrating shale contain a large amount of macerated plant material. Fragments of leaves and stems, leaves of Lepidodendron and branching stems of uncertain affinity are associated with the few determinate plant remains.

Specimen F22833: Illustrated in Figure 19. Young stems, referred to *Lepidodendron volkmannianum*, have a very regular pattern of leaf bases. Raised margins form a rhombic network and leaf trace scars are near the centre, on a circular pad enclosed by the margin.

Figure 19

Young stems *Lepidodendron volkmannianum* Stbg.
F22833. Magn. X 2. Negative No. F./5022.



Specimen F22834: *Lepidodendron volkmannianum* not illustrated

F22835: Figure 20 shows this specimen. A young stem of *L. volkmannianum* has a "bottle-brush" of attached leaves.

Figure 20

Lepidodendron volkmannianum
 F.22835. Natural size
 Negative No.F./5021.

Figure 21

Lepidodendron mansfieldense
 F.22836. Natural size
 Negative No.F./5020.



Specimen F22836: Figure 21 illustrates this specimen of L.mansfieldense

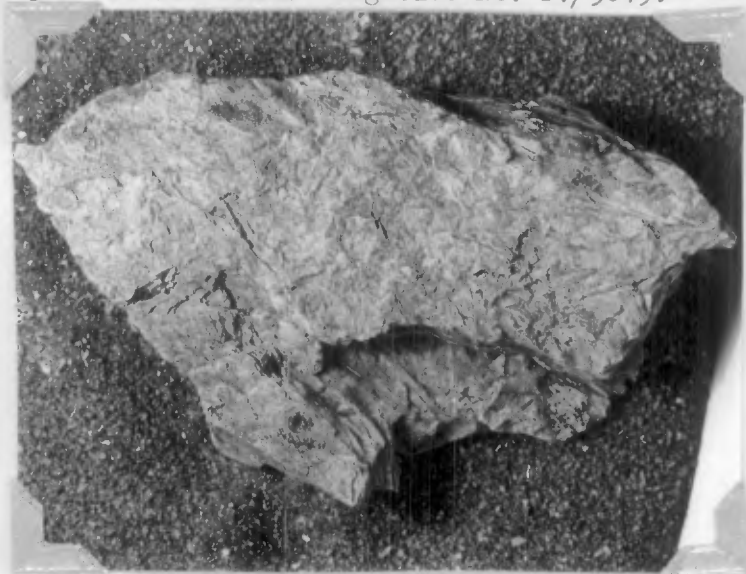
F22837: Specimens with very numerous, finely branching stems. The ultimate branches may be linear leaves. Referred to ?Rhodea. No complete specimens for positive identification.

F22838: Illustrated specimen - Figure 22 of finely branched material - ?Rhodea

Figure 22

Finely branches stems and ? leaves

F22838. Natural size. Negative No. F./5019.



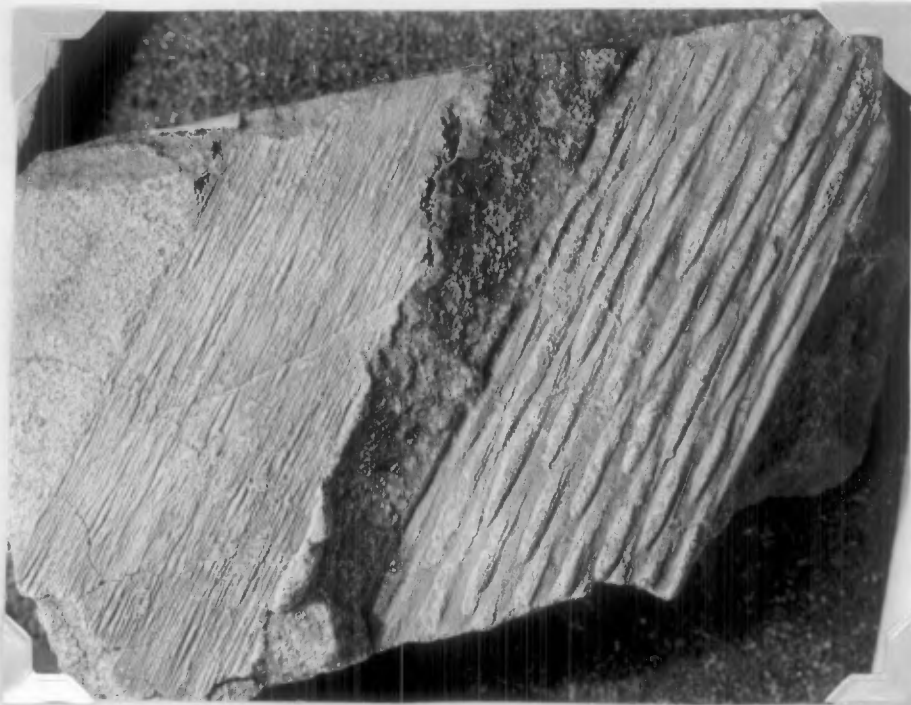
Age of Fossil Horizon at Locality 943:

The assemblage of species at this locality appears to indicate Carboniferous age.

The 1961 collection from the Telemon Formation contained abundant Leptophloeum australe. It was regarded as Upper Devonian as there was no proof at that stage of Leptonphloeum in Lower Carboniferous. It now seems likely that Telemon Formation is Lower Carboniferous.

Figure 23

Decorticated Lepidodendron sp.
F22840. Natural size. Negative No. F./5017.



MOUNT HALL CONGLOMERATE

Locality 925A: Pt. 925; photo 5132, run 8A. Galilee. Mt. Donny Brook.

Specimen F22840: Illustrated in Figure 23, contains two decortication forms of Lepidodendron sp. No specific determination is possible. The forms are of general L. veltheimianum type.

Age of Mt. Hall Conglomerate: Probably Carboniferous.

MT. RANKIN BEDS

Locality 785: Pt. 785; photo 51, run 3 Clermont. 38 miles
north-north-east of Clermont.

Specimen F22841: Decorticated Lepidodendron sp.

F22842: Stigmara ficoides (fragmentary) and Lepidodendron cf.
L. veltheimianum Stbg.

Specimen F22843: Lepidodendron veltheimianum Stbg. The same decortication
form with fibrous leaf bases as occurs at Locality 436.
Stigmara ficoides Bgt.

Age of Mt. Rankin Beds: Carboniferous.