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COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.
BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

1957/74.

REPORT ON PLANT FOSSILS FROM THE NORTH EAST CANNING BASIN,
WESTERN AUSTRALIA.

by

Mary E. White.

Report on Plant Fossils from the North East Canning Basin,

Western Australia.

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A large collection of some two hundred plant fossil specimens was made in the North East Canning Basin of Western Australia by J.N. Casey in 1956 from beds of Palaeozoic and Mesozoic age. Some of the material is excellently preserved and of considerable botanical interest.

An account follows of the species of plants which can be identified from the various localities and of the age determinations which are possible from a study of the flora.

Locality L.10. (Lucas four mile sheet)

Specimens no. F 21581.

An Equisetalean stem cast showing three nodes at $1\frac{1}{2}$ -2cm intervals and with about 14 vertical ridges to the 1.75cm width, is referred tentatively to Phyllothea cf. australis Brongn. The preservation is poor and the fossil is a pith cast. The range of this type of fossil can be given roughly as Permo-Carboniferous to Lower Mesozoic.

Locality B.2. (Billiluna four mile sheet)

Specimens no. F 21582.

The stem impressions which occur in these specimens are indeterminate.

Locality B.4. (Billiluna four mile sheet)

Specimen no. C.P.C.2835 (Figure 1, Plate I.)

This specimen shows an impression of a stem with a regular rhombic pattern similar to that seen in Leptophloeum australe (M'Coy). Leaf trace scars are present in the upper angles of the rhombs. The specimen represents a slightly decorticated form and is similar to commonly occurring decorticated forms of Leptophloeum australe. With only the one specimen available it is not possible to give a positive identification as Leptophloeum australe (M'Coy). In lepidodendroid fossils different species can and do have similar decorticated forms. It is unwise to attempt a positive identification on a single specimen unless that specimen shows a surface view of a mature stem. The present specimen is therefore assigned only doubtfully to Leptophloeum australe (M'Coy). It is not impossible that it could represent a decorticated form of Lycopodiopsis pedroanus Carr.

Leptophloeum australe is a most typical plant fossil of Upper Devonian - Lower Carboniferous horizons, with a range extending probably higher into the Carboniferous. Lycopodiopsis pedroanus Carr. is a typical Lower Permian form associated with the Glossopteris Flora in the Southern Hemisphere. (Edwards, 1952).

At the present state of knowledge therefore, the fossil in specimen no. C.P.C.2835 must be dated by other means if possible and cannot be used itself as a reliable indicator of age.

Locality B.14. (Billiluna four mile sheet)

Specimens no. F 21583

The stem impression occurring in this coarse-grained sandstone is indeterminate.

Locality B.24. (Billiluna four mile sheet).

Specimens no. F 21584

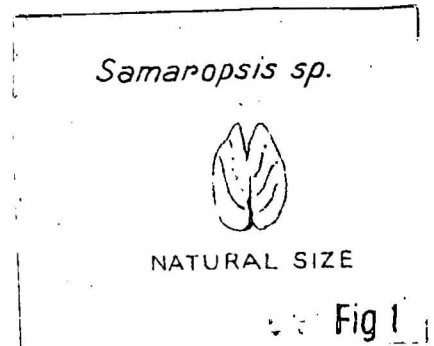
These specimens contain one determinate fossil which is referred to Vertebraria sp., cf. V. indica Royle. Figure 2. Plate I, Specimen C.P.C. 2844. This specimen resembles closely specimens of Vertebraria indica from the Lower Gondwana series in the Raniganj field. (Plate XIV A, Pal. Indica III). The range of this type of fossil is Permian. Vertebraria is usually present with Glossopteris, and is believed to be part of the rhizome of Glossopteroid plants.

Locality B.25. (Billiluna four mile sheet).

Specimens no. F 21585

The plant remains in these specimens are largely fragmentary and indeterminate. Two identifications are possible :-

1. One seed of the Samaropsis type is present. (Text Figure 1). C.P.C. 2845. The dimensions of this oval seed are 110mm long with a maximum width of 80mm. The apex is divided for 4mm, and there is a prominent median ridge below. Faint striations are visible on either side of the central ridge. The species is not determinate, but this type of seed is common in Permian horizons.



2. A fragment of leaf referable to Noeggerathiosis hislopi (Bunb.) showing the characteristic strong parallel venation is present. This is a Permian plant fossil.

Locality B.29. (Billiluna four mile sheet).

Specimens no. F 21586

Several indeterminate wood and stem impressions occur in these specimens. A tentative determination of an impression with strong parallel venation as a portion of a leaf of Noeggerathiosis suggests a Permian age for the specimens.

Locality L.II. (Lucas four mile sheet).

Specimens no. F 21587

The layer of shale in these specimens is highly fossiliferous but there is a great deal of powdery iron-rich material incorporated which has largely obliterated details. The plant remains are mostly indeterminate but fragments of leaves occur which show venation characteristic of Glossopteris. There is a recognisable portion of a scale leaf of the Glossopteris type in one specimen.

The age of these specimens is Permian.

Locality M.5. (Mt. Bannerman four mile sheet)

Specimens no. F 21588

Some of these specimens show only indeterminate plant remains. Others show leaf impressions referable to Glossopteris cf. indica, but insufficiently preserved for accurate determination. There is one clear example of a seed of the Carpolithus type. (Text, Figure 2). Spec. C.P.C.2846. The degree of preservation is insufficient for specific determination.

Carpolithus sp.



NATURAL SIZE

The age of these specimens is Permian.

Fig.2

Locality M.6. (Mt. Bannerman four mile sheet)

Specimens no. F 21589

Two lepidodendroid type of stem impressions are present in these specimens. C.P.C.2847. They are both of small areas of Lycopod stems. Figures 3 and 4, Plate I. They show leaf cushions which are horizontally extended. One impression has roughly the appearance of a cone with a stem portion below but this arrangement seems to be coincidental as there are leaf trace scars on each cushion in the upper obtuse angle, and this feature is inconsistent with any arrangement seen in a surface view of a cone. The other impression is slightly decorticated and each cushion has a central pit for the leaf trace bundle.

Both impressions are assigned tentatively to Lycopodiopsis pedreganus Carr. which is a Lower Permian Lycopod which occurs associated with the Glossopteris flora in South Africa, Brazil, and Western Australia (Poole Range. Edwards, 1952). There is insufficient material in this case for the identification to be completely positive.

Locality M.18. (Mt. Bannerman four mile sheet)

Specimens no. F 21590

Badly preserved and largely indeterminate leaves similar to Glossopteris indica and Gangamopteris cyclopteroides occur in these specimens, denoting a Permian age.

Locality L.44. (Lucas four mile sheet)

Specimens no. F 21591

Glossopteris indica Sch. (Spec. C.P.C.2848 and 2851) and Glossopteris communis Feist. (Spec. C.P.C.2849) occur together in these specimens, (Figures 6, 7 and 8, Plate II) an association similar to that which occurs in the Raniganj Flora in India. Vertebraria australis McCoy (Figure 5, Plate I, C.P.C. 2850), is present and also leaves determined as Gangamopteris cyclopteroides Feist. One specimen appears to be Rhipidopsis densinervis Feist. but is insufficiently well preserved for the identification to be beyond question.

The flora in these specimens is a typically Permian assemblage.

Locality M.23. (Mt. Bannerman four mile sheet)

Specimens no. F 21592

These specimens contain most interesting plant fossils in an excellent state of preservation. Equisetalean stems, referable to Schizoneura gondwanensis Feistm. are present alone in some specimens (Figure 10, Plate II. Specimen C.P.C. 2852) and associated with Lycopod stems in others. Schizoneura gondwanensis Feist. occurs in India from Upper Carboniferous (Talchir) to Permian. Text Figure 3 shows a node of a stem of the species with an arrangement of branch scars most typical of the species. (Specimen C.P.C. 2853).

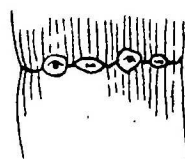


Fig 3

Node of Schizoneura

Transversely wrinkled Lycopod stems (Figure 11, Plate III.) are present as casts and impressions Specimens C.P.C.2854. They are assigned to Lycopodiopsis. This genus includes Cyclodendron (Edwards, 1952) which is the generic name usually applied to Lycopod stems of this type with leaf traces represented by pits. Whether these specimens are referable to Lycopodiopsis pedroanus Carr. or not is not clear. In the absence of other forms typical of that species they are determined as Lycopodiopsis sp. and interpreted as denoting an Upper Carboniferous - Lower Permian age for the specimens.

Locality M.24. (Mt. Bannorman four mile sheet)

Specimens nos. F 21593, C.P.C.2855.

Winged seeds of the Samaropsis type occur plentifully in a zone in these specimens. There appear to be three distinct species. The smallest variety, A. in Text Figure 4, have a roughly circular wing with a slight point above, and are emarginate below. The seed portion is diamond-shaped with a circular inclusion and is situated slightly below the centre point of the wing. This seed with its relatively large wing is similar to Samaropsis moravica (Helmhacher) which is a very common Permian and Upper Carboniferous type in Europe.

Far larger winged seeds, B. in Text figure 3, occur in the specimens. These are probably referable to Samaropsis milleri Feist.

A third type of winged seed has marked radiating striations on the wings and has not been identified.

Numerous small spherical bodies, E. in Text figure 4, occur in some of these specimens (Spec. no. C.P.C.2856). Their average diameter is 1 mm and the degree of preservation is insufficient for any determination to be made. These small bodies may be seeds but could possibly be fresh water Ostracods. (P. Jones, personal communication.)

Indeterminate Equisetalean type stem fragments and linear impressions which seem to be roots are present and there are a few scale leaves, D. in Text figure 4, of the Glossopteris type.

The age of these specimens appears to be uppermost Carboniferous or Permian.

Samaropsis moravica ?



Samaropsis milleri

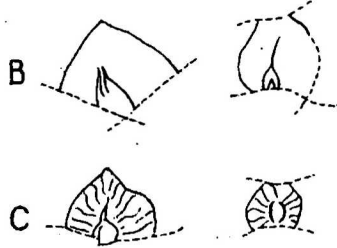


Fig.4.

Locality M.30. (Mt. Bannerman four mile sheet)

Specimens no. F 21594.

Well preserved leaves of Gangamopteris cyclopteroides Feist. occur in these specimens, (Figure 9, Plate II. Specimen C.P.C.2857) associated with Glossopteris indica Sch. and Glossopteris communis Feist., denoting a Permian age. Small triangular scale leaves referable to Glossopteris are also present.

Locality M.47. (Mt. Bannerman four mile sheet)

Specimens no. F 21595.

Gangamopteris cyclopteroides Feistm., Glossopteris indica Sch., Glossopteris communis Feistm. and Glossopteris scale leaves (C.P.C.2858) denote a Permian age for these specimens.

An organ believed to be a large seed or a fruit is illustrated in Figure 12, Plate III, C.P.C.2859. It is over an inch in length, and is half an inch wide at the middle. The affinities of this specimen are uncertain.

Locality C.I. (Cornish four mile sheet)

Specimens no. F 21596.

Equisetalean stems referable to Schizoneura sp. are the only determinate plant remains in these specimens. They denote a Permo-Triassic age for the specimens.

Locality C.6. (Cornish four mile sheet)

Specimens no. F 21597.

No determinate plant fossils are present in these specimens.

Locality C.7. (Cornish four mile sheet)

Specimens no. F 21598

Indeterminate roots are present in these specimens and give no indication of the age of the rocks.

Locality C.46. (Cornish four mile sheet)

Specimens no. F 21599

Fragments of leaves of Glossopteris indica Sch. and an Equisetalean stem fragment referable to Schizoneura denote a Permian age for the specimens.

Locality C.3. (Cornish four mile sheet)

Specimens no. F 21600

A stem of Brachyphyllum sp. is present with two other indeterminate stem casts in these specimens. The presence of Brachyphyllum suggests an age younger than Permian.

Locality L.35. (Lucas four mile sheet)

Specimens no. F 21601

Triangular cone scales of Araucarites, of the same general type as Araucarites cutchensis, occur in these specimens. (Figure 13, Plate III, C.P.C.2860). Cone scales of this type have a wide range from Triassic strata. It is possible that such scales could have been borne by Late Permian Conifers, but there is no evidence of their association with such forms, and the distribution is generally assumed to be Triassic-Jurassic.

Locality M.12. (Mt. Bannerman four mile sheet)

Specimens no. F 21602

Indeterminate stems occur in these specimens and there is no indication of their age.

Locality M.15. (Mt. Bannerman four mile sheet)

Specimens no. F 21603

A cone scale of Araucarites sp. distinct from that present at locality L 35, is present associated with indeterminate roots in these specimens. Specimen C.P.C.2861. The age as indicated by the cone scale is probably Triassic - Jurassic, or possibly from Late Permian. (Figure 14, Plate IV).

Locality M.29. (Mt. Bannerman four mile sheet)

Specimens no. F 21604

The following identifications of plant fossils have been made in these specimens :-

I: Small portions of a frond of a fern Stenopteris elongata Carr. (figure 15, Plate IV.). This fern has a Triassic - Jurassic distribution and occurs in the Ipswich and Walloon Series in Queensland. C.P.C.2862.

2: Very large fronds, in an excellent state of preservation of Thinnfeldia feistmantelli Johnston. (Figure 16, Plate IV)
Age Triassic - Jurassic. C.P.C. 2863.

3: Large leaves of a frond referable to Danaeopsis hughesi Feist. (Figure 17, Plate V. Specimen C.P.C. 2864). This species occurs in Rhaetic strata in Australia, South Africa and India.

4: Equisetalean stems in the form of casts and impressions. Some of these stems are large, with a flattened diameter of about three inches. The ribs do not alternate at the nodes. (Figures 19 and 20, Plate V. C.P.C. 2865.) These stems are referable on their own appearance to either Schizoneura or Equisetites.

5: Equisetalean Cones. (Figure 18, Plate V. Specimen C.P.C. 2866). These cones appear to be referable to Equisetites woodsii Jones and Jersey which occurs in Jurassic strata in Queensland. They are associated with Equisetalean leaf sheaths similar to those found with Equisetites woodsii in the Brighton Beds, Queensland.

6: Equisetalean Leaf Sheaths. (Figure 21, Plate V. Specimen C.P.C. 2867). The evidence of the cones and leaf sheaths in association with the Equisetalean stems suggests that the stems should be referred to Equisetites.

The age of these Equisetalean fossils is most probably Late Triassic - Jurassic.

7: Cycadolepis sp. These thin, bract-like leaves have been wrinkled transversely during preservation. (Figure 22, Plate V. Specimen C.P.C. 2868). They are of a type common in the Late Triassic and Jurassic eras.

8: Fronds of the fern Callipteridium stormbergense Sew. (Figure 23, Plate VI. Specimen C.P.C. 2869). One portion of the frond shows the main rachis and this bears pinnules. The venation is of the Cladophlebis type as far as can be seen.

This is a fern with a Rhaetic distribution.

9: An obscure woody fructification? similar to the problematical "Eury-Cycadolepis" from Wealden Beds in England occurs in these specimens. (Figure 25, Plate VI. Specimen C.P.C. 2870). It is not possible to form any reliable conclusions on the nature of this specimen.

A study of the Flora from Locality M 29 suggests that the age of the plant-bearing beds is Uppermost Triassic, or represents a transition from Upper Triassic to Lower Jurassic.

Locality C.8. (Cornish four mile sheet)

Specimens F. 21605, C.P.C. 2871, 2871a.

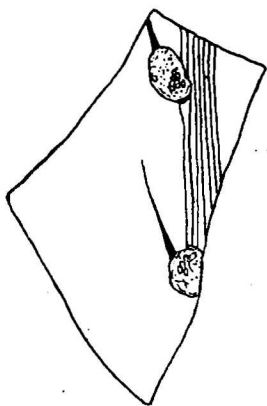
In the specimens from this locality a few examples of fragments of fronds of Thinnfeldia lancifolia Morr. are present with small portions of leaves of Taeniopteris sp. denoting a Rhaetic or Jurassic age.

The majority of the plant remains, however, appear to be referable to a single species showing features of considerable botanical interest. They are all fragments of a small herbaceous Equisetalean in a highly fertile state. (Figures 26, 27, 28, 29, plate VII.)

Stem impressions vary from 3 - 10 mm in width and most show strong vertical ribbing. There is no indication of nodding of the stems. A few of the stem impressions, as in figs. 27 and 28, show no surface ribbing and these have a ribbon-like appearance with slightly undulating margins. The leaf-like appearance of several of these ribless impressions is striking and some show a median groove like a midrib.

Small cones are present in numbers, attached to the stems and fossilised separately. The diameter of the cones is from 2 - 5 mm. Complete examples suggest that each is composed of an aggregation of oval bodies. Some of the cone impressions show a central hollow and in these cases the cone seems to have been broken off partially. There is one case where two cones are borne laterally on a stem in the axis of needle-like bracts or leaves. (Text fig. 5, C.P.C.2871a).

Fig 5.



*Two cones in axes of
bracts or leaves.*

Locality C.31. (Cornish four mile sheet)

Specimens no. F 21606

The following plant species occur at this locality, denoting a Triassic or Jurassic age for the fossil horizon:-

1: Equisetalean Cones. (C.P.C.2872. Figure 31, Plate VIII).

These cones are similar to those referred to Equisetites woodsi Jones and de Jersey from Jurassic strata in Queensland. Unidentified cones of this type are illustrated from the Rajmahal beds in India (Jurassic) by Feistmantel (1877).

2: Equisetalean stem fragments.

3: Fragments of leaf of Yabiella ? and Thinnfeldia sp.

4: Linear leaves and "cones" are present as from locality C.8.

Locality C.62. (Cornish four mile sheet)

Specimens no. F 21607

The specimens from this locality are mainly well preserved and the age as determined by the flora is Upper Triassic or Jurassic.

1: Specimens of Thinnfeldia lancifolia Morr. are present. (Figure 30, Plate VIII, C.P.C.2874). This species has a Rhaetic-Jurassic range.

2: An impression of a cone, Figure 32(A) Plate VIII, C.P.C.2873, is referred to the genus Lycopodites. In the absence of material sufficiently preserved for detailed study only a tentative determination can be made. Lycopodites has been recorded from the Walloon Series in Queensland.

3: Linguifolium sp. A terminal portion of a leaf with undulating margins and a very clear venation of the Linguifolium type is seen in specimen C.P.C.2873, Figure 32(B). Plate VIII. It is similar to Linguifolium denmeadi which also occurs at this locality.

4: Linguifolium denmeadi Jones & de Jersey.

C.P.C.2875.

5: A leaf of Ginkgoites antarctica Saporta is seen in specimen C.P.C.2876. Figure 33, Plate IX. Range Rhaetic - Jurassic.

6: Pinnules of a frond of Danaeopsis hughesi Foist. occur in specimen C.P.C.2877. (Figure 34, Plate IX.). The range of this species is Rhaetic - Jurassic.

7: Indistinct impressions which appear to be referable to Baiera sp. occur in specimen C.P.C.2878. (Figure 35, Plate IX.). Each frond has much contorted laminal segments attached to the top of the rachis.

Locality C.63. (Cornish four mile sheet).

Specimens no. F 21619

Specimens from this locality show indeterminate stem impressions, some possibly with Equisetalean affinities, and no age determination is possible.

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PLATE I

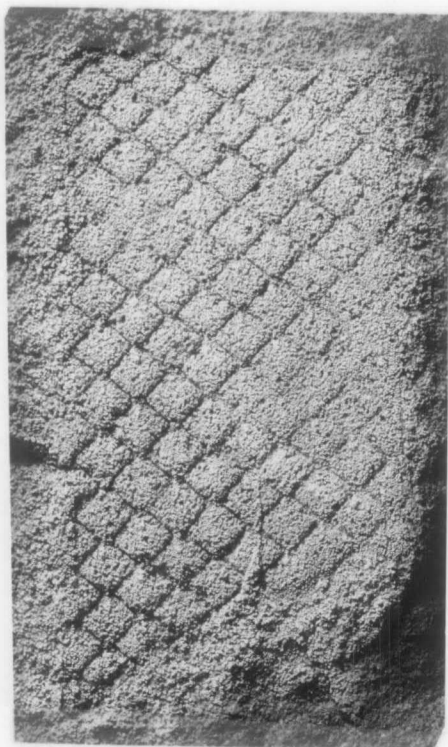
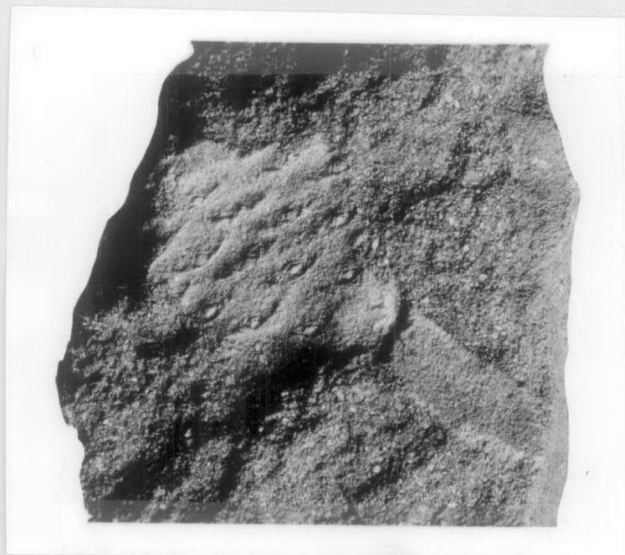


Fig. 1: Leptophloeum australe (M'Coy) ?
Loc. B 4. C.P.C. 2835.
Decorticated stem impression.



Fig. 2: Vertebraria sp.

Loc. B 24.
C.P.C. 2844.



Figs. 3 & 4: Lycopodiopsis pedroanus Carr. ?
C.P.C. 2847. Locality M 6.

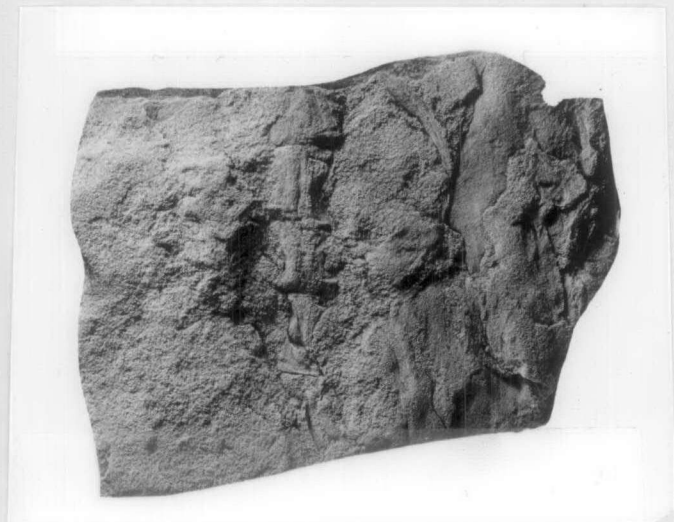


Fig. 5: Vertebraria australis

M'Coy. Loc. L 44
C.P.C. 2850.

PLATE II.



Fig. 6. Glossopteris indica Sch.
C.P.C. 2848. Loc. L 44.

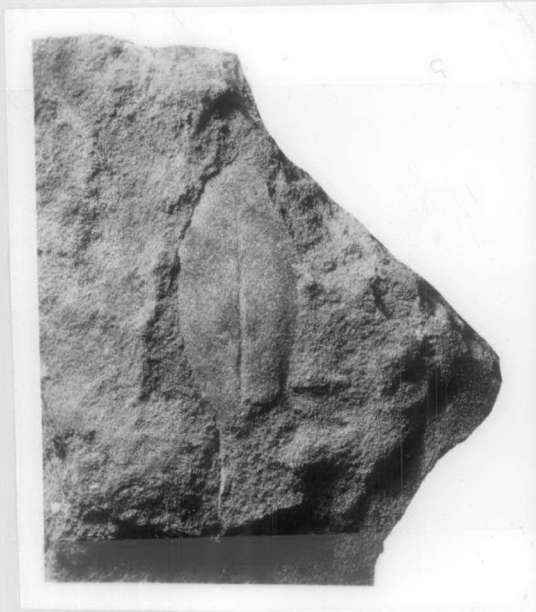


Fig. 7: Glossopteris indica Sch.
C.P.C. 2851. Loc. L 44.



Fig. 8: Glossopteris communis
C.P.C. 2849. Loc. L 44.



Fig. 9: Gangamopteris cyclopteroides
Feist. Loc. M 30. C.P.C. 2857.



Fig. 10: Schizoneura
gondwanensis Feist.
Approx. $\frac{1}{2}$ size. Loc. M23
C.P.C. 2852.



Fig. 11. Lycopodiopsis sp. Transversely wrinkled Lycopod stems with Equisetalean stems.
Loc. M 23. C.P.C. 2854.



Fig. 12. Large Winged seed or fruit ?
C.P.C. 2859.
Loc. M 47.



Fig. 13. Araucarites sp.
Cone scale. Loc. L 35.
C.P.C. 2860.

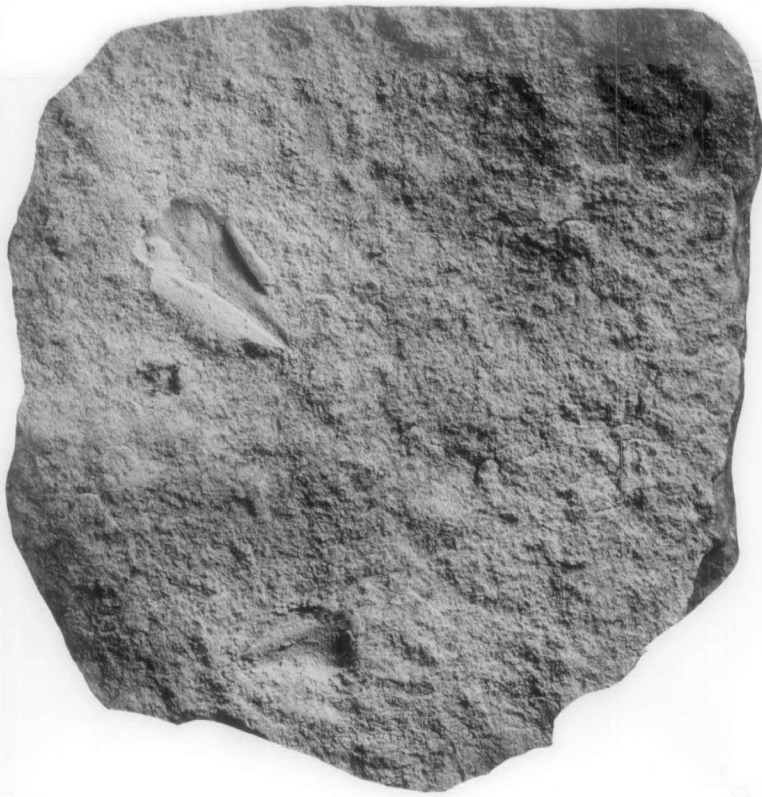


Figure 14.

Araucarites sp.

Cone scales.

C.P.C. 2861.

Loc. M 15.

Fig. 15. Stenopteris elongata

Carr. C.P.C. 2862.

Loc. M 29.

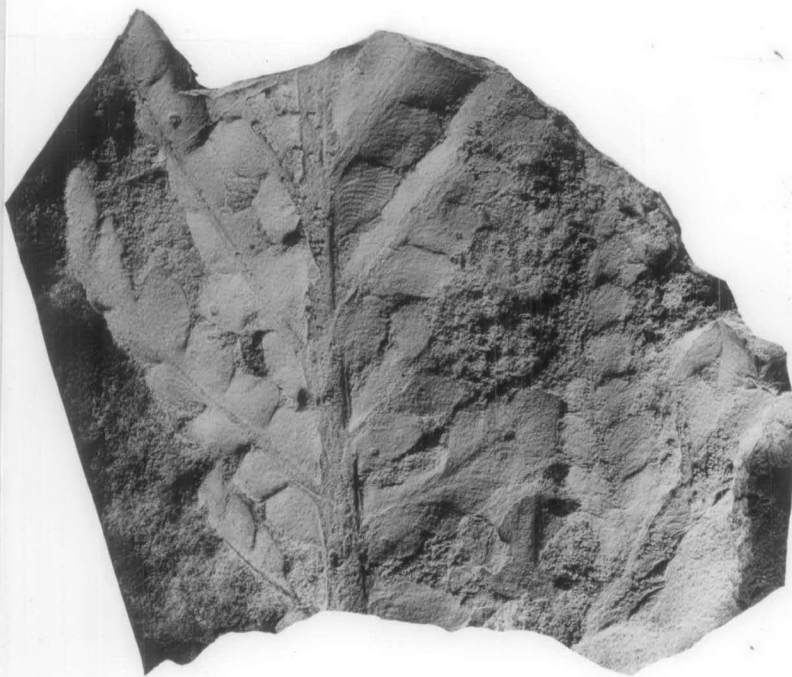


Fig 16. Thinnfeldia feistmanteli John.

C.P.C. 2863. Loc. M 29.

PLATE V.

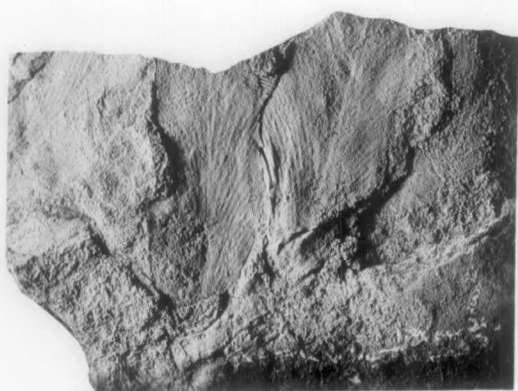


Fig. 17.
Danaeopsis hughesi Feist.
C.P.C. 2864. Loc. M 29.

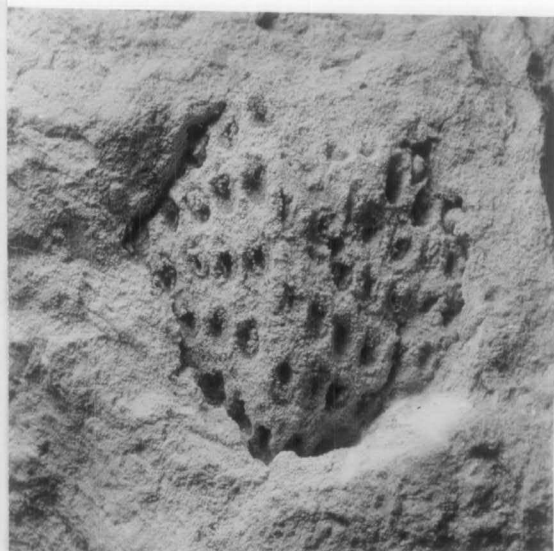
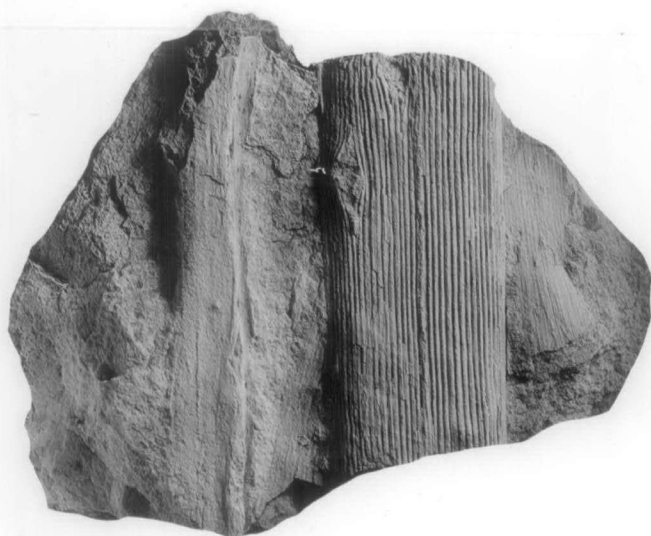


Fig. 18.
Equisetalean Cone. X3.
C.P.C. 2866. Loc. M 29.



Figs. 19 & 20. Equisetalean stems.
C.P.C. 2865. Loc. M 29,



Fig. 21. Equisetalean leaf sheath
with Thinnfeldia pinnules.
C.P.C. 2867. Loc. M 29.



Fig. 22. Cycadolepis.
C.P.C. 2868.
Loc. M 29.

PLATE VI.

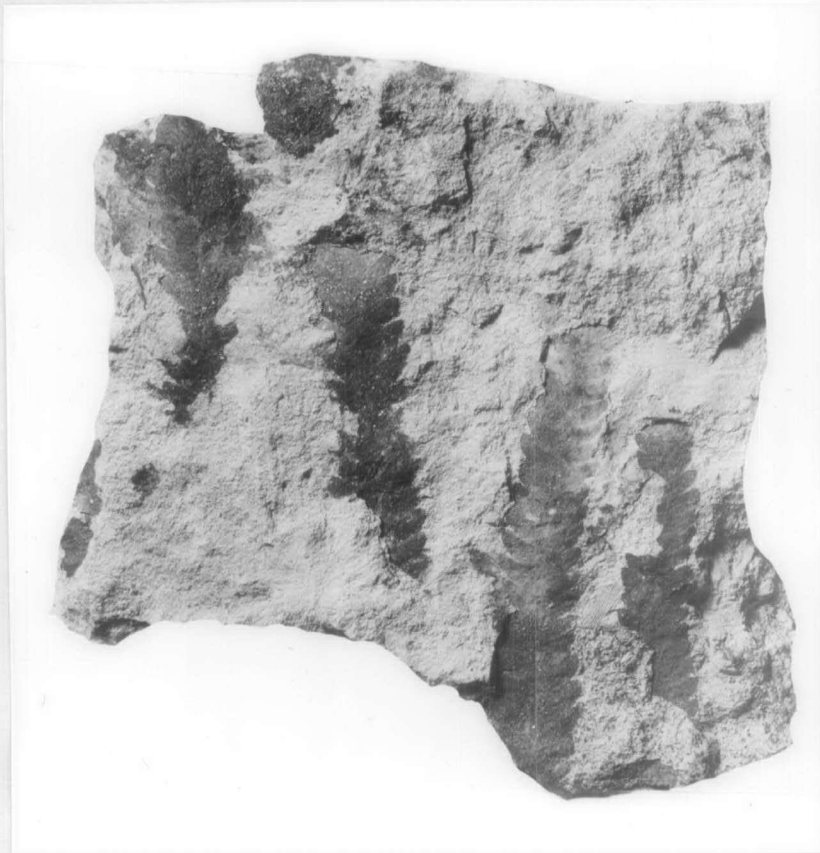


Fig. 23. Callipteridium stormbergense Sew.
C.P.C. 2869. Loc. M 29.

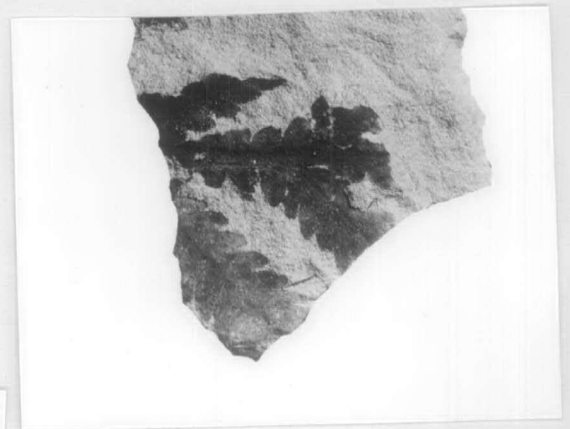


Fig. 24. Callipteridium stormbergense
Sew. C.P.C. 2869. Loc. M 29.
Pinnules on rachis.

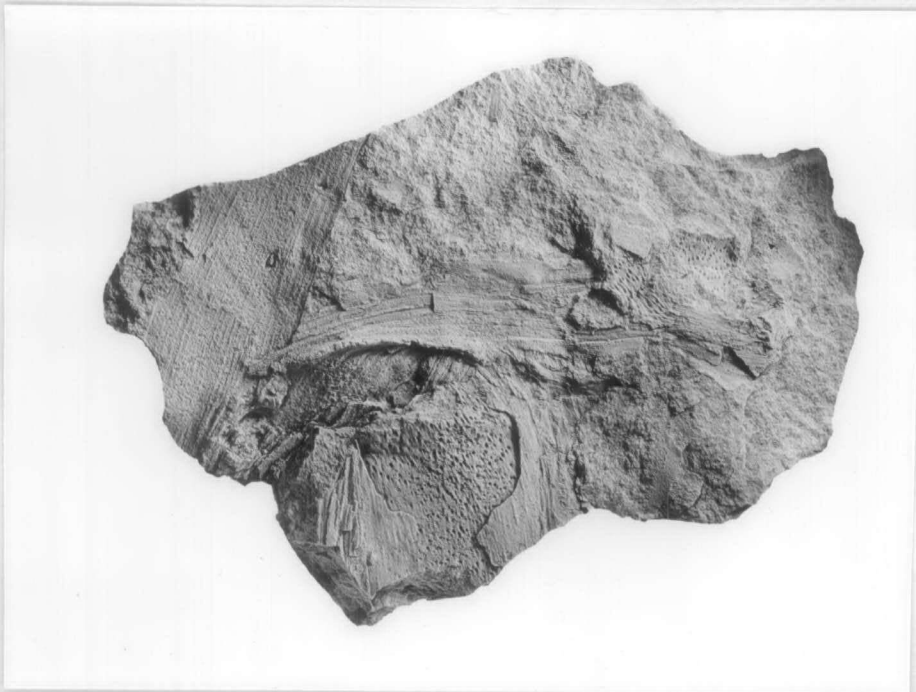


Fig. 25. Eury - Cycadolepis.
C.P.C. 2870. Loc. M 29.

PLATE VII.

Fertile, herbaceous Equisetalean.



Fig. 26. Equisetalean stem with
cone attached. X 2.
C.P.C. 2871. Loc. C 8.



Figs. 27 and 28.

Stems without ribbing.
C.P.C. 2871. Loc. C 8.
X 2.

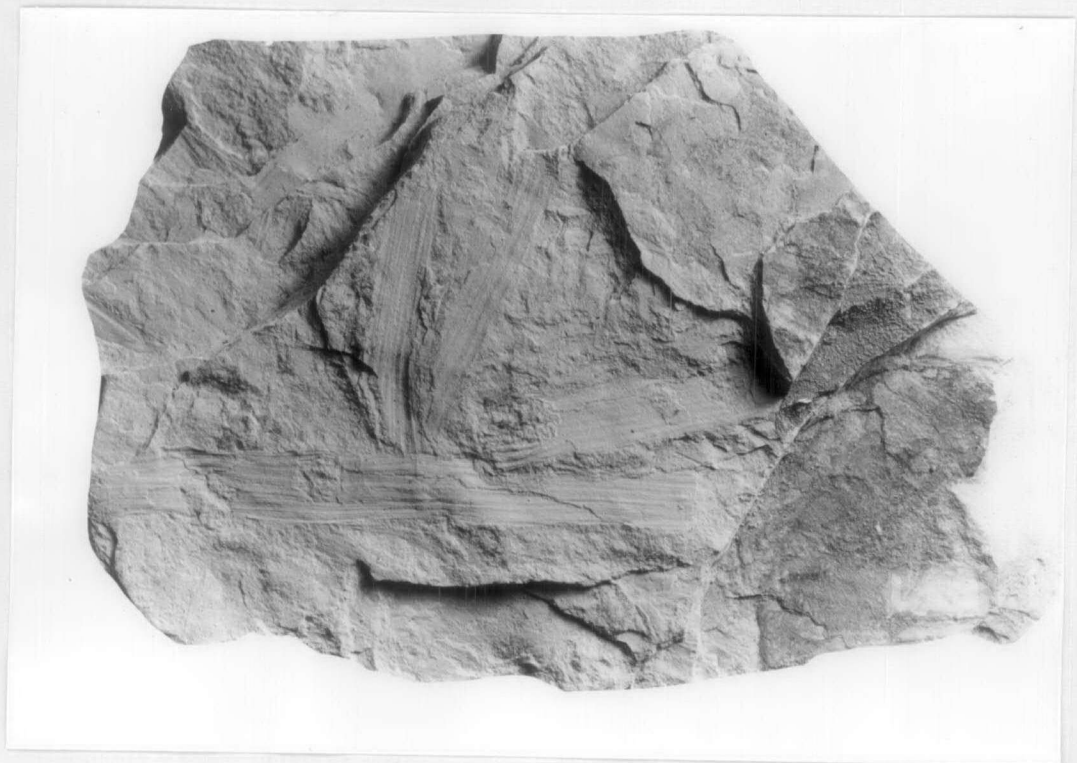


Fig. 29. Equisetalean stems with cones attached.
C.P.C. 2871. Loc. C 8.
X 2.

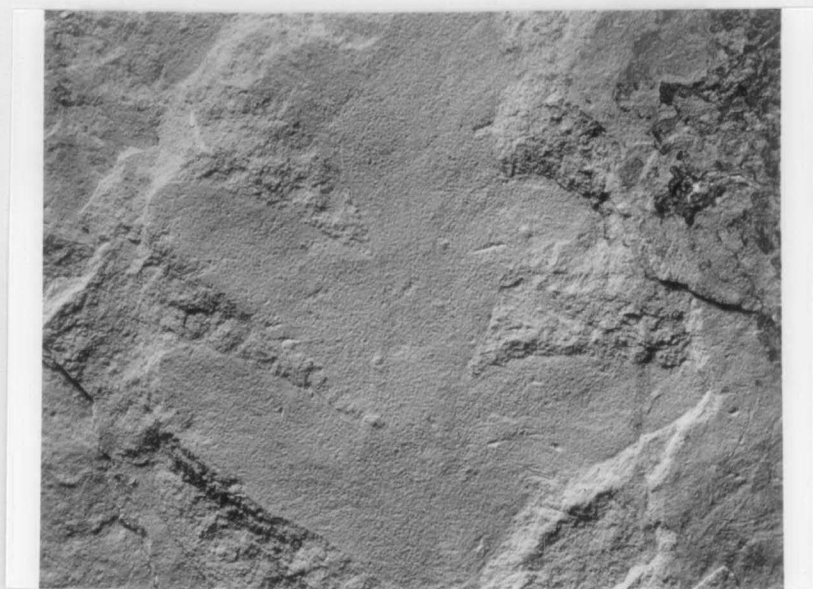


Fig. 30. Thinnfeldia lancifolia Morr. X3.
C.P.C. 2874. Loc. C 62.

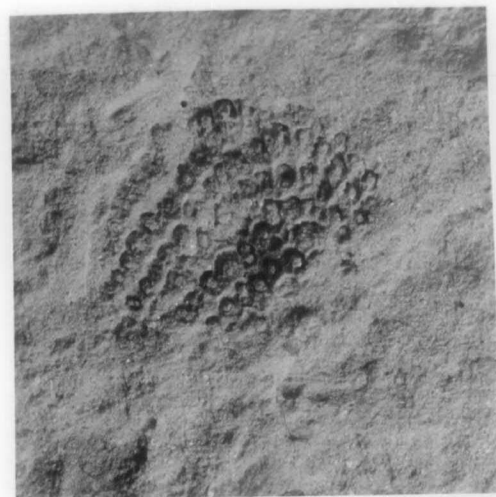


Fig. 31. Equisetalean Cone.
C.P.C. 2872. Loc. 31.
X3.

8

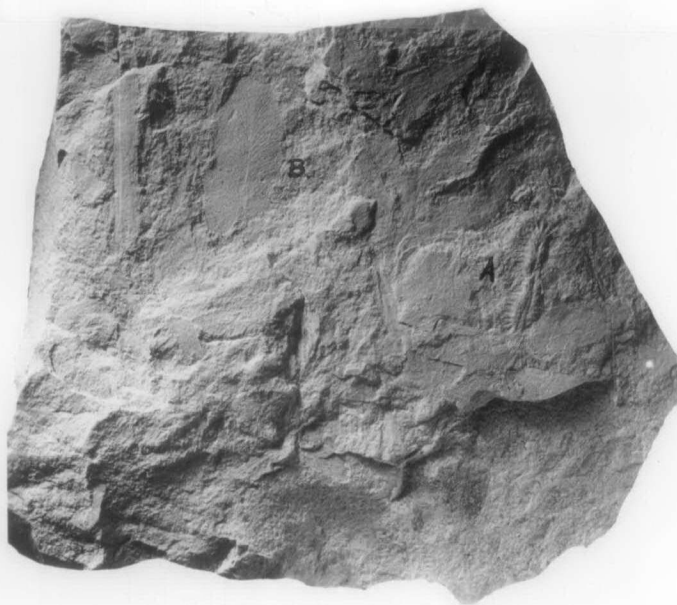


Fig. 32. A. Cone of Lycopodites.
B. Leaf of Linguifolium ?
C.P.C. 2873. Loc. C.62.

PLATE IX.

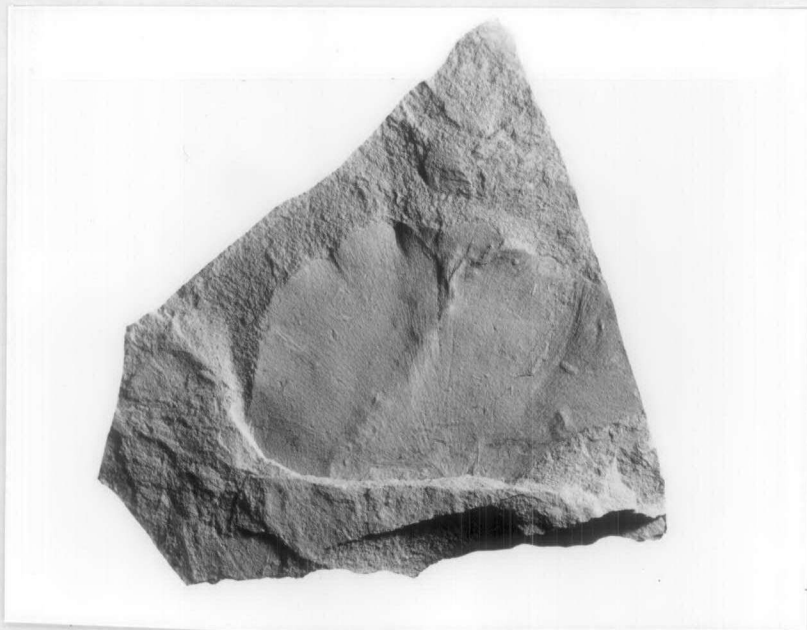


Fig. 33. Ginkgoites antarctica Saporta.
C.P.C. 2876. Loc. C 62.



Fig. 34. Danaeopsis hughesi Feist.
C.P.C. 2877. Loc. C 62.

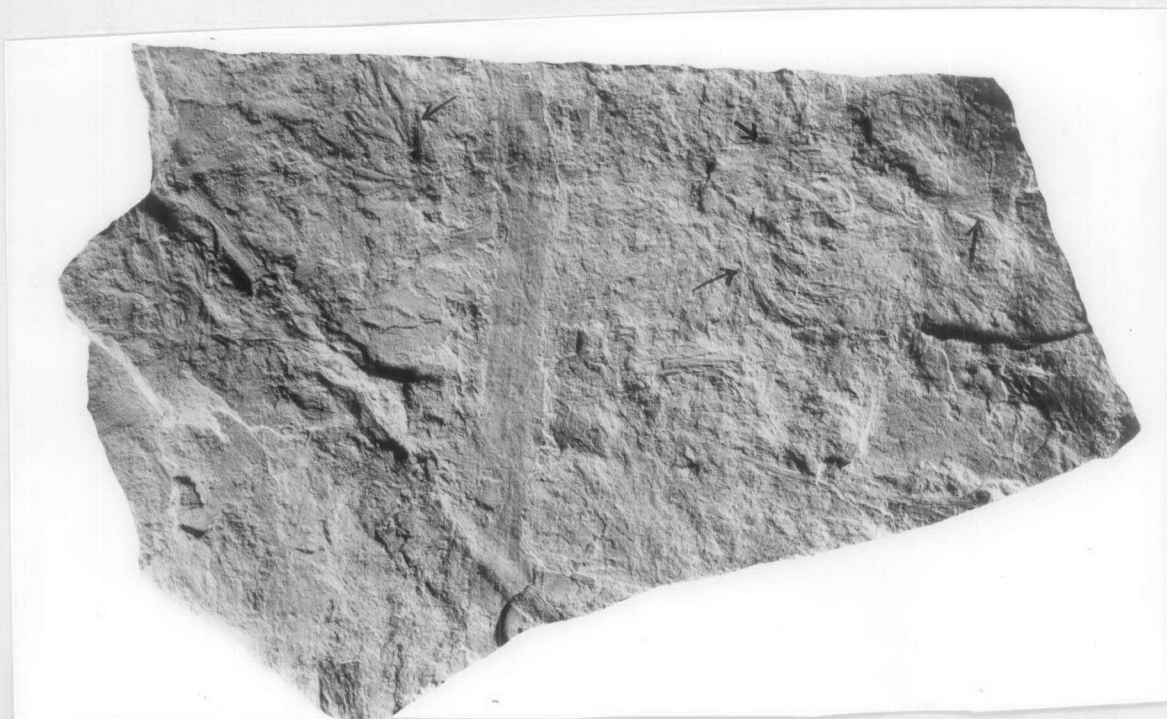


Fig. 35. Baiera sp. ?
C.P.C. 2878. Loc. C 62.