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RECORDS.

Records 1958/38

PLANT FOSSILS FROM THE EINASLEIGH REGION, NORTH-EAST QUEENSLAND

by

Mary E. White

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About three hundred specimens containing plant fossils were collected by the Bureau of Mineral Resources geological party in 1957, mainly from the Broken River and Clarke River Formations. The fossil flora is rich and interesting.

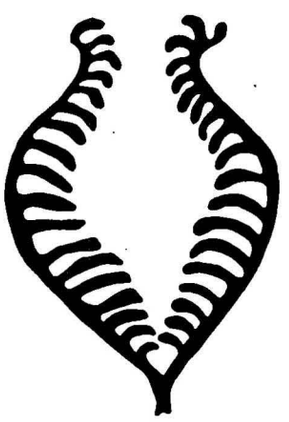
Collections from the different localities are grouped below according to their apparent age as determined by their plant fossils.

I. UPPER SILURIAN OR LOWER DEVONIAN

Specimens from localities BR4, BRS4, BRS 33 and BRS32 contain three fossil forms, two of which are almost certainly of plant origin and one which is best regarded as uncertain, although it seems to be a plant. For the purposes of description botanical terms are used in describing the "problematica".

A. Locality BRS 4 (and BR 4).

These specimens contain very numerous fronds of the "problematica". (Figure I, Plate I). The fronds are plumose, more or less curled, and in no instance attached to any organ. Each frond has segments attached along one side of the curled axis. In a few instances there is a suggestion that the fronds may have been paired, the two branches united below with the pinnule-like segments inwards as in Text Figure I.



Text Figure I - "Problematica".

The pinnules are of fairly uniform length along most of the axis, the lower ones slightly shorter, but they decrease in size near the tip of the frond and in some cases small lobes occur on both sides of the axis at the extreme apex. The edges of some of the pinnules or segments appear finely dissected but this may be due to incomplete preservation. No minute surface detail is visible.

Measurements of the fronds vary considerably, as the following examples show:-

	1	2	3	4
Length of axis of frond	9 cm.	3½ cm.	3½ cm.	4 cm.
Number of segments	20	15	11	12
Length of longest segments	1 cm.	7 mm.	1 cm.	1½ cm.
Average length of shorter segments	5 mm.	5 mm.	8 mm.	1½ cm.

Smooth axes are present associated with the plumose fronds but not connected to them. (Figure 2, Plate I). These axes are all fragmentary, about 5 mm. in width and somewhat sinuous. Some show minute surface markings of pits, only just visible to the naked eye, in obliquely transverse rows. There is no sign of lateral appendages, branching of axes or attachment to fronds. On the evidence available in the specimens from this locality only, the axes can be determined as of Psilophytalean affinity.

B. Locality BRS 32.

These specimens contain fronds of the "problematica" which are mostly far smaller than those in BRS 4. A large number do not exceed 2 cm. in length, with pinnules between 3 and 5 mm. long.

C. Locality BRS 33.

(i) Among these specimens are two which contain only densely crowded vermiform impressions, the average size of the less broken examples being 1½ inches long and ⅛ inch wide. These are fragments of smooth axes of the type seen in BRS4. Although smooth and apparently featureless, minute pits can be discerned on the surface of some.

(ii) Ten specimens contain segmented vermiform impressions of most striking appearance. (Figure 3, Plate 2). In the figured specimen, ten examples of the segmented type occur together with one curled axis of the smooth type which seems to be in continuity with a segmented example (bent at point A).

There are other examples where portions of smooth pitted axes lead into the segmented portions. It appears that the segments may be united down one side and free on the other. Sizes of the segmented organs vary as the measurements below indicate:-

	1	2	3	4
Length of segmented axis	4 cm.	6 cm.	1.5 cm.	2 cm.
Width of segmented axis-widest pt.	4 mm.	3 mm.	3 mm.	4 mm.
narrowest "	4 mm.	2 mm.	3 mm.	3 mm.
Length of smooth axis below, if any	-	-	-	5 mm.
Average depth of segments	1.5 mm.	1.25 mm.	2 mm.	1.5 mm.

(iii) Four specimens contain segmented impressions as in (ii) together with plumose fronds of the "problematica".

Discussion of the fossil forms occurring in BRS 4, BRS 32 and BRS 33.

The smooth Psilophytalean axes with minute surface pitting and without lateral appendages of any sort appear to be in continuity in some instances with segmented axes. It seems probable that the segmented axes represent the fertile organs of the plants, which may have resembled in habit the Zosterophyllum Rheanum as reconstructed by Krausel and Weyland (Gothan and Weyland 1954, p.75). The smooth succulent-like sinuous axes of the submerged portion of a waterplant bearing erect fertile axes which protruded above water level are in keeping with the gently curled form of the organs in this plant.

The general arrangement of the segmented, probably fertile, axes recalls the genera Barinophyton, Bucheria and Broggeria although there seems to be no close similarity to any of these. The preservation of the present specimens is such that no detail can be made out, and the nature of the organs remains in doubt.

There is no indication whatever of a junction between the fronds of the "problematica" with the smooth or segmented axes. It is not impossible that they represent the foliose organs of these plants but in the absence of any evidence that this is the case they must be considered separately. Among Silurian plants figured by Cookson (1935) is an example of "cf. Hostimella sp." showing "pinnately branched axes", one example of which shows two pinnately branched axes joined at the base with the segments inwards. This arrangement is the same as that which occurs, in an exaggerated form, in the present species. The pinnate branching in these specimens is developed so that the transition from branchlet to pinnule is far advanced and the frond-like nature of the whole is evident.

If these fronds are referable to the Psilophytalean axes with which they occur, the species is an interesting one showing characters linking it with the more highly evolved ferns and less ancient plants.

Further collection from the richly fossiliferous Broken River Formation might elucidate this interesting problem.

II. DEVONIAN

Specimens from localities BRS 14 and BRS 15 contain fragmentary plant fossils which are mostly indeterminate. Some indications of Psilophytalean affinity occur in stem impressions from both localities suggesting a probable Lower Devonian age. Specimens from locality BRS 30 contain stem impressions also of Psilophytalean type.

A. Locality BRS 15.

These specimens contain:-

(i) Impressions of narrow axes with two deep vertical grooves such as occur in Hostimella and some other Psilophytales.

(ii) Stem impressions with oblique (or spiral?--)

markings in the residual tissue on the surface of the impressions. Some of these stems show branching, laterals being given off in approximately opposite pairs (Text Fig. 2a). Some of the stem impressions have no residual tissue and are sulcate.

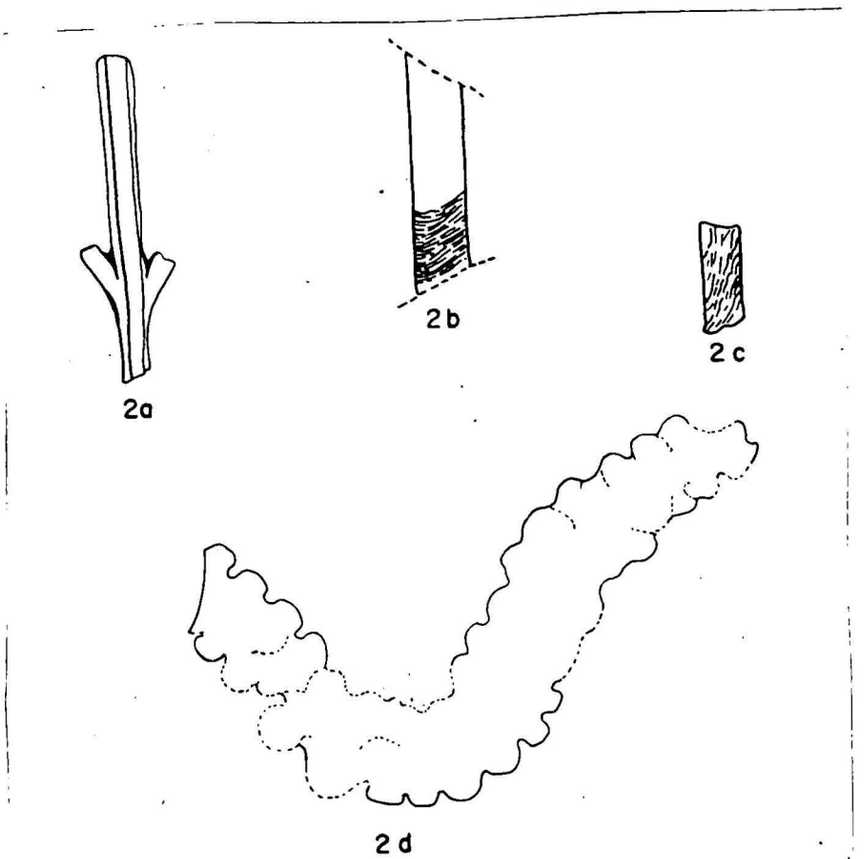
B. Locality BRS 14.

These specimens contain numerous fragmentary impressions of short lengths of stems varying in width from $\frac{1}{8}$ to $\frac{1}{3}$ inch with the characteristic oblique markings in the form of residual tissue on the impression surface. In some, presumably at a different level of decortication, a different pattern occurs. Examples are illustrated in text figure 2, (b) and (c). These stems are the same as those in BRS 15 which in addition show branching.

Very numerous impressions of fragmentary stems or macerated plant material occur among the striated stems, and there are several examples of obscure featureless casts of indeterminate organs. A large example of such a cast is illustrated diagrammatically in Text Figure 2 (d). This example shows lobing round the edges.

C. Locality BRS 30.

The stem impressions in these specimens have the characteristic appearance and method of branching of Psilophytalean axes of early Devonian age (Figure 4, Plate 2).



Text figure 2 - Possibly Devonian plant fossils.

III. CARBONIFEROUS

A. Locality BRS 29.

Plant remains are plentiful in these specimens and comprise the following:-

(i) A large block of silicified wood, to be sectioned for microscopic examination.

(ii) Equisetalean stem casts and impressions of various sizes up to $1\frac{1}{2}$ inches wide, showing no alternation of ridges at the nodes. These are referable to Calamites radiatus Bgt.

(iii) Lepidodendroid impressions and casts of stems of different sizes, all decorticated to some extent. This is referred to Lepidodendron cr. veltheimianum but there are no surface impressions for positive identification.

(iv) Indeterminate stem and wood impressions.

The association of Calamites radiatus Bgt. with a Lepidodendron of this type suggests a Lower to Middle Carboniferous age for the specimens.

B. Locality BRS 28.

Several impressions and one cast of a Lepdidodendron of the Veltheimianum type occur in these specimens. Lepidodendron stems of this type are plentiful in Lower Carboniferous strata but occur throughout Carboniferous times and may persist even into Lower Permian.

C. Locality No. 2303.

These specimens contain impressions of large numbers of fossilised stems which are of the fern-rachis type but otherwise indeterminate. They vary in width from $\frac{1}{8}$ - $\frac{1}{2}$ inch. Many show a median ridge or sulcus such as is found in the rachis of some Rhacopteris ferns.

Associated with the fern rachis impressions are several very clear impressions of Lycopod stems. These, including a surface view of a young stem, are referred to Lepidodendron Veltheimianum Stbg.

Two indistinct impressions of stems with vertical ridges and transverse lines of small scars are referable to Sigillaria sp.

The plant assemblage at this locality appears to be of Lower Carboniferous age.

D. Locality No. 2273.

In these specimens a number of indeterminate impressions of stems of Lepidodendroid type occur with indeterminate wood impressions. There are also two clear impressions referable to Stigmaria ficoides Brongn. (Figure 5, Plate 2). No age determination is possible on the presence of Stigmaria ficoides as the root structures of Lycopods from Devonian to Permian eras are very similar and all referred to this species.

E. Locality BRS 64.

The following plant remains occur in these specimens:-

(i) Stems.

a. Finely ribbed Equisetalean stems referable to Calamites radiatus Bgt.

b. Ribbon-like impressions of stems with a median depression, of the Rhacopteris fern rachis type, associated with pinnules of the fern described below.

c. Casts of faintly ribbed stems showing no preservation of internal structure.

d. Impressions up to 1½ inches wide of ribbon-like appearance, with the surface faintly striated vertically. Indeterminate.

e. Impressions of stems (narrower than in d. but up to 1 inch wide) which have surface roughness and pitting such as frequently occurs in fossilised fern stems. Associated with pinnules of the fern which is described below.

(ii) Fern Fronds.

A striking fern occurs abundantly in many specimens from BRS 64. It is a delicate fern of Sphenopteroid type. (Figure 6, Plate 3). It is characterised by dichotomy of the pinnules. There is considerable variation in the pinnules, those of some fronds being far more foliose than others. Imperfectly preserved specimens and those in which the lamina is reduced, resemble Rhode.. Very foliose examples approximate more to Adiantides in individual pinnule. The fern shows similarity to figured specimens of Sphenopteris affinis Lind. and Hutt. There are no fertile pinnules present.

This fern is best referred to the form-genus Diplothmema Stur on account of the dichotomy of its pinnules. It is a fern of Lower Carboniferous appearance. Its association with Calamites radiatus Bgt. confirms its determination as of Lower Carboniferous age.

F. Locality BRS 65.

A few of the specimens from this locality are very coaly but contain no determinate plant remains. These specimens might be treated for spore and cuticle extraction. Several specimens containing macerated plant material and impressions of wood are also indeterminate.

Impressions of large numbers of Equisetalean stems occur in a number of the specimens, featuring slight, irregular alternation of ridges at nodes or no alternation at all. These appear to be referable to Calamites cf. radiatus Bgt. and probably denote a Lower Carboniferous age for the specimens.

Numerous ribbon-like impressions up to ½ inch wide with faint vertical striations are present in considerable numbers. These may be indeterminate stem impressions but it is not impossible that they are long, narrow leaves referable to the form genus Cordaites. Some show slight tapering. If these impressions are Cordaitean leaves they are unfortunately

valueless for age determination as this sort of leaf occurs from Devonian times onwards.

G. Locality BRS 67.

These specimens contain many beautifully preserved fronds referable to Rhacopteris ovata (M'Coy) Walkom associated with an Equisetalean Calamites radiatus Bgt. (Figure 7, Plate 3).

Rhacopteris ovata occurs associated with Calamites radiatus in Lower Carboniferous beds at Stroud, at Arowa and Port Stephens in N.S.W. and at other localities in Australia in beds of Lower to Middle Carboniferous age. It occurs in so-called Lower Carboniferous beds in Peru and the Argentine as well.

The range of Rhacopteris ovata appears to be "common in Lower and Middle Carboniferous, and occasionally found in the Upper Carboniferous, where it is rare".

H. Locality BRS 66.

Large Equisetalean stems referable to Calamites radiatus Bgt. occur in these specimens. Some fragmentary pinnules of Rhacopteris ovata (M'Coy) Walkom are present. The association is the same as in specimens from BRS 67.

I. Locality BRS 53.

This specimen contains pinnule and rachis fragments of Rhacopteris ovata (M'Coy) Walkom as occurs in BRS 67.

IV. SPECIMENS OF INDETERMINATE AGE

Specimens from Localities BRS 55, BRS 31 and BRS 54 contain indeterminate plant fossils of indeterminate age. BRS 54 might be Devonian if the axes present are Psilophytalean, but there is insufficient evidence available for reliable determination.

V. SPECIMENS FROM LOACLITIES OTHER THAN IN THE BROKEN RIVER AND CLARKE RIVER FORMATIONS

1. Specimens S.G.2. (Star Group)

These specimens contain impressions of slightly decorticated stems of Leptophloeum australe (M'Coy), a form most typical of Upper Devonian and Lower Carboniferous horizons in Australia. This species probably ranges at least to Middle Carboniferous in some cases.

2. Specimens No. 1 (D.A.White).

Fragments of leaves of Glossopteris communis Feist and Gangamopteris cyclopteroides Feist occur in these specimens. Both species are very common in Permian strata but can persist into Lower Triassic strata.

3. Specimens No. 2 (D.A.White).

These specimens contain remarkably well preserved large leaves of Glossopteris and of Noeggerathiopsis hislopi, Feist.

a. Glossopteris leaves. (Figure 8, Plate 4).

The venation of these leaves is clearly preserved. The midrib is broad at the base and tapers gradually toward the apex. None of the specimens has a complete apex. The lateral veins extend right to the margins, are fine and markedly parallel to each other, and lie at an angle between 40 and 50 degrees to the midrib. There is very little anastomosing of the lateral veins and none of the marked reticulation which occurs in the species Browniana. The venation is therefore of the type seen in Glossopteris communis Feist. of the Lower Gondwanas of India. This type of Glossopteris frond is found in profusion in Permian strata and persists into the lower beds of the Upper Gondwanas as well.

b. Two large leaves of Noeggerathiopsis hislopi Feist. are present. One shows a terminal portion of a leaf with a rounded apex. (Figure 9, Plate 4). The broadest portion of the leaf is almost two inches wide. The other is a fragment of a very large leaf, the width of the incomplete specimen being over two and a half inches. In this specimen the vertical ridging of the leaf between the veins is visible. Dichotomising of the veins can also be seen. Leaves of this species are common in the Lower Gondwanas and persist into Lower Trias.

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PLATE 1

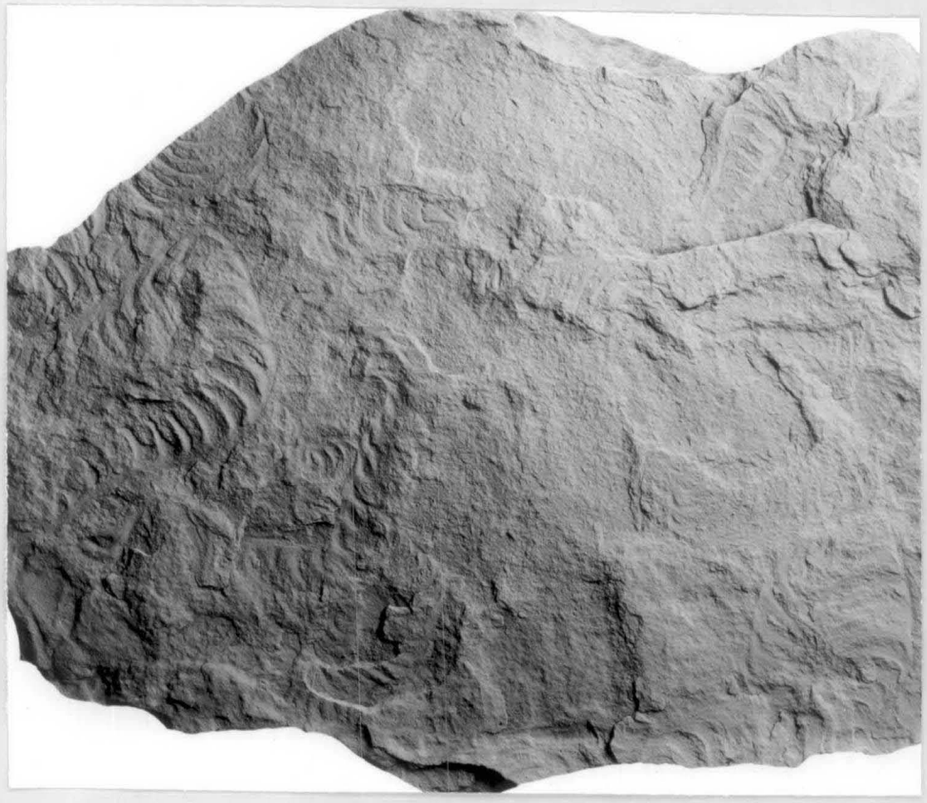

Figure I : Fronds of "Problematica".

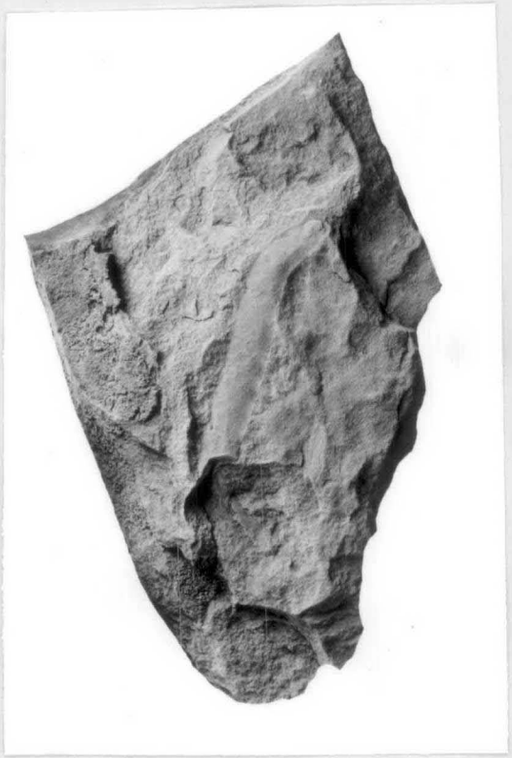

Figure 2 : Smooth axis.

PLATE 2

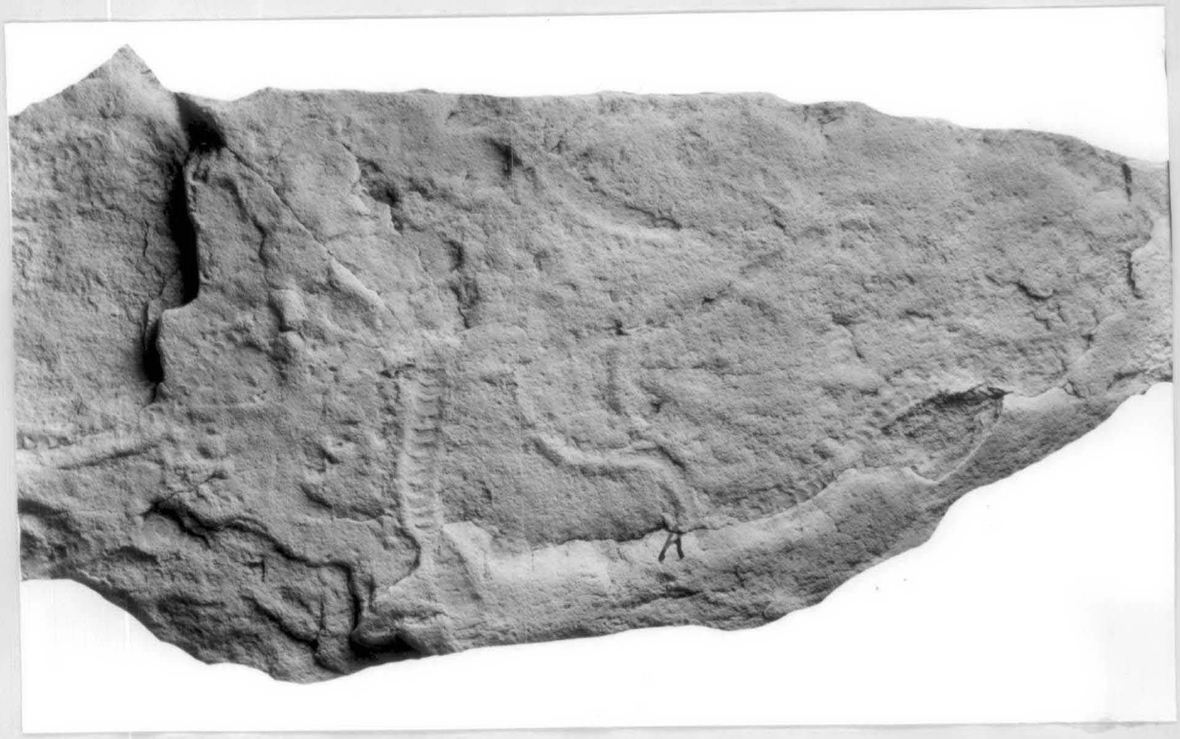

Figure 3 : Segmented axes

Figure 4 :

Psilophytalean axes

Figure 5 :

Stigmaria ficoides
Brongn.

PLATE 3

Figure 6 : Diplothmema sp. ?

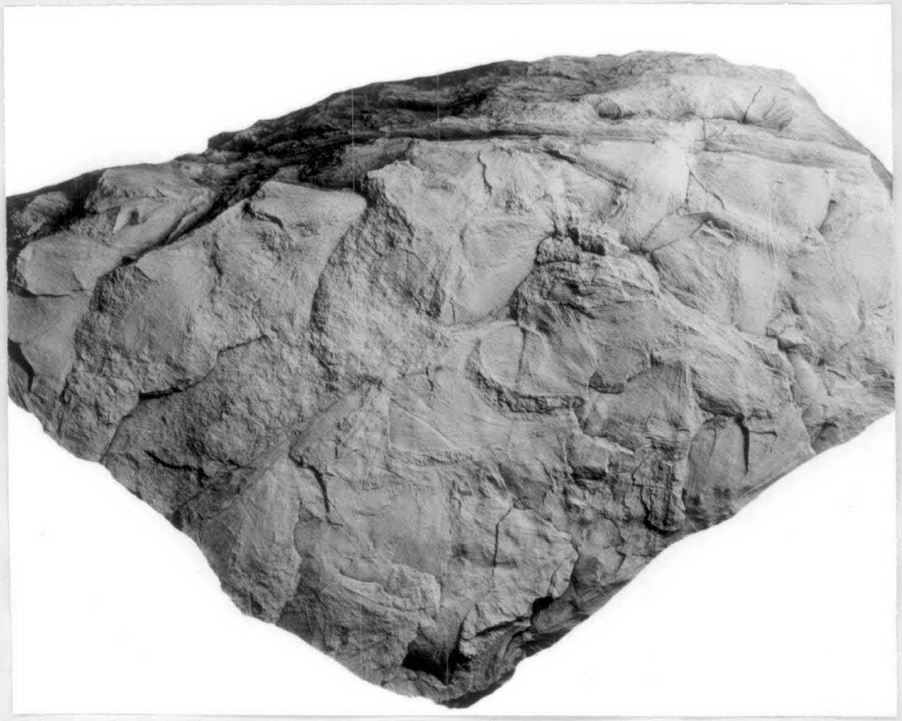

Figure 7 : Rhacopteris ovata (M'Coy) Walkom

PLATE 4

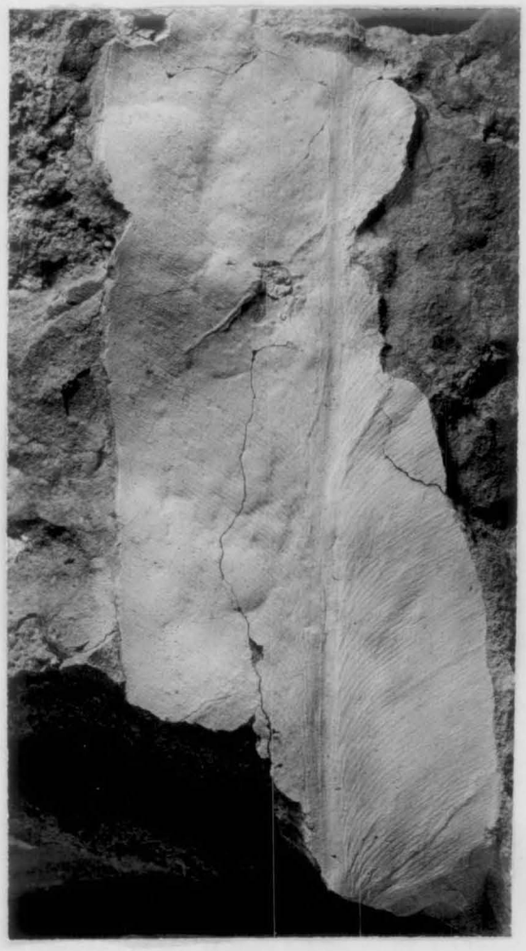

Figure 8 : Glossopteris Communis Feist.

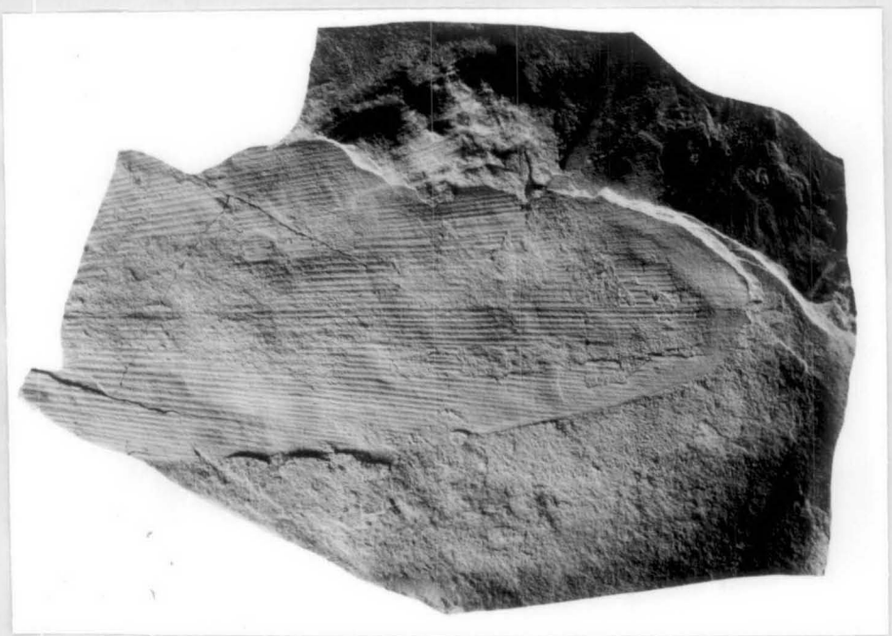

Figure 9 : Noeggerathiopsis hislopi Feist.