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PERMIAN PLANT FOSSILS FROM THE AGATE CREEK VOLCANICS, NORTH QUEENSLAND.

by

Mary E. White.

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Permian Plant Fossils from the Agate Creek Volcanics, North Queensland.

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Plant fossils were collected from two localities: one on the Georgetown 4-mile sheet; and the other on the Gilberton sheet in 1957 by D.A. White and party from Agate Creek Volcanics; and from a third locality, on the Gilberton 4-mile sheet, in 1958.

The Agate Creek Volcanics:

(abstracted from "Summary Report of Croydon Sub-Party, 1960 Field Season" by C.D. Branch - Records 1960/135).

"The volcanics occupy a fault block, with an area of about 25 sq. miles, on the S.E. edge of the Georgetown 4-mile sheet.....

A generalised section of the volcanics exposed is (from the top):-

(a). Pink rhyolite and ignimbrite, intruded by rhyolite dykes. + 150'.

--------angular uncomformity--------

(b). Viscous pink-purple rhyolite with platy flow banding. + 40'.

(c). Basalt.....alternating flows of massive basalt and amygdaloidal basalt.....Flows average 20' in thickness on the N.W. edge of the volcanics but rapidly thicken to the S.E. where, through block faulting they are repeated several times. The greatest thickness of basalt exceeds 200'.

(d). Extensive bed of cream mudstone and graded bedded shale (15' thick) crops out half way up the basalt section. (Plant Fossil Locality F 21165-F 21180 and D.A.W.I)

(e). Viscous pink-purple rhyolite. 45' thick.

(f). Massive volcanic tuff and breccia with rare flows of rhyolite glass up to 3' thick. The fragments in the upper breccias are all pink-purple rhyolite, but lower in the section there are many fragments of biotite schist. (Plant Fossil Locality D.A.W.2) The base is not exposed. + 200'.

The total thickness exceeds 700'.

The structure is that of a shallow basin, elongated north - west. A number of north - west faults cut the basin - they may also control the margins - and dips in the volcanics are steepened near the faults. "

Plant fossil localities:

Locality DAW I (1957) is situated 3 miles S. of locality DAW 2. Fragments of leaves of Glossopteris indica Sch. and Gangamopteris cyclopteroides Fm. are preserved in mudstone.

Locality DAW 2 (1957) is situated on the track from Forsayth to Ortona Copper Mine, 30 miles South of Forsayth. Latitude 19° 00', Long. 143° 34'.

Well preserved leaves of Glossopteris indica Sch. and Noeggerathiopsis hislopi (Bunb). are preserved in coarse-grained greywacke. D.A. White states that this fossil horizon is at the base of the volcanics and older than the horizons at DAW 1 and Loc. 3. (Plant fossils at localities DAW I & 2 briefly reported on in Records 1958/38.

Locality 3. (specimens F 21165 - F 21180, 1958) is situated in the headwaters of Agate Creek on the Gilberton 4-mile sheet 3 miles S.S.E. of DAW 2.

The following plants are identified at this locality:-

Noeggerathiopsis hislopi (Bunb).

Carpolithes belmontensis Walk.

Gangamopteris cyclopteroides Fm.

Glossopteris angustifolia Brong.

Glossopteris indica Sch., including "communis" type

Glossopteris stricta ?

Glossopteris cf.G. intermittens Feist

(plants from Loc. 3 briefly reported on in Records 1959/75.

Plant fossil numbers incorrectly referred to as F 21161).

Age of the Agate Creek Volcanics Flora:

The age of the fossil horizon is Lower to Middle Permian. Gangamopteris cyclopteroides first appears in Uppermost Carboniferous and is not found in beds younger than Middle Permian. The other species in the assemblage have a Permian to Lower Triassic distribution.

Descriptions of Selected Specimens:

1. Noeggerathiopsis hislopi (Bunb).

Figures 1 and 2 show two Cordaitean leaves, the one wide and bluntly tipped, the other narrow in proportion to length and tapering slightly towards its base. The strong parallel venation is characteristic of the species.

Noeggerathiopsis hislopi is a common Permian plant. It is a prominent member of the Lower Permian Glossopteris floras in India, Africa and Australia. It decreases in importance in Upper Permian floras. There is no evidence of its abrupt extinction at the end of the Permian age. In Australia it is recorded from Permian horizons only but it probably existed as a less important member of early Mesozoic floras. In India it has recently been found in the Parsora Series of Middle Triassic age. (Lele,K.M.. 1955.. Plant fossils from Parsora in the South Rewa Gondwana Basin. Palaeobotanist 4, 23-33.)

Figure I.

Noeggerathiopsis hislopi (Bunb),

Natural size.
Locality DAW I.

Figure 2.

Noeggerathiopsis hislopi.

Natural size. Locality 3.
Specimen no. F 21174.

2. Seeds:

Many approximately round seeds with a diameter of between .4 and .5 cm. occur in the specimens. Three examples are illustrated in Figure 3, a, b, c. They are emarginate at the micropylar end where the wing is broadest. The wing tapers to nothing below. Some show carbonised spots on the striated surface of the seed. The wing is clearly of less substantial construction.

Figure 3.

a.

b.

c.

Seed: Magn. X 3. (a and b)

Specimen F 21166.
Locality 3.

Seed: Magn. X 2

Apparently attached to leaf base. Loc. 3
Specimen F 21167.

In Figure 3c a seed is seen apparently attached to a piece of tissue with Glossopteris venation. It is unfortunate that preservation is not entirely satisfactory and the leaf not determinate. It would be of the greatest interest if the seed could be shown without doubt to be borne on a leaf or petiole.

The seeds closely resemble Carpolithes belmontensis Walk. described from Belmont (Walkom 1928).

3. Gangamopteris:

Figure 4 shows a large leaf of Gangamopteris cyclopteroides Fm. Several other large leaves occur in the collection. They are similar to the type material of G. cyclopteroides illustrated on Plate XIV A of Vol.4 of the Fossil Flora of the Gondwana System (Feistmantel, O. 1886).

Figure 4.

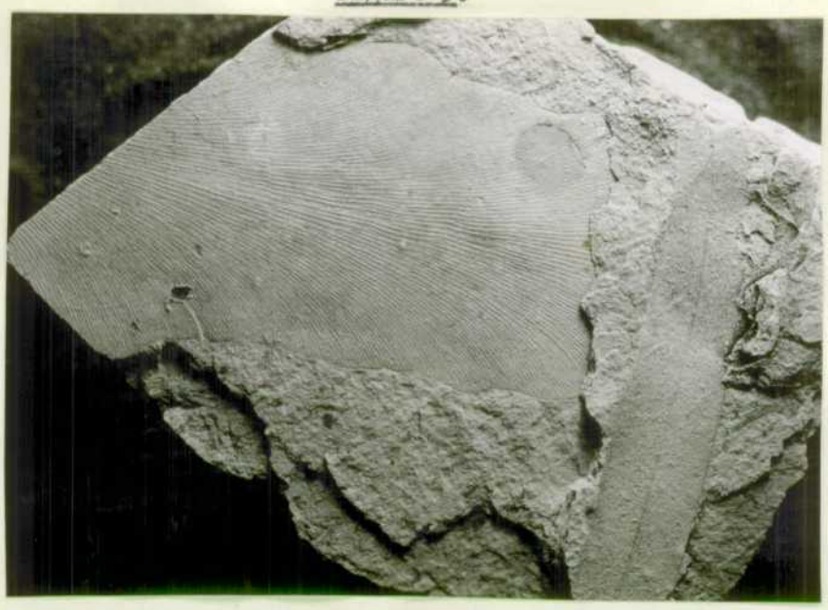
Gangamopteris cyclopteroides Fm.

Natural size. Locality 3.

Specimen no. F 21177.

Figure 5 shows another leaf of Gangamopteris cyclopteroides of special interest because of its undulating margins, a feature not seen in other specimens. A narrow leaf of Glossopteris angustifolia Brong. if also present.

Figure 5.



Gangamopteris cyclopteroides Fm. and

Glossopteris angustifolia Brong.

Natural size. Locality 3.
Specimen no. F 21175.

Figure 6 shows a small leaf referred to Gangamopteris cyclopteroides var attenuata Fm. Poor preservation of the lower middle section of the lamina results in a strong resemblance to Glossopteris. It will be seen, however, that there is no true midrib.

Figure 6.

Gangamopteris cyclopteroides var attenuata Fm.

Locality 3. Natural size.
Specimen no. F 21178.

The specific name "cyclopteroides" is widely known and used for leaves of the types illustrated above. It has been established that the specific name "obovata (Carr). D.White" has priority and some authors (notably Plumstead) have abandoned "cyclopteroides" in favour of "obovata". Walkom (1922) expressed reluctance to do so. The specimens illustrated by Plumstead and referred to "obovata" have an obovate leaf form unlike the broad, foliose laminae in the present examples, and their fructifications are known. It is quite likely that several true species are represented by forms which can be included in "cyclopteroides". Where identification is on appearance of impressions only without cuticle structure preserved or fructification known, no useful purpose can be served by abandoning the widely known "form species" name in favour of one which is suitable for a limited number of specimens only (and not suited to the present specimens at all).

4. Glossopteris:

a. Glossopteris angustifolia Brong.

In Figure 5 a long, narrow leaf of G. angustifolia is seen associated with Gangamopteris cyclopteroides. The leaf blade tapers towards the tip but no apex is present.

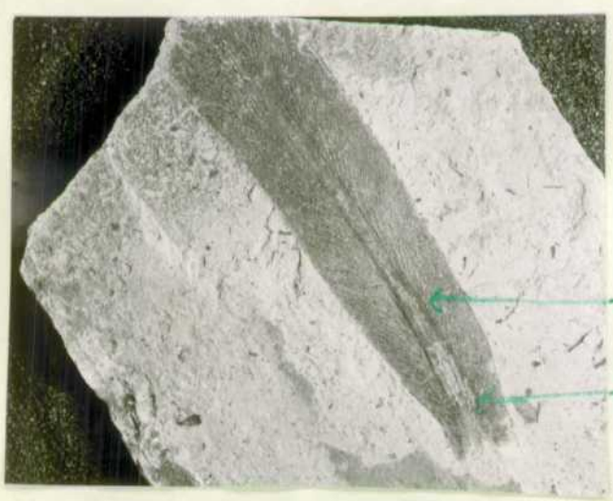
Figure 7 shows the middle portion of a similar leaf.

Figure 8 shows the lower part of a leaf. It is of particular interest as the midrib is obviously thickened and seems to have been grooved, and there is a scar on the midrib at the point at which the thickening of the midrib base commences.

Figure 7.

G. angustifolia Bgt. Nat. Siz.
Loc. 3. Specimen No. F 21172.

Figure 8.

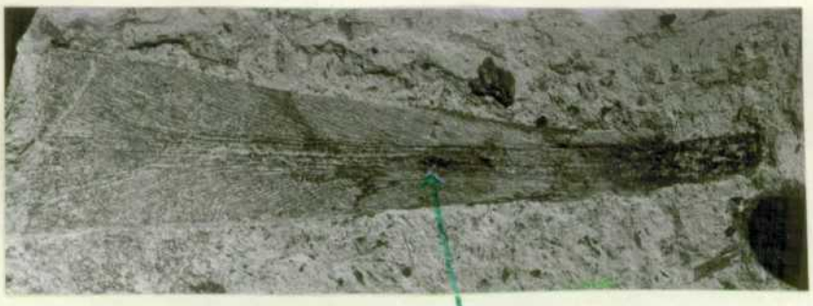


Glossopteris angustifolia Bgt.

Natural size. Locality 3.
Specimen no. F 21171.

A similar scar in the same situation is seen in Figure 9. The venation of the lamina in the specimen in Fig. 9 is of G. angustifolia type but leaf is bigger and widens towards its middle, Dr. Plumstead, whose advice was sought, suggests that this specimen may be closer to Glossopteris intermittens Feist.

Figure 9.



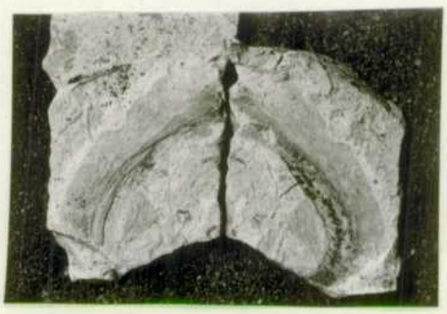
scar on midrib.

Glossopteris, cf. G. intermittens Feist.

Natural size. Locality 3.
Specimen no. F 21170.

Figure 10 shows both faces of an impression of the basal part of a leaf which has venation of G. angustifolia type. The thickened, grooved midrib is seen on the left, the counterpart shows carbonised material enclosed in the groove. The inside of the thickened groove is striated longitudinally and appears woody. Hollow midribs at the base of leaves are a characteristic of some species of Glossopteris. The woody thickening of the midrib is probably mechanical strengthening of the tissue to support a fructification which was attached to the scar at the top of the thickened section, as in Figures 8 and 9. The swollen midrib below the scar (point of attachment of fructification) is a feature of the fertile specimens described by Plumstead. (1956,1958).

Figure 10.



Basal sections of leaf of G. angustifolia?

showing thickened groove on left, counterpart with carbonaceous inclusions on right.

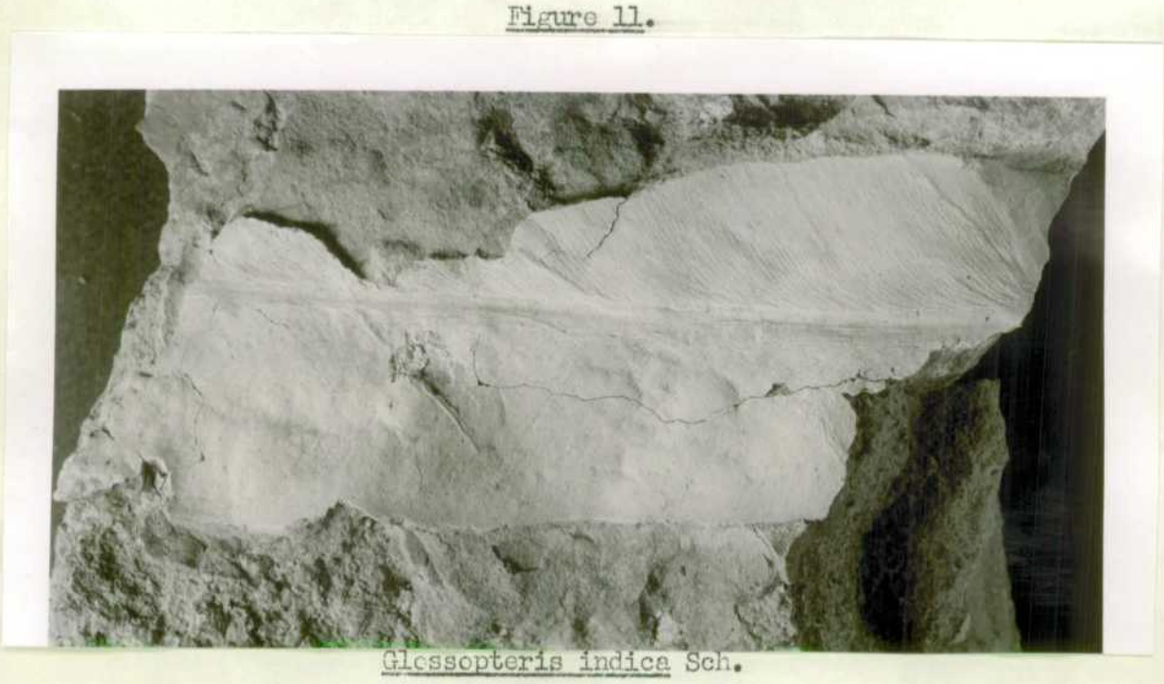
b. Glossopteris indica Sch.

Figures 11 and 12 show large leaves of the type referred to Glossopteris indica. Such leaves were described by Feistmantel as G. communis in his Gondwana Flora and included under G. indica by Arber in his Revision of the Glossopteris Flora in 1905.

It must be emphasised that G. indica is a form-species and there are probably several true species grouped under this head. In the absence of cuticle preservation or fructifications no reliable separation can be made. Variation of form is considerable.

On cuticle study G. indica, G. arberi and G. communis are separated. All have leaves of the same type when seen as impressions. Where reproductive structures are known, G. indica in S. Africa (Plumstead) bears Scutum, and a "G. indica" now referred to "G. communis" by Hamshaw Thomas bears Lidgettonia. In this latter case no cuticle was present for comparison with the G. communis separated on cuticle structure by Srivastava in India. (1956).

Figure 11.



Glossopteris indica Sch.
Locality DAW 2. Natural size.

Figure 12.

Glossopteris indica Sch.

Natural size. Locality 3.
Specimen no. F. 21173.

In Figures 13 and 14 the apex and the leaf base of two leaves are seen. The typical "indica" venation is clearly shown.

Figure 13.

Glossopteris indica Sch.

Natural size. Locality 3.
Specimen no F 21169.

Figure 14.

Glossopteris indica Sch.

Natural size. Locality 3.
Specimen no. F 21167.

Figure 15.

In Figure 15 part of a small leaf is illustrated in which the venation is intermediate between indica and angustifolia types. The form of the complete leaf is not known.

Glossopteris indica ?.
Specimen no. F 21179.
Natural size. Loc. 3.

Dr. Plumstead was consulted on separation of species within the form-species "indica". She is of the opinion that cuticle investigations complicate matters and that it is not possible to determine species from cuticle fragments even in modern plants. She separates G. communis and G. indica in her Lower Permian material, which is markedly similar to the Agate Creek Flora, on the following criteria:-
G. indica has parallel margins, stranded midribs and enlarged mesh near the midrib; G. communis has finer mesh all the way, usually a smooth, hollow midrib and margins which curve almost continuously. Some forms are intermediate.

On this method of separation, Figures 11,12,13 and 14 would be referred to G. communis, although Figures 11 and 12 are intermediate with margins nearly parallel. Figure 15 with "communis" venation has parallel margins but is a young, incompletely expanded leaf and might differ considerably from a mature leaf of its species.

c. Glossopteris stricta ?

Figure 16 shows both faces of an impression of the base of a leaf with a broad midrib and sparse secondary venation. The specimen is poorly preserved but resembles G. stricta.

Figure 16.

Glossopteris stricta?

Natural size. Locality 3.
Specimen no. F 21168.

Acknowledgement: I am grateful to Dr. E.P. Plumstead for examining photographs of the Agate Creek material and advising me on identifications.

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