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PLANT FOSSILS FROM THE CALLAWA FORMATION, CANNING
BASIN, WESTERN AUSTRALIA

by

Mary E. White

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Mesozoic plant fossils were collected by Messrs. D.M. Traves and J.N. Casey in 1954 in the Callawa area of the Canning Basin from four localities on the Yarrie four-mile sheet (Traves, Casey & Wells, 1957). Those from localities Y23 and Y34 were examined by Dr. R.O. Brunnschweiler (1949) who made tentative identifications and deduced a Late Triassic or Jurassic age. A fuller investigation of the plants from those localities has now been made, in the course of review of all material from the Canning Basin, and material from two additional localities in the area has also been examined.

The following plant fossils have been identified:-

1. At locality Y23. (14 miles N.W. of Callawa Homestead).
 - a. "Neorhacopteris minuta", new genus and species
 - b. Pachypteris sp.
 - c. Ginkgoites digitata Brongn.
 - d. Cladophlebis australis Morr.
 - e. Brachyphyllum mamillare Lind. & Hutt.
2. At locality Y34. (10 miles N.W. of Callawa Homestead).
 - a. Pagiophyllum peregrinum Schimp.
 - b. Cycadean seeds.
 - c. Brachyphyllum foliage. (Voltzia.)
 - d. Ruffordia mortoni Walk.
3. At locality Y7. (13½ miles west of north of Yarrie Homestead).
 - a. Pachypteris sp.
 - b. Cladophlebis australis Morr. (Sterile and fertile states).
 - c. Brachyphyllum mamillare L. & H.
 - d. Cordaitan pith cast ?
 - e. "Neorhacopteris minuta"
 - f. Bi-locular seed, uncertain affinity.
 - g. Small, fine frond, affinities unknown.
4. At locality Y27. (15 miles east of north of Yarrie Homestead).

Indeterminate plant fragments.

The following species listed by Dr. Brunnschweiler do not occur in the specimens:-

"Dictyophyllum sp. (Hausmannia ?)
Cladophlebis cf. C. concinna (Prest.)
Taeniopteris cf. T. wianamattae Walkom.
Cone Scales, probably Araucarites."

The "Cladophlebis sp." of his list is referable to Cladophlebis australis Morr., the "Sphenopteris sp." to Ruffordia mortoni Walkom, and the "?Johnstonia cf. J. dentata Walkom" to Pachypteris sp.

The plant assemblage in the specimens is a typically Jurassic one. However, the fern Ruffordia mortoni Walkom is described from Lower Cretaceous beds at Plutoville, Cape York Peninsula (1928). It is similar to the very common Jurassic fern Coniopteris hymenophylloides var. australica Seward, and some Jurassic specimens of Ruffordia mortoni may have been referred to this species. Its presence in this assemblage suggests a Late Jurassic age, or possibly early Cretaceous.

The specimens from the Callawa area are housed in the Bureau of Mineral Resources Palaeontological Collection under numbers F21,181-F21,189.

Descriptions of Specimens

F21,181 and F21,181a. (Locality Y23).

Four impressions of terminal sections of delicate fern fronds are present in these specimens. Figure I, Plate I, (Magn. X2) shows one of the larger examples, the others being less complete and of narrower fronds. This fern shows most striking similarity of form to the Palaeozoic genus Rhacopteris, and to Rhacopteris ovata McCoy in particular, although the size is in no way comparable. (Figures of Rhacopteris ovata showing the similarity are seen in plate 25 of "The Carboniferous Flora of Peru" by W.J. Jongmans, 1954).

It is proposed to name this new plant species "Neorhacopteris minuta". There is no indication of the form of complete fronds and no fertile specimens are present. With such fragmentary evidence the plant can only be assigned doubtfully to the Filicales. It is not impossible that it might have some affinity with Phyllocladopsis heterophylla Fontaine.

A small fragment of frond of Pachypteris sp. is present in one specimen.

Specimen F21,182. (Locality Y23).

An indistinct impression of part of a leaf of Ginkgoites digitata Brongn. is associated with small sterile fronds of Cladophlebis australis Morr., a small, narrow stem of Brachyphyllum mamillare, and a fragment of Pachypteris sp. in this specimen.

Ginkgoites digitata Brongn. is not a natural species and is used to include a large number of variously lobed leaves of the Ginkgoites type, very common in Jurassic strata and with practically world-wide distribution. (Figure 2, plate 1).

Specimens F21,183 and F21,183a. (Locality Y34).

These specimens contain stem impressions referable to Pagiophyllum peregrinum Schimp. (Figure 3, Plate I). The surface of each stem impression is deeply pitted in a regular pattern corresponding to the overlapping scale-like leaves of the original plant, seen here in cast form. Associated with these large stems are very narrow small stems referable to

Brachyphyllum mamillare Lind. & Hutt., and fragments of Coniferous foliage of the "Voltzia" type. There are also small round seeds which may be of Cycads.

The genera Pagiophyllum, Brachyphyllum and Voltzia are not natural groups but are useful descriptive terms for types of stems and leaves of plants of Conifer affinity, and in this case it is probable that the large stems, small stems and leaf fragments are parts of the same plant species. All are widespread Jurassic types, ranging through Cretaceous to Tertiary and extending back to Permian in some cases.

Specimen F21,184a. (Locality Y34).

This specimen contains a terminal portion of a frond of the fern Ruffordia mortoni Walkom. (Figure 4, Plate I), associated with conifer stem and leaf fragments as seen in F21,183a.

Specimen F21,184b. (Locality Y34).

Part of a frond of the fern Ruffordia mortoni Walkom occurs in this specimen, showing clearly the well separated, multilobed pinnules of the species. (Figure 5, Plate I). There is also a terminal section of a very small frond of "Neorhacopteris minuta".

Ruffordia mortoni Walkom was described by Walkom (1928) from Cape York Peninsula from a Cretaceous horizon. It is a species similar to a Wealden species in Europe, and a Lower Cretaceous species in America. It is a fern similar to the very common Jurassic fern Coniopteris hymenophylloides var australica Seward, especially in appearance of terminal sections of fronds.

Specimen F21,184c. (Locality Y34).

Figure 6, plate I, shows a small frond with six pinnules apparently with the same venation as "Neorhacopteris minuta".

Specimen F21,185. (Locality Y7).

In this specimen fronds of Pachypteris sp. occur (Figure 7, Plate 2) associated with fertile pinnules of Cladophlebis australis Morr., small stems of Brachyphyllum, and a fragment of stem with ring markings on the surface (Figure 8, Plate 2) which looks like a pith cast of the "Artisia" type and may be of Cordaitan affinity. There is also a very delicate frond approximately an inch long and $\frac{1}{8}$ " wide (Figure 9, Plate 2) of unknown affinity.

The fern fronds referred to Pachypteris sp. are similar to Johnstonia dentata Walkom, but are not referred to Johnstonia as Walkom's description of that genus emphasises a lamina "continuous, with the margin entire or lobed to a varying extent..." Pachypteris is closer to the Thinnfeldia type of frond with pinnules decurrent. No venation is visible in the present specimens except for a faint midrib on one pinnule. Early records of species of Pachypteris noted the absence of visible veins, but later Thinnfeldia type venation was shown to be present in well preserved specimens of all species, but without a branch to the decurrent portion of each lamina.

Species of Pachypteris occur in Late Triassic and in Jurassic strata in South Africa and in Europe.

Specimen F21,186. (Locality Y7).

Figure 10, Plate 2, shows small stems of Brachyphyllum mamillare Lind. & Hutt. and a small bilocular seed. There are also fertile pinnules of Cladophlebis australis Morr. and pinnules of "Neorhacopteris minuta".

Specimen F21,187. (Locality Y7).

Figure 11, Plate 2, shows sterile fronds of Cladophlebis australis Morris which is a very common Jurassic plant. It ranges from Middle Triassic, where it is rare, is common in Upper Triassic, and very common in Jurassic strata. It persists into Cretaceous strata in the Styx River Series in Queensland.

Specimen F21,187a. (Locality Y7).

Figure 12, Plate 2, shows portion of a fertile frond of Cladophlebis australis Morr. with sori in two rows parallel to the midrib on each pinnule, near the margins.

Specimen F21,188. (Locality Y7).

The remaining specimens from locality Y7 contain elements of the same flora as seen in the described specimens.

Specimen F21,189. (Locality Y27).

The plant fragments in these specimens are indeterminate.

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PLATE I.



Figure 1. F21181.
"Neorhacopteris minuta"
Terminal portion of frond.
Magnif. X2.

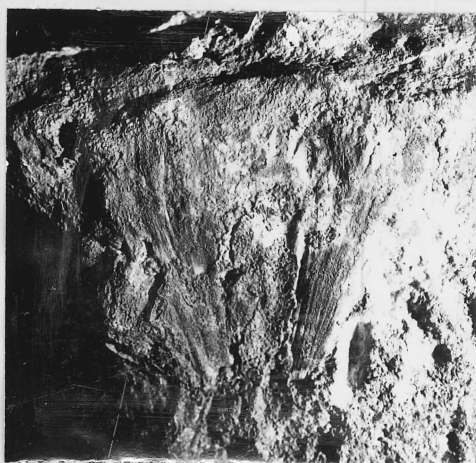


Figure 2. F21182.
Ginkgoites digitata Brongn.
Magnif. X2.



Figure 3. F21183.
Pagiophyllum peregrinum
Sch.

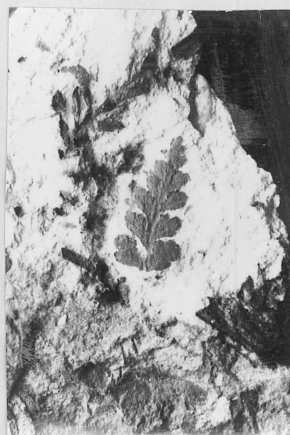


Figure 4. F21184a. Ruffordia
mortoni Walk. Terminal portion
of frond, with fragments of
Conifer foliage. Magnif. X2.

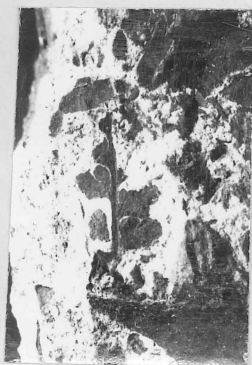


Figure 5. F211846.
Ruffordia mortoni Walk.
Magnif. X2.



Figure 6. F21184c. Small frond.
Same venation as "Neorhacopteris
minuta".
Magnif. X2.

PLATE II.

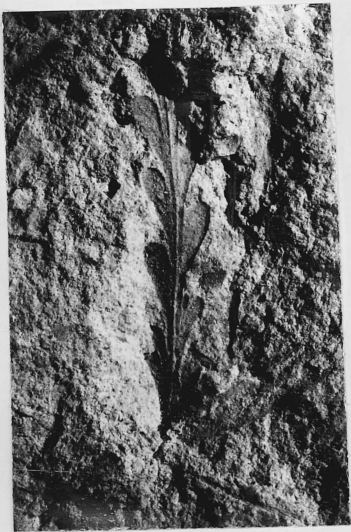


Figure 7. F21185.
Pachypteris sp. X 2.

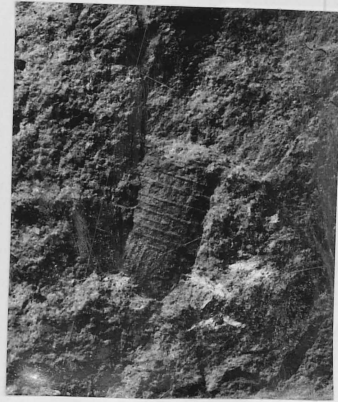


Figure 8. F21185. Pith Cast (?)
of "Artisia" type. X 2.

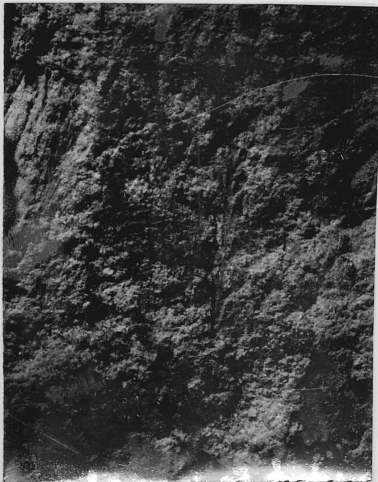


Figure 9. F21185.
Fine Frond. X 3.



Figure 10. F21186.
Brachyphyllum mamillare L & H.
(A and B) and Bi-ocular seed
(C). X 2.



Figure 11. F21187.
Sterile fronds of
Cladophlebis australis Morr.



Figure 12. F21187a. Fertile
pinnules of *Cladophlebis*
australis Morr. X 2.