NOTE

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A Queensland Government Project
Typeset at the Queensland Museum
A 5-winged fruit from Miocene sediments near Kingaroy, southeast Queensland possesses characters consistent with those of fossil and living apetalous members of Ceratopetalum Sm. A flower-like specimen from a similar stratigraphic horizon at a nearby locality is also reminiscent of Ceratopetalum, but characters diagnostic of the genus are not preserved.

Among the fossil taxa reported (Manchester & Crane, 1987; Manchester, 1991; Manchester & Hably, 1997; Hably & Manchester, 2000; Wang & Manchester, 2000) are Asterocarpinus.
Manchester & Crane (Betulaceae), Chaneya Wang & Manchester (Simaroubaceae), Cruciptera Manchester (Juglandaceae), Raskya Manchester & Hably (family affinities possibly with Simaroubaceae), and an extinct member of Tetrapterys Cav. emend. A. Juss. (Malphigiae).

Notwithstanding imperfect preservation of the fruit fossil from Kingaroy, sufficient characters are represented for comparisons with fruits of Ceratopetalum and those of extant and fossil members of several other families.

LOCATION AND AGE

The specimen was collected along with other plant fossils from a ~30cm thick outcrop of ironstained mudstones overlying a thin band of coarse sandstones beneath some 50cm of volcanogenic breccia south of Kingaroy (QML1329 at 26°35'18.6"S 151°56'32.1"E; Fig. 1). Cainozoic sediments in the Kingaroy district formed in small lacustrine basins within an extensive palaeodrainage system, and are considered part of the Tertiary Main Range Volcanics (Sawers & Cooper, 1986), which have been dated as 22-24 my.

SYSTEMATIC PALAEOBOTANY

Family CUNONIACEAE
Ceratopetalum Sm., 1793

TYPE SPECIES. Ceratopetalum gummiferum Sm.

Ceratopetalum sp. (Figs 2, 3A-F, 4A-D)

DIAGNOSIS. Fruit radially symmetrical with five wings disposed in a plane at right angles to a semi-inferior ovary; the wings arise from the margin of a short tube and have longitudinally aligned primary vascular bundles that branch distally to form an imperfect reticulum.

DESCRIPTION. Limonite stained impression of a 5-winged fruit that has split between the upper and lower surfaces of the perianth members that arise from the circular margin of a receptacle ~2 mm in diameter. Calyx members fused at base, lobes spatulate in outline, ~7 mm long, ~4 mm wide and each with 7-9 longitudinal vascular bundles, the central of which enter the receptacle whereas the laterals unite with corresponding bundles in the adjacent lobes below their common sinus. Vascular bundles dichotomise in distal regions of sepals and some of the secondary veins fuse to form and imperfect reticulum.

DISCUSSION. Propeller-like fruits superficially resembling those of the impression occur in many species of dicotyledons distributed amongst at least 12 families belonging to the Rosid, Asterid, and Caryophyllid clades (Magallon et al., 1999). The widespread taxonomic distribution of taxa with such fruits is evident in the sample of extant and fossil genera listed in Table 1. Of those genera only Ceratopetalum possesses the set of characters exhibited by the fossil described above which is thus assigned to that genus for the following reasons. The ovary though incompletely preserved is interpreted as semi-inferior as the sepaline whorl arises from the receptacle, and not the pedicel (Fig. 3C,E; Fig. 4B); the sepals arise initially as a short tube from the margin of which develop five lobes; the primary vascular bundles of the sepals are of two kinds in that the central members enter the receptacle but the laterals of adjacent lobes unite in the tissue below their common sinus (Fig. 3C,F; Fig. 4B,C) and in distal regions of the sepals the vascular bundles dichotomise, the dichotomies forming an imperfect reticulum (Fig. 4D); the sepals are constricted at their bases (Fig. 3A,B; Fig. 4A,B). This character set also occurs in Aphanopetalum Endl. formerly regarded as closely related to Ceratopetalum (Bentham, 1864) but now considered belonging to a clade with Tetracarpaeae, Haloragaceae and Penthoraceae (Savolainen et al., 2000) or to the Saxifragales (Bradford & Barnes, 2001), but not in other extant and fossil taxa studied with superficially similar 4-6 winged fruits (Table 1). The impression has been assigned to Ceratopetalum rather than...
Aphanopetalum because the latter has four rather than five wings, which are commonly represented in the former genus (Dickison, 1975).

The Kingaroy specimen lacks petals and possesses 7-9 longitudinal primary veins in each sepal lobe and in these respects resembles more closely fruit of extant Ceratopetalum succirubrum and C. virchowii than fruits of other extant members of the genus. The apetalous fossil taxa, C. westermannii Barnes & Hill and C. maslinensis Barnes & Hill, differ in possessing sepal lobe venation of three traces. Other described fossil taxa, C. priscum Holmes & Holmes and C. wilkinsonii (Ettings.) Holmes & Holmes, differ in possessing petals. Although distinct from other fossil taxa we prefer not to institute a formal species pending recovery of further and better preserved specimens.

A limonite compression designated as 'compositaceous compound head' (Hill et al., 1970, pl. Cz.XI, fig. 3; UQF10731) from a nearby locality at Goodyer, some 10km S of Kingaroy has sepal-like structures which in shape and size resemble those of fruits of Ceratopetalum (Fig. 5A,B). However, neither the venation pattern nor the structure of the central portion of the fossil has been preserved and so the affinities of the fossil remain in doubt.

Nevertheless, the Kingaroy fruit identified as Ceratopetalum sp. confirms the genus in the Queensland Tertiary and extends its known fossil range northwards by some 3° of latitude. Previous reports of fossil fruits of the genus are from Tertiary sediments in South Australia (Christophel & Blackburn, 1978; Christophel, 1994; Barnes, 1999; Barnes & Hill, 1999) and New South Wales (Ettingshausen, 1883; White, 1990; Holmes & Holmes, 1992).
Table 1. Wing and ovary characters of genera with fruits superficially resembling those of Ceratopetalum. (e) = extant; (f) = fossil.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Family</th>
<th>Ovary</th>
<th>No. derivation of wings</th>
<th>Calyx lobes free/united at base</th>
<th>Lateral veins of adjacent lobes united</th>
<th>Number of primary veins/lobe</th>
<th>Vein branching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceratopetalum Sm. (e. &amp; f.)</td>
<td>Cunoniaceae</td>
<td>Semi-inferior</td>
<td>4-6, sepals</td>
<td>United</td>
<td>Yes</td>
<td>3-9</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Cruciptera Manchester (f.)</td>
<td>Juglandaceae</td>
<td>Inferior</td>
<td>4(5,6), sepals</td>
<td>Free</td>
<td>No</td>
<td>15+</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Astereocarpinus Manchester &amp; Crane (f.)</td>
<td>Betulaceae</td>
<td>Inferior</td>
<td>4-5(6-7), bracts</td>
<td>Free</td>
<td>?</td>
<td>1</td>
<td>Pinnate</td>
</tr>
<tr>
<td>Calypcopteris Lam. (e.)</td>
<td>Combretaceae</td>
<td>Inferior</td>
<td>5, sepals</td>
<td>United</td>
<td>?</td>
<td>3</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Tetrapterys Cav. (e. &amp; f.)</td>
<td>Malphigiaceae</td>
<td>Superior</td>
<td>4, bracts</td>
<td>United</td>
<td>No</td>
<td>15+</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Petrea L. (e.)</td>
<td>Verbenaceae</td>
<td>Superior</td>
<td>4-6, sepals</td>
<td>United</td>
<td>No</td>
<td>1</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Ancistroclados Wall. (e.)</td>
<td>Ancistrocladaceae</td>
<td>Inferior</td>
<td>5, sepals</td>
<td>United</td>
<td>No</td>
<td>Several</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Raskya Manchester &amp; Halby (f.)</td>
<td></td>
<td>Superior</td>
<td>4, sepals</td>
<td>Free</td>
<td>No</td>
<td>12-15</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Picrasma Bl. (e.)</td>
<td>Simaroubaceae</td>
<td>Superior</td>
<td>4-5, sepals</td>
<td>United</td>
<td>No</td>
<td>?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Chanayea Wang &amp; Manchester (f.)</td>
<td></td>
<td>Superior</td>
<td>5, sepals</td>
<td>United</td>
<td>No</td>
<td>5</td>
<td>Reticulate/ Dichotomous</td>
</tr>
<tr>
<td>Porana Burn.(e.)</td>
<td>Convolvulaceae</td>
<td>Superior</td>
<td>5, sepals</td>
<td>Free</td>
<td>No</td>
<td>5</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Dinetus Sweet (e.)</td>
<td>Convolvulaceae</td>
<td>Superior</td>
<td>4-5, sepals</td>
<td>Free</td>
<td>No</td>
<td>5</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Astronium Jacq. (e.)</td>
<td>Anacardiaceae</td>
<td>Superior</td>
<td>6, sepals</td>
<td>?</td>
<td>?</td>
<td>1-3</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Monotes A. DC. (e.)</td>
<td>Dipterocarpaceae</td>
<td>Superior</td>
<td>5, sepals</td>
<td>United</td>
<td>No</td>
<td>5</td>
<td>Reticulate</td>
</tr>
<tr>
<td>Waterhousea B.Hyland (e.)</td>
<td>Myrtaceae</td>
<td>Inferior</td>
<td>4-6, sepals</td>
<td>United</td>
<td>No</td>
<td>3</td>
<td>Reticulate</td>
</tr>
</tbody>
</table>

ACKNOWLEDGEMENTS

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LITERATURE CITED


FIG. 5. A, B, fossil specimen (UQF10731) having superficial resemblance to fruits of *Ceratopetalum*, but lacking detail of ovary and wing venation. Scale bars = 5mm.


WHITE, M.E. 1990. The nature of hidden worlds. (Reed: Sydney).