ISSN-01311419 Liaison officer

A.S.G.A.P. CYCAD, ZAMIAD AND PALM STUDY GROUP
NEWSLETTER NO. 65 - MAY - JUNE, 1995

Leader: Len P. Butt - Ph. 07 8483515

Asst: Brian Runnegar - Ph. 07 2861164

CYCADS ON SCAWFELL ISLAND

Scawfell Island is a continental island about 60 kilometres north east of Mackay. It is very rugged, covered mainly by eucalypt forest with some rainforest species and has no fresh water.

Cycas media flourishes in various habitats, from waters edge to hill tops. Some were up to 15 metres high with trunks about 400mm in diameter. Fronds appeared a bluish colour and measured up to 1 metre in length. Several specimens were multi-trunked.

The mature plants had survived many fires.

How did the plants with heavy seeds become established on the hill tops and in the steep gullies? There were no animals large enough to carry the seeds up the hills if they floated to the island. One answer could be that they were there before the seas rose and the high ground became the island. At some stage all the area could have been nearly flat. So the plants existing now are successors to the original plants. Possibly the cycads on the high ground now provide seeds to held populate the lower areas.

E. Brighouse

My grateful thanks to Ed. Brighouse for this observation. He is of course a very active group member. Comments on this cycas finding are invited by me.

- Len

Seven new species of *Macrozamia* section *Parazamia* (Miq.) Miq. (Zamiaceae section *Parazamia*) from Queensland

David L. Jones* & Paul I. Forster**

Summary

Jones, David L. & Forster, Paul I. (1994). Seven new species of *Macrozamia* section *Parazamia* (Miq.) Miq. (Zamiaceae section *Parazamia*) from Queensland, *Austrobaileya* 4(2): 269–288. Seven new species of *Macrozamia* section *Parazamia* (Miq.) Miq. from south-east Queensland are described and illustrated. They are *M. conferta, M. cranei, M. crassifolia, M. machinii, M. occidua, M. parcifolia,* and *M. viridis*. All are restricted endemics allied to either *M. plurinervia* (L.A.S. Johnson) D.L. Jones or *M. pauli-guilielmi* W. Hill & F. Muell. A key to the species of *M.* section *Parazamia* in Queensland is presented.

Keywords: Zamiaceae section *Parazamia*; *Macrozamia*-Queensland; *Macrozamia conferta; Macrozamia cranei; Macrozamia crassifolia; Macrozamia machinii; Macrozamia occidua; Macrozamia parcifolia; Macrozamia viridis; Macrozamia plurinervia; Macrozamia pauli-guilielmi.*

*David L. Jones, Australian National Botanic Gardens, P.O. Box 1777, Canberra, ACT 2601, Australia

** Paul I. Forster, Queensland Herbarium, Meiers Road, Indooroopilly, Qld, 4068, Australia

Introduction

The genus *Macrozamia* Miq. (Zamiaceae) is currently being revised by the senior author. The species that occur in Queensland are being revised jointly by the current authors in preparation for that revision. Three precursor papers on the genus have been published (Forster & Jones 1992, Jones 1991, Jones & Hill 1992) and here, seven new Queensland species of *Macrozamia* are described in *M.* section *Parazamia* (Miq.) Miq. All excepting *M. machinii* and *M. viridis* have been discovered within the last eight years and recent collections of fertile material have established them as new. Most of the new species are currently listed on the schedule of rare or threatened flora for Queensland (Forster 1994) and their naming facilitates management and conservation programs for their survival.

As with other cycad genera, e.g, *Cycas* (Hill 1992), *Ceratozamia* (Stevenson *et al.* 1986), *Dioon* (Sabato & De Luca 1985), *Encephalartos* (Heenan 1977, Robbertse *et al.* 1988, 1989) *and Zamia* (Stevenson 1993), speciation in *Macrozamia* has occurred where populations have become geographically isolated over long periods of time. The new species are narrowly endemic, being mostly represented by more than one population. These populations generally exist in close proximity (being less than 100 km apart) and in similar habitats.

Macrozamia section *Parazamia* comprises small to relatively small plants with a subterranean caudex which may be unbranched or branched, leaves usually spirally twisted, the lower leaflets not reduced and spine-like and an absence of mucilage canals in the leaflets (Johnson 1959). Two complexes dominate *M.* section *Parazamia* in Queensland:-

(1) The *M. plurinervia* complex, based on *M. plurinervia* which itself is restricted to northern New South Wales. Taxa have moderately broad to broad, usually shallowly concave leaflets. Seven species occur in the Darling Downs and Leichhardt districts of southern Queensland. These species are as follows -

M. conferta, restricted to ranges near Warwick in the Darling Downs district.

M. cranei, restricted to the Texas area in the Darling Downs district.

M. fearnsidei, restricted to the Injune area in the Leichhardt district.

Accepted for publication 27 June 1994

Austrobaileya 4(2): 269–288 (1994)

M. machinii, restricted to the Inglewood area in the Darling Downs district.

M. occidua, restricted to the Sundown area in the Darling Downs district.

M. platyrhachis, restricted to the Blackdown Tableland in the Leichhardt district.

M. viridis, restricted to the Girraween area in the Darling Downs district.

(2) The *M. pauli-guilielmi* complex, based on *M. pauli-guilielmi* which is restricted to the Wide Bay district of south-east Queensland. Taxa in this complex have very narrow, deeply concave leaflets. Three species occur in the Wide Bay and Burnett districts of Queensland. All occupy specific habitats. These are -

M. crassifolia, restricted to the Mundubbera - Eidsvold area in the Burnett district.

M. parcifolia, restricted to the Biggenden area in the Wide Bay district.

M. pauli-guilielmi, restricted to the Wide Bay district, growing mainly in coastal lowlands.

A revision of the *M. miquelii* (F. Muell.) A. DC. species complex (*M.* section *Macrozamia*) will be presented in a future paper.

Materials and Methods

All species dealt with in this paper were examined in the field. Measurements cited here were made from both living and dried material. Examination of stomatal arrangement and venation was carried out on sections of pinnae cleared in lactophenol.

Conservation codings for the species are as recommended by Briggs & Leigh (1988). Cycad popularity throughout the world has imposed tremendous pressures on natural populations, to the extent that a significant number of species have become nearly extinct in the wild, particularly in South Africa, Mexico, Central America and South America (Jones 1993, Vovides 1986). The situation in Australia is not yet critical but poaching of plants from the wild for profit is a reality that must be faced. For this reason localities cited in this paper are general rather than specific, in line with the actions of other cycad botanists (e.g. Stevenson 1990, 1993).

Specimens of known sex are cited as A (female) or B (male) following the collector's number.

Terminology

Morphological terminology basically follows that of Johnson (1959) except that peduncle is used in place of cone-stalk, microsporophyll in place of male sporophyll and megasporophyll in place of female sporophyll. Stem measurements are taken at the widest point. Measurements of leaflets are taken at the midpoint of the lamina. Measurements of the male and female cones and their peduncles are taken separately, with the width of the cones measured at the widest point. Microsporophyll and megasporophyll measurements are taken from those organs at the widest part of the cone. Seeds are normally somewhat angular from pressures exerted in the developing cone and measurements are taken from the longest length and the widest diameter. Preliminary studies indicate that patterns on the chalazal end of the seed may have some diagnostic use and this feature is included in the drawings for each species. This character needs to be explored further for its usefulness.

Taxonomy

Critical comparative measurements in this paper are made between the new taxa and either *M. plurinervia* or *M. pauli-guilielmi*. Neither of these taxa is detailed in this paper but to facilitate comparisons of pertinent dimensions in the new taxa the following abbreviated descriptions are included.

M. plurinervia: Caudex more or less ovoid, 20–30 cm diam., subterranean, branched with up to 12 growths in a complex clump. Young leaves glaucous, glabrous. Mature leaves 85–115 cm long, grey-green to green, dull, glabrous, erect, 5–7 in a sparse to moderately dense crown. Leaflets linear, 10–30 cm long, 4–9 mm wide, green to grey-green above, dull, strongly glaucous beneath, arising at 50–70 degrees to the rhachis, obliquely erect to

spreading, hypostomatic, concave adaxially in cross-section, thick-textured, 110–180 per leaf; callous base yellow to orange. Male cones 18–28 cm × 4–6 cm, strongly glaucous; peduncle 15–20 cm × 2–2.5 cm.; microsporophylls cuneate, 1.8–2.3 cm × 1.5–1.8 cm; spines to 1.5 cm long. Female cones 15–23 cm × 6–9 cm, glaucous; peduncle 12–17 cm × 2–2.5 cm; megasporophylls with stipe 3–4 cm long, the outer face 3.5–4.5 cm × 1–1.5 cm; spines to 2.5 cm long. Seeds broadly ovoid to oblong-ellipsoid, 2.5–3 cm × 2.3–2.6 cm.

M. pauli-guilielmi: Caudex more or less ovoid, 10–20 cm diameter, subterranean, branched with up to 19 growths in a clump. Young leaves bright green glabrous. Mature leaves 60–90 cm long, dark green, dull, glabrous, erect, 1–6 in a sparse crown. Leaflets narrowly linear, 15–40 cm × 2.3–4 mm, dark green, dull on both surfaces, arising at 20–45 degrees to the rhachis, widely spreading, recurved in the distal half, hypostomatic, deeply concave adaxially in cross-section, moderately thick-textured, 130–190 per leaf; callous base cream to white. Male cones 8–14 cm × 3.5–5 cm; peduncle 8–12 cm × 1.5 cm; microsporophylls cuneate, 1.4–1.8 cm × 0.8–1.1 cm; spines vestigial to 0.8 mm long. Female cones 9–12 cm × 5–6.5 cm; peduncle 10–13 cm × 1.5–2 cm; mega-sporophylls with stipe 1.5–2.2 cm long, the outer face 2.5–3 cm × 1–1.4 cm; spines to 2.5 cm long. Seeds obovoid, 2–2.5 cm × 1.5–2 cm.

1. **Macrozamia conferta** D. L. Jones & P. I. Forst. **sp. nov.** *M. plurinerviae* (L.A.S. Johnson) D. L. Jones affinis, sed foliis juvenilibus sericeis, foliis maturis brevioribus foliolis angustioribus prasinis confertis, strobilis minoribus, et seminibus multo minoribus, differt. **Typus**: Queensland. DARLING DOWNS DISTRICT: near Warwick, 20 Apr 1992, *P.I. Forster* 9800B *& P. Machin* [male plant] (holo: BRI [2 sheets & carpological]; iso: CBG).

Macrozamia sp. (Warwick K. Hill 3825); Forster (1994).

Mature caudex more or less ovoid, 15–30 cm diameter, subterranean, each plant branched with up to 12 growths in a clump. Young leaves sericeous on the rhachis and petiole. Mature leaves 35–60 cm long , dark green, shiny, glabrous with age, erect, 1–5 in a sparse crown; expanded leaf base 6–10 cm long, 1.2–2.3 cm wide, densely covered with light fawn, soft wool; petiole (including the woolly expanded base) 7–21 cm long, 7–12 mm wide at the first leaflet, dark green, dull, with adaxial surface flat to slightly convex and abaxial surface strongly convex; rhachis spirally twisted 2–3 times, dull dark green, in cross-section similar to that of the petiole. Leaflets linear, 6–30 cm long, 2–6 mm wide, arising at 30–60 degrees to the rhachis, obliquely erect, hypostomatic, bright green and shiny on both surfaces, concave adaxially in cross-section, moderately thick-textured, not twisted except at base, 90–160 per leaf, arranged more or less in 2 ranks but not always in opposite pairs, crowded (1–17 mm apart), the longest leaflets found towards the middle of the leaf with distal and proximal leaflets shorter; apex asymmetrically acuminate; callous base greenish to greenish-yellow, rarely reddish. Male cones more or less cylindrical, 7–18 cm × 2.5–4 cm, straight or slightly curved with age; peduncle 4–18 cm × 1.5–2 cm, circular to elliptical in cross-section; microsporophylls narrowly cuneate to reniform, 0.9–1.7 cm × 0.7–1.6 cm, most with vestigial spines, a few distally with stiff, pointed spines to 0.5 cm long. Female cones more or less ovoid to ovoid-cylindrical, 6–12 cm × 3.5–6 cm, erect; peduncle 10–15 cm × 1–2.0 cm, elliptical in cross-section, furrowed, often twisted, densely woolly; megasporophylls with stipe 1.7–2 cm long, the outer face transversely ovate to reniform, 2.4–3.2 cm × 0.6–1.2 cm, with a prominent depression just below the apical spine; spines increasing in length towards the apex of the cone, the longest c. 1 cm long. Seeds ovoid to oblong-ovoid, 2–2.5 cm × 1.6–2 cm, the sarcotesta red when ripe. **Figs 1, 8B.**

Selected specimens: **Queensland**. DARLING DOWNS DISTRICT: near Warwick, May 1992, *Jones* 9357 *& Jones* (BRI, CBG, NSW); ditto., Sep 1992, *Forster* 11705A & B *& Machin* (BRI, CBG); ditto., Jan 1993, *Forster* 12711A *& Machin* (BRI), ditto 12711B (BRI, CBG); Apr 1992, *Forster* 9800A *& Machin* (BRI, CBG); ditto., Sep 1992, *Forster* 11727A (BRI), ditto 11727B *& Machin* (BRI, CBG).

Distribution and habitat: *M. conferta* is restricted to two State Forests in the Darling

Austrobaileya 4(2): 269–288 (1994)

Downs district near Warwick. In one site the plants grow in ash-grey to white, floury, silty loam in flat terrrain or on low ridges, whereas the second site is hilly with steep slopes and grey-white, skeletal soils. Here the cycads form open colonies at altitudes between 600 and 750 m, in open forest communities dominated by *Eucalyptus maculata* Hook., *E. fibrosa* F. Muell., *E. melliodora* A. Cunn. ex Schauer, *E. crebra* F. Muell. and *E. moluccana* Roxb. Associated understorey species include *Acacia lineata* A. Cunn. ex G. Don, *A. fimbriata* A. Cunn. ex G. Don, *Jacksonia scoparia* R. Br. and *Melichrus urceolatus* R. Br.

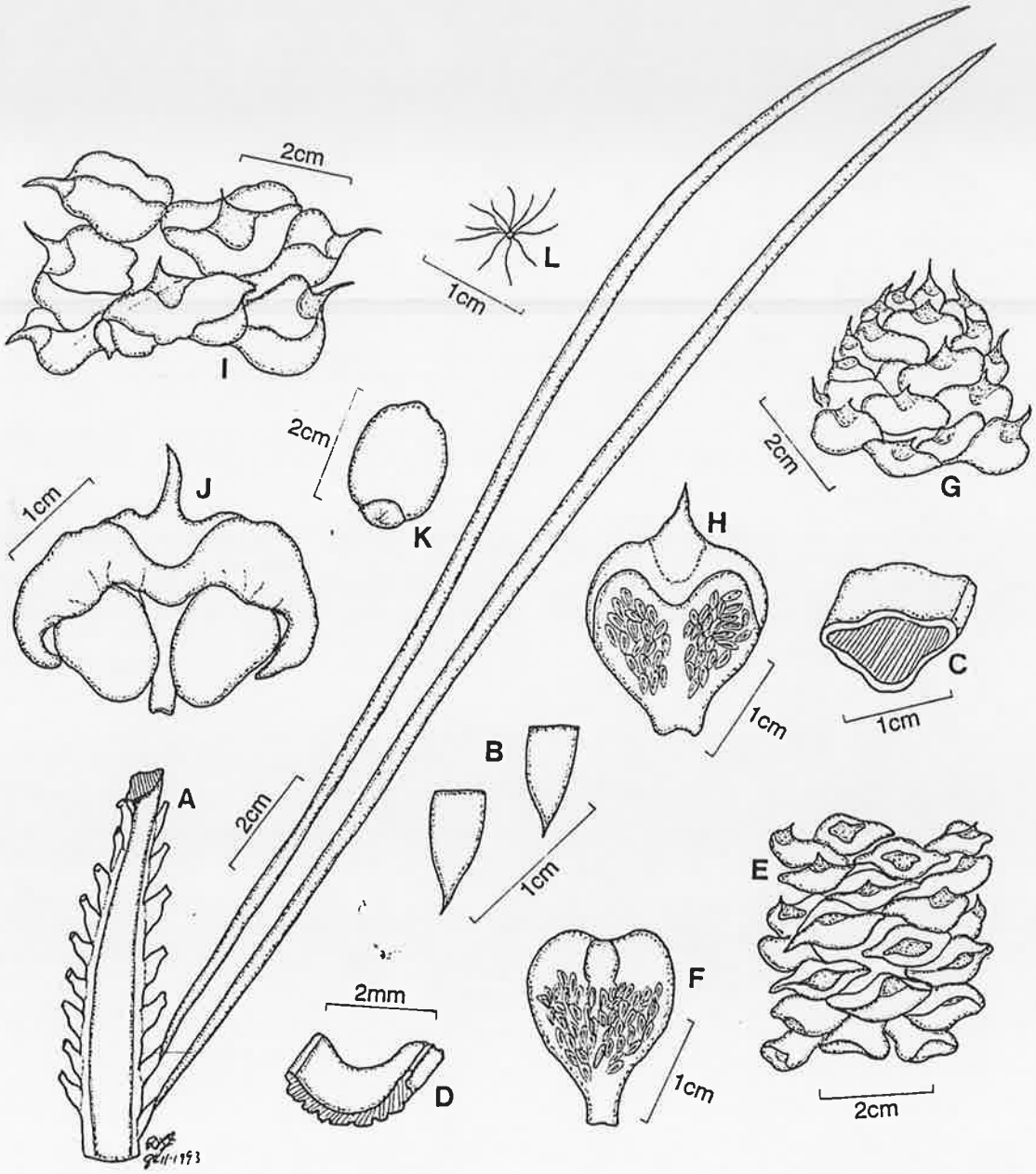

Fig. 1. *Macrozamia conferta*. A. portion of rhachis and two leaflets. B. tips of leaflets. C. TS of rhachis. D. TS of leaflet. E. basal portion of male cone. F. microsporophyll (abaxial view) from basal portion of cone. G. apical portion of male cone. H. microsporophyll (abaxial view) from apical portion of cone. I. portion of female cone. J. megasporophyll (abaxial view). K. seed. L. pattern on chalaza end of seed. From *Jones* 9357 & *Jones* (CBG) and *Forster* 9800A & *Machin* (BRI).

Phenology: Cones mature October–November; seeds ripen February–March.

Notes: This species appears to have been discovered in 1987 by A. R. Bean while collecting eucalypts near Warwick, but no specimens were lodged in any herbarium. *Macrozamia conferta* has the smallest habit of the Queensland cycads and is notable also for its leaves with very crowded leaflets. It is allied to *M. plurinervia* but is readily distinguished from that species by its much narrower, bright green, shiny, crowded leaflets, the much smaller, green cones and much smaller seeds.

Conservation status: Locally common but vulnerable to poaching: a conservation coding of V, was given by Forster (1994).

Etymology: The specific epithet is derived from the Latin *confertus* and alludes to the crowded leaflets of the leaf.

2. **Macrozamia cranei** D. L. Jones & P. I. Forst. **sp. nov.** affinis *M. plurinerviae* (L.A.S. Johnson) D. L. Jones, sed caudice non ramoso, foliolis atrovirentibus supra nitentibus infra pruinosis, strobilis multo minoribus non-glaucis et seminibus minoribus ovoideis usque oblongis differt. **Typus**: Queensland. DARLING DOWNS DISTRICT: near Texas, 25 Sep 1992, *P.I. Forster* 11593B, *P. Machin & R. Crane* [male plant] (holo: BRI [2 sheets & carpological]; iso: CBG).

Macrozamia sp. (Texas R. Crane 741); Forster (1994).

Caudex more or less ovoid, 10–25 cm diameter, subterranean, unbranched. Young leaves sericeous on the rhachis and leaflet bases and glabrous and strongly pruinose on the leaflets. Mature leaves 70–90 cm long, erect, dark green, shiny, glabrous with age, 1–5 in a sparse crown; expanded leaf base 6–13 cm × 1.0–2.5 cm, densely covered with fawn to grey-brown, soft wool; petiole (including the woolly expanded base) 15–31 cm long, 7–12 mm across at the first leaflet, dark green, shiny, with adaxial surface slightly convex and abaxial surface strongly convex; rhachis spirally twisted 3–6 times, dark green, the cross-section similar to that of the petiole. Leaflets linear, arising at about 50 degrees to the rhachis, obliquely erect to widely spreading, often with drooping tips, 7–30 cm × 2–7 mm, hypostomatic, dark green and shiny above, dull and pruinose-glaucous beneath, shallowly concave adaxially in cross-section, moderately thick-textured, not twisted except at base, 100–150 per leaf, arranged more or less in 2 ranks but not always in opposite pairs, moderately crowded (4–30 mm apart), the longest leaflets found towards the middle of the leaf, distal and proximal leaflets shorter, apex asymmetrically acuminate, with a yellow mucro; callous base greenish to greenish-white, rarely reddish, inconspicuous. Male cones more or less cylindrical, 8–22 cm × 2.5–5.5 cm, straight or curved with age; peduncle 8–22 cm × 1.3–2 cm, elliptical to round in cross-section; microsporophylls narrowly-to broadly-cuneate, 1.5–2 cm × 1.3–2 cm, those in the proximal half to two-thirds of the cone with vestigial spines, distal ones with stiff, pointed spines to 1 cm long. Female cones ovoid, 8–13 cm × 4.5–5.5 cm, erect, green; peduncle 12–20 cm × 1.2–2.1 cm, elliptical in cross-section, furrowed; megasporophylls with stipe 1.7–2.5 cm long, the outer face transversely ovate, 2–4 cm × 1.5–2 cm, with a prominent depression just below the apical spine; spines increasing in length towards the apex of the cone, the longest c. 1.5 cm long. seeds ovoid, 2–2.5 cm × 1.8–2.2 cm, the sarcotesta orange to red when ripe. **Figs 2, 9B,10D.**

Selected specimens: **Queensland.** DARLING DOWNS DISTRICT: [all from type locality] Jun 1992, *Crane* 741 (BRI, CBG); Sep 1992, *Forster* 11593A, *Machin & Crane* (BRI, CBG); 11611 (BRI, CBG); 11619 (BRI, CBG); Jan 1993, *Forster* 12694 & *Machin* (BRI); Apr 1993, *Jones* 11525, *et al* (CBG, NSW).

Distribution and habitat: *M. cranei* is restricted to a small area of rugged terrain near Texas in the Darling Downs district and grows at 400–600 m altitude. Plants occur in small colonies on steep ridges in shallow, skeletal soil or on alluvium along ephemeral watercourses, both soil types associated with limestone outcrops. The vegetation where they occur is either open forest dominated by *Eucalyptus* species or fragmented semi-evergreen vinethicket.

Phenology: Cones mature October–February; seeds ripen February–March.

***Notes*:** This species was discovered by R. Crane in May 1992. It is allied to *M. plurinervia* but can be distinguished from that species by its non-branching caudex, the leaflets which are dark green and shiny on the upper surface and strongly pruinose-glaucous beneath, smaller, green cones and smaller seeds. It is also very close to *M. occidua* but differs from that species by its longer leaves, longer, shiny leaflets and green cones.

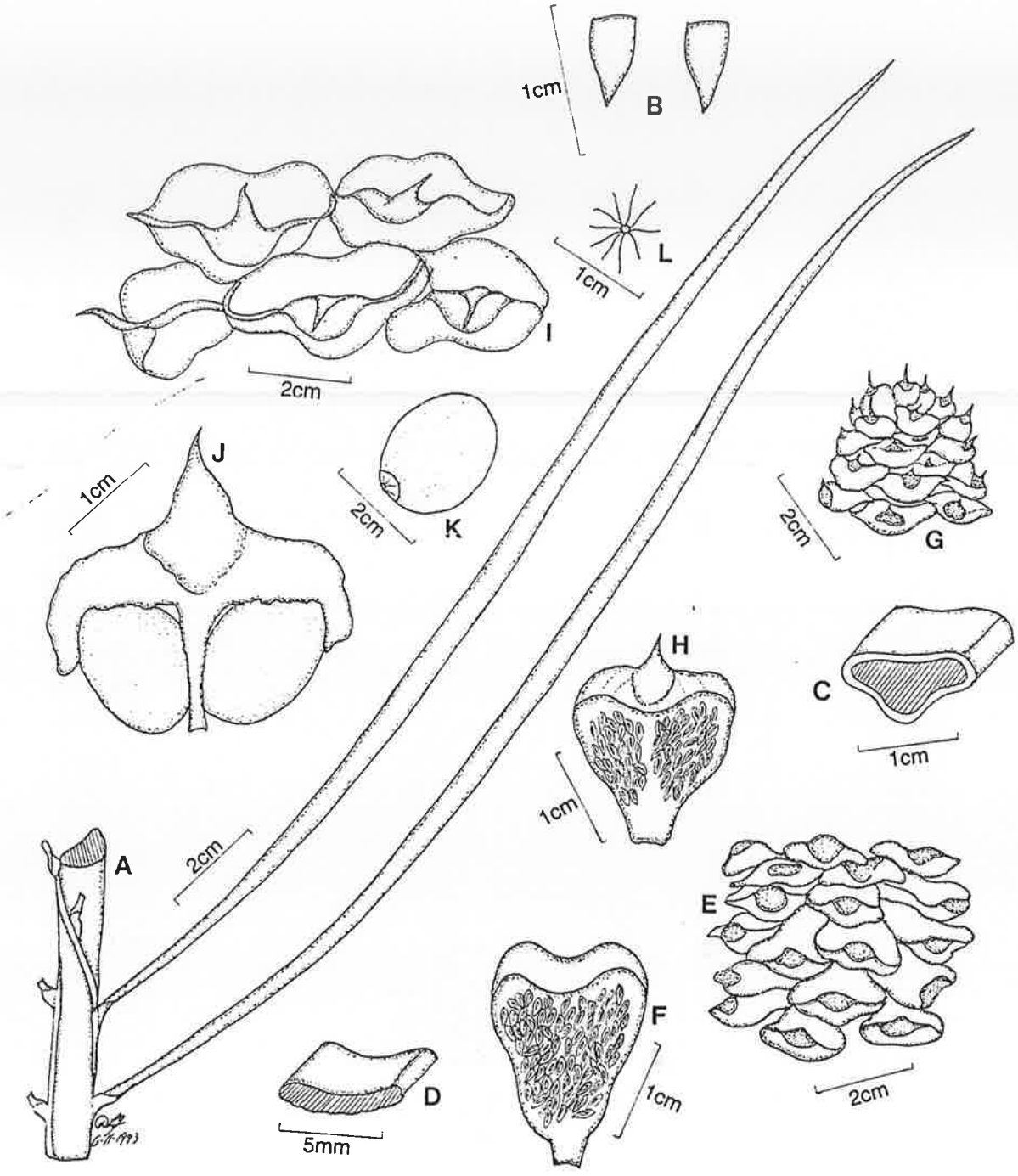

Fig. 2. *Macrozamia cranei*. A. portion of rhachis and two leaflets. B. tips of leaflets. C. TS of rhachis. D. TS of leaflet. E. basal portion of male cone. F. microsporophyll (abaxial view) from basal portion of cone. G. apical portion of male cone. H. microsporophyll (abaxial view) from apical portion of cone. I. portion of female cone. J. megasporophyll (abaxial view). K. seed. L. pattern on chalaza end of seed. From *Jones* 11525 *et al.* (CBG) and *Forster* 11593A, *Machin & Crane* (BRI).