

Encephalartos equatorialis (Zamiaceae): a newly described species from tropical Africa

P.J.H. Hurter* and H.F. Glen

Lowveld National Botanical Garden, P.O. Box 1048, Nelspruit, 1200 Republic of South Africa

*National Botanical Institute, Private Bag X101, Pretoria, 0001 Republic of South Africa

Received 6 March 1995; revised 15 May 1995

Encephalartos equatorialis P.J.H. Hurter is described from Uganda. This species resembles *E. hildebrandtii* A. Br. & Bouché and *E. ituriensis* Bamps & Lisowski because of its stiff, dentate and pungent green leaves. It differs from both these species on account of its ascending, succubous, hard pinnae which become incubous and strongly imbricate towards the apex of the leaves.

Encephalartos equatorialis P.J.H. Hurter word beskryf vanaf Uganda. Die nuwe spesie toon ooreenkomste met *E. hildebrandtii* A. Br. & Bouché en *E. ituriensis* Bamps & Lisowski op grond van sy stywe, getande, stekelpuntige blare. Dit verkil egter van die twee spesies op grond van sy harde en stygende, sukkubiese pinnae wat oorliggend en sterk dakpansgewys word naby die toppunt van die blaar.

Keywords: *Encephalartos equatorialis*, new species, Uganda, Zamiaceae.

*To whom correspondence should be addressed

Introduction

An evaluation of Zamiaceae from Uganda, near the equator, has revealed the existence of a distinct undescribed species of *Encephalartos*. In this article this entity is formally described, and its diagnostic characters, distribution and conservation status are considered. In particular, the species described here differs markedly from that reported by Heenan (1977).

Description

Encephalartos equatorialis P.J.H. Hurter, sp. nov., *E. hildebrandtii* A. Br. & Bouché et *E. ituriensis* Bamps & Lisowski propter folios rigidos, dentatos, pungentes similis. A speciebus his ambobus pinnis ascendentes, succubis, duris, apicem versus incubis et valde imbricatis differt.

TYPUS.— Uganda: (NE0033) Thruston Bay, 1 000 m alt., 22nd October 1994 (leaf and part of male cone), P.J.H. Hurter 94U/1 (PRE, holotypus).

Plant arborescent, suckering from the base. Trunk up to 3.5 or rarely 4.2 m long and 350–450 mm in diameter; leaf bases persistent. Leaves erect, linear oblanceolate, numerous, in a dense crown; apex slightly recurved, rigid, sub-sessile, green, 3.1–3.4 (–4.1) m long, 345–350 (–430) mm wide, tapering slightly to the rounded apex and gradually to the base. Petiole not apparent, bulbous basally, up to 13 mm long, at first fulvous, tomentose, glabrous at maturity. Rachis tomentose, becoming glabrous with age, ovate in cross section, shallowly grooved between the pinnae. Pinnae hard, rigid, ascending, dentate, with 3–6 teeth on both margins; veins not raised abaxially; margins slightly thickened; leaflets directed towards the apex of the leaf at an angle of c. 30° to the rachis, opposing leaflets slightly inflexed, set at an angle of c. 90° to each other, overlapping mainly succubously; terminal pinnae strongly imbricate and incubous; proximal pinnae gradually reduced to a distinct series of spines. Median pinnae 200–260 mm long and 20–26 mm wide, narrowly elliptic, gradually acuminate towards the apex, pungent, subsessile; apices somewhat turned towards the leaf apex.

Strobili seriate, dimorphous, glabrous, scale facets smooth,

dark green. Microsporangiate strobili c. 5 per trunk, subconical, 300–400 mm long and 90–100 mm in diameter, on a peduncle 200–300 mm long. Median microsporophylls slightly ascending; lamina oblong, tapering to the base, c. 21–24 mm wide, 25–30 mm long and 10–15 mm high; margins contracted to the pedicel; bulla deflexed, sub-triangular; adaxial face forming two trapezoidal facets; sagittal ridge poorly defined, terminal facet flat or slightly concave; lateral ridges acute; adaxial surface indented and striated.

Megasporangiate strobili 1–3 per trunk, erect, ovoid, 360–400 mm long and 180–200 mm in diameter, with peduncle up to 250–310 mm long. Median megasporophylls rhombic, with two lateral, one concave terminal facet, c. 55 mm wide, 60 mm long and 30 mm high, with terminal facet a third of the horizontal diameter of the bulla; median facet ill defined with two latero-sagittal ridges; lateral lobe crenulate and a third the length of the bulla; seminal ridge denticulate and sagittal crest smooth. Seeds c. 200 per cone; sarcotesta orange-red; kernel 35–38 mm long and 23–30 mm in diameter, ellipsoid, round and smooth (Figures 1–3).

Diagnostic features and affinities

E. equatorialis superficially resembles *E. hildebrandtii* A. Br. & Bouché (Melville 1957, 1958) and *E. ituriensis* Bamps & Lisowski (Bamps & Lisowski 1990) because of its stiff, dentate and pungent green leaves. However, even vegetatively it is easily distinguished from both species. In *E. hildebrandtii* the pinnae are ascending, falcate, with apices directed towards the base of the leaf; in *E. ituriensis* the pinnae are spreading and falcate with apices directed towards the base of the leaf and in *E. equatorialis* the pinnae are ascending, not falcate and apices are directed towards the apex of the leaf. In both *E. hildebrandtii* and *E. ituriensis* the pinnae are succubously orientated throughout the length of the leaf; in *E. equatorialis* the pinnae are succubously orientated along the basal and median section of the leaf, becoming strongly incubous and imbricate towards the apex. In *E. hildebrandtii* the apex of the pinnae often ends in two or three pungent spines; in both *E. equatorialis* and *E. ituriensis* the pinna apex consists of a single pungent spine. The lamina in *E. ituriensis*

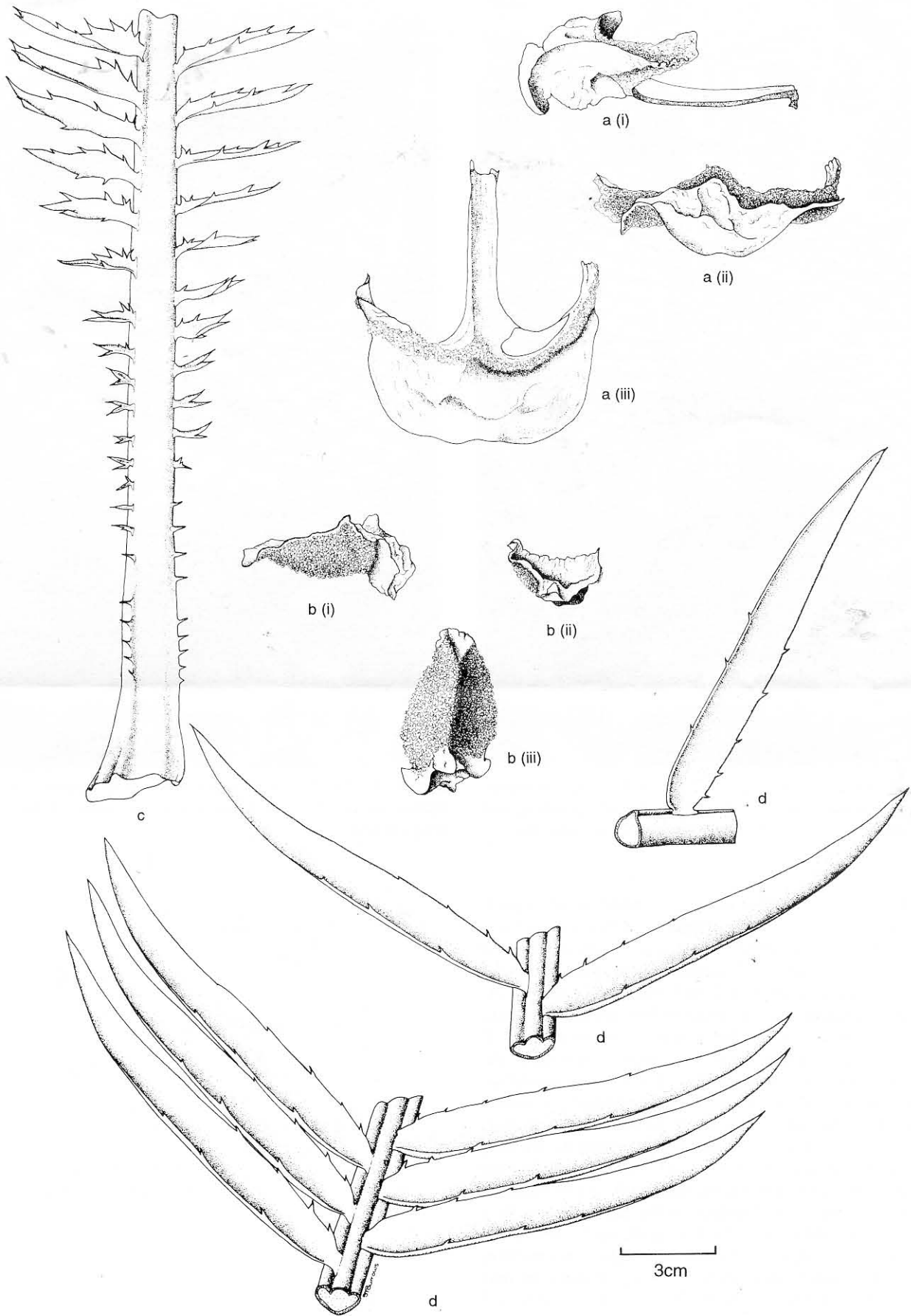


Figure 1 *Encephalartos equatorialis*: (a) median megasporophyll (P.J.H. Hurter 94U/2a), (i) side view, (ii) frontal view, (iii) abaxial view; (b) median microsporophyll (P.J.H. Hurter 94U/1a) (i) side view, (ii) frontal view, (iii) abaxial view; (c) Petiole and proximal pinnae (P.J.H. Hurter 94U/1a); (d) Median pinnae (P.J.H. Hurter 94U/1a). (del. S. Burrows).



Figure 2 *Encephalartos equatorialis* with erect, seriate microsporangiostrobili showing microsporophylls spreading and only slightly ascending towards the apex of the microstrobili.

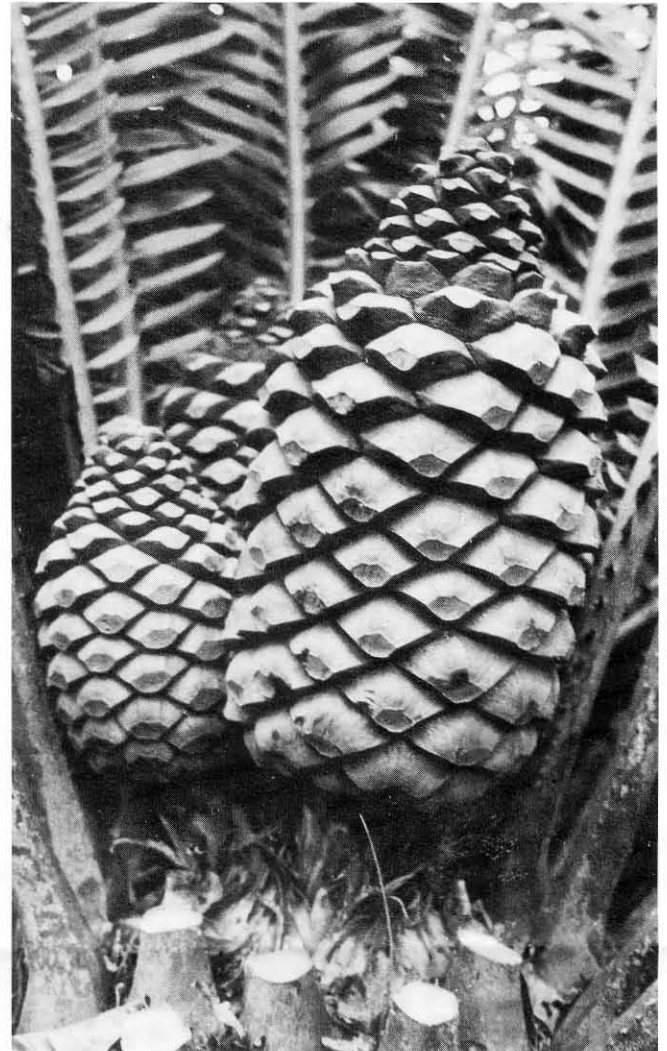


Figure 3 *Encephalartos equatorialis* with seriate megasporangiostrobili showing ill-defined median facets on the median megasporophylls.

sis and *E. hildebrandtii* is soft and pliable, while the lamina in *E. equatorialis* is hard and rigid. Profound differences are also observable between the strobili of the new species and those of previously described taxa. In *E. equatorialis* the microstrobili are dark green at maturity, while in both *E. hildebrandtii* and *E. ituriensis* the microstrobili are greenish-yellow, or reddish in some colonies of *E. hildebrandtii*. The size of the microstrobili in *E. equatorialis* is about a third of that in *E. hildebrandtii* and *E. ituriensis*. In *E. ituriensis* the microstrobili are mostly pendulous, while in *E. equatorialis* and *E. hildebrandtii* the microstrobili are erect. In *E. hildebrandtii* the microsporophylls are strongly ascending, in *E. equatorialis* the microsporophylls are only slightly ascending, while those of *E. ituriensis* are spreading and only slightly ascending towards the apex of the microstrobili. In *E. equatorialis* the adaxial surface of the microsporophylls is indented and striated while in both *E. hildebrandtii* and *E. ituriensis* the adaxial surface of the microsporophylls is smooth or only slightly indented. Megastrobili of *E. equatorialis* are dark green at maturity, while megastrobili in both *E. hildebrandtii* and *E. ituriensis* are greenish-yellow, or reddish in some colonies of *E. hildebrandtii*. In both *E. hildebrandtii* and *E. ituriensis* the bullae of the megasporophylls have clearly defined median facets, without latero-sagittal ridges, while in *E. equatorialis* the median facets are ill defined, with distinct latero-sagittal

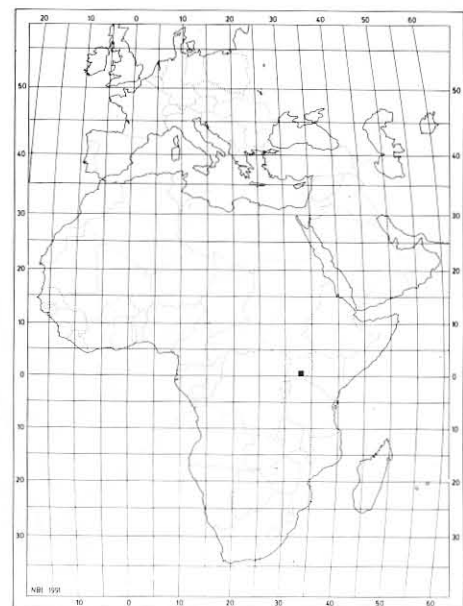


Figure 4 *Encephalartos equatorialis*: known geographical distribution.



Figure 5 *Encephalartos equatorialis* in habitat near Thruston Bay, Uganda.

ridges. *Encephalartos hildebrandtii* var. *dentatus* Melville differs from the present species in several respects, most notably in the toothlike protrusions (hence the name) on the bullae of both megasporophylls and microsporophylls. One of us (P.J.H.H.) has seen Melville's plant in several localities in Tanzania, and concluded that they were definitely not similar to the species described here. Heenan (1977) refers to plants said to be the same as Melville's from near Jinja in Uganda. We doubt the accuracy of some details of this report, as (1) there is no Arab village, ruined or otherwise, near Fort Thruston [spelt thus in the best gazetteer available to us (United States Board ... 1964), not 'Thuston' as Heenan has it], (2) Fort Thruston has been a jail for political prisoners, not a ruin, since 1970, and (3) the cycads in the area do not match Melville's description.

The following key may serve to clarify some of these distinguishing characters:-

1. Apices of pinnae pointing towards leaf apex, with 1 spine; pinnae not falcate; lamina hard and rigid; strobili dark green at maturity; microstrobili erect; bullae of megasporophylls with ill-defined median facets and distinct latero-sagittal ridges
 *E. equatorialis*
- 1'. Apices of pinnae pointing towards leaf base, with 1-3 spines; pinnae falcate; lamina soft and pliable; strobili usually greenish-yellow at maturity; microstrobili erect or pendent; bullae of megasporophylls with well-defined median facets, without latero-sagittal ridges:
2. Pinnae ascending; apices with 2-3 spines; microstrobili erect
 *E. hildebrandtii*
- 2'. Pinnae spreading; apices with 1 spine each; microstrobili pendent
 *E. ituriensis*

Geographical distribution and habitat

At present this species is known only from a single granite hill on the eastern shore of Thruston Bay, Lake Victoria, Uganda (Figure 4). Plants grow exposed on the western aspect of the hill in severely degraded rainforest dominated by Rubiaceae and

Euphorbiaceae species (Figure 5). The surroundings of the hill are entirely under cultivation.

Conservation status

This species must be considered severely threatened. No recruitment was observed; all seeds seen were infertile and it appears as if the species-specific pollinator may be extinct. Considerable evidence of recent collector activity was observed and several previously removed but discarded trunks had to be replanted. Threats to the species appear to be mainly collectors, human encroachment and the species' inability to reproduce. The species only persists at its locality through the copious formation of basal suckers.

Material studied

— Uganda, (NE0033) Thruston Bay, Lake Victoria: P.J.H. Hurter 94U/1a (Leaf and part of microstrobilus), P.J.H. Hurter 94U/2a (Median section of leaf and part of megastrobilus).

Acknowledgements

This research was financed by the National Botanical Institute and Loran Whitelock. We thank Sandie Burrows for the artwork in Figure 1.

References

- BAMPS, P. & LISOWSKI, S. 1990. A new species of *Encephalartos* (Zamiaceae) from northeastern Zaïre. *Mem. N.Y. bot. Gdn* 57: 152-155.
- HEENAN, D. 1977. Some observations on the cycads of Central Africa. *Bot. J. Linn. Soc.* 74: 279-288.
- MELVILLE, R. 1957. *Encephalartos* in Central Africa. *Kew Bull.* 12: 237-257.
- MELVILLE, R. 1958. Gymnospermae. In: *Flora of tropical East Africa*. pp 3-10. Crown Agents, London.
- UNITED STATES BOARD ON GEOGRAPHIC NAMES, 1964. *Uganda, official standard names gazetteer*. Office of Geography, Washington.