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A New Species of *Heterospathe* from Fiji

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Since the publication of Moore's (1979) treatment of Fiji palms, extensive and more intensive botanical exploration has occurred in many areas of the Fiji archipelago. Even in locations close to developed areas, more thorough examination has revealed a number of novelties, including the new species of *Heterospathe* described in this paper. The most recently described palms from Fiji, *Alsmithia longipes* H.E. Moore (Moore et al. 1982) and *Gulubia microcarpa* Essig (Essig 1982), resulted from collections conducted in 1980. These discoveries, along with recent field work (Fuller and Doyle, unpublished), indicate a significantly larger palm flora than previously recognised.

The indigenous palm flora of Fiji is relatively rich in taxa and includes ca. 30 species distributed among the following 13 genera: *Alsmithia*, *Balaka*, *Calamus*, *Clinostigma*, *Cyphosperma*, *Heterospathe*, *Goniocladus*, *Gulubia*, *Metroxylon*, *Neoveitchia*, *Physokentia*, *Pritchardia*, and *Veitchia*. The common and widespread *Cocos* was probably an early aboriginal introduction into Fiji, and as such, is excluded from the above list. Although three of the 13 genera listed above were previously considered as Fiji endemics and monotypic (*Alsmithia*, *Goniocladus*, and *Neoveitchia*), the recent discovery of a new species of *Neoveitchia* from Vanuatu (Dowe and Cabalion 1996) reduces the number of endemic monotypic genera to two. All native palm species from Fiji are considered endemic to the island group. Most Fiji palms are inhabitants of tropical moist forest, primarily occurring as subemergents.

The genus *Heterospathe* was not previously known to occur in Fiji, although its presence is not surprising based on its western tropical Pacific distribution, which includes the Philippines, Micronesia, eastern Indonesia, New Guinea, Solo-

mon Islands, and Bismarck Archipelago (Uhl and Dransfield 1987), and Vanuatu (Dowe and Cabalion 1996). The affinities of Fiji palms follows the same general pattern as the rest of the vascular flora—essentially a Pacific extension of the Indo-Malesian floristic region, although Polynesian and even Neocaledonian connections exist. Within the southwest Pacific region and at the generic level, the palm flora's closest relationship is with Vanuatu (Dowe and Cabalion 1996).

The remarkable endemism (100%) of Fiji's palms suggests that there has been considerable speciation within the group. Based on its oceanic geologic origins (Rodda 1994), presumably all indigenous taxa in Fiji were dispersed by means of short-distance dispersal from adjacent islands, or by long-distance dispersal from other floristic source areas. The fruits of many Fiji palms appear to be bird dispersed, although at least one taxon (*Metroxylon*) may be water dispersed. Fiji's oldest terrestrial rocks range from about 14–17 million years old (Rodda, personal communication). The age of the islands, combined with their insular nature both in terms of isolation from other islands as well as locally occurring topographic barriers (e.g., mountain ranges) has undoubtedly contributed to the high level of endemism of palms within the Fiji Islands. Many, if not all, of Fiji's native palms probably are the result of speciation events *in situ* (neoendemics), as opposed to being relict species (paleoendemics) which had once wider distributions and are now only restricted to single or few localities.

While some taxa [e.g., *Veitchia vitiensis* (H. Wendl.) H.E. Moore and *Balaka longirostris* Becc.] are common, several species [e.g., *Cyphosperma tanga* (H.E. Moore) H.E. Moore and *Heterospathe phillipsii* sp. nov.] are very rare and confined to single or only a few localities, with some potentially threatened from logging or other land use activities. At present, only one palm species from Fiji [*Neoveitchia storckii* (H. Wendl.) Becc.] is

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internationally recognized as endangered (Gorman and Siwatibau 1975; Lucas and Syngé 1978). Because of the diversity and high endemism of Fiji's palm flora, combined with increasing threats to their habitat, efforts must be taken to both document the occurrence of taxa present as well as develop conservation strategies for their long-term preservation.

***Heterospathe phillipsii* Fuller and Dowe sp. nov.**

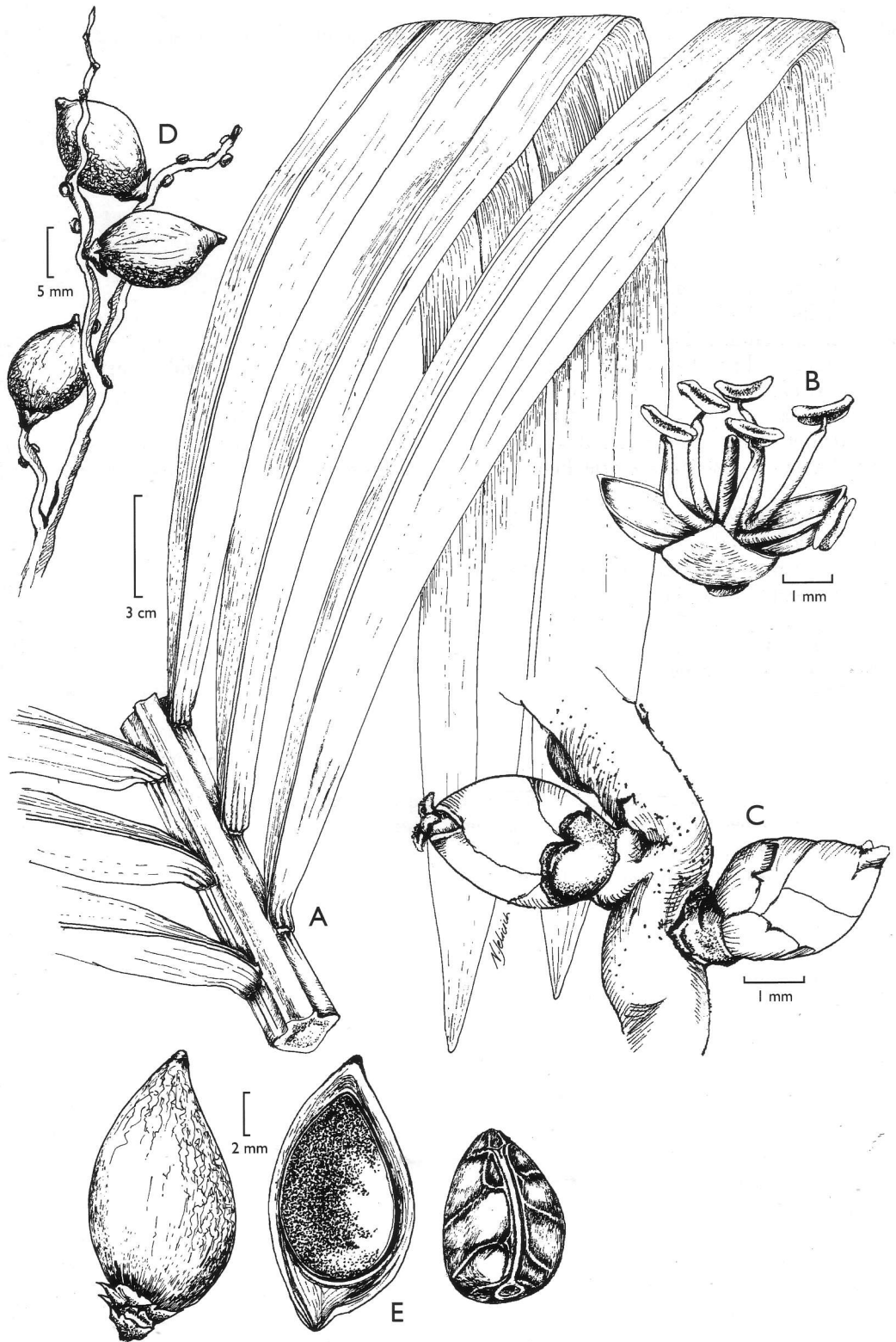
Palma usque 12 m alta. Folia pinnis latis laxis semipendulis medio folii 4.5 cm latis. Inflorescentia ramosa in 4 ordines. Flos staminatus 6 stamina ferens. Fructus ellipsoideus usque 13 mm longus, vestigio stigmatis apicale excentrico. Semen vadose ruminatum. Typus: Fiji, Viti Levu, Veivatu District, Namosi Province, 8 km NW of Navua, Natural Forest Management Pilot Project (NFMPP) Reserve, c. 150–200 m altitude, 14 Nov 1995, *Fuller 299* (holotypus SUVA; isotypi BH, BRI). (Figs. 1–3).

Solitary palm to 12 m tall. Trunk erect, to 18 cm DBH, green to brown in upper portion, becoming grey with age in the lower portion, base expanded; leaf scars closely spaced, raised. Leaves 10–12 in a compact crown, to 5 m long, arching to curved below the horizontal, 48–52 pinnae per side, leaf bases not forming a crownshaft; new leaf usually reddish/bronze; petiole 30–50 cm long, green, concave adaxially, convex abaxially, glabrous; rachis ridged adaxially, convex abaxially in lower portion becoming flat in distal portion, glabrous; pinnae lax to semi-pendulous, in one plane, glossy dark green on adaxial surface, paler green on abaxial surface, widely and evenly spaced along rachis, lanceolate, apex acute, mid-leaf pinnae to 75 cm long, 3.5–4.5 cm wide; mid-rib prominent adaxially and raised only slightly abaxially; secondary lateral ribs 2–3 on either side of midrib, most prominent on adaxial surface, positioned unequally between midrib and marginal rib; ramenta on abaxial midrib sparse, absent from distal one-fourth of pinnae, basifixed. Inflorescence interfoliar, to 1.8 m long, branched to four orders, axes white-cream, all branches straight, major branches angular in cross section, minor branches terete in cross section, bases of

branches with prominent pulvini; peduncle to 30 cm long, elliptic in cross section, 2.5 cm wide by 1 cm thick at the base, to 1.5 cm wide by 0.8 cm thick below attachment of first branch; prophyll 50–60 cm long, fully encircling peduncle at attachment, dorsiventrally compressed, marginally winged, persistent, outer surface with numerous punctiform scales, inner surface glabrous, disintegrating to fibrous strands; peduncular bract 1, greatly exerted from apex of prophyll, attached ca. 5 cm above attachment of prophyll, to 1.8 m long, tubular, fully enclosing inflorescence in bud, apex dorsiventrally spatulate, splitting longitudinally along adaxial surface prior to dehiscence, caducous, outer surface with numerous punctiform scales, inner surface glabrous; rachillae 15–25 cm long, white-cream, terete in cross-section, slightly flexuous, longitudinally striate, sparse brown scales most dense near triads. Flowers in triads in proximal portion, paired or single staminate flowers in distal portion, spirally arranged, sessile, subtended by liplike bracts. Staminate flower white-cream, slightly asymmetric in bud, sepals imbricate to 1 mm long, petals valvate to 3 mm long, stamens 6, anthers dorsifixed, latrose, versatile; pistillode to 3 mm long, columnar, tapered toward the apex. Pistillate flower white-cream, symmetrical, to 3 mm long, sepals imbricate, to 1.5 mm long, petals imbricate to 3 mm long, stigma trifid, protruding at anthesis. Fruit ellipsoid, to 13 × 7 mm, stigmatic remains prominent, eccentrically apical; epicarp smooth (drying pebbled), red at maturity, mesocarp thin, fibrous, endocarp thin, crustaceous. Seed ellipsoid, attached laterally, to 7 × 4 mm, hilum elongate, extending the length of the seed, raphe branches anastomosing, surface with shallow grooves, endosperm shallowly ruminant; embryo basal. Eophyll pinnate.

Distribution: FIJI. Known from one locality on Viti Levu, 8 km north of Navua in forest that has been selectively logged. This same palm species was originally reported (in 1976) from a separate disjunct area near Naimasiasi Village, Province of Tailevu, some 60 km NE of the extant population. A tree from this disjunct population is presently growing in the garden of Mr R.H. Phillips (*Zona 642*). The palms in this area could have

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2. *Heterospathe phillipsii*, habit, inland from Navua, Viti Levu. 3. Leaf and inflorescence of *Heterospathe phillipsii*.

been destroyed when the area was clear-felled for planting Mahogany (*Swietenia macrophylla*). A search in 1994 found no trace of the *Heterospathe* palms (R.H. Phillips, personal communication).

Specimens Examined: FIJI. Viti Levu, Veivatu-
loa District, Namosi Province, 8 km NW of Navua,
Natural Forest Management Pilot Project (NFMPP)
Reserve, c. 150–200 m altitude, 3 Mar 1995, *Fuller & Doyle 159* (BH, BRI, SUVA, US); 15 March
1995, *Fuller & Doyle 171, 172* (BRI, CAS,
SUVA); 21 Apr 1995, *Fuller 177* (SUVA); 21 Apr
1995, *Fuller 179* (CAS, SUVA); cultivated in gar-
den of R.H. (Dick) Phillips, Mara Road, Sama-
bula, Suva, 28 May 1995, *Zona 642* (FTG,
SUVA); 10 km inland from Queens Hwy, 29 May
1995, *Zona 643* (FTG, SUVA).

Etymology: Named for Richard (Dick) H. Phil-
lips, horticulturist and amateur botanist, who has
been active for many decades in collecting and
growing Fiji palms.

Ethnobotany: Vernacular name: *niu niu*. The

palm heart is edible and the immature seeds are
eaten: they are reported to taste like coconut.

Conservation: Proposed as Threatened: The
population consists of an estimated 400–500 adult
trees in a single population along a 5 km section
of logging road. The area has been selectively
logged. The land where *Heterospathe phillipsii*
occurs is owned by the Nabukebuke Mataqali
(clan) from Nakavu village. The Fiji Department
of Forestry has leased most of the palm habitat as
part of the NFMPP project for 50 years effective
1 January 1991 (315 ha). Selective logging con-
tinues in adjacent rain forest tracts. The palm is
cultivated in a few private gardens in Suva while
seeds have been distributed to botanic gardens
and collectors in Hawaii and Australia.

Heterospathe phillipsii occurs as a semi-emer-
gent element in dense evergreen lowland rainfor-
est, on steep well-drained slopes usually above
watercourses at elevations of 80–300 m. Soils are
deeply weathered clays with a low natural fertility

(de Vletter 1991). Associated vegetation includes the palms *Balaka longirostris* and *Veitchia vitiensis*, with dominant trees in Myristicaceae (16%), Myrtaceae (9%), Sapotaceae (8%), Clusiaceae (8%), Burseraceae (6%), and Thymelaeaceae (6%). Large *Agathis vitiensis* (Araucariaceae) and a few *Degeneria vitiensis* (Degeneriaceae) are present in the surrounding forest.

Within the population, adult palms are evenly scattered. Regeneration is good with both immature trees (1–3 m tall) and seedlings being common. Flowering and fruiting occur throughout the year in an apparently cyclical non-seasonal manner, with most individuals flowering and fruiting concurrently. Pollination may be achieved by small wasps or bees as these have been observed at the flowers. Dispersal appears to be mainly gravity driven, although Masked Shining Parrots (*Prosopaea personata*) have been observed foraging on the palms.

Heterospathe phillipsii is distinguished from other species of *Heterospathe* by the following combination of characters: tall solitary trunk, pinnae broad and lax, inflorescence branched to four orders, staminate flower with six stamens, fruit ellipsoid with prominent, eccentrically apical stigmatic remains, and the endosperm only shallowly ruminant. The species appears most closely related to the *H. woodfordiana* Becc. group from the Solomon Islands, and to *H. uniformis* Dowe from Vanuatu. This assemblage of species includes moderately tall palms with staminate flowers with six stamens and elongate/ellipsoid fruit. The New Guinea *Heterospathe* (ca. 16 spp.) tend to be rather small arborescent or acaulescent/clustering palms with moderately branched inflorescences (1–3 orders) and with most species having more than six stamens, while those from the Philippines (ca. 11 spp.) tend to be rather small clustering palms with six stamens. The occurrence of *Heterospathe* in Fiji significantly, but not unexpectedly, extends the distribution of the genus.

Other outliers occur in the Moluccas, Micronesia, and Vanuatu.

Acknowledgments

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