

A revision of the genus *Iguanura* (Arecaceae) in Peninsular Malaysia

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ABSTRACT. Eleven species of *Iguanura* are recognised for Peninsular Malaysia, one of them with two varieties. One species is described as new, *Iguanura ruthiae* Saw. All species are described, and notes on distribution, provisional IUCN conservation assessment and ecology are given. Thirteen taxa are synonymised and all names typified.

Keywords. *Iguanura asli*, *Iguanura bicornis*, *Iguanura divergens*, *Iguanura geonomiformis*, *Iguanura humilis*, *Iguanura kelantanensis*, *Iguanura mirabilis*, *Iguanura parvula*, *Iguanura wallichiana*, palms

Introduction

Blume (1838) was the first to describe *Iguanura* Blume. There are about 32 species in the genus distributed in Myanmar, Thailand, Peninsular Malaysia, Singapore, Sumatra and Borneo. The genus in the Malay Peninsula (here we include the political regions of Southern Thailand, Peninsular Malaysia and Singapore) is very distinct among the Arecoid palms and cannot be confused with other genera due to its leaflets with praemorse margin, sunken triads of flowers, and the basal position of the stylar remains in the fruits (Kiew, 1976). In the most recent palm classification, the genus is placed under subfamily Arecoideae, tribe Areceae but its subtribe placement is unclear (Dransfield et al., 2008). Kiew (1976) has provided a comprehensive historical account of the genus. Since her monographic treatment, Hodel (1997a, 1997b), Lim (1998a, 1998b, 2003) and Henderson et al. (2020) published a number of new taxa, all from the Malay Peninsula except for one from Myanmar. Lim in particular has reworked the genus for species found in southern Thailand and Peninsular Malaysia, reassigning taxa in both the *Iguanura wallichiana* and *I. polymorpha* complexes. In Kiew's revision, she enumerated only four species and five infraspecific taxa (all under *Iguanura wallichiana*) for Peninsular Malaysia. Between Hodel and Lim, twenty species and four varieties were enumerated for Peninsular Malaysia. A revision for Thailand was made in 2013 (Hodel, 2013).

Although *Iguanura* is easily recognisable as a genus, species are often difficult to distinguish. This is particularly so in Peninsular Malaysia. Species found in Borneo and Sumatra are more distinct and identification more easily worked out, probably due to the more localised distribution of species leading to more morphologically uniform species expressions. However, in the lowlands of Peninsular Malaysia, several

widespread species exhibit morphologically distinct forms in different localities. Such a phenomenon has been similarly observed in *Licuala* Wurmb (Saw, 1997; Loo et al., 2001). Lack of consistent characters in *Iguanura* further added difficulty in defining species delimitations. Although *Licuala* has greater diversity than *Iguanura*, species delimitations are easier to observe. *Licuala* species can often be clearly delimited by floral and inflorescence characters or a combination of these characters. Characters useful in distinguishing species of *Iguanura* include the shape of the leaves, position of the inflorescence in relation to the leaves, whether the anthers are lobed or unlobed, fruit shape and whether the endocarp is smooth, ribbed or ridged (Kiew, 1976). Unfortunately, species in Peninsular Malaysia are highly polymorphic (Whitmore, 1970) with variable leaf shape and dissection, inflorescence structure is highly variable, flowers are all very similar, none of the species has lobed anthers, and all species have smooth endocarps. The species found in Peninsular Malaysia can be delimited by a few characters into two major species complexes, i.e., the *Iguanura polymorpha* group (*I. bicornis* Becc., *I. divergens* Hodel, *I. mirabilis* C.K.Lim, *I. parvula* Becc., and *I. polymorpha* Becc.) and the *I. wallichiana* group (*I. asli* C.K.Lim, *I. geonomiformis* (Griff.) Mart., *I. humilis* (Kiew) C.K.Lim, *I. kelantanensis* C.K.Lim, *I. ruthiae* Saw, and *I. wallichiana* (Mart.) Benth. & Hook.f. ex Becc.). However, within the complexes, species delimitation becomes difficult. They can become subjective depending on size and shape of leaves, inflorescence size, degree of inflorescence branching, diameter of inflorescence rachillae and colour of fruits. All these characters provide good taxon delimitation but more often than not the characters merge into each other.

Materials and methods

The revision is based on observations of specimens from E, FL, K, KEP, L, SAN, SAR and SING (Thiers, continuously updated). All specimens have been seen unless otherwise stated. Images of type specimens were also accessed through JSTOR Global Plants, Naturalis BioPortal and Kew websites. The study was based on the examination of 737 specimens.

Measurements made on the specimens were based on dried herbarium material, unless otherwise stated. Field characters such as habit, plant sizes and colour were based on field observations made by collectors.

The vegetation types given in the Ecology sections below follow notes on the specimens, observations in the field, and the classification of Saw (2010).

Specimen and taxonomic information management for the revision was made using the BRAHMS database software (<https://herbaria.plants.ox.ac.uk/bol/brahms/software>). An index of exsiccatae is provided in Appendix 1; the list was generated by BRAHMS database software. Provisional conservation assessments were made on a global level based on specimen data from herbarium collections. The assessments for all species follow IUCN Red List Categories and Criteria (IUCN Standards and Petitions Committee, 2022). Calculations for extent of occurrence (EOO) and area of occupancy (AOO) were made using the GeoCat tools (Bachman et al., 2011).

Key to the species of *Iguanura* in Peninsular Malaysia

- 1a. Leaves persistent, often decaying in crown, leaflets mostly parallelogram (lateral margins about parallel); inflorescence interfoliar in both flowering and fruiting stages; fruits globose to ovoid 2
- 1b. Leaves abscising cleanly from stem, leaflets mostly trapezoid (much wider towards the outer edge), if entire, leaves abscising cleanly from stem; inflorescence inter- or infra-foliar in flowering, infrafoliar in fruiting stages; fruits narrowly ellipsoid, falcate or with bilobed apex, if globose leaflets trapezoid 7
- 2a. Inflorescences branched, rachillae divergent 3
- 2b. Inflorescences spicate, if branched, rachillae arranged tightly together along rachis axis 4
- 3a. Inflorescences erect, peduncle mostly hidden within the leaf sheaths 1. *I. asli*
- 3b. Inflorescences erect to spreading then pendent, peduncle clearly extended beyond leaf sheaths 11. *I. wallichiana*
- 4a. Inflorescences erect; leaves mostly entire-bifid 5. *I. humilis*
- 4b. Inflorescences spreading then pendent; leaves mostly segmented 5
- 5a. Solitary and caulescent palm; rachillae (4-)8-26 6. *I. kelantanensis*
- 5b. Solitary or caespitose, stemmed palm; rachillae 1-7 6
- 6a. Rachillae thick, width 3-7 mm; flowers tightly spaced around rachillae, 1-4 mm apart (measured in the middle of rachilla) 4. *I. geonomiformis*
- 6b. Rachillae thin, width 1-2.5 mm; flowers loosely spaced around the rachillae, 5-15 mm apart (measured in the middle of rachilla) 10. *I. ruthiae*
- 7a. Leaves entire-bifid, if pinnate fruits ovoid 8
- 7b. Leaves pinnate, if entire-bifid fruits oblong-obovate, ellipsoid and curved 9
- 8a. Blade large, 50-84 × 14-22 cm; fruits ellipsoid and curved 7. *I. mirabilis*
- 8b. Blade small, 20-42 × 6-8 cm; fruits ovoid 8. *I. parvula*
- 9a. Fruits oblong-obovate, apex distinctly bilobed 2. *I. bicornis*
- 9b. Fruits ovoid to ellipsoid, curved, apex not lobed 10
- 10a. Rachillae 1-4(-10), not wiry, 2-4 mm wide (measured in the middle of the rachilla), densely covered with reddish brown indumentum 9. *I. polymorpha*
- 10b. Rachillae 5-20, wiry, 0.75-1 mm wide (measured in the middle of the rachilla), glabrescent to covered with reddish brown indumentum 3. *I. divergens*

1. *Iguanura asli* C.K.Lim, Gard. Bull. Singapore 48: 28 (1998). – TYPE: Malaysia, Pahang, Berkelah FR, 20 September 1993, *Lim H1539* (holotype SING [SING0072412]). (Fig. 1A)

Iguanura cemurung C.K.Lim, Folia Malaysiana 4: 147 (2003), **syn. nov.** – TYPE: Malaysia, Terengganu, Hutan Lipur Cemurung, 2003, *Lim L6506* (holotype KEP; isotypes K, SING – specimens were not distributed).

Solitary to caespitose, shrubby, understory palm 1–3 m tall, stilt-rooted. **Stems** 1–2.5 cm diam., internodes 1–1.7 cm. **Leaves** 7–10 per stem, spreading, marcescent; leaf sheath 15–16 cm long, covered with reddish brown indumentum, petiole 20–50(–80) cm long, rachis 24–70 cm long, leaflets trapezoid or parallelogram (when > 10 pairs), apical pair widest; leaflets 4–7(–11) per side, 18–39 × 3.5–10 cm, secondary veins align ± parallel with slight taper towards base, 2–7 per leaf segment, 0.8–1.1 cm apart. **Inflorescences** interfoliar, erect, 1 or 2 per stem, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle hidden in between the leaf sheaths, 5–14 cm long, rachis 3–11.5 cm long; branched to 1 order, rachillae 4–7, spreading out and divergent, 8–24 cm long, 1.5–2.5 mm wide at base, densely covered with caducous scruffy brown indumentum. **Flowers** spirally arranged along rachillae, in pits, 1–2 mm apart; male flowers: calyx covered with caducous brown indumentum soon becoming glabrous, lobes c. 1 mm high, corolla glabrous, lobes c. 2 × 1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrescent, lobes c. 2 mm long, corolla glabrous, lobes c. 3 × 1 mm. **Fruits** ovoid to globose, cream ripening red, 10–20 × 7–12 mm.

Distribution. Endemic to Peninsular Malaysia (Kelantan, Terengganu, Pahang and Johor).

Ecology. Lowland dipterocarp forest, at elevation 5–360 m above sea level.

Provisional IUCN conservation assessment. Near Threatened (NT). Its EOO was calculated as 35,431 km².

Specimens examined. MALAYSIA: *Unknown MS 4035* (SING [SING0151708]). **Kelantan:** Gua Musang, Ulu Lebir FR, 12 Aug 1970, *Suppiah FRI 11698* (KEP [KEP21832]); Ulu Lebir FR, Compartment 34, 12 Aug 1970, *Evans RE 7770* (KEP [KEP21729]); ibidem, *Evans RE 7670* (KEP [KEP21890]); Kuala Krai, Stong Tengah FR, 13 Aug 1969, *Whitmore FRI 12427* (KEP [KEP21838]); ibidem, *Whitmore FRI 12429* (KEP [KEP21812]); ibidem, 6 Feb 2007, *Yao et al. FRI 53849* (KEP [KEP140555]). **Terengganu:** Dungun, Besul FR, 21 Nov 2018, *Chan et al. FRI 70669* (KEP [KEP274603]); Bt Bauk FR, 20 Feb 1998, *Saw & Loo FRI 44899* (KEP [KEP28251]); Jerangau, 15 Nov 1998, *Lim L3144* (KEP [KEP55142]); Jerangau FR, 22 Jul 2009, *Mhd Hairul et al. FRI 69802* (KEP [KEP164481]); ibidem, 23 Jul 2009, *Mhd Hairul et al. FRI 69809* (KEP [KEP164447]); ibidem, 3 Apr 2013, *Saw & Mhd Hairul FRI 48428* (KEP [KEP235698]); ibidem, 3 Apr 2013, *Lim FRI 73015* (KEP [KEP238601]); Pasir Raja FR, 8 Jun 2004, *Markandan & Mustapa FRI 49185* (KEP [KEP92404]); Hulu Terengganu,



Fig. 1. A. *Iguanura asli* C.K.Lim. B, C. *Iguanura bicornis* Becc. A. Crown showing inflorescence. From FRI 48428. B. Habit. C. Inflorescence with mature fruits. From FRI 80083. (Photos: L.G. Saw)

G Padang, 16 Mar 2010, *Mhd Hairul et al. FRI 70851* (KEP [KEP180020]); Ulu Terengganu FR, Sekayu, 20 Jul 1993, *Saw FRI 39868* (KEP [KEP21822]); Kemaman, Pasir Gajah, 30 Jul 1992, *Saw & Baya FRI 37577* (KEP [KEP21850]); Kuala Terengganu, Sg Terengganu, 17 Feb 1972, *Whitmore FRI 20592* (KEP [KEP21829]). **Pahang:** Jerantut, Taman Negara, G Padang, 15 Sep 1969, *Whitmore FRI 12535* (KEP [KEP21765]); Kuantan, Balok FR, 31 May 1962, *Meijer & Yong KEP 94916* (KEP [KEP21619]); *ibidem*, 17 May 1967, *Whitmore FRI 3808* (KEP [KEP21762]); *ibidem*, 20 Sep 2000, *Saw FRI 44361* (KEP [KEP71023]); *ibidem*, *Saw FRI 44367* (KEP [KEP70681]); Bukit Galing FR, 22 Jul 1975, *Dransfield & Manokaran JD 4553* (KEP [KEP21861]); Lepar FR, 12 Feb 2018, *Ummul Nazrah et al. FRI 88379* (KEP [KEP273258], SAN, SING); Rompin, Kedaik, 8 Oct 1991, *Lim 91/1041* (KEP [KEP2354]); Kpg Aur, 18 Feb 1971, *Suppiah FRI 14774* (KEP [KEP21757]); Lesong FR, 17 Feb 1971, *Whitmore FRI 15859* (KEP [KEP21770]); *ibidem*, 17 Feb 1971, *Whitmore FRI 15860* (KEP [KEP21782]); *ibidem*, 17 Feb 1971, *Samsuri SA 433* (SING [SING0249864]); Rompin Rd, 27 Jan 1966, *Palmer 27/1* (SING [SING0249862]). **Johor:** *Lim H1454* (SING [SING0151485]); Kluang, Batu Pahat, 20 Nov 1922, *Holtum 9476* (SING [SING0151757]); Mersing, Jamari, 26 Aug 1993, *Lim H1524* (SING [SING0151501]).

Notes. The species has few to many segmented leaves. It is like both *Iguanura geonomiformis* and *I. wallichiana*. The inflorescence branching appears similar to *Iguanura wallichiana* with its rather loose and spreading rachillae but *I. asli* has a rather short peduncle, and the peduncle is hidden within the leaf sheaths. *Iguanura wallichiana* has longer peduncles (23–)40–94 cm long, *I. asli* shorter, 5–14 cm long. It differs from *Iguanura geonomiformis* by its divergent rachillae (*I. geonomiformis* has rachillae that are held closer together with an acute angle to the axis of the inflorescence rachis).

I could not differentiate *Iguanura cemurung* from *I. asli*. Lim (2003) has suggested that *Iguanura cemurung* has more robust stems and thicker leaves. Other than these characters, it cannot be distinguished. Robustness of stems and leaf texture are often phenotypic expression. From the specimens I have examined, they fall within the variation of *Iguanura asli*. I have thus reduced *Iguanura cemurung* to *I. asli*. Neither the holotype nor the isotype of the species was distributed to KEP nor to SING. I have based this decision on Lim's (2003) plates where the species was published and on the specimen *Lim L3144* (KEP) which was cited in the description.

2. *Iguanura bicornis* Becc., *Malesia* 3: 188 (1889); Beccari & Hooker, *Fl. Brit. India* 4: 417 (1892); Ridley, *Mat. Fl. Malay. Penins.* 2: 153 (1907); Ridley, *Fl. Malay Penins.* 5: 16 (1925); Whitmore, *Palms Malaya* 63 (1973); Kiew, *Gard. Bull. Singapore* 28: 204 (1976); Lim, *Gard. Bull. Singapore* 48: 42 (1998); Hodel, *Palms Cycads Thailand* 98 (1998); Henderson, *Palms Southern Asia* 113 (2009); Hodel in *Barfod & Dransfield, Fl. Thailand* 11: 416 (2013). – TYPE: [Malaysia], Perak, Gunong Ijuk, August 1884, *Scortechini 1188* (lectotype FI [FI014158], designated by Lim (1998a)). (Fig. 1B, 1C)

Small, solitary to caespitose, shrubby, understorey palm to 2.5 m tall. **Stems** 0.7–1.5 cm diam., internodes 1.5–3 cm. **Crownshaft** well-developed to 27 cm long. **Leaves** 6–8 per stem, spreading, abscising cleanly from stem; leaf sheath 10–12 cm long, covered with reddish brown indumentum, petiole 14–22 cm long, rachis 35–53 cm long, pinnae 4–7 per side, secondary veins diverging towards leaflet margin, 1–2 cm apart, leaflets trapezoid, widest distally, 10–16 cm long, 1–6 cm wide proximally, 4–14 cm wide distally. **Inflorescences** infrafoliar, 1–3 per stem, erect, to 30 cm long, peduncle 1.5–4 cm long, rachis 2.5–7 cm long; branched to 1 order, rachillae 5–10, 8–20 cm long, 1–1.5 mm wide at base. **Flowers** in triads loosely arranged along rachillae, in shallow sunken pits, cream, 2–5 mm apart, subtended proximally by a cup-like bracteole to 0.75 mm high, distally by a thin knife-like bracteole c. 0.2 mm high or lacking a bracteole; male flowers: calyx glabrous, lobes c. 1 × 1 mm, corolla glabrous, lobes c. 3 × 1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous, lobes c. 1 × 1 mm, corolla glabrous, lobes c. 1.5 mm long, surface prominently ribbed. **Fruits** oblong-obovate, apex distinctly bilobed, yellowish green to cream ripening red, c. 2.5 × 1.2 cm.

Distribution. Perak and Kedah. Also recorded in Peninsular Thailand.

Ecology. An understorey palm in hill dipterocarp to lower montane forest, at elevation 300–1300 m above sea level. Locally common.

Provisional IUCN conservation assessment. Vulnerable (VU B1ab(iii)). Its EOO was calculated as 5,830 km². There is a population found in a protected area in Royal Belum State Park, Perak, the remaining localities are found in forest reserves; these areas are subjected to logging and such activity can threaten existing populations.

Specimens examined. MALAYSIA: **Kedah:** Baling, G Inas FR, 7 Feb 1968, *Whitmore FRI 4650* (KEP [KEP21592]); G Lang, 25 Mar 1938, *Kiah SFN 35048* (SING [SING0151490]). **Perak:** Hulu Perak, Belum FR, Sg Halong, 9 Nov 1993, *Dransfield et al. JD 7334* (KEP [KEP21591], SING [SING0151508]); Krunei State Land, 30 Jun 1970, *Evans RE 4370* (KEP [KEP21585]); ibidem, *Evans RE 4170* (KEP [KEP21586]); ibidem, *Evans RE 4270* (KEP [KEP21587]); ibidem, *Evans RE 4070* (KEP [KEP21588]); ibidem, *Evans RE 4470* (KEP [KEP21589]); ibidem, *Evans RE 4570* (KEP [KEP21590]); Kinta, Tambun, 10 Sep 1920, *Burkill SFN 6299* (SING [SING0151515]); Larut & Matang, Jul 1884, *King's collector 6376* (SING [SING0001359]); Bt Larut FR, Maxwell Hill, 21 Oct 1923, *Mhd Haniff SFN 9091* (SING [SING0151489]); Larut, Jul 1889, *King's collector 6375* (FI [FI014157], SING [SING0001359, SING0151486]); Maxwell's Hill, 21 Oct 1923, *Mhd Haniff SFN 9090* (SING [SING0151487]); ibidem, 3 Dec 1968, *Mhd Shah & Sidek MS 1048* (SING [SING0151488]).

Notes. The species in vegetative form cannot be distinguished from *Iguanura polymorpha* but when fruiting is distinctive due to its horned fruits. *Iguanura polymorpha* has ellipsoid and curved fruits.

3. *Iguanura divergens* Hodel, Palm J. 136: 7 (1997); Hodel, Palms Cycads Thailand 98 (1998); Henderson, Palms Southern Asia 113 (2009); Hodel in Barfod & Dransfield, Fl. Thailand 11: 416 (2013). – TYPE: Thailand, Betong, *Hodel et al. 1743* (holotype BK).

Iguanura polymorpha Becc. var. *canina* Becc., Malesia 3: 190 (1886), **syn. nov.** – TYPE: [Malaysia], Perak, *Scortechini s.n.* (lectotype FI [FI014154], designated here).

Iguanura tenuis Hodel, Palm J. 136: 11 (1997); Henderson, Palms Southern Asia 114 (2009); Hodel in Barfod & Dransfield, Fl. Thailand 11: 418 (2013), **syn. nov.** – TYPE: Thailand, between Takuapa and Phanon, *Hodel et al. 1727* (holotype BK).

Iguanura tenuis Hodel var. *khaosokensis* C.K.Lim, Principes 42(2): 112 (1997); Henderson, Palms Southern Asia 114 (2009); Hodel in Barfod & Dransfield, Fl. Thailand 11: 418 (2013), **syn. nov.** – TYPE: Thailand, Surat Thani, Khao Sok, *Lim H1993* (holotype BKF; isotype KEP – specimens were not distributed).

Iguanura belumensis C.K.Lim, Gard. Bull. Singapore 48: 52 (1998), **syn. nov.** – TYPE: Malaysia, Perak, Hulu Perak, Belum Forest Reserve, 7 October 1992, *Lim H1281* (holotype KEP [KEP21596, KEP169972, KEP169973 – a single specimen over three sheets]).

Iguanura perdana C.K.Lim, Gard. Bull. Singapore 48: 55 (1998), **syn. nov.** – TYPE: Malaysia, Perak, Hulu Perak, Grik, 2 February 1992, *Lim H1125* (holotype KEP [KEP21643, KEP169968, KEP169969, KEP169970 – a single specimen over four sheets]).

Small, mostly solitary, occasionally caespitose, understorey palm to 4.5 m tall, stilt-rooted. **Stems** 0.8–1.5 cm diam., internodes 2–6 cm. **Crownshaft** well-developed to 20–40 cm long. **Leaves** 9–14 per stem, spreading, abscising cleanly from stem; leaf sheath 10–15 cm long, covered with caducous light silvery brown indumentum, petiole 12–23 cm long, rachis 30–51 cm long, 4–7(–15) leaflets per side, secondary veins diverging towards margin, 0.6–1.5 cm apart, leaflets broadly to narrowly trapezoid (for individuals with many leaflets > 10 per side), narrower basally, widening apically, 7–20(–30) cm long, 1–9 cm wide basally, 1.5–14 cm wide apically. **Inflorescences** interfoliar and infrafoliar, erect to spreading, 1–3 per stem, 20–30(–53) cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 12–20(–40) cm long, rachis 4–25 cm long; branched to 1 or 2 orders, rachillae 5–10(–22), 5–31 cm long, moderately wide to thinly wiry, 0.75–1 mm wide (measured in the middle of the rachilla), glabrescent to covered with caducous scruffy brown indumentum. **Flowers** loosely arranged along rachillae, in shallow sunken pits, cream, 4–6 mm apart, subtended proximally by a thick triangular cup-like bracteole to c. 0.75 mm high; male flowers: calyx glabrous, lobes c. 1 × 1 mm, corolla glabrous, lobes 3–4 × c. 1.5 mm, surface with prominent parallel veins; female flowers not seen. **Fruits** ovoid

to ellipsoid and slightly falcate, light green to cream ripening red, c. 1.5×0.7 cm.

Distribution. Northern Peninsular Malaysia, recorded in Perak, Pahang, and Kelantan. Also recorded in Peninsular Thailand.

Ecology. An understorey palm in hill dipterocarp forest to lower montane forest, at elevation 500–1300 m above sea level. Locally common.

Provisional IUCN conservation assessment. Near Threatened (NT). Its EOO was calculated as 16,692 km², potentially qualifying the species as Vulnerable under criterion B, but it is known from more than 10 populations. There is a population in a protected area, Royal Belum State Park, Perak; the remaining distribution is found mostly in forest reserves and these areas are subjected to logging activities. Such activities can pose a threat to existing populations.

Specimens examined. MALAYSIA: **Perak:** Cottage, Feb 1892, *Ridley 3157* (SING [SING0151658]); Batang Padang, Bt Tapah FR, 25 Feb 1994, *Perumal et al. FRI 41681* (KEP [KEP21607]); G Bujang Melaka, 11 Feb 1975, *Mhd Shah et al. MS 3369* (KEP [KEP21620]); Hulu Perak, Belukar Semang FR, 20 Aug 1993, *Lim H1507* (SING [SING0151642]); *ibidem*, 1507b, (SING [SING0151644]); Belum FR, 12 Nov 1993, *Dransfield & Lim JD 7342* (KEP [KEP21597]); Temengor FR, Sg Enam, 4 Oct 2012, *Imin et al. FRI 77933* (KEP [220193]); Kinta, G Korbu, 3 Jul 2019, *Wan Syafiq et al. FRI 93747* (KEP [KEP279524]); Kuala Kangsar, Bubu FR, 21 Apr 1995, *Chua et al. FRI 40436* (KEP [KEP21632]); *ibidem*, 29 Apr 1968, *Ng FRI 6134* (KEP [KEP21609]); *ibidem*, 29 Aug 1968, *Selvaraj FRI 6557* (KEP [KEP21608]); *ibidem*, 15 Aug 1966, *Whitmore FRI 633* (KEP [KEP21631], SING [SING0151730]); *ibidem*, 17 Jun 1970, *Evans RE 32A70* (KEP [KEP21641]); *ibidem*, *Evans RE 3070* (KEP [KEP21640]); *ibidem*, *Evans RE 33A70* (KEP [KEP21639]); *ibidem*, *Evans RE 31A70* (KEP [KEP21638]); Bubu FR, G Bubu, 20 Dec 2006, *Yao et al. FRI 53832* (KEP [KEP128292], SING [SING0103829]); *ibidem*, 20 Dec 2006, *Lim et al. FRI 52840* (KEP [KEP131024]); Kledang Saiong FR, 3 May 1931, *Symington FMS 25620* (KEP [KEP21628]); Larut & Matang, Bt Larut FR, 31 May 1918, *Barnard FMS 29* (KEP [KEP21610]); *ibidem*, 18 Jun 1970, *Evans RE 3470* (KEP [KEP21625]); *ibidem*, 18 Nov 1969, *Evans RE 1169* (KEP [KEP21642]); Larut, Feb 1918, *Barnard CF 29* (SING [SING0151649]); Larut Hills, 12 Dec 1902, *Ridley 11405* (SING [SING0151521]); *ibidem*, Mar 1911, *Anderson 173* (SING [SING0151650]); Maxwell's Hill, Sep 1889, *Curtis 2078* (SING [SING0151524]); *ibidem*, 6 Mar 1924, *Burkill & Mhd Haniff SFN 12715* (SING [SING0151520]); *ibidem*, 1891, *Ridley s.n.* (K, SING [SING0151655]); Taiping, Mar 1911, *Anderson 165* (SING [SING0151646]). **Kelantan:** Gua Musang, G Chamah, 26 Jul 2011, *Siti Munirah & Mhd Nazri FRI 76439* (KEP [KEP266658]); Kuala Krai, Stong Tengah FR, 14 Aug 1969, *Whitmore FRI 12468* (KEP [KEP21828]). **Pahang:** Cameron Highlands, Ulu Sg Lemoi, 9 Sep 1931, *Dolman FMS 28127* (KEP [KEP21618]).

Notes. *Iguanura divergens* is within the *I. polymorpha* complex, with its trapezoid leaflets, branched inflorescences, and often ellipsoid and falcate fruits. *Iguanura divergens* differs from *I. polymorpha* by its more branched inflorescences (5–10(–22)

rachillae in the former and 1–5 rachillae in the latter), flowers on mainly wiry rachillae, often in shallow sunken pits in the former and flowers on mainly thicker rachillae in sunken pits in the latter.

Iguanura divergens is a variable species, its habit is mainly solitary and occasionally caespitose, a species found mainly at higher elevation. *Iguanura polymorpha* is mostly caespitose and only occasionally solitary, mainly a lowland species often found at limestone hill bases. I consider the variation described in *Iguanura tenuis*, *I. tenuis* var. *khaosokensis*, *I. belumensis* and *I. perdana* to be within the variation found in the species and it is not possible to differentiate these taxa. The differences are reported to be mainly in habit, size and the degree of branching of inflorescences. They merge into each other with the specimens I have examined. At the extreme end, *Iguanura perdana* and *I. belumensis* are larger forms of the species. For example, *Lim HI671*, a larger form of the species, has inflorescences very similar to these two entities, i.e., a much-branched inflorescence, but another sheet of the same collection has only three rachillae (KEP [KEP2348]). This showed that the rachilla number can also be variable. Lim (1998a) described *Iguanura perdana* as having fruits like *I. bicornis* but eccentric, with a flat top, not two-lobed. He described this from only one example he observed in the field but which was not deposited with the holotype specimen. This I consider as a variation found within *Iguanura divergens*.

Iguanura divergens has an earlier name under *I. polymorpha* var. *canina* Becc., from a specimen collected in Perak by Scortechini. As a name has no priority outside its rank (Art. 11.2, Turland et al., 2018), *Iguanura polymorpha* var. *canina* has now become a synonym of *I. divergens*.

4. *Iguanura geonomiformis* (Griff.) Mart., Hist. Nat. Palm. 3: 229, t. 178 (1845); Miquel, Fl. Ned. Ind. 3: 44 (1855); Beccari & Hooker in Hooker, Fl. Brit. India 6: 415 (1892); Ridley, Mat. Fl. Malay. Penins. 2: 150 (1907); Ridley, Fl. Malay Penins. 5: 13 (1925); Martelli, Nuovo Giorn. Bot. Ital. 42: 52 (1935); Whitmore, Palms Malaya 63 (1973); Lim, Gard. Bull. Singapore 48: 34 (1998). – *Slackia geonomiformis* Griff., Calcutta J. Nat. Hist. 5: 468 (1845), as ‘*geonomaeformis*’; Griffith, Palms Brit. E. India 162 (1851). – TYPE: [Malaysia], Malacca, Ayer Punnus (Ayer Panas), *Griffith s.n.* (lectotype K [K000207993], designated here). (Fig. 2)

Iguanura malaccensis Becc., Malesia 3: 102 (1886); Beccari & Hooker in Hooker, Fl. Brit. India 6: 416 (1892); Whitmore, Palms Malaya 114 (1973); Lim, Gard. Bull. Singapore 48: 34 (1998). – *Iguanura geonomiformis* Mart. var. *malaccensis* (Becc.) Ridl., Mat. Fl. Malay. Penins. 2: 150 (1907). – *Iguanura wallichiana* (Mart.) Becc. subsp. *malaccensis* (Becc.) Kiew var. *malaccensis* (Becc.) Kiew, Gard. Bull. Singapore 28: 222 (1976). – TYPE: [Malaysia], Selangor, Klang, December 1878, *Keheding 108* (lectotype FI [FI008392], designated here).

Iguanura geonomiformis (Griff.) Mart. var. *ramosa* Ridl., Mat. Fl. Malay. Penins. 2: 151 (1907). – TYPE: Malaysia, Negeri Sembilan, Tampin Hill, May 1894, *Goodenough 1881* (lectotype SING [SING0249851], designated here).



Fig. 2. *Iguanura geonomiformis* (Griff.) Mart. **A.** Plant with spicate inflorescence. From *FRI 80030*. **B.** Plant with branched infructescence. Cultivated plant in Forest Research Institute Malaysia. (Photos: L.G. Saw)

Iguanura wallichiana (Mart.) Becc. subsp. *malaccensis* (Becc.) Kiew var. *elatiior* Kiew, Gard. Bull. Singapore 28: 224 (1976). – TYPE: Malaysia, Johor, Gunung Belumut, 22 May 1923, *Holtum 10299* (holotype SING [SING0001357]).

Solitary or caespitose, shrubby, understory palm to 3 m tall, stilt-rooted. **Stems** 1–3 cm diam., internodes 2–2.5 cm. **Crownshaft** 23–32 cm long. **Leaves** 6–12 per stem, spreading, not abscising but marcescent; covered with reddish brown indumentum, blade entire-bifid or pinnate, leaf sheath 10–28 cm long, petiole 8–65 cm long, rachis 31–130 cm long, when entire-bifid: blade 31–104 × 14–48 cm, obovate with slightly diverging side margins and bifid tip; when pinnate: leaflets 3–7(–17) per side, parallelogram-shaped, apical pair often widest, (18–)30–47 × (1–)3–8.5 cm, secondary veins align ± parallel with slight taper towards base, 0.8–1.7 cm apart. **Inflorescences** interfoliar, spreading then pendent, 1–3 per stem, 42–130 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 13–109 cm long, rachis 0–16 cm long; branched only 1 order when not spicate, rachillae 1–7, arranged tightly together along rachis axis when not spicate, (11–)20–65 cm long, 3–7 mm wide (measured in the middle of rachilla), densely covered with caducous scruffy brown indumentum. **Flowers** tightly arranged along rachillae, in deep pits, cream, 1–4 mm apart; male flowers: calyx glabrescent to glabrous, lobes c. 2 × 1–2 mm, corolla glabrous, lobes c. 3 × 1–1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous, lobes c. 2 × 1.5–2 mm, corolla glabrous, lobes 4–4.5 × 1.5–2 mm, surface prominently ribbed. **Fruits** ovoid, pale green to cream ripening red, 1–1.6 × 0.8–0.9 cm.

Distribution. Distributed mainly in Central and South Peninsular Malaysia and Singapore.

Ecology. Lowland to upper hill dipterocarp forest. Often found growing gregariously in swampy areas, inundated by floods. Recorded from 15–1200 m elevation.

Provisional IUCN conservation assessment. Least Concern (LC). The EOO was calculated as 77,306 km².

Specimens examined. MALAYSIA: *Unknown 12/4* (SING [SING0249874]); *Unknown s.n.* (SING [SING0249875]). **Perak:** Batang Padang, Slim Hills FR, 3 Sep 1966, *Whitmore FRI 765* (KEP [KEP21579]); Kinta, G Korbu, 2 Jul 2019, *Wan Syafiq et al. FRI 93712* (KEP [KEP284320]). **Kelantan:** Gua Musang, 10 May 1991, *Saw FRI 37404* (KEP [KEP21738]); Sg Lebir, Kuala Aring, 13 Sep 1967, *Whitmore FRI 4355* (KEP [KEP21545]); Jeli, Sg Ketil, 16 Mar 1972, *Whitmore FRI 20689* (KEP [KEP21559]). **Terengganu:** Dungun, Jerangau FR, 22 Jul 2009, *Mhd Hairul et al. FRI 69806* (KEP [KEP164443, KEP164446], SAN); Hulu Terengganu, G Padang, 19 Mar 2010, *Mhd Hairul et al. FRI 70874* (KEP [KEP269421]). **Pahang:** 1891, *Ridley s.n.* (SING [SING0240620]); Batu Balai, 23 Nov 1924, *Burkill & Mhd Haniff SFN 15828* (SING [SING0240590]); Kuala Tenok, 24 Jul 1891, *Ridley 3138* (SING [SING0151684, SING0249867]); Sg Yu, 15 Aug 1964, *Hardial & Mhd Noor 84* (SING [SING0240591]); Bentung, Genting Highlands, G Ulu Kali, 27 Nov 1970, *Evans RE 11270*

(KEP [KEP21663]); Kemasul FR, Ulu Sg Jemali, 22 Sep 1925, *Hamid 10620* (KEP [KEP21577]); Jerantut, Kuala Tembeling, 20 Aug 1928, *Holttum SFN 20538* (SING [SING0240598]); Tahan, 8 Sep 1923, *Mhd Nur s.n.* (SING [SING0249833]); Taman Negara, 9 Aug 1967, *Palmer 2* (SING [SING0249852]); ibidem, 25 Apr 1975, *Ang FRI 23369* (KEP [KEP21795]); ibidem, *Ang FRI 23371* (KEP [KEP21835]); ibidem, 24 Apr 1975, *Ang FRI 23372* (KEP [KEP21733]); ibidem, 25 Apr 1975, *Ang FRI 23373* (KEP [KEP21856]); Taman Negara, Gua Luas, 10 Feb 2007, *Lim et al. FRI 56385* (KEP [KEP142676]); Taman Negara, Kuala Tahan, Jeram Panjang, 10 Mar 1968, *Dransfield JD 681A* (KEP [KEP21557]); Taman Negara, Kuala Yong, 8 Jul 1970, *Everett FRI 14330* (KEP [KEP21551]); Taman Negara, Kuala Tahan, Kpg Belebar, 10 Feb 1970, *Evans RE 970* (KEP [KEP21717]); ibidem, *Evans RE 770* (KEP [KEP21659]); ibidem, 10 Feb 1970, *Evans RE 870* (KEP [KEP21723]); ibidem, 10 Feb 1970, *Evans RE 1070* (KEP [KEP21886]); ibidem, 11 Feb 1970, *Evans RE 1170* (KEP [KEP21658]); ibidem, 11 Feb 1970, *Evans RE 1370* (KEP [KEP21660]); ibidem, 11 Feb 1970, *Evans RE 1470* (KEP [KEP21887]); Taman Negara, Kuala Tahan, Jeram Panjang, 1 Mar 1968, *Dransfield JD 681A* (KEP [KEP23927]); Taman Negara, Sg Tahan, 11 Aug 1967, *Palmer 13* (SING [SING0151674]); ibidem, *Palmer 12* (SING [SING0151673]); ibidem, *Palmer 12A* (SING [SING0249853]); ibidem, *Palmer 11A* (SING [SING0151712]); ibidem, *Palmer 11* (SING [SING0151711]); ibidem, *Palmer 11B* (SING [SING0151729]); ibidem, 1893, *Mat s.n.* (SING [SING0249849]); Tembeling, 13 Jul 1929, *Henderson SFN 21874* (SING [SING0151686]); ibidem, 26 May 1931, *Henderson SFN 24531* (SING [SING0240589]); Lipis, Gua Gunting, 29 May 2013, *Ummul Nazrah et al. FRI 78343* (KEP [KEP249089]); Kuala Lipis, 16 Nov 1924, *Burkill & Mhd Haniff SFN 17188* (SING [SING0151707]); Ulu Terenggun FR, 24 Aug 1992, *Saw & Kamarudin FRI 37594* (KEP [KEP21818]); Pekan, Aur FR, 11 May 1967, *Whitmore FRI 3664* (KEP [KEP21800]); Chini FR, 3 Oct 1968, *Cockburn FRI 11049* (KEP [KEP21554]); ibidem, 6 Oct 1968, *Cockburn FRI 11095* (KEP [KEP20973]); Raub, Fraser's Hill, 22 Jan 1973, *Kochummen FRI 16650* (KEP [KEP21814]); Fraser's Hill, Red Cross Path, 8 Apr 1970, *Evans RE 1870* (KEP [KEP21781]); Rompin, Endau-Rompin, 10 Oct 1985, *Low & Mat Asri FRI 25956* (KEP [KEP21831]); ibidem, *Low & Mat Asri FRI 25957* (KEP [KEP21817]); Endau-Rompin S.P., Sg Kinchin, 23 Aug 1988, *Saw FRI 36338* (KEP [KEP21824]); ibidem, 16 Jul 1992, *Saw FRI 37542* (KEP [KEP21651]); Endau-Rompin S.P., Ulu Sg Endau, 27 Aug 1973, *Kiew RK 603* (KEP [KEP21696]); ibidem, *Kiew RK 604* (KEP [KEP21698]); ibidem, *Kiew RK 605* (KEP [KEP21653]); ibidem, *Kiew RK 606* (KEP [KEP21654]); Temerluh, Kemasul FR, 16 Sep 1925, *Hamid 10596* (KEP [KEP21578]); Krau W.R., Kuala Lompat, 19 Apr 1970, *Evans RE 2670* (KEP [KEP21689]); Palong FR, Fort Iskandar, 2 Jul 1967, *Whitmore FRI 3991* (KEP [KEP21797]); Tasik Bera, 21 May 2009, *Mhd Hairul et al. FRI 60984* (KEP [KEP162470]); ibidem, 13 Jan 1965, *Palmer 18/1* (SING [SING0249861]). **Selangor:** Pataling, 21 Jun 1889, *Ridley s.n.* (SING [SING0151699]); Gombak, Batu Caves, Aug 1984, *Kiew RK 1345* (KEP [KEP21715]); ibidem, Dec 1891, *Ridley s.n.* (SING [SING0240580]); Bt Belachan, 27 Jul 1986, *Kiew s.n.* (KEP [KEP21748]); Forest Research Institute Malaysia, 26 Oct 2002, *Chee et al. FRI 47373* (KEP [KEP83010]); ibidem, 28 Oct 2009, *Norazmi et al. NA 5* (KEP [KEP146397]); ibidem, 28 Oct 2009, *Latifah et al. K2 I* (KEP [KEP146391]); Ginting Bidai, May 1896, *Ridley s.n.* (SING [SING0151700]); Ginting Perai, May 1896, *Ridley 70887* (SING [SING0240606]); Ulu Gombak, 12 Oct 1921, *Hume 8982* (SING [SING0151741]); ibidem, 31 Oct 1921, *Hume 9363* (SING [SING0151743]);

ibidem, mile 16, 25 Oct 1937, *Mhd Nur s.n.* (SING [SING0151738]); Ulu Gombak FR, 24 Jun 1985, *Low FRI 31109* (KEP [KEP21735]); ibidem, 6 Mar 1991, *Saw FRI 37346* (KEP [KEP21756]); ibidem, 8 Oct 1969, *Evans RE 369* (KEP [KEP21706]); ibidem, 8 Dec 1969, *Evans RE 169* (KEP [KEP21657]); ibidem, 8 Oct 1969, *Evans RE 269* (KEP [KEP21725]); Hulu Langat, G Nuang, 7 Sep 2016, *Saw & Mhd Aidil FRI 80030* (KEP [KEP249733], SING); Kajang, 19 Jan 1968, *Dransfield UPM 1705* (KEP [KEP21534]); Kuala Lumpur, 27 Jun 1889, *Ridley s.n.* (SING [SING0240605]); ibidem, Feb 1890, *Curtis s.n.* (SING [SING0151681]); ibidem, s.d., *Native collector s.n.* (SING [SING0240586]); Semenyih, 8 Jul 1921, *Hume 7796* (SING [SING0151680]); ibidem, 18 Jul 1921, *Hume 8116* (SING [SING0151742]); Sg Lalang FR, 14 May 1986, *Low FRI 31114* (KEP [KEP21736]); ibidem, 19 Jan 1968, *Whitmore FRI 4607* (KEP [KEP21570]); ibidem, *Whitmore FRI 4609* (KEP [KEP21569]); ibidem, 8 May 1984, *Kiew RK 1294* (KEP [KEP21707]); Ulu Langat, 31 Dec 1969, *Whitmore FRI 15126* (KEP [KEP21574]); ibidem, *Whitmore FRI 15129* (KEP [KEP21576]); ibidem, *Evans RE 2169* (KEP [KEP21702]); ibidem, *Evans RE 2269* (KEP [KEP21885]); Ulu Langat FR, 31 Dec 1969, *Evans RE 2069* (KEP [KEP21699]); ibidem, *Evans RE 1969* (KEP [KEP21701]); Hulu Selangor, Bt Kutu, May 1896, *Ridley 7889* (SING [SING0151739]); Rawang, May 1896, *Ridley s.n.* (SING [SING0240607]). **Negeri Sembilan:** Jelebu, Berembun FR, Bt Lantai, 10 Apr 2008, *Ummul Nazrah et al. FRI 57104* (KEP [KEP152570, KEP152571], SAN); Berembun FR, Jeram Toi, 8 Apr 2008, *Yao et al. FRI 57911* (KEP [KEP159942]); Berembun FR, Bt Tangga, 8 Apr 2008, *Rafidah & Rosdi FRI 55739* (KEP [KEP160070]); Berembun FR, G Telapak Buruk, 8 Apr 2008, *Syahida Emiza et al. FRI 55230* (KEP [KEP162375]); Bt Tangar, 28 May 1970, *Evans RE 3870* (KEP [KEP21716]); ibidem, 29 Dec 1969, *Evans RE 1869* (KEP [KEP21724]); Jelebu FR, 3 May 2010, *Mhd Hairul et al. FRI 70952* (KEP [KEP188970]); Pasoh FR, 29 Oct 1974, *Mat Asri FRI 21850* (KEP [KEP21775]); ibidem, 25 Apr 1975, *Yap SK 620* (KEP [KEP21561]); ibidem, 28 May 1970, *Evans RE 3170* (KEP [KEP21695]); ibidem, *Evans RE 3370* (KEP [KEP21697]); ibidem, May 1970, *Kiew s.n.* (KEP [KEP21700]); ibidem, 2 May 1970, *Evans RE 3270* (KEP [KEP21676]); ibidem, *Evans RE 3070* (KEP [KEP21726]); ibidem, 14 May 1987, *Kochummen FRI 26614* (KEP [KEP101888]); ibidem, 30 Nov 1987, *LaFrankie 2685* (KEP [KEP103534]); ibidem, 20 Feb 1988, *LaFrankie 2797* (KEP [KEP103552]); ibidem, 13 Aug 1987, *LaFrankie 2448* (KEP [KEP106949]); ibidem, *LaFrankie 2441* (KEP [106990]); ibidem, 1987, *LaFrankie 2569* (KEP [KEP233792]); Jempol, Ladang Geddes, 13 Jan 1966, *Palmer 19-1* (SING [SING0151733]); Serting FR, 30 Nov 1989, *Saw FRI 37313* (KEP [KEP21560]); Kuala Pilah, G Angsi, May 1904, *Ridley 11968* (SING [SING0151698]); ibidem, 21 Nov 1923, *Mhd Nur SFN 11589* (SING [SING0240587]); Serting FR (Tambahan), 13 Apr 1985, *Low & Mat Asri FRI 25876* (KEP [KEP21734]); Sg Bendul, 16 Jun 1937, *Furtado SFN 33122b* (KEP [KEP21568], SING [SING0151667]); ibidem, *Furtado SFN 33122* (SING); Ulu Bendul, 1 Dec 1922, *Holttum 9845* (SING [SING0151697]); Port Dickson, Sg Menyala, 9 Sep 1970, *Evans RE 8770* (KEP [KEP21670]); ibidem, *Evans RE 8670* (KEP [KEP21671]); Sg Menyala FR, 26 Jun 1970, *Whitmore FRI 15201* (KEP [KEP21836]); ibidem, 2 Apr 1971, *Whitmore FRI 15977* (KEP [KEP21556]); ibidem, 9 Sep 1970, *Evans RE 8370* (KEP [KEP21693]); ibidem, *Evans RE 8470* (KEP [KEP21694]); ibidem, *Evans RE 8570* (KEP [KEP21673]); Rembau, G Tampin FR, 27 Jan 1928, *Burkill SFN 3100* (SING [SING0249866]); Perhentian Tinggi, Dec 1898, *Ridley s.n.* (SING [SING0151696]); ibidem, Dec 1890, *Ridley s.n.* (SING [SING0240603]); Rembau FR, 28 Jun 1988, *Anthonyamy*

SA 933 (KEP [KEP21746]); Seremban, Berembun FR, Sg Batang Benar, 8 Apr 2008, *Mhd Hairul et al. FRI 60015* (KEP [KEP160173], SAN); G Berembun, Sg Ujong, 30 Jun 1885, *Alvins 1991* (SING [SING0240616]); Tampin, Gemas, 16 Sep 1920, *Burkill SFN 6372* (SING [SING0240613]); Gemas Rd, 21 Feb 1966, *Palmer 3/2* (SING [SING0249858]); Tampin FR, G Tampin, 27 Jun 1918, *Burkill SFN 3100* (SING [SING0249848]); ibidem, May 1894, *Goodenough 1881* (SING [SING0249851]). **Malacca:** 22 Dec 1884, *Alvins 131* (SING [SING0240622]); 5 Nov 1884, *Alvins 194* (SING [SING0240626]); Darat, 8 Jan 1966, *Palmer 11-1* (SING [SING0151672]); ibidem, 11 Jan 1966, *Palmer 14-1* (SING [SING0151671]); ibidem, 22 Jan 1966, *Palmer 23-1* (SING [SING0151670]); ibidem, *Palmer 22-1* (SING [SING0151669]); ibidem, *Palmer 10/1* (SING [SING0249860]); Lubok Kedondong, Jun 1892, *Ridley s.n.* (SING [SING0240609]); Mt Ophir, Apr 1888, *Hullett 751* (SING [SING0151690]); Tebong FR, 24 Nov 1922, *Holttum SFN 9626* (SING [SING0240625]); Alor Gajah, Bt Tampin, May 1894, *Goodenough 1911* (SING [SING0240621]); Bt Tampin, May 1894, *Goodenough 1911A*, (SING [SING0151682]); Tampin, 27 Dec 1965, *Palmer 12/2* (SING [SING0240599]); ibidem, 9 Jan 1966, *Palmer 12/1* (SING [SING0240600]); Jasin, Air Panas, Nov 1893, *Ridley 1618* (SING [SING0240627]); ibidem, 1891, *Ridley s.n.* (SING [SING0249873]); Ayer Panas, Nov 1893, *Ridley 1583* (SING [SING0151692]); Bt Senggeh FR, 10 Apr 1940, *Kiah SFN 37222* (SING [SING0151663]); Mt Ophir, Jun 1892, *Ridley s.n.* (SING [SING0151668]); Melaka Tengah, Sg Udang, Nov 1893, *Ridley 1594* (SING [SING0151683]); ibidem, Jun 1889, *Derry 174* (SING [SING0240617]). **Johor:** Lawa, 14 Oct 1900, *Ridley s.n.* (SING [SING0151688]); Seduah, Aug 1908, *Ridley s.n.* (SING [SING0151716]); Kluang, 13 Sep 1959, *Tan TAN 13* (SING [SING0151677]); Batu Pahat, 20 Nov 1922, *Holttum 9478* (SING [SING0151756]); Endau-Rompin S.P., Sg Selai, G Chabang Tiga, 25 Aug 2007, *Rosdi et al. Angan FRI 58714* (KEP [KEP151203]); ibidem, 23 Sep 1970, *Mhd Shah & Sanusi 2180* (SING [SING0249854]); Kluang, 5 Mar 1973, *Singh & Samsuri HS 1084* (SING [SING0001356]); ibidem, 13 Sep 1959, *Tan 11* (SING [SING0151679]); Kluang-Mersing road, 16 Nov 1922, *Mhd Nur 9265* (SING [SING0151689]); Kluang FR, 11 May 1968, *Dransfield JD 817* (KEP [KEP21562]); ibidem, 14 May 1968, *Dransfield JD 838* (KEP [KEP21544]); ibidem, 21 Oct 1969, *Kochummen FRI 2481* (KEP); ibidem, 5 Feb 1966, *Ng KEP 98021* (KEP [KEP21580]); ibidem, 20 Jul 1991, *Saw et al. FRI 37429* (KEP [KEP21737]); ibidem, 9 Nov 1970, *Evans RE 10570* (KEP [KEP21691]); ibidem, *Evans RE 10670* (KEP [KEP21692]); ibidem, *Evans RE 10370* (KEP [KEP21732]); ibidem, *Evans RE 10870* (KEP [KEP21727]); ibidem, *Evans RE 11070* (KEP [KEP21728]); ibidem, *Evans RE 10770* (KEP [KEP21720]); ibidem, *Evans RE 104.70* (KEP [KEP21709]); ibidem, *Evans RE 109-70* (KEP [KEP21710]); ibidem, *Evans RE 11170* (KEP [KEP21778]); ibidem, 11 May 1968, *Dransfield JD 817* (KEP [KEP21599]); ibidem, 21 Oct 1969, *Kochummen FRI 2841* (KEP [KEP21565]); ibidem, *Tan TAN 15* (SING [SING0151678]); Kluang FR, G Belumut, 13 Aug 2009, *Ummul Nazrah & Mustapa FRI 66163* (KEP [KEP251156]); Kluang-Mersing Rd, 16 Nov 1922, *Mhd Nur 9265* (SING [SING0151689]); ibidem, *Holttum 9256* (SING [SING0151715]); Layang Layang, 21 Apr 1935, *Holttum SFN 29352* (SING [SING0151714]); Kota Tinggi, G Panti, Dec 1892, *Ridley s.n.* (SING [SING0151665]); ibidem, 9 Dec 1892, *Ridley s.n.* (SING [SING0240608]); Kota Tinggi, Jan 1910, *Ridley s.n.* (SING [SING0151691]); Linggiu, 24 Jul 1991, *Saw FRI 37453* (KEP [KEP21801]); Linggiu Dam, 19 Jul 1991, *Saw et al. FRI 37422* (KEP [KEP21739]); Mawai, 13 May 1934, *Corner SFN 29001* (SING [SING0151703]); Panti FR, 8 Nov 1970, *Evans RE*

9870 (KEP [KEP21721]); *ibidem*, *Evans RE 9770* (KEP [KEP21664, KEP21722]); *ibidem*, *Evans RE 9670* (KEP [KEP21665]); *ibidem*, *Evans RE 10170* (KEP [KEP21666]); *ibidem*, *Evans RE 10070* (KEP [KEP21667]); *ibidem*, *Evans RE 10270* (KEP [KEP21776]); Panti FR, G Panti, 23 Apr 1993, *Saw FRI 37743* (KEP [KEP21789]); *ibidem*, 13 Dec 1970, *Whitmore FRI 15702* (KEP [KEP21547]); Sg Berassau, 6 Feb 1935, *Corner SFN 28743* (SING [SING0151717]); Sg Kayu, 24 Oct 1936, *Kiah SFN 32167* (SING [SING0151664]); Sg Kayu Ara, 23 Jun 1935, *Furtado s.n.* (SING [SING0151713]); *ibidem*, *Corner & Furtado s.n.* (SING); Sg Pelepah, 5 Mar 1928, *Mhd Nur SFN 20004* (SING [SING0151706]); Sg Sedili, 3 Feb 1939, *Unknown s.n.* (SING [SING0249855]); Mersing, Bt Tinggi, 21 Jun 2011, *Mhd Hairul et al. FRI 72334* (KEP [KEP225005]); Endau-Rompin S.P., *Chua FRI 33038* (KEP [KEP21784]); *ibidem*, 19 Aug 2002, *Chee & Saw FRI 44192* (KEP [KEP82988]); Endau-Rompin S.P., Sg Jasin, 14 May 1985, *Kiew RK 1700* (KEP [KEP21655]); *ibidem*, 16 May 1985, *Kiew RK 1731* (KEP [KEP21656]); Endau-Rompin S.P., G Janing, 21 May 1985, *Kiew RK 1792* (KEP [KEP21679]); Labis FR, Bt Majar, 20 May 1967, *Whitmore FRI 3850* (KEP [KEP21564]); Muar, Asahan, 27 May 1987, *Anthony samy SA 855* (KEP [KEP21678]); G Ledang FR, Sg Belemang, 14 Jul 1969, *Whitmore FRI 12311* (KEP [KEP21855]); G Ledang FR, 19 Sep 1970, *Evans RE 8970* (KEP [KEP21730]); *ibidem*, *Evans RE 9170* (KEP [KEP21668]); *ibidem*, *Kiew s.n.* (KEP [KEP21779]); G Ledang FR, Sg Gemeh, 24 Jul 2013, *Saw FRI 80010* (KEP [KEP227490], SING [SING0222782]); Segamat, Endau-Rompin S.P., Sg Selai, 15 Aug 2002, *Saw FRI 44419* (KEP [KEP71058]); *ibidem*, *Saw FRI 44423* (KEP [KEP71063]); *ibidem*, 24 Jul 2012, *Mhd Hairul et al. FRI 78574* (KEP [KEP239237]); Gemas, 13 Apr 1966, *Palmer 8-4* (SING [SING0151728]); *ibidem*, *Palmer 914* (SING [SING0249856]); Gemas Rd, 13 Apr 1966, *Palmer 10-4* (SING [SING0151666]); Labis FR, 19 Feb 1971, *Whitmore FRI 15924* (KEP [KEP21553]); *ibidem*, 16 Apr 1966, *Whitmore FRI 200* (KEP [KEP21810], SING [SING0240611]); *ibidem*, 20 Sep 1970, *Evans RE 9270* (KEP [KEP21669]); *ibidem*, *Evans RE 9570* (KEP [KEP21672]); Ulu Batu Pahat, Kpg Simpai, 1892, *Lake & Kelsall s.n.* (SING [SING0240615]).

SINGAPORE: **Bukit Timah:** 1890, *Ridley 3140* (SING [SING0151685]); Bt Timah NR, 15 May 2019, *Niissalo et al. SING2019-445* (SING [SING0295665]). **Nee Soon:** Chan Chu Kang FR, FRNS, 1891, *Goodenough s.n.* (SING [SING0014817]); *ibidem*, 21 Dec 1889, *Ridley 1664* (SING [SING0090543]); Nee Soon Freshwater Swamp Forest, 17 Feb 2009, *Staples et al. SING2009-161* (SING [SING0123487]); Nee Soon Swamp Forest, 17 Apr 2012, *Leong et al. SING2012-172* (SING [SING0174233]); Upper Bt Mandai, 10 Dec 1890, *Ridley 3139* (SING [SING0090544]). **Singapore Botanic Gardens:** 29 Jun 2017, *Leong & Koh SING2017-254* (SING [SING0258974]).

Notes. This is another polymorphic species with a large range of morphological expression in the vegetative and fertile parts. The leaves can be entire-bifid to finely segmented. The inflorescence can be spicate to variously branched. The key differentiation of *Iguanura geonomiformis* and its allies (*I. ruthiae* and *I. kelantanensis*) to *I. wallichiana* is the characteristic branching of the rachillae. Spicate inflorescences are only found in *Iguanura geonomiformis*. For specimens with branched inflorescences, the rachillae of *Iguanura geonomiformis* and its allies are held close to each other, at acute angles along the axis, whereas in *I. wallichiana*, the rachillae are spread out or divergent often almost at right angles to the axis (Fig. 2).

The inflorescences of *Iguanura geomiformis* have rachillae ranging from 1–7 that are often thick and densely covered with a reddish brown indumentum with tightly packed spirally arranged triads (some Johor specimens). It is similar to *Iguanura ruthiae* (see discussion under that species for the differences).

5. *Iguanura humilis* (Kiew) C.K.Lim, Gard. Bull. Singapore 48: 37 (1998). – *Iguanura wallichiana* subsp. *malaccensis* (Becc.) Kiew var. *humilis* Kiew, Gard. Bull. Singapore 28: 223 (1976). – TYPE: Malaysia, Terengganu, Kemaman, Ulu Bendong, 31 October 1935, *Corner SFN 30095* (holotype SING [SING0072417]). (Fig. 3)

Small, mostly solitary, occasionally caespitose, acaulescent or short-stemmed understorey palm, stilt-rooted for plants with a stem. **Stems** to 1.5 m tall, 0.8–1 cm diam., internodes 0.3–1.7 cm. **Leaves** 8–10 per stem, spreading, not abscising but marcescent; blade mostly entire-bifid or sometimes pinnate, when pinnate 3–5 leaflets per side, leaf sheath 9–10 cm long, covered with reddish brown indumentum, petiole 20–40 cm long, rachis 35–55 cm long, blade when entire-bifid: obovate with slightly diverging side margins and bifid tip, (22.5–)40–75 × 15–30 cm; when pinnate: leaflets parallelogram-shaped, apical pair often widest, leaflets 15–27 × 3–8 cm, secondary veins align ± parallel with slight taper towards base, 0.5–1.2 cm apart. **Inflorescences** interfoliar, erect, 1 or 2 per stem, 35–60 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, mostly spicate, occasionally bifurcate, peduncle 9–35 cm long, extending beyond leaf sheaths, rachillae 11–30 cm long, 1–3 mm wide in the middle, densely covered with scruffy brown indumentum. **Flowers** tightly arranged along rachillae, in pits, 1–5 mm apart in the middle of rachilla; male flowers: calyx glabrous to covered with caducous brown indumentum, lobes 1–2 × 1–1.5 mm, corolla glabrous, lobes 3–5 × 1–1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous to covered with caducous brown indumentum, lobes 1–1.5 × c. 1 mm, corolla glabrous, lobes 2–3 × c. 1 mm. **Fruits** globose to ovoid, cream or white to yellowish green ripening red, 5–12 × 5–8 mm.

Distribution. Endemic to Peninsular Malaysia, recorded in Perak, Pahang, Kelantan and Terengganu. The species appears to be distributed in three disjunct regions. There is a population around Bukit Larut, Perak, another around Gua Musang, Kelantan into NW Pahang and finally in Western Terengganu.

Ecology. Lowland to hill dipterocarp forest, found at elevation 40–160 m in Terengganu and Kelantan, the Bukit Larut population gets to a higher elevation to 900 m above sea level.

Provisional IUCN conservation assessment. Near Threatened (NT). Its EOO was calculated as 19,612 km², potentially qualifying the species as Vulnerable under criterion B, but it is known from more than 10 populations. The species is distributed mainly in forest reserves and they are all subjected to logging activities.



Fig. 3. *Iguanura humilis* (Kiew) C.K.Lim, habit. (Photo: L.G. Saw)

Specimens examined. MALAYSIA: **Perak:** s.l., Dec 1887, *Glasgow s.n.* (SING [SING0240618]); Kuala Kangsar, G Pondok, 22 Jun 1924, *Burkill & Mhd Haniff SFN 13906* (SING [SING0249835]); Larut & Matang, Bt Larut FR, 21 Nov 1977, *Dransfield JD 5402* (KEP [KEP21769]); *ibidem*, 20 Oct 1992, *Saw FRI 37670* (KEP [KEP21740]); *ibidem*, 13 Aug 1999, *Saw FRI 44281* (KEP [KEP71146]); Maxwell's Hill, 16 Sep 1949, *Sinclair & Kiah SFN 38783* (SING [SING0151701]); Taiping waterfalls, 7 Jun 1937, *Furtado SFN 33076* (SING [SING0151647, SING0151702]); Taiping Hills, 20 Feb 1923, *Henderson 10446* (SING [SING0249839]); Tea Gardens, Dec 1902, *Ridley 11404* (SING [SING0249869]). **Kelantan:** Sg Keteh, 6 Feb 1924, *Mhd Nur SFN 11952* (SING [SING0249831]); Gua Musang, Gua Ninik, 21 Oct 1927, *Henderson SFN 19501* (SING [SING0151494]); Sg Perias, Kuala May, 20 Jul 1967, *Whitmore FRI 4132* (KEP [KEP21550]); Sg Perias, Kuala Yai, 22 Jul 1967, *Whitmore FRI 4200* (KEP [KEP21567]). **Terengganu:** Besut, Ulu Besut FR, 10 May 1988, *Kiew RK 2717* (KEP [KEP21674]); Dungun, Jengai FR, 17 Oct 2002, *Chee et al. FRI 47305* (KEP [KEP82916]); Pasir Raja FR, 7 Jun 2004, *Markandan & Mustapa FRI 49173* (KEP [92411]); Hulu Terengganu, Tasik Kenyir, 4 Apr 2009, *Kamarul Hisham et al. FRI 67106* (KEP [KEP162599]); *ibidem*, 4 Aug 2007, *Chua & Mustapa FRI 46926* (KEP [KEP235632]); Kemaman, Bt Bandi FR, 21 Jun 1999, *Saw FRI 44999* (KEP); Bt Kajang, 26 Aug 1986, *Anthony's SA 579* (KEP [KEP21780]); *ibidem*, 4 Nov 1935, *Corner SFN 30237* (SING [SING0151492]); Jeram Tanduk, 20 Aug 2014, *Mhd Hairul et al. FRI 82404* (KEP [KEP239123]); Sg Kajang, 16 Jul 1971, *Kiew RK 4* (KEP [KEP21688]); *ibidem*, *Kiew RK 16* (KEP [KEP21685]); *ibidem*, *Kiew RK 13* (KEP [KEP21684]); *ibidem*, *Kiew RK 12* (KEP [KEP21683]); *ibidem*, *Kiew RK 8* (KEP [KEP21682]); *ibidem*, *Kiew RK 5* (KEP [KEP21681]); *ibidem*, *Kiew RK 14* (KEP [KEP21680]); Sg Nipah, 5 May 1988, *Kiew RK 2662* (KEP [KEP20900]); Sg Nipah FR, 22 Oct 2002, *Chee et al. FRI 47349* (KEP [KEP83472]); *ibidem*, 24 May 2006, *Rafidah & Syahrir Farihan FRI 51637* (K, KEP [KEP121477]); *ibidem*, 26 May 2006, *Rafidah & Syahrir Farihan FRI 51677* (KEP [KEP121498]); Ulu Ayam, 5 Nov 1935, *Corner SFN 30259* (SING [SING0151495]); *ibidem*, *Corner SFN 30258* (SING [SING0151503]); *ibidem*, *Corner SFN 30260* (SING [SING0151504]); Ulu Bendong, 1 Nov 1935, *Corner s.n.* (SING [SING0151493]); Setiu, Ulu Setiu FR, 3 Aug 1977, *Dransfield JD 5156* (KEP [KEP21854]); *ibidem*, 16 May 1993, *Lim PMS 1451* (KEP [KEP21645]); *ibidem*, 23 Jul 1993, *Saw FRI 39884* (KEP [KEP21841], L [L.4188368]); *ibidem*, 6 Mar 2002, *Saw FRI 44376* (KEP [KEP70728]). **Pahang:** Jerantut, Taman Negara, Gua Peningat, 16 Jul 1970, *Loh FRI 17254* (KEP [KEP21555]); Taman Negara, G Tahan, Feb 1961, *Wong & Wyatt-Smith W7* (KEP [KEP21548]); *ibidem*, 3 Feb 2007, *Lim et al. FRI 56321* (E, KEP [KEP135019, KEP135020]); Taman Negara, Kuala Teku, Tahan Woods, 20 Feb 1968, *Dransfield JD 614* (KEP [KEP21558]); *ibidem*, 21 Feb 1968, *Dransfield JD 635* (KEP [KEP21546]); *ibidem*, 22 Feb 1968, *Dransfield JD 642* (KEP [KEP21543]); Taman Negara, Kuala Tahan, Kpg Belebar, 1970, *Everett s.n.* (KEP [KEP21542]); Taman Negara, Kuala Juram, Sg Tanum, 5 May 1997, *Chua et al. FRI 38843* (KEP [KEP21743]); Taman Negara, Kuala Juram, 6 May 2008, *Chew et al. FRI 60201* (KEP [KEP159549], SAN); *ibidem*, *Chew et al. FRI 60202* (KEP [KEP159548], SAN); Lipis, 16 Mar 1972, *Mhd Shah MS 2574* (KEP [KEP21808], SING [SING0151695]); Taman Negara, Lata Luis, 2 Feb 2007, *Lim et al. FRI 56317* (KEP [KEP142765]); Taman Negara, Merapoh, 14 May 1980, *Yap FRI 28464* (KEP [KEP21794]); *ibidem*, 2 Feb 2007, *Lim et al. FRI 56305* (KEP [KEP135017]); Taman Negara, Sg Tanum, Kuala Juram, 31 Jul 1996, *Saw FRI 44656* (KEP [KEP28337]).

Notes. I concur with Lim (1998a) who elevated the variety to species rank. The species is in the *Iguanura geonomiformis* group (see discussion of the group under the species) but is distinct from other members of the group by its smaller stature, predominately entire-bifid leaves and by its erect and mostly spicate inflorescences.

The species has pockets of distribution in Perak, Kelantan, Terengganu and Taman Negara, Pahang. The Larut Hills (Perak) population has all entire-bifid leaves with almost smooth lateral margins whereas specimens from Kelantan and Terengganu with entire-bifid leaves have shallowly serrated lateral margins. The Kelantan and Terengganu populations also have segmented leaves (e.g., *Whitmore FRI 4200*, *Chee et al. FRI 47305*, *Kiew RK 5*, *RK 16*). Most of the other specimens have entire-bifid leaves. Specimens from Taman Negara, Pahang appear to be more mixed in leaf dissection, containing both entire-bifid and segmented leaves.

6. *Iguanura kelantanensis* C.K.Lim, Gard. Bull. Singapore 48: 52 (1998). – TYPE: Malaysia, Kelantan, Gua Musang, Batu Papan FR, 26 August 1992, *Saw & Kamarudin FRI 37607* (holotype KEP [KEP21646, KEP167290 – a single specimen over two sheets]). (Fig. 4)

Solitary understorey palm, acaulescent to 0.6 m tall, stilt-rooted. **Stems** c. 2.5 cm diam. **Leaves** c. 10 per stem, spreading, not abscising but marcescent; covered with reddish brown indumentum, blade entire-bifid or pinnate, leaf sheath 11–16 cm long, petiole 17–114 cm long, rachis 31–120 cm long, when entire-bifid: blade 79–92 × 23–43 cm, obovate with slightly diverging side margins and bifid tip; when pinnate: leaflets 4–12 per side, parallelogram-shaped, apical pair often widest, 25–35 × 0.8–3.8 cm, secondary veins align ± parallel with slight taper towards base, 0.9–1.3 cm apart. **Inflorescences** interfoliar, erect, spreading then arching, 27–68 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 8–49 cm long, rachis 3–22 cm long; branched 1 or 2 orders, rachillae (4–)8–26, arranged tightly together along rachis axis, (8–)15–22 cm long, 1–2 mm wide in the middle of rachilla, glabrescent to densely covered with caducous reddish brown indumentum. **Flowers** tightly arranged along rachillae, in deep pits, white, 1–3(–6) mm apart; male flowers: calyx glabrous, lobes 1–2 × 1–1.5 mm, corolla glabrous, lobes c. 3 × 1.5–2 mm, surface with prominent parallel veins; female flowers not seen. **Fruits** ovoid to globose, white ripening red, c. 1 × 0.7–0.8 cm.

Distribution. Endemic to Peninsular Malaysia, distributed east of the Main Range in Kelantan, Terengganu and Pahang.

Ecology. Mostly in lowland to hill dipterocarp forest. Often found growing gregariously in swampy areas, inundated by floods, also recorded on ridges. Recorded from 30–790 m elevation.



Fig. 4. *Iguanura kelantanensis* C.K.Lim, inflorescence. Cultivated plant in Forest Research Institute Malaysia. (Photo: L.G. Saw)

Provisional IUCN conservation assessment. Vulnerable (VU B1ab(iii)). Its EOO was calculated as 5,127 km². It is found only in forest reserves and they are subjected to logging activities. Such activities can threaten existing populations.

Specimens examined. MALAYSIA: **Kelantan:** Gua Musang, Batu Papan FR, 26 Aug 1992, *Saw & Kamarudin FRI 37604* (KEP [KEP21851]); Bt Batu Papan, 4 Jul 1935, *Henderson SFN 29501* (SING [SING0151510]); Nenggiri FR, 1 Oct 2002, *Chee & Apok FRI 44199* (KEP [KEP83506]); Relai FR, 1992, *Kiew KBH 51* (KEP [KEP21745]); Sg Lebir, Kuala Ternya, 3 Sep 1967, *Whitmore FRI 4287* (KEP [KEP21752]); *ibidem*, 4 Sep 1967, *Whitmore FRI 4294* (KEP [KEP21792]); Sg Lebir, Kuala Rantong, 5 Sep 1967, *Whitmore FRI 4298* (KEP [KEP21786]). **Terengganu:** Dungun, Taman Negara, G Mandi Angin, 9 Jul 1968, *Whitmore FRI 12040* (KEP [KEP21755]); *ibidem*, 13 Jul 1968, *Whitmore FRI 12056* (KEP [KEP21754]); Taman Negara, Kuala Dato, 4 Jul 1968, *Whitmore FRI 8912* (KEP [KEP21763]); Hulu Terengganu, Taman Negara, Kuala Kerbat, 27 Jun 1971, *Whitmore FRI 20271* (KEP [KEP21772]). **Pahang:** Jerantut, Taman Negara, Ulu Sat, Kuala Kelapah, 9 Jul 1970, *Whitmore FRI 15208* (KEP [KEP21846]); Taman Negara, Ulu Sat, Tg. Petir, 11 Jul 1970, *Whitmore FRI 15253* (KEP [KEP21834]); *ibidem*, *Whitmore FRI 15254* (KEP [KEP21815]); *ibidem*, 12 Jul 1970, *Whitmore FRI 15268* (KEP [KEP21860]); Taman Negara, Ulu Sg Sepia, Kuala Aur, 16 Jul 1970, *Whitmore FRI 15290* (KEP [KEP21826]); *ibidem*, *Whitmore FRI 15297* (KEP [KEP21825]); *ibidem*, *Whitmore FRI 15306* (KEP [KEP21809]); *ibidem*, 18 Jul 1970, *Whitmore FRI 15342* (KEP [KEP21827]); *ibidem*, *Whitmore FRI 15356* (KEP [KEP21848]). **Cultivated:** Selangor, Gombak, Forest Research Institute Malaysia, 22 Aug 2017, *Bellot et al. FRI 69208* (K, KEP [KEP262805]).

Notes. The species is similar to *Iguanura geonomiformis*. *Iguanura kelantanensis* generally has much-branched rachillae (4–)8–26, often branching to 2 orders, and thinner rachillae, 1–2 mm wide, whereas *I. geonomiformis* often has spicate inflorescences, and if branched with fewer than 7 rachillae, its rachillae often are very thick at 3–7 mm across. *Iguanura kelantanensis* is distributed on the northern fringe of *Iguanura geonomiformis*.

7. *Iguanura mirabilis* C.K.Lim, Gard. Bull. Singapore 48: 57 (1998). – TYPE: Malaysia, Terengganu, Setiu, Setiu FR, 16 May 1993, *Lim PSM 1448* (holotype KEP [KEP21647, KEP169966, KEP169967 – a single specimen over three sheets]). (Fig. 5)

Small, caespitose, shrubby, understorey palm to 2.5 m tall, stilt-rooted. **Stems** 1.2–1.5 cm diam., internodes 3–4 cm. **Crown shaft** well-developed to 20–35 cm long. **Leaves** 8–10 per stem, spreading, abscising cleanly from stem; leaf sheath 9–15 cm long, covered with reddish brown indumentum, petiole 3–5 cm long, rachis 38–55 cm long, leaves entire-bifid, strongly plicate, secondary veins align ± parallel, 5–8 mm apart, blade 50–84 × 14–22 cm, bifid apically for 13–17 cm. **Inflorescences** mostly interfoliar and infrfoliar, erect, rather robust, 1–3 per stem, 16–40 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 9–14 cm long, rachis 1–7



Fig. 5. *Iguanura mirabilis* C.K.Lim. **A.** Habit. **B.** Inflorescence with fruits. From *FRI 44377*. (Photos: L.G. Saw)

cm long; branched to 1 order, rachillae 2–6, divergent, 15–18 cm long, 2–4 mm wide at base, densely covered with scruffy reddish brown indumentum. **Flowers** loosely arranged along rachillae, in sunken pits, 2–6 mm apart, subtended proximally by a thick cup-like bracteole splitting irregularly apically to 0.75–1 mm high, densely covered by reddish brown indumentum; male flowers: calyx glabrous, lobes c. 1×1 mm, corolla glabrous, lobes c. 4×1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous, lobes c. 1×1 mm, corolla glabrous, lobes c. 4 mm long, surface prominently ribbed. **Fruits** ellipsoid and strongly curved, cream ripening red, $1.5\text{--}2 \times c. 0.6$ cm.

Distribution. Endemic to Setiu FR, Terengganu, only known from the type locality.

Ecology. An understory palm in lowland dipterocarp forest, c. 50 m above sea level. Locally very common as an understory palm.

Provisional IUCN conservation assessment. Critically Endangered (CR B2ab(ii)(iii)). Its EOO was calculated as 2.9 km^2 . The species is only known from a single locality which is currently a forest reserve in the lowlands which is subjected to logging. With such a narrow distribution it is strongly threatened.

Specimens examined. MALAYSIA: **Terengganu:** Setiu, Ulu Setiu FR, 3 Aug 1977, *Dransfield JD 5145* (KEP [KEP21853]); *ibidem*, 8 Oct 1992, *Lim FRI 37653* (KEP [KEP21842]); *ibidem*, 8 Oct 1992, *Lim PSM 1300* (KEP [KEP21649]); *ibidem*, 6 Mar 2002, *Saw FRI 44377* (KEP [KEP115411]); *ibidem*, 6 Dec 1993, *Lim PSM 1379* (KEP [KEP21648]); *ibidem*, 22 Aug 1993, *Lim H1518* (SING). **Cultivated:** Selangor, Gombak, Forest Research Institute Malaysia, 22 Aug 2017, *Bellot et al. FRI 69209* (K, KEP [KEP262388]).

Notes. The inflorescences and fruits are like *Iguanura polymorpha* and it differs from it by its entire-bifid strongly plicate leaves, shorter petioles, and a more robust inflorescence.

8. *Iguanura parvula* Becc., in Hooker, Fl. Brit. India 6: 417 (1892). – TYPE: Malaysia, Perak, *Scortechini s.n.* (lectotype FI [FI014156], designated here; isolectotype SING [SING0151512]).

Iguanura speciosa Hodel, Palm J. 134: 29 (1997); Hodel, Palms Cycads Thailand 100 (1998); Lim, Principes 42: 111 (1998); Hodel in Barfod & Dransfield, Fl. Thailand 11: 417 (2013), **syn. nov.** – *Iguanura polymorpha* Becc. var. *integra* C.K.Lim, Principes 42: 112 (1998). – TYPE: Thailand, SW of Narathiwat, *Hodel & Vatcharkorn 1628* (holotype BK).

Small, caespitose or rarely solitary, shrubby, understorey palm to 4 m tall, stilt-rooted. **Stems** 0.5–1.5 cm diam., internodes 2–5 cm. **Leaves** 8–12 per stem, spreading, abscising cleanly from stem; crownshaft well-developed to 12–25 cm long; leaf sheath 9–15 cm long, covered with reddish brown indumentum, petiole 5–10 cm long, rachis 23–36 cm long, leaves entire-bifid, rarely pinnate with 2 or 3 leaflets per side, when entire-bifid: blade obovate with slightly diverging side margins, 20–42 × 6–8 cm, leaf margin wavy, secondary veins align ± parallel, 4–7 mm apart, bifid apically for 3–4 cm; when pinnate: leaflets 10–11 × 7–11 cm with 6–11 parallel secondary veins per side. **Inflorescences** mostly interfoliar in flower and infrafoliar in fruit, erect to spreading, 1–3 per stem, 16–25 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 8.5–14 cm long, rachis 1–3 cm long; branched to 1 order, rachillae 1–4, wiry, 7–13 cm long, c. 1 mm wide (measured in the middle of rachilla), densely covered with reddish brown indumentum. **Flowers** loosely arranged along rachillae, in slightly sunken pits, 2–5 mm apart, subtended proximally by thick lip-like bracteole to 0.75 mm high; male flowers: calyx glabrous, lobes c. 1.3 mm high, corolla glabrous, lobes c. 3 mm high, surface with prominent parallel veins; female flowers not seen. **Fruits** (unripe) white, globose, c. 0.6 cm across.

Distribution. Peninsular Malaysia (around the Kedah and Perak border, and from Kelantan). Known from six specimens from Peninsular Malaysia. The species is also recorded in southern Thailand.

Ecology. An understory palm in lowland dipterocarp forest, c. 790 m above sea level. Locally common as an understory palm.

Provisional IUCN conservation assessment. Endangered (EN B1ab(iii)). The EOO was calculated as 27 km² and it is only known from two localities. It has a restricted distribution in Peninsular Malaysia, distributed only in forest reserves. Its populations may be subjected to logging and this will pose a threat.

Specimens examined. MALAYSIA: **Kedah:** Kuala Ketang, 20 Apr 1928, *Mhd Haniff SFN 21104* (SING [SING0151497]); Baling, G Inas FR, 18 Aug 1991, *Lim LCK 91/962* (KEP [KEP2346], SING [SING0151498]); *ibidem*, *Lim LCK 91-962* (SING). **Perak:** Larut & Matang, Bintang Hijau FR, Sg Bayur, 24 Jan 1990, *Damahuri FRI 36713* (KEP [KEP21820]). **Kelantan:** Gua Musang, Gua Chawan-Gua Kambing, 6 Nov 2017, *Wan Syafiq et al. FRI 90233* (KEP [275608]).

Notes. *Iguanura parvula* is a diminutive understory palm of lowland forest. It has generally undivided leaves but there is a specimen (*Damahuri FRI 36713*) collected from Bintang Hijau, Perak with pinnate leaves. I have reduced *Iguanura speciosa* to *I. parvula*. Hodel (2013) had already noted the affinity of *Iguanura speciosa* to *I. parvula*. *Iguanura polymorpha* var. *integra* is also reduced to this species being homotypic with *I. speciosa*.

This is a very attractive diminutive palm which could have great horticulture potential.

9. *Iguanura polymorpha* Becc., Malesia 3: 189 (1889); Beccari & Hooker in Hooker, Fl. Brit. India 6: 417 (1892); Ridley, Mat. Fl. Malay. Penins. 2: 152 (1907); Ridley, Fl. Malay Penins. 5: 15 (1925); Whitmore, Principes 14: 124 (1970); Whitmore, Palms Malaya 63 (1973); Lim, Gard. Bull. Singapore 48: 47 (1998); Henderson, Palms of Southern Asia: 114 (2009); Hodel in Barford & Dransfield, Fl. Thailand 11: 417 (2013). – TYPE: [Malaysia], Perak, *Scortechini 318b* (lectotype FI [FI014153], designated here). (Fig. 6)

Iguanura corniculata Becc., Malesia 3: 187 (1886); Beccari & Hooker in Hooker, Fl. Brit. India 6: 417 (1892); Ridley, Mat. Fl. Malay. Penins. 2: 152 (1907); Fl. Malay Penins. 5: 15 (1925); Whitmore, Principes 14: 124 (1970); Whitmore, Palms Malaya 63 (1973); Lim, Gard. Bull. Singapore 48: 44 (1998), **syn. nov.** – TYPE: [Malaysia], Perak, Lalacua, July 1882, *King's Collector 3131* (holotype CAL; isotypes FI [FI014152], K [K000207995]).

Iguanura brevipes Hook.f., Fl. Brit. India 6: 416 (1892). – TYPE: [Malaysia], Perak, Larut, *King's Collector 2029* (lectotype K [K000207992], designated here; isolectotype [K000207991]).



Fig. 6. *Iguanura polymorpha* Becc. **A.** Habit. **B.** Inflorescence with fruits. Cultivated plant in Forest Research Institute Malaysia. (Photos: L.G. Saw)

Iguanura ferruginea Ridl. J. Straits Branch Roy. Asiat. Soc. 41: 40 (1904); Mat. Fl. Malay. Penins. 2: 152 (1907). – TYPE: Malaysia, Perak, Box Hill, October 1899, *Fox SFN 10684* (lectotype SING [SING0151652], designated here; isolectotypes SING [SING0151651, SING0151653]).

Iguanura arakudensis Furtado, Repert. Spec. Nov. Regni Veg. 35: 273 (1934). – TYPE: Malaysia, Penang, Seberang Perai Tengah, Ara Kuda, December 1895, *Ridley 7027* (holotype SING [SING0151654]).

Iguanura thalangensis C.K.Lim, Principes 42(2): 114 (1998), **syn. nov.** – TYPE: Thailand, Phuket, Khao Pra Taew, 1997, *Lim H1995* (holotype BKF; isotype KEP – types were not distributed).

Small, caespitose, shrubby, occasionally solitary, understory palm to 3 m tall, stilt-rooted. **Stems** 0.6–1.0 cm diam., internodes 2.5–3.5 cm. **Crownshaft** well-developed to 26–42 cm long. **Leaves** 7–12 per stem, spreading, abscising cleanly from stem; leaf sheath 8–12 cm long, covered with reddish brown indumentum, petiole 10–23 cm long, rachis 22–50 cm long with entire-bifid blade, (rarely) to (2–)3–6 leaflets

per side, secondary veins diverging towards margin, 0.5–2 cm apart towards margin, leaflets trapezoid, narrowing basally, widening apically, and size progressively larger apically, 8–16 cm long, 1–10 cm wide basally, 4–10(–19) cm wide apically. **Inflorescences** interfoliar and infrafoliar, mainly infrafoliar in mature flowering or in fruiting specimens, erect to spreading, 1–3 per stem, 16–40 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 8–20 cm long, rachis 1–3 cm long for inflorescences more than 2 rachillae; branched to 1 order, rarely to 2 orders, rachillae 1–4(–16), not wiry, 9–25 cm long, 2–4 mm wide (measured in the middle of the rachilla), densely covered with caducous scruffy brown indumentum. **Flowers** loosely arranged along rachillae, in sunken pits, cream, 2–4 mm apart, subtended proximally by a thick triangular cup-like bracteole to 2 mm high; male flowers: calyx glabrous, lobes c. 1 × 1 mm, corolla glabrous, lobes 3–4 × c. 1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous, lobes c. 1 × 1 mm, corolla glabrous, lobes c. 4 mm long, surface prominently ribbed. **Fruits** ellipsoid and slightly to strongly falcate, occasionally ovoid, cream ripening red, 1.7–2.2 × 0.4–0.6 cm.

Distribution. Northern Peninsular Malaysia, recorded in mainland Penang, Kedah, Perak, Pahang, Terengganu and Kelantan. Also recorded in Peninsular Thailand and Sarawak.

Ecology. An understory palm in lowland to lower montane forest and often in forest around the base of limestone hills, at elevation 30–1500 m above sea level. Locally common.

Provisional IUCN conservation assessment. Near Threatened (NT). Its EOO was calculated as 42,370 km².

Specimens examined. MALAYSIA: **Kedah:** Sik, Ulu Muda FR, 26 Mar 2003, *Chee & Mustapa FRI 47283* (KEP [KEP83523], SING [SING0103828]). **Penang:** Seberang Perai, 15 Aug 1994, *Lim H1672* (KEP [KEP2347]); Nibong Tebal, 15 Oct 2018, *Saw et al. JKB 2391* (KEP [KEP281202], PBG). **Perak:** Batang Padang, Bujang Malacca, 1898, *Ridley 9803* (SING [SING0151523]); *ibidem*, Dec 1896, *Curtis 3164* (SING [SING0001358]); G Batu Puteh, *Wray Jr. 396* (SING [SING0151659]); Kpg Sekam, 5 Sep 1982, *Ave 132* (L [L.1407173]); Hulu Perak, Belum FR, 31 May 1994, *Lim H1671* (KEP [KEP2348]); *ibidem*, 27 Apr 1994, *Lim H1643* (KEP [KEP2349]); Belum FR, Kuala Sg Lebur, 31 May 1998, *Kamarudin et al. FRI 42375* (KEP [KEP21593], SING [SING0103830]); Belum FR, Sg Kabu, 4 Jun 1998, *Kamarudin et al. FRI 42345* (KEP [KEP21594], L [L.4179593]); Belum FR, Sg Kejar, 19 Jun 2007, *Syahida Emiza & Kueh FRI 55170* (KEP [KEP143135]); *ibidem*, 20 Jun 2007, *Syahida Emiza & Kueh FRI 55195* (KEP [KEP143152]); Belum FR, Sg Tiang, 10 Sep 2015, *Ummul Nazrah et al. FRI 83484* (KEP [KEP255545]); Chegar Daras, Fort Tapong, 25 Jan 1971, *Whitmore FRI 15762* (KEP [KEP21636]); Padang Chong FR, 23 May 1937, *Furtado s.n.* (SING [SING0151513]); Sg Perak, Kuala Tiang, Jeram Benuas, 24 Jan 1971, *Whitmore FRI 15726* (KEP [KEP21629]); Sg Perak, Kuala Kendrong, 24 Jan 1971, *Whitmore FRI 15741* (KEP [KEP21634]); Kinta, Tambun, 1898, *Ridley s.n.* (SING [SING0151507]); Tambun, Hot

Springs, 16 Feb 2011, *Saw FRI 48268* (K, KEP [KEP185667], L); Kuala Kangsar, G Kanthan, 22 May 2013, *Tan et al. FRI 78067* (K, KEP [KEP232409], SAN); *ibidem*, 20 Jun 2013, *Tan et al. FRI 78105* (KEP [KEP232425]); *ibidem*, 27 Mar 2017, *Rafidah et al. FRI 86678* (KEP [KEP265214]); G Pondok, 12 Mar 1971, *Samsuri SA 604* (SING [SING0151518]); *ibidem*, 7 Jun 1930, *Henderson SFN 23792* (SING [SING0151519]); Padang Rengas, 15 Jun 1924, *Burkill & Mhd Haniff SFN 13577* (SING [SING0151522]); Maxwell's Hill, 18 Sep 1949, *Sinclair & Kiah SFN 38795* (SING [SING0151527]). **Kelantan:** Sg Ketch, 11 Feb 1924, *Mhd Nur & Foxworthy SFN 12052* (SING [SING0151660]); Gua Musang, Batu Baloh, 28 Mar 2018, *Ummul Nazrah et al. FRI 88441* (KEP [KEP270098]); *ibidem*, *Wan Syaifiq et al. FRI 91546* (KEP [284971]); Batu Baloh, Batu Berangin, 27 Mar 2018, *Kiew et al. FRI 91651* (K, KEP [KEP284333]); G Renayang, 8 May 1990, *Kiew & Anthonysamy RK 2861* (KEP [KEP21606]); Gua Kambing, 6 Nov 2017, *Ummul Nazrah et al. FRI 92043* (KEP [KEP267908]); Gua Musang, 13 Aug 1929, *Henderson SFN 22685* (SING [SING0151640]); Gua Ninik, 21 Oct 1927, *Henderson SFN 19504* (SING [SING0151639]); Kuala Betis, 15 Feb 2003, *Kiew RK 5257* (KEP [KEP109730], SING [SING0151662]); *ibidem*, 18 Jul 2017, *Mhd Hairul & Kiew FRI 82321* (K, KEP [KEP270730], SING); Kuala Betis, G Biol, 29 Mar 2018, *Rafidah et al. FRI 90393* (KEP [KEP273333]); Sg Bering, 11 May 1990, *Kiew & Anthonysamy RK 2909* (KEP [KEP21603]); *ibidem*, *Kiew & Anthonysamy RK 2908* (KEP [KEP21602]); Sg Lebir, Kuala Ternya, 4 Sep 1967, *Whitmore FRI 4291* (KEP [KEP21581]); *ibidem*, *Whitmore FRI 4297* (KEP [KEP21583]); Sg Nenggiri, Kuala Jenera, 17 Jul 1967, *Whitmore FRI 4048* (KEP [KEP21635]); Taman Negara, Kuala Koh, 30 Mar 1995, *Abdul Latiff et al. ALM 4158* (KEP [75053]); Ulu Sg Ketch, 19 Feb 1924, *Mhd Nur s.n.* (SING); *ibidem*, 17 Feb 1924, *Mhd Nur s.n.* (SING [SING0151641]); Jeli, Gua Maka, 13 Sep 2017, *Aliaa Athirah et al. FRI 83683* (KEP [KEP266352]); Gua Setir, 12 Jan 2010, *Rafidah & Kueh FRI 64427* (KEP [KEP214194]); *ibidem*, 14 Sep 2017, *Aliaa Athirah et al. FRI 83699* (KEP [KEP266580]); *ibidem*, 14 Sep 2017, *Ummul Nazrah et al. FRI 87538* (KEP [KEP272152], SAN); Jeli FR, 2 Apr 1967, *Rahim KEP 104265* (KEP [KEP21582]); *ibidem*, 30 Jun 1968, *Whitmore FRI 6528* (KEP [KEP21637]); *ibidem*, 9 Oct 1992, *Lim PSM 1302* (KEP [KEP21816]); Kota Bharu, *Gwynne-Vaughan s.n.* (L [L.1407253]); Kuala Krai, Gua Pagar, 30 Mar 2018, *Cheah et al. FRI 86941* (KEP [KEP272053], SING); Sg Durian FR, 8 Aug 1970, *Evans RE 6970* (KEP [KEP21624]); *ibidem*, *Evans RE 6770* (KEP [KEP21623]); *ibidem*, *Evans RE 7070* (KEP [KEP21622]); *ibidem*, *Evans RE 6670* (KEP [KEP21621]); *ibidem*, *Evans RE 6870* (KEP [KEP21614]); Machang, Bt Baka FR, 24 Feb 1974, *Mhd Shah & Ahmad Shukor MS 3200* (SING); *ibidem*, *Mhd Shah & Ahmad Shukor MS 3200A* (SING); Bt Baka, Sg Jeram Tinggi, 24 Feb 1974, *Mhd Shah & Ahmad MS 3200* (KEP [KEP5661], SING [SING0151528]); Temangan V.J.R., 9 Apr 1973, *Kochummen FRI 16707* (KEP [KEP21833]); Ulu Sat FR, Comp 66, 5 Aug 1970, *Evans RE 6070* (KEP [KEP21616]); *ibidem*, *Evans RE 6170* (KEP [KEP21615]); Pasir Puteh, Chabang Tongkat FR, 5 Aug 1970, *Evans RE 5970* (KEP [KEP21626]); *ibidem*, *Evans RE 5870* (KEP [KEP21617]); *ibidem*, 23 May 2001, *Sam & Mustapa FRI 46537* (KEP [KEP75647]); Tanah Merah, Kemahang, 27 Jun 1968, *Whitmore FRI 8875* (KEP [KEP21630]). **Terengganu:** Besut, Bt Bintang, 9 May 1988, *Kiew RK 2705* (KEP [KEP21605]); G Tebu FR, 13 Aug 1970, *Evans RE 8170* (KEP [KEP21613]); *ibidem*, *Evans RE 7870* (KEP [KEP21612]); *ibidem*, *Evans RE 8070* (KEP [KEP21611]); *ibidem*, 15 Jun 1999, *Saw FRI 44964* (KEP [KEP71145]); *ibidem*, 12 Sep 1955, *Sinclair & Kiah SFN 40821* (SING [SING0151526]); Kpg La, 9 May 1988,

Kiew RK 2701 (KEP [KEP21604]); Hulu Terengganu, Tasik Kenyir, 19 Nov 2008, *Kamarul Hisham et al. FRI 59344* (KEP [KEP159107, KEP159108], SAN); Kuala Terengganu, Kuala Terengganu-Besut Rd, 12 Feb 1989, *Dransfield et al. JD 6504* (KEP [KEP21849]); Setiu, Sg Tong FR, 5 Jun 1962, *Meijer & Yong KEP 94780* (KEP [KEP21584]). **Pahang:** Sg Gesoh, 7 Sep 1931, *Jaamat SFN 28264* (SING [SING0151517]); Jerantut, Taman Negara, Sg Cheruai, Gua Gajah, 6 May 1997, *Chua et al. FRI 40610* (KEP [KEP21627]); Lipis, Gua Gunting, 29 May 2013, *Ummul Nazrah et al. FRI 78345* (KEP [KEP249091]); Merapoh, 4 Apr 2014, *Mhd Hairul et al. FRI 79881* (K, KEP [KEP243559]); Merapoh, G Gajah, 13 Oct 2017, *Wan Syafiq et al. FRI 90148* (K, KEP [275605]); Merapoh, Gua Bekong, 5 Aug 1996, *Saw FRI 44747* (KEP [KEP28681]); *ibidem*, *Saw FRI 44748* (KEP [KEP28688]); Merapoh, Gua Tanggang, 6 Aug 1996, *Saw FRI 44770* (KEP [KEP28683]); Raub, Bt Serdam, Oct 1931, *Henderson SFN 25059* (SING [SING0151491]).

Notes. *Iguanura polymorpha* is a variable species. Its habit ranges from solitary to caespitose, the leaves are very variable in size, and the leaflets vary from entire-bifid to pinnate with up to six pairs of leaflets. The inflorescence is branched almost all to 1 order, spicate to branched to four or five rachillae. Specimens from Belum FR (Royal Belum S.P.) have more-branched inflorescences, 5–10(–16) rachillae (*FRI 42345*, *FRI 42375*, *Lim L1643*, *L1671*). *Lim L1671* was recorded as branching to 16 rachillae, the herbarium specimen is branched to 10 rachillae. I have included these variations within the species as their rachillae were not wiry but thick, c. 2 mm across, characteristic of *Iguanura polymorpha*. The much-branched rachilla is similar to *Iguanura divergens* (see discussion under that species for differences).

I have reduced *Iguanura corniculata* to *I. polymorpha*. *Iguanura corniculata* was differentiated from *I. polymorpha* by its spicate inflorescences and falcate fruits. However, spicate inflorescences with falcate fruits of *Iguanura polymorpha* were observed in a few localities in Penang (Bukit Panchor State Park, Seberang Perai Selatan, *Lim H1672* (KEP), *Saw et al. JKB 2391* (KEP)), Perak (Gunung Kanthan, *Tan et al. FRI 78067* (KEP), *Rafidah et al. FRI 86678* (KEP)), Pahang (Bukit Serdam, Raub, *Henderson 25059* (KEP), Gua Gajah, Merapoh, *Mhd Hairul et al. FRI 79881* (KEP)) and Kelantan (Sungai Bring, *Kiew RK 2908* (KEP), Sungai Durian, *Evans 6870* (KEP)). The distribution of this form is within the range of *Iguanura polymorpha*. In Gunung Kanthan, Perak, a branched form has been collected from the same area as the spicate form (*Tan et al. FRI 78105* (KEP)). *Whitmore FRI 4291* (KEP) is a specimen with both a spicate and a branched infructescence on the same stem. The specimen *Ummul et al. FRI 78345* (KEP) from Gua Gunting, Pahang, has both a spicate inflorescence and bifurcating inflorescences under the same number. The type specimen of *Iguanura corniculata* was collected from Selama, Perak.

I have reduced *Iguanura thalagensis* to *I. polymorpha*. This entity has a spicate to bifurcating inflorescence with rather thin rachillae and falls within the variation of *Iguanura polymorpha*. Lim (1988) listed the types as being distributed to BKF (holotype) and KEP (isotype) but as of 2022 this has not been done. The decision to synonymise the taxon into *Iguanura polymorpha* is based on the photographs of live plants provided in the publication (Lim, 1998b, plates 7, 8).

There is an editorial error in Ridley's (1925: 15) citation of *Iguanura ferruginea* Becc. in the *Flora of the Malay Peninsula*. He had unwittingly used the description of *Licuala ferruginea* Becc. rather than *Iguanura ferruginea*. Lim (1998a) had noted this error. The description of the species, its distribution and previous literature citations all refer to *Licuala ferruginea*.

10. *Iguanura ruthiae* Saw, sp. nov.

Similar to *Iguanura geonomiformis* (Griff.) Mart. but differs by its glabrescent and rather thin light brown rachillae (1–2.5 mm wide) with loosely arranged or laxly arranged flowers. *Iguanura geonomiformis* has rachillae that are thicker (3–7 mm wide) and densely covered with a reddish brown indumentum and tightly arranged flowers along the rachilla. – TYPE: Pahang, Krau Wildlife Reserve, Kuala Lompat, 28 April 1970, *Evans RE 2870* (holotype KEP [KEP21713, KEP171459 – a single specimen over two sheets]). (Fig. 7, 8)

Solitary or caespitose, shrubby, understorey palm to 2 m tall, stilt-rooted. **Stems** c. 1.5 cm diam., internodes c. 2 cm. **Crownshaft** to 26 cm long. **Leaves** 6–8 per stem, spreading, not abscising but marcescent; covered with a reddish brown indumentum, blade pinnate, leaf sheath 12–17 cm long, petiole 12–30 cm long, rachis 44–72 cm long, leaflets 4–6(–17) per side, parallelogram-shaped, apical pair often widest, 16–28 × (0.7–)4–8 cm, secondary veins align ± parallel with slight taper towards base, 0.5–1.5 cm apart. **Inflorescences** interfoliar, spreading then pendent, 46–112 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle 23–67 cm long, rachis 0–15 cm long; branched only 1 order when not spicate, rachillae 1–6, arranged tightly together along rachis axis when not spicate, 23–58 cm long, 1–2.5 mm wide in the middle of rachilla, glabrescent or covered with reddish brown indumentum becoming glabrescent, drying light brown. **Flowers** loosely arranged along rachillae, in deep pits, 5–15 mm apart; male flowers: calyx glabrescent to glabrous, lobes c. 2 × 1.5–2 mm, corolla glabrous, lobes c. 4 × 1.5–2 mm, surface with prominent parallel veins; female flowers not seen. **Fruits** ovoid, pale green to cream ripening pink or red, 1–1.8 × 0.6–1 cm.

Distribution. Endemic to Pahang, distributed in west central Pahang, e.g., Krau Wildlife Reserve and Fraser's Hill.

Ecology. Lowland dipterocarp to lower montane forests, recorded at 75–1400 m elevation. In the lowlands, it often dominates swamps and areas beside streams.

Provisional IUCN conservation assessment. Near Threatened (NT). Although its EOO (9,242 km²) could potentially qualify this species as Vulnerable, it is known from more than 10 populations and is rather common where it is distributed. There are populations at higher elevation where the species will be protected.

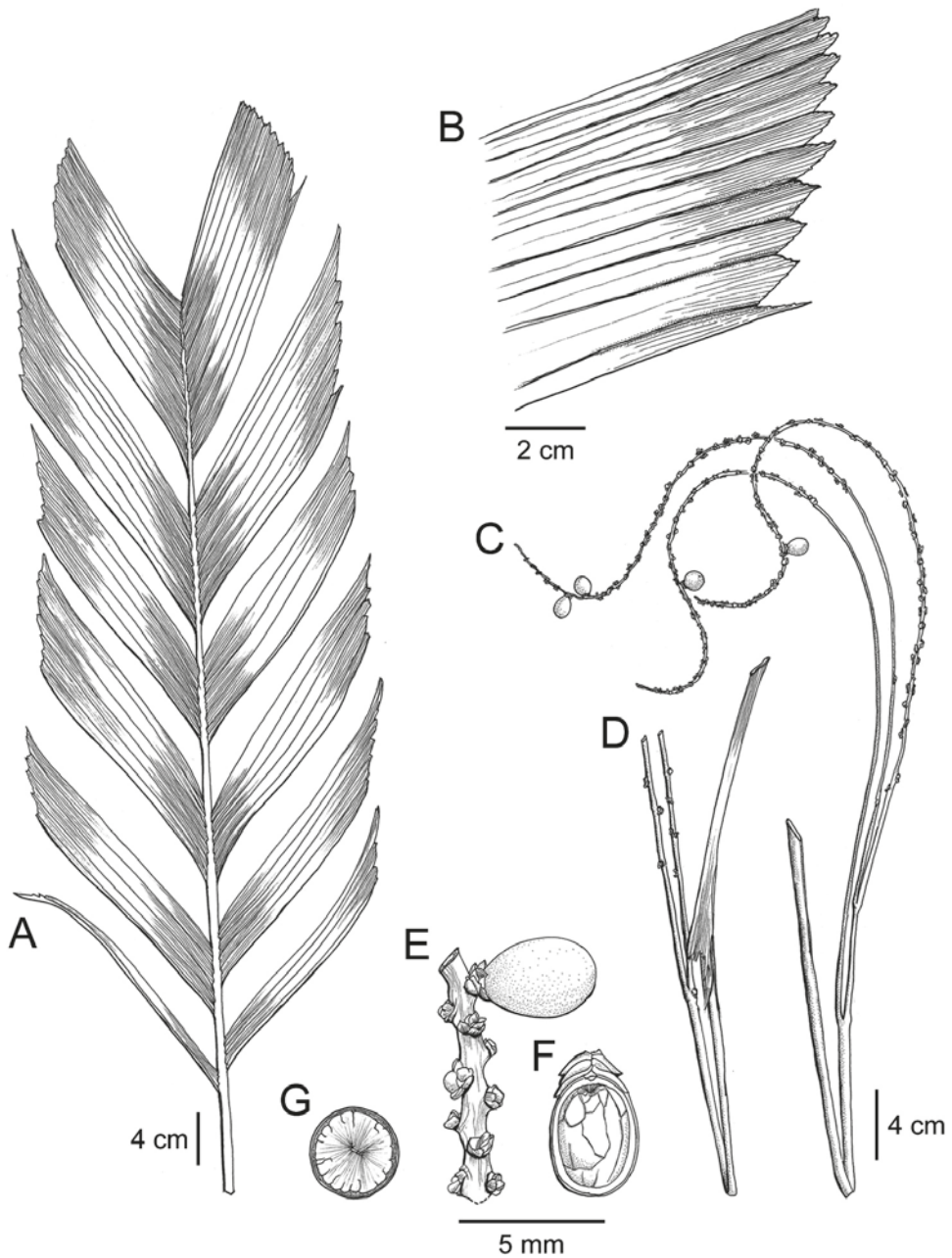


Fig. 7. *Iguanura ruthiae* Saw. **A.** Upper portion of a frond. **B.** Leaf segment margin. **C.** Inflorescence. **D.** Low portion of inflorescence, showing peduncle and prophyll. **E.** Portion of rachilla with a fruit. **F.** Lateral section of a fruit. **G.** Transverse section of a fruit. All drawn from *Evans RE 2870*. Drawn by Mohamad Aidil Nordin.



Fig. 8. *Iguanura ruthiae* Saw. Crown showing infructescence. (Photo: L.G. Saw)

Additional specimens examined. MALAYSIA: **Pahang:** P. Tawar, Kadandong, 1891, *Ridley 3514* (SING [SING0249868]); Bentong, Karak FR, 14 Jul 1924, *Best SFN 14101* (SING [SING0240581]); *ibidem*, *Best SFN 13872* (SING [SING0240583]); Bentung, Genting Sempah, 9 Jan 1970, *Evans RE 170* (KEP [KEP21705]); Jerantut, 24 Nov 1924, *Burkill & Mhd Haniff SFN 16079* (SING [SING0249834]); Kota Gelanggi, 1891, *Ridley s.n.* (SING [SING0249876]); Taman Negara, Sg Tahan, 11 Aug 1967, *Palmer 14* (SING [SING0151735]); Taman Negara, Tahan Woods, 25 Jul 1891, *Ridley s.n.* (SING [SING0151704]); Karak, 12 Mar 1966, *Palmer 14-3* (SING [SING0151734]); Lipis, Chegar Perah, Bt Chemaga, 19 Oct 1932, *Henderson SFN 19483* (SING [SING0249850]); Kuala Lipis, Aug 1899, *Butter 11636* (SING [SING0240588]); Merapoh, Gua Gajah, 4 Apr 2014, *Mhd Hairul et al. FRI 79878* (KEP [KEP270726]); Ulu Terenggun FR, 24 Aug 1992, *Saw & Kamarudin FRI 37593* (KEP [KEP21914]); Raub, Fraser's Hill, 6 Jan 1968, *Whitmore FRI 4590* (KEP [KEP21552]); *ibidem*, 8 Apr 1970, *Evans RE 1770* (KEP [KEP21876]); *ibidem*, 20 Mar 1929, *Holtum SFN 21535* (SING [SING0151693]); *ibidem*, 10 Mar 1966, *Palmer 9-3* (SING [SING0151710]); *ibidem*, *Palmer 4-3* (SING [SING0151709]); Fraser's Hill, Red Cross Path, 8 Apr 1970, *Evans RE 1970* (KEP [KEP21868]); *ibidem*, 11 Oct 1969, *Evans RE 669* (KEP [KEP21882]); Fraser's Hill, Bishop's trail, 24 Apr 1970, *Evans RE 3870* (KEP [KEP21731]); Fraser's Hill, Telecom station, 13 Mar 1986, *Anthonyamy SA 480* (KEP [KEP21747]); Raub, 11 Nov 1924, *Burkill & Mhd Haniff SFN 16899* (SING [SING0240592]); Sg Simpan, 10 Mar 1970, *Evans RE 1670* (KEP [KEP21888]); *ibidem*, 15 Apr 1970, *Evans RE 2170* (KEP [KEP21675]); *ibidem*, *Evans RE*

2370 (KEP [KEP21714]); *ibidem*, *Evans RE 2270* (KEP [KEP21711]); *ibidem*, 10 Mar 1970, *Evans RE 1570* (KEP [KEP21891]); *ibidem*, 16 Apr 1970, *Evans RE 2570* (KEP [KEP21777]); Temerloh, G Senyum, 1 Aug 1929, *Henderson SFN 22334* (SING [SING0240585]); G Senyum, 9 Feb 2011, *Saw FRI 48258* (KEP [KEP185660]); Krau W.R., 14 Mar 1967, *Whitmore FRI 3484* (KEP [KEP21573]); *ibidem*, 19 Oct 1999, *Chua et al. FRI 40860* (KEP [KEP64742]); *ibidem*, 10 Nov 1999, *Damahuri et al. FRI 45303* (KEP [KEP110072]); *ibidem*, 4 Oct 2000, *Saw FRI 44310* (KEP [KEP115407]); *ibidem*, 12 Jul 2007, *Mhd Hairul et al. FRI 58919* (KEP [KEP141036]); Krau W.R., Bt Tapah, 9 Nov 1969, *Whitmore FRI 12824* (KEP [KEP21571]); *ibidem*, *Whitmore FRI 12829* (KEP [KEP21572]); Krau W.R., G Benom, 16 Mar 1967, *Whitmore FRI 3221* (KEP [KEP21549]); *ibidem*, *Whitmore FRI 3226* (KEP [KEP21575]); *ibidem*, 15 Nov 2009, *Mhd Hairul et al. FRI 69919* (KEP [KEP187041]); Krau W.R., Kuala Lompat, 12 Nov 1965, *Whitmore FRI 12865* (KEP [KEP21563]); *ibidem*, 18 Mar 1975, *Yap SK 571* (KEP [KEP21566]); *ibidem*, 20 Dec 1969, *Evans RE 1569* (KEP [KEP21690]); *ibidem*, 12 Nov 1969, *Evans RE 1069* (KEP [KEP21703]); *ibidem*, 20 Dec 1969, *Evans RE 1369* (KEP [KEP21704]); *ibidem*, *Evans RE 1769* (KEP [KEP21708]); *ibidem*, *Evans RE 2970* (KEP [KEP21712]); *ibidem*, 19 Apr 1970, *Evans RE 2770* (KEP [KEP21661]); *ibidem*, 12 Nov 1969, *Evans RE 869* (KEP [KEP21662]); *ibidem*, 20 Dec 1969, *Evans RE 1669* (KEP [KEP21806]); Krau W.R., Sg Lompat, 21 Feb 2001, *Damahuri & Ayau FRI 46252* (KEP [KEP98223]), L [L.4182497]; Kuala Bera, 12 Jun 1913, *Murdoch SFN 174* (SING [SING0151687]); *ibidem*, 12 Jun 1913, *Burn-Murdoch SFN 174* (SING [SING0240604]); Lanchang, Sep 1986, *Kiew UPM 4036* (KEP [KEP21677]); *ibidem*, *Kiew UPM 4037* (KEP [KEP21686]); *ibidem*, *Kiew UPM 4038* (KEP [KEP21687]); Titi Bungor, 19 Mar 1923, *Henderson 10553* (SING [SING0240628]); *ibidem*, 18 Mar 1928, *Henderson 10691* (SING [SING0249832]). **Selangor:** Hulu Selangor, Semangkok Pass, May 1904, *Ridley s.n.* (SING [SING0151694]); *ibidem*, Jul 1897, *Ridley s.n.* (SING [SING0151737]).

Notes. The species is like *Iguanura geonomiformis* with its similar inflorescence structure, i.e., its interfoliar inflorescences, spreading then pendent orientation and the rachillae that are tightly held together along the rachis.

The species epithet is named after the collector, Ruth Kiew (née Ruth Evans).

11. *Iguanura wallichiana* (Mart.) Benth. & Hook.f. ex Becc., *Malesia* 3: 100 (1886). – *Areca wallichiana* Mart., *Hist. Nat. Palm.* 3: 178 (1838). – TYPE: [Malaysia], Penang, 1822, *Porter s.n.* [EIC 8600] (lectotype K [K000207987], designated here).

Iguanura wallichiana (Mart.) Benth. & Hook.f. ex Becc. var. *minor* Becc. in Hooker, *Fl. Brit. India* 6: 416 (1892). – TYPE: [Malaysia], Perak, Gopeng, August 1880, *King's Collector 454* (lectotype FI [FI014146], designated here).

Iguanura diffusa Becc. in Beccari & Hooker, *Fl. Brit. India* 6: 416 (1892); Ridley, *Mat. Fl. Malay. Penins.* 2: 152 (1907); Lim, *Gard. Bull. Singapore* 48: 27 (1998), **syn. nov.** – TYPE: [Malaysia], Perak, Gunung Ijok, August 1884, *Scortechini 1181* (lectotype FI [FI014155], designated here).

Iguanura multifida Hodel, Palm J. 136: 8 (1997); Lim, Principes 42: 8 (1998). – TYPE: Thailand, Betong, 800 m, *Hodel & Vatcharkorn 1745* (holotype BK).

Iguanura wallichiana Benth. & Hook.f. ex Becc. var. *rosea* C.K.Lim, Gard. Bull. Singapore 48: 23 (1998), **syn. nov.** – TYPE: Malaysia, Perak, Belukar Semang, 2 February 1992, *Lim H1126* (holotype KEP [KEP21540, KEP171509, KEP171510 – a single specimen over three sheets]).

Iguanura piahensis C.K.Lim, Gard. Bull. Singapore 48: 31 (1998), **syn. nov.** – TYPE: Malaysia, Perak, Piah FR, 3 September 1992, *Lim H1266* (holotype KEP [KEP21644, KEP169958, KEP169959 – a single specimen over three sheets]); isotypes KEP [KEP169960, KEP169961], KEP [KEP169962, KEP169963], KEP [KEP169964, KEP169965]).

Small, solitary, or caespitose, shrubby, understorey palm to 3 m tall, stilt-rooted. **Stems** 1.2–2.5 cm diam., internodes 1.2–2.5 cm. **Crown shaft** well-developed to 30–45 cm long. **Leaves** 6–16 per stem, spreading, not abscising but marcescent; entire-bifid or pinnate, 3–16 leaflets per side, leaf sheath 12–25 cm long, covered with reddish brown indumentum, petiole 7–55(–80) cm long, rachis 65–100 cm long, leaflets when entire-bifid: blade 31–131 × 14–75 cm, obovate with slightly diverging side margins and bifid tip; when pinnate: parallelogram, apical pair widest, leaflets 3–14, (15–)30–48 × 2–12 cm, secondary veins align ± parallel with slight taper towards base, 0.5–1.3 cm apart. **Inflorescences** interfoliar, erect to spreading, 1–3 per stem, 35–125 cm long, enclosed by a papery bicarinate prophyll and a rachis bract, peduncle (23–)40–94 cm long, rachis (3–)5–14 cm long; branched to mostly 1 order, occasionally to 2 orders, rachillae 4–10, (9–)20–55 cm long, 1–2.5 mm wide in the middle of rachillae, densely covered with caducous scruffy brown indumentum, becoming glabrescent. **Flowers** loosely arranged along rachillae, in shallow pits, cream, 3–10 mm apart; male flowers: calyx glabrous, lobes c. 1.5 × 1 mm, corolla glabrous, lobes c. 4 × 1.5 mm, surface with prominent parallel veins; female flowers: calyx glabrous, lobes c. 1.5 × 1 mm, corolla glabrous, lobes c. 2.5 mm long, surface prominently ribbed. **Fruits** ellipsoid, cream ripening red, 1–2.2 × 0.7–1.2 cm.

Distribution. Northern Peninsular Malaysia, recorded in Penang, Perlis, Kedah, Langkawi Island, Perak, Pahang, Terengganu, and Kelantan. Also recorded in Peninsular Thailand and Sumatra, Indonesia.

Notes. Two varieties can be recognised for Peninsular Malaysia: *Iguanura wallichiana* var. *wallichiana*, widespread in northern Peninsular Malaysia and Peninsular Thailand, and *I. wallichiana* var. *major*, endemic to Perak.

Key to varieties

- 1a. Leaves segmented; inflorescences wiry to robust; fruits generally smaller, 1–1.3 × 0.7–0.8 cm *I. wallichiana* var. *wallichiana*
 1b. Leaves entire-bifid; inflorescences very robust; fruits generally larger, 1.3–2.2 × 0.8–1.2 cm *I. wallichiana* var. *major*

11.1 *Iguanura wallichiana* var. *wallichiana* (Fig. 9)

Caespitose or solitary to 3 m tall. **Leaves** variously segmented; petiole 11–55(–80) cm long, rachis 65–100 cm long, 3–16 leaflets per side. **Inflorescences** wiry to robust. **Fruits** 1–1.3 × 0.7–0.8 cm.

Distribution. Northern Peninsular Malaysia, recorded in Penang, Perlis, Kedah, Langkawi Island, Perak, Pahang, Terengganu, and Kelantan. Also recorded in Peninsular Thailand and Sumatra, Indonesia. This is the most widespread *Iguanura*.

Ecology. An understory palm in lowland to hill dipterocarp forest, at elevation 5–900 m above sea level. Locally common.

Provisional IUCN conservation assessment. Least Concern (LC). Its EOO was calculated as 56,536 km².

Specimens examined. MALAYSIA: **Perlis:** Titi Tinggi, Mata Ayer FR, 20 Apr 1995, *Saw et al. FRI 40025* (KEP [KEP21819]). **Kedah:** Baling, Cherok Baubak, 23 Feb 1945, *Moh 10100* (KEP [KEP21759]); Ulu Legong, 14 Apr 2006, *Imin et al. FRI 50650* (KEP [KEP115347]); Kulim, G Bongsu FR, 6 Mar 2019, *Ahmad Firdaus et al. FRI 92846* (KEP [KEP278723]); Langkawi, G Raya FR, 6 May 1996, *Saw FRI 44595* (K, KEP [KEP21785], SAN, SAR); ibidem, 13 Mar 2007, *Siti Munirah et al. FRI 55300* (KEP [KEP143273, KEP143274], SAN); Teluk Datai, 20 Feb 2009, *Rosdi et al. FRI 59932* (KEP [KEP162145]); Sik, Ulu Muda FR, 26 Mar 2003, *Chee & Mustapa FRI 47285* (KEP [KEP83529]); Weng, 2 Jun 1937, *Furtado 33071a* (SING [SING0151727]); ibidem, *Furtado 33070* (SING [SING0151751]); ibidem, *Furtado 33071* (SING [SING0151753]). **Penang:** s.l., *Curtis s.n.* (SING [SING0151758]); ibidem, Dec 1895, *Ridley s.n.* (SING [SING0151761]); ibidem, *Wallich Cat. s.n.* (M [M0208163]); ibidem, *Wallich Cat. s.n.* (M [M0209161]); Seberang Perai Tengah, Ara Kuda, Dec 1895, *Ridley 7022* (SING [SING0151760]); ibidem, *Ridley 7108* (SING [SING0240614]); Timur Laut, Penang Hill, 1899, *Ridley 10344* (SING [SING0151740]); ibidem, Dec 1895, *Ridley 7101* (SING [SING0249870]). **Perak:** s.l., Mar 1911, *Anderson 170* (SING [SING0151747]); ibidem, *Unknown s.n.* (SING [SING0240630]); Bt Kapayang, Jul 1904, *Ridley s.n.* (SING [SING0249847]); Bagan Serai, Kpg Changkat Lobak, 4 Dec 1938, *Spare SFN 36723* (SING [SING0240596]); Batang Padang, Bt Tapah FR, 9 Jul 1966, *Ng FRI 1288* (KEP [KEP21766]); ibidem, 7 Mar 1991, *Saw FRI 37380* (KEP [KEP21749]); G Besout FR, 23 Aug 1975, *Putz FRI 23686* (KEP [KEP21750]); Kroh FR, 2 Jul 1970, *Evans RE 5370* (KEP [KEP21874]); ibidem,



Fig. 9. *Iguanura wallichiana* (Mart.) Benth. & Hook.f. ex Becc. var. *wallichiana*. **A.** Habit. **B.** Rachillae with an open staminate flower. From *FRI 80065*. (Photos: L.G. Saw)

Evans RE 5576 (KEP [KEP21865]); *ibidem*, *Evans RE 5670* (KEP [KEP21883]); Tapah, Jun 1890, *Ridley s.n.* (SING [SING0151744]); *ibidem*, *Wray 1413* (SING [SING0249844, SING0151745]); *ibidem*, Oct 1894, *Curtis s.n.* (SING [SING0240612]); *ibidem*, Nov 1900, *Ridley s.n.* (SING [SING0240619]); *ibidem*, *Ridley 14100* (SING [SING0240629]); *ibidem*, Oct 1894, *Curtis s.n.* (SING [SING0249836]); Hilir Perak, Changkat Jong FR, 10 Sep 1967, *Ng FRI 5661* (KEP [KEP21764]); Bintang Hijau FR, 23 Jan 1990, *Khairuddin FRI 38309* (KEP [KEP21843]); *ibidem*, 14 Jul 1966, *Whitmore FRI 611* (KEP [KEP21805], SING [SING0249838]); *ibidem*, 30 Jul 1970, *Everett FRI 14529* (KEP [KEP21771]); Grik, 26 Jul 1936, *Corner SFN 31637* (SING [SING0240594]); Krunei State Land, 30 Jun 1970, *Evans RE 4870* (KEP [KEP21873]); *ibidem*, *Evans RE 4970* (KEP [KEP21870]); *ibidem*, *Evans RE 4670* (KEP [KEP21880]); *ibidem*, *Evans RE 4770* (KEP [KEP21718]); Lenggong, Ulu Perak, 5 Aug 1925, *Hamid FMS 10383* (KEP [KEP21796]); Padang Chong FR, 23 May 1937, *Furtado 33008* (SING [SING0151755]); *ibidem*, 19 Jun 1970, *Evans RE 3670* (KEP [KEP21863]); *ibidem*, *Evans RE 3570* (KEP [KEP21866]); *ibidem*, *Evans RE 37A70* (KEP [KEP21889]); Sg Perak, Kuala Tiang, Jeram Benuas, 24 Jan 1971, *Whitmore FRI 15731* (KEP [KEP21774]); *ibidem*, 27 Jan 1971, *Whitmore FRI 15808* (KEP [KEP21783]); Temengor, Jul 1909, *Ridley 14710* (SING [SING0249837, SING0249845]); Temengor Dam, Sg Singor, 8 Nov 1993, *Saw FRI 39939* (KEP [KEP21652]); Temengor FR, Sg Halong, 9 Nov 1993, *Saw FRI 39947* (KEP [KEP21650]); Temengor FR, Banding, 6 Oct 2012, *Ummul Nazrah & Mhd Nazri FRI 72795* (KEP [KEP263734]); Temengor, Sg Temengor, 1 Jul 1970, *Evans RE 5170* (KEP [KEP21879]); *ibidem*, *Evans RE 5070* (KEP [KEP21719]); *ibidem*, *Evans RE 5270* (KEP [KEP21871]); Kinta, Bt Kinta FR, 10 Aug 1999, *Saw FRI 44266* (KEP [KEP71171]); Bujang Melaka FR, 1898, *Ridley 9802* (SING [SING0249842]); Gopeng, 9 Jun 1937, *Furtado SFN 33089* (KEP [KEP21758], SING [SING0151724]); Kuala Kangsar, Chior FR, Cpt. 2, 8 Oct 1967, *Ng FRI 5792* (KEP [KEP21790]); Kledang Saiong FR, 5 May 1931, *Symington FMS 25647* (KEP [KEP21799]); *ibidem*, 26 Mar 1931, *Symington FMS 25738* (KEP [KEP21798]); *ibidem*, 4 Feb 1970, *Evans RE 670* (KEP [KEP21881]); *ibidem*, 11 Aug 1999, *Saw FRI 44271* (KEP [KEP71163]); Sg Siput, 12 Dec 1920, *Mhd Haniff & Mhd Nur SFN 6973* (SING [SING0249843]); Larut & Matang, Bt Larut FR, Maxwell Hill, 1891, *Ridley s.n.* (SING [SING0249846]). **Kelantan:** Gua Musang, Batu Papan FR, 25 Aug 1992, *Saw FRI 37595* (KEP [KEP21823]); Kuala Aring, 1992, *Kiew KBH 49* (KEP [KEP21821]); *ibidem*, *Kiew KBH 44* (KEP [KEP21744]); Relai FR, 22 Oct 1967, *Cockburn FRI 7295* (KEP [KEP21793]); Sg Lebir, Kuala Ternya, 3 Sep 1967, *Whitmore FRI 4282* (KEP [KEP21788]); Taman Negara, Kuala Koh, 21 Mar 2002, *Chua et al. FRI 41762* (KEP [KEP64863]); *ibidem*, 22 Mar 2002, *Chua et al. FRI 41764* (KEP [KEP64862]); Taman Negara, Sg Aring, Kuala Telong, 21 Sep 1967, *Whitmore FRI 4428* (KEP [KEP21787]); Taman Negara, Ulu Sg Aring, Kuala Tapah, 23 Sep 1967, *Whitmore FRI 4498* (KEP [KEP21760]); Jeli, Jeli FR, 10 Apr 1973, *Kochummen FRI 16718* (KEP [KEP21840]); Pergau Dam Site, Sg Renyok, 8 Oct 1992, *Saw FRI 37647* (KEP [KEP21741]); Kuala Krai, Kuala Pertang, 3 Feb 1923, *Mhd Haniff & Mhd Nur SFN 10370* (SING [SING0151731]); Sg Jenal, 27 Oct 1967, *Cockburn FRI 7449* (KEP [KEP21751]); Sokor Taku FR, 10 Aug 1970, *Evans RE 7170* (KEP [KEP21864]); *ibidem*, 11 Aug 1970, *Evans RE 7470* (KEP [KEP21872]); *ibidem*, 10 Aug 1970, *Evans RE 7270* (KEP [KEP21878]); *ibidem*, 11 Aug 1970, *Evans RE 7570* (KEP [KEP21884]); Taku FR, 28 Jan 1962, *Unknown KEP 86702* (KEP [KEP21753]);

Machang, Ulu Sat, Cpt. 20, 6 Aug 1970, *Evans RE 6270* (KEP [KEP21877]); Ulu Sat, Cpt. 21, 6 Aug 1970, *Evans RE 6470* (KEP [KEP21862]); *ibidem*, *Evans RE 6370* (KEP [KEP21869]). **Terengganu:** Hulu Terengganu, Taman Negara, Kuala Kerbat, 24 Jun 1971, *Whitmore FRI 20206* (KEP [KEP21767]); *ibidem*, 30 Jun 1971, *Whitmore FRI 20305* (KEP [KEP21773]); Tasik Kenyir, 31 Jul 2007, *Yao et al. FRI 55937* (KEP [KEP140599]); Tembat FR, 19 Nov 2008, *Imin et al. FRI 68068* (KEP [KEP158643]); *ibidem*, 31 Mar 2009, *Sam et al. FRI 50356* (KEP [KEP148656]); *ibidem*, 6 Apr 2009, *Mhd Hairul et al. FRI 60977* (KEP [KEP175162]). **Pahang:** Cameron Highlands, Sg Ketei, 30 Oct 1970, *Evans RE 9470* (KEP [KEP21875]); *ibidem*, *Evans RE 9570* (KEP [KEP21867]); Sg Pauh, 1902, *Ridley s.n.* (SING [SING0240610]); Jerantut, Taman Negara, 8 Aug 1967, *Palmer 3* (SING [SING0249857]); *ibidem*, 9 Aug 1967, *Palmer 1* (SING [SING0249859]); Taman Negara, Gua Kumbang, 29 Apr 1975, *Yap SK 637* (KEP [KEP21811]); Taman Negara, Kuala Keniyam, 2 Mar 1968, *Dransfield JD 683* (KEP [KEP21804]); *ibidem*, 22 Sep 1993, *Lim H1542* (SING [SING0240601]); Taman Negara, Sg Keniyam, 2 Mar 1968, *Dransfield JD 686* (KEP [KEP21595]); Taman Negara, Sg Belau, 7 Mar 1968, *Whitmore FRI 8608* (KEP [KEP21802]); Taman Negara, Ulu Sat, Kuala Kelapah, 9 Jul 1970, *Whitmore FRI 15217* (KEP [KEP21859]); *ibidem*, *Whitmore FRI 15223* (KEP [KEP21845]); Taman Negara, Ulu Sg Sepia, Kuala Aur, 16 Jul 1970, *Whitmore FRI 15286* (KEP [KEP21837]); *ibidem*, *Whitmore FRI 15301* (KEP [KEP21844]); *ibidem*, 18 Jul 1970, *Whitmore FRI 15340* (KEP [KEP21847]); *ibidem*, 16 Jul 1970, *Whitmore FRI 15284* (KEP [KEP21830]); Lipis, Sg Telom, Bt Cheraga, 26 May 1971, *Whitmore FRI 20038* (KEP [KEP21768]). **Malacca:** s.l., 22 Dec 1884, *Alvins 132* (SING [SING0151763]). **Cultivated:** Selangor, Gombak, Forest Research Institute Malaysia, 24 Aug 2017, *Bellot & Apok FRI 69211* (K, KEP [KEP262392]); *ibidem*, *Bellot & Apok FRI 69212* (K, KEP [KEP262399]).

Notes. This taxon is highly variable with inflorescences varying from being wiry to robust. Leaf segments are also very variable, from few-segmented with rather broad leaflets to many-segmented with narrow leaflets (sometimes unicostate). *Iguanura diffusa* and *I. multifida* are forms with very narrow segments, with leaf segments often unicostate. Fruit colour is not a good character. Lim (1998a) recognised *Iguanura wallichiana* var. *rosea* as a variety with pink immature fruits maturing dark pink or red, whereas the fruits of the rest of this species vary from light green to cream to white and one record of being yellow when immature, ripening pink or red. In Ulu Temin, Royal Belum State Park, Perak I have seen a population in which the individuals mostly have pink fruit when immature but I have also observed some individuals in the same population with cream-coloured immature fruits. I have reduced this variety to *Iguanura wallichiana* var. *wallichiana*. *Iguanura piahensis* has less robust and wiry rachillae. Less robust specimens have been recorded in several localities other than Piah FR, Perak, e.g., Kedah (Baling: *Imin et al. FRI 50650*, Langkawi: *Rosdi et al. FRI 59932*), Perak (Tengah FR: *Saw FRI 37380*, G Besut: *Putz FRI 23686*, Krunei Stateland: *Evans 4970, 4770*) and Terengganu (*Yong et al. FRI 46826*, *Mhd Hairul FRI 60977*). They varied in degree of robustness and it is difficult to circumscribe the differences as the variation merged into specimens with a more robust inflorescence. He further diagnosed the species as having fruits “usually light green, turning cream to yellow,

ripening red". There is a collection from Piah FR with a rather robust infructescence (*Evans 37A70*) with cream-coloured immature fruits. I find this difficult to maintain and have thus reduced it to *Iguanura wallichiana* var. *wallichiana*.

11.2 *Iguanura wallichiana* var. *major* Becc. ex Hook.f., Fl. Brit. India 6: 416 (1892); Kiew, Gard. Bull. Singapore 28: 221, 222 (1976). – *Geonoma pynaertiana* Sander, Gard. Chron., ser. 3, 23: 258 (1898). – *Iguanura spectabilis* Ridl., J. Straits Branch Roy. Asiat. Soc. 41: 40 (1904), nom. illeg. – TYPE: [Malaysia], Perak, Bruas, February 1897, *Ridley 8403* (lectotype SING [SING0151719], designated here; isolectotype K [K000208054]). (Fig. 10)

Solitary or caespitose palm to 2.2 m tall. **Leaves** undivided, rarely segmented, petiole 7–30 cm long, blade 100–131 × 36–75 cm. **Inflorescences** very robust. **Fruits** 1.3–2.2 × 0.8–1.2 cm.

Distribution. Endemic to Malaysia, recorded from Perak, Bubu FR and Kledang Saiong FR, Bruas and Hermitage Hill with one collection from Gunung Bongsu FR, Kedah (*Corner SFN 35837*).

Ecology. Lowland dipterocarp to hill forest, up to 900 m above sea level, often gregarious in moist valleys and beside streams.

Provisional IUCN conservation assessment. Endangered (EN B1ab(iii)). Its EOO was calculated as 1,366 km². The variety is restricted to only four localities between Perak and Kedah.

Specimens examined. MALAYSIA: **Kedah:** Kulim, G Bongsu FR, 21 Jul 1940, *Corner SFN 35837* (KEP [KEP0151722], SING [SING0151722, SING0151723]). **Perak:** Kuala Kangsar, Bubu FR, 21 Apr 1995, *Chua et al. FRI 40444* (KEP [SC1291]); *ibidem*, 20 Feb 1970, *Everett FRI 13911* (KEP [KEP21761]); *ibidem*, 28 Jan 1993, *Lim PMS 1380* (KEP [KEP21601]); *ibidem*, 22 Oct 1992, *Saw FRI 37685* (KEP [KEP21791]); *ibidem*, 17 Jun 1969, *Selvaraj FRI 11121* (KEP [KEP21807]); *ibidem*, 4 Apr 1933, *Symington FMS 30743* (KEP [KEP21600]); *ibidem*, 14 Aug 1966, *Whitmore FRI 615* (KEP [KEP21803]); *ibidem*, *Whitmore FRI 626* (KEP [KEP21633], SING [SING0151725]); Kledang Saiong FR, 23 Feb 1982, *Yap SK 30490* (KEP [KEP21813]); *ibidem*, 10 Jun 1968, *Dransfield JD 873* (KEP [KEP21598]); Ulu Kenas, 2 Dec 2014, *Saw et al. FRI 48452* (KEP [KEP240259]); Larut & Matang, Hermitage Hill, 7 Mar 1892, *Ridley s.n.* (SING [SING0151721]).

Notes. I agree with Lim (1998a) on the circumscription of this variety. It must be noted that it is circumscribed mainly by its undivided leaves. The variety is very distinctive and found in very high densities in moist valleys and along the stream banks.



Fig. 10. *Iguanura wallichiana* (Mart.) Benth. & Hook.f. ex Becc. var. *major* Becc. ex Hook.f. **A.** Habit. **B.** Inflorescence. From *FRI 48452*. (Photos: L.G. Saw)

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Appendix 1. Specimen identification list.

Key to taxa: 1 = *Iguanura asli*, 2 = *I. bicornis*, 3 = *I. divergens*, 4 = *I. geonomiformis*, 5 = *I. humilis*, 6 = *I. kelantanensis*, 7 = *I. mirabilis*, 8 = *I. parvula*, 9 = *I. polymorpha*, 10 = *I. ruthiae*, 11a = *I. wallichiana* var. *wallichiana*, 11b = *I. wallichiana* var. *major*.

Abdul Latiff, ALM 4158 (9); *Ahmad Firdaus*, FRI 92846 (11a); *Aliaa Athirah*, FRI 83683 (9); FRI 83699 (9); *Alvins*, 131 (4); 132 (11a); 194 (4); 1991 (4); *Anderson*, 165 (3); 170 (11a); 173 (3); *Ang*, FRI 23369 (4); FRI 23371 (4); FRI 23372 (4); FRI 23373 (4); *AnthonySamy*, SA 480 (10); SA 579 (5); SA 855 (4); SA 933 (4); *Ave*, 132 (9).

Barnard, FMS 29 (3); CF 29 (3); *Bellot*, FRI 69208 (6); FRI 69209 (7); FRI 69211 (11a); FRI 69212 (11a); *Best*, SFN 13872 (10); SFN 14101 (10); *Burkill*, SFN 12715 (3); SFN 13577 (9); SFN 13906 (5); SFN 15828 (4); SFN 16079 (10); SFN 16899 (10); SFN 17188 (4); SFN 3100 (4); SFN 3100 (4); SFN 6299 (2); SFN 6372 (4); *Burn-Murdoch*, SFN 174 (10); *Butter*, 11636 (10).

Chan, FRI 70669 (1); *Cheah*, FRI 86941 (9); *Chee*, FRI 44192 (4); FRI 44199 (6); FRI 47283 (9); FRI 47285 (11a); FRI 47305 (5); FRI 47349 (5); FRI 47373 (4); *Chew*, FRI 60201 (5); FRI 60202 (5); *Chua*, FRI 33038 (4); FRI 38843 (5); FRI 40436 (3); FRI 40444 (11b); FRI 40610 (9); FRI 40860 (10); FRI 41762 (11a); FRI 41764 (11a); FRI 46926 (5); *Cockburn*, FRI 11049 (4); FRI 11095 (4); FRI 7295 (11a); FRI 7449 (11a); *Corner*, SFN 28743 (4); SFN 29001 (4); SFN 30095 (5); SFN 30237 (5); 30258 (5); SFN 30259 (5); 30260 (5); SFN 31637 (11a); SFN 35837 (11b); SFN 35837 (11b); s.n. 1 Nov 1935 (5); s.n. 23 Jun 1935 (4); *Curtis*, 2078 (3); 3164 (9); s.n. Feb 1890 (4); s.n. (11a); s.n. Oct 1894 (11a).

Damahuri, FRI 36713 (8); FRI 45303 (10); FRI 46252 (10); *Derry*, 174 (4); *Dolman*, FMS 28127 (3); *Dransfield*, UPM 1705 (4); JD 4553 (1); JD 5145 (7); JD 5156 (5); JD 5402 (5); JD 614 (5); JD 635 (5); JD 642 (5); JD 6504 (9); JD 681A (4); JD 681A (4); JD 683 (11a); JD 686 (11a); JD 7334 (2); JD 7342 (3); JD 817 (4); JD 817 (4); JD 838 (4); JD 873 (11b).

Evans, RE 10070 (4); RE 10170 (4); RE 10270 (4); RE 10370 (4); RE 104.70 (4); RE 10570 (4); RE 10670 (4); RE 1069 (10); RE 1070 (4); RE 10770 (4); RE 10870 (4); RE 109-70 (4); RE 11070 (4); RE 11170 (4); RE 11270 (4); RE 1169 (3); RE 1170 (4); RE 1369 (10); RE 1370 (4); RE 1470 (4); RE 1569 (10); RE 1570 (10); RE 1669 (10); RE 1670 (10); RE 169 (4); RE 170 (10); RE 1769 (10); RE 1770 (10); RE 1869 (4); RE 1870 (4); RE 1969 (4); RE 1970 (10); RE 2069 (4); RE 2169 (4); RE 2170 (10); RE 2269 (4); RE 2270 (10); RE 2370 (10); RE 2570 (10); RE 2670 (4); RE 269 (4); RE 2770 (10); RE 2870 (10); RE 2970 (10); RE 3070 (3); RE 3070 (4); RE 3170 (4); RE 31A70 (3); RE 3270 (4); RE 32A70 (3); RE 3370 (4); RE 33A70 (3); RE 3470 (3); RE 3570 (11a); RE 3670 (11a); RE 369 (4); RE 37A70 (11a); RE 3870 (4); RE 3870 (10); RE 4070 (2); RE 4170 (2); RE 4270 (2); RE 4370 (2); RE 4470 (2); RE 4570 (2); RE 4670 (11a); RE 4770 (11a); RE 4870 (11a); RE 4970 (11a); RE 5070 (11a); RE 5170 (11a); RE 5270 (11a); RE 5370 (11a); RE 5576 (11a); RE 5670 (11a); 5870 (9); RE 5970 (9); RE 6070 (9); RE 6170 (9); RE 6270 (11a); RE 6370 (11a); RE 6470 (11a); RE 6670 (9); RE 669 (10); RE 670 (11a); RE 6770 (9); RE 6870 (9); RE 6970 (9); RE 7070 (9); RE 7170 (11a); RE 7270 (11a); RE 7470 (11a); RE 7570 (11a); RE 7670 (1); RE 770 (4); RE 770 (1); RE 7870 (9); RE 8070 (9); RE 8170 (9); RE 8370 (4); RE 8470 (4); RE 8570 (4); RE 8670 (4); RE 869 (10); RE 870 (4); RE 8770 (4); RE 8970 (4); RE 9170 (4); RE 9270 (4); RE 9470 (11a); RE 9570 (4); RE 9570 (11a); RE 9670 (4); RE 970 (4); RE 9770 (4); RE 9870 (4); RE 9970 (4); *Everett*, FRI 13911

(11b); *FRI 14330* (4); *FRI 14529* (11a); *s.n.* 1970 (5).

Fox, *SFN 10684* (9); *Furtado*, 33008 (11a); 33070 (11a); 33071a (11a); 33071 (11a); *SFN 33076* (5); *SFN 33089* (11a); *SFN 33122b* (4); *SFN 33122* (4); *s.n.* 23 Jun 1935 (4); *s.n.* 23 May 1937 (9).

Glasgow, *s.n.* Dec 1887 (5); *Goodenough*, 1881 (4); 1911A (4); *s.n.* 1891 (4); *Griffith*, 847 (4); *s.n.*, *s.d.* (4); *Gwynne-Vaughan*, *s.n.* (9).

Hamid, *FMS 10383* (11a); 10596 (4); 10620 (4); *Hardial*, 84 (4); *Henderson*, 10446 (5); 10553 (10); 10691 (10); *SFN 19483* (10); *SFN 19501* (5); *SFN 19504* (9); *SFN 21874* (4); *SFN 22334* (10); *SFN 22685* (9); *SFN 23792* (9); *SFN 24531* (4); *SFN 25059* (9); *SFN 29501* (6); *Holtum*, *SFN 10299* (4); *SFN 20538* (4); *SFN 21535* (10); *SFN 29352* (4); 9256 (4); 9476 (1); 9478 (4); *SFN 9626* (4); 9845 (4); *Hullett*, 751 (4); *Hume*, 7796 (4); 8116 (4); 8982 (4); 9363 (4).

Imin, *FRI 50650* (11a); *FRI 68068* (11a); *FRI 77933* (3).

Jaamat, *SFN 28264* (9).

Kamarudin, *FRI 42345* (9); *FRI 42375* (9); *Kamarul Hisham*, *FRI 59344* (9); *FRI 67106* (5); *Keheding*, 108 (4); *Kerr*, 14435 (11a); *Khairuddin*, *FRI 38309* (11a); *Kiah*, *SFN 24260* (9); *SFN 32167* (4); *SFN 35048* (2); *SFN 37222* (4); *Kiew*, *RK 12* (5); *RK 1294* (4); *RK 13* (5); *RK 1345* (4); *RK 14* (5); *RK 16* (5); *RK 1700* (4); *RK 1731* (4); *RK 1792* (4); *RK 2662* (5); *RK 2701* (9); *RK 2705* (9); *RK 2717* (5); *RK 2861* (9); *RK 2908* (9); *RK 2909* (9); *RK 4* (5); *UPM 4036* (10); *UPM 4037* (10); *UPM 4038* (10); *KBH 44* (11a); *KBH 49* (11a); *RK 5* (5); *KBH 51* (6); *RK 5257* (9); *RK 603* (4); *RK 604* (4); *RK 605* (4); *RK 606* (4); *RK 8* (5); *FRI 91651* (9); *s.n.* May 1970 (4); *s.n.* 27 Jul 1986 (4); *s.n.* 19 Sep 1970 (4); *King's Collector*, 3131 (9); 2029 (9); 6375 (2); 6376 (2); *Kochummen*, *FRI 16650* (4); *FRI 16707* (9); *FRI 16718* (11a); *FRI 2481* (4); *FRI 26614* (4); *FRI 2841* (4).

LaFrankie, 2441 (4); 2448 (4); *JV 2569* (4); 2685 (4); 2797 (4); *Lake* *s.n.* 1892 (4); *Latifah*, *K2 1* (4); *Leong*, *SING 2012-172* (4); *SING 2017-254* (4); *Lim*, *PSM 1125* (3); 1126 (11a); *PSM 1266* (11a); *PMS 1281* (3); *PSM 1300* (7); *PSM 1302* (9); *PSM 1379* (7); *PMS 1380* (11b); *PMS 1448* (7); *PMS 1451* (5); *H1454* (1); *H1507* (3); *1507b* (3); *H1518* (7); *H1524* (1); *H1539* (1); *H1542* (11a); *H1615* (3); *H1643* (9); *H1671* (9); *H1672* (9); *L3144* (1); *FRI 37653* (7); *FRI 52840* (3); *FRI 56305* (5); *FRI 56317* (5); *FRI 56321* (5); *FRI 56385* (4); *FRI 73015* (1); 91-962 (8); 91/1041 (1); *LCK 91/962* (8); *Loh*, *FRI 17254* (5); *Low*, *FRI 25876* (4); *FRI 25956* (4); *FRI 25957* (4); *FRI 31109* (4); *FRI 31114* (4).

Markandan, *FRI 49173* (5); *FRI 49185* (1); *Mat*, *s.n.* 1893 (4); *Mat Asri*, *FRI 21850* (4); *Mhd Haniff*, *SFN 21104* (8); *SFN 9090* (2); *SFN 10370* (11a); *SFN 2727* (11a); *SFN 6973* (11a); *SFN 9091* (2); *Mhd Nur*, *SFN 11589* (4); *SFN 11952* (5); *SFN 12052* (9); *SFN 20004* (4); 9265 (4); *s.n.* 19 Feb 1924 (9); *s.n.* 25 Oct 1937 (4); *s.n.* 8 Sep 1923 (4); *s.n.* 17 Feb 1924 (9); *Meijer*, *KEP 94780* (9); *KEP 94916* (1); *Moh*, 10100 (11a); *Mhd Hairul*, *FRI 58919* (10); *FRI 60015* (4); *FRI 60977* (11a); *FRI 60984* (4); *FRI 69802* (1); *FRI 69806* (4); *FRI 69809* (1); *FRI 69919* (10); *FRI 70851* (1); *FRI 70874* (4); *FRI 70952* (4); *FRI 72334* (4); *FRI 78574* (4); *FRI 79878* (10); *FRI 79881* (9); *FRI 82321* (9); *FRI 82404* (5); *Mhd Shah*, *MS 1048* (2); 2180 (4); *MS 2574* (5); *MS 3200* (9); *MS 3200* (9); *MS 3200A* (9); *MS 3369* (3); *Murdoch*, *SFN 174* (10).

Native collector, *s.n.* (4); *Ng*, *FRI 1288* (11a); *FRI 5661* (11a); *FRI 5792* (11a); *FRI 6134* (3); *KEP 98021* (4); *Niissalo*, *SING 2019-445* (4); *Norazmi*, *NA 5* (4).

Palmer, 1 (11a); 10-4 (4); 10/1 (4); 11A (4); 11 (4); 11B (4); 11-1 (4); 12 (4); 12A (4); 12/1 (4); 12/2 (4); 13 (4); 14 (10); 14-1 (4); 14-3 (10); 18/1 (4); 19-1 (4); 2 (4); 22-1 (4); 23-1 (4); 27/1

(1); 3 (11a); 3/2 (4); 4-3 (10); 8-4 (4); 9-3 (10); 914 (4); *Perumal*, FRI 41681 (3); *Porter*, 8600 (11a); *Putz*, FRI 23686 (11a).

Rafidah, FRI 51637 (5); FRI 51677 (5); FRI 55739 (4); FRI 64427 (9); FRI 86678 (9); FRI 90393 (9); *Rahim*, KEP 104265 (9); *Ridley*, 10344 (11a); 11404 (5); 11405 (3); 11968 (4); 14100 (11a); 14710 (11a); 1583 (4); 1594 (4); 1618 (4); 1664 (4); 3138 (4); 3139 (4); 3140 (4); 3157 (3); 3514 (10); 7022 (11a); 7027 (9); 70887 (4); 7101 (11a); 7108 (11a); 7889 (4); 8403 (11b); 9802 (11a); 9803 (9); *s.n.* 1891 (3); *s.n.* Dec 1892 (4); *s.n.* Jun 1892 (4); *s.n.* Jan 1910 (4); *s.n.* 14 Oct 1900 (4); *s.n.* May 1896 (4); *s.n.* 21 Jun 1889 (4); *s.n.* Dec 1898 (4); *s.n.* May 1904 (10); *s.n.* Aug 1908 (4); *s.n.* 25 Jul 1891 (10); *s.n.* 7 Mar 1892 (11b); *s.n.* 1898 (9); *s.n.* Jul 1897 (10); *s.n.* Jun 1890 (11a); *s.n.* Dec 1895 (11a); *s.n.* May 1896 (4); *s.n.* Dec 1891 (4); *s.n.* Dec 1890 (4); *s.n.* 27 Jun 1889 (4); *s.n.* 9 Dec 1892 (4); *s.n.* Jun 1892 (4); *s.n.* 1902 (11a); *s.n.* Nov 1900 (11a); *s.n.* 1891 (4); *s.n.* 1891 (11a); *s.n.* Jul 1904 (11a); *s.n.* 1891 (4); *s.n.* 1891 (10); *s.n.* May 1896 (4); *Rosdi*, FRI 58714 (4); FRI 59932 (11a).

Sam, FRI 46537 (9); FRI 50356 (11a); *Samsuri*, SA 433 (1); SA 604 (9); *Saw*, JKB 2391 (9); FRI 36338 (4); FRI 37313 (4); FRI 37346 (4); FRI 37380 (11a); FRI 37404 (4); FRI 37422 (4); FRI 37429 (4); FRI 37453 (4); FRI 37542 (4); FRI 37577 (1); FRI 37593 (10); FRI 37594 (4); FRI 37595 (11a); FRI 37604 (6); FRI 37607 (6); FRI 37647 (11a); FRI 37670 (5); FRI 37675 (11a); FRI 37685 (11b); FRI 37743 (4); FRI 39868 (1); FRI 39884 (5); FRI 39939 (11a); FRI 39947 (11a); FRI 40025 (11a); FRI 44266 (11a); FRI 44271 (11a); FRI 44281 (5); FRI 44310 (10); FRI 44361 (1); FRI 44367 (1); FRI 44376 (5); FRI 44377 (7); FRI 44419 (4); FRI 44423 (4); FRI 44595 (11a); FRI 44656 (5); FRI 44747 (9); FRI 44748 (9); FRI 44770 (9); FRI 44899 (1); FRI 44964 (9); FRI 44999 (5); FRI 48258 (10); FRI 48268 (9); FRI 48428 (1); FRI 48452 (11b); FRI 80010 (4); FRI 80030 (4); *Scortechini*, 1181 (11a); 1188 (2); 318b (9); *s.n.* (8); *Selvaraj*, FRI 11121 (11b); FRI 6557 (3); *Sinclair*, SFN 38783 (5); SFN 38795 (9); SFN 40821 (9); *Singh*, HS 1084 (4); *Siti Munirah*, FRI 55300 (11a); FRI 76439 (3); *Spare*, SFN 36723 (11a); *Staples*, SING 2009-161 (4); *Suppiah*, FRI 11698 (1); FRI 14774 (1); *Syahida Emiza*, FRI 55170 (9); FRI 55195 (9); FRI 55230 (4); *Symington*, FMS 25620 (3); FMS 25647 (11a); FMS 25738 (11a); FMS 30743 (11b); *Tan*, 11 (4); TAN 13 (4); TAN 15 (4); FRI 78067 (9); FRI 78105 (9).

Ummul Nazrah, FRI 57104 (4); FRI 66163 (4); FRI 72795 (11a); FRI 78343 (4); FRI 78345 (9); FRI 83484 (9); FRI 87538 (9); FRI 88379 (1); FRI 88441 (9); FRI 92043 (9); *Unknown*, 12/4 (4); MS 4035 (1); KEP 86702 (11a); *s.n.* (11a); *s.n.* 3 Feb 1939 (4).

Wallich Cat., *s.n.* (11a); *s.n.* 1822 (11a); *s.n.* (11a); *Wan Syafiq*, FRI 90148 (9); FRI 90233 (8); FRI 91546 (9); FRI 93712 (4); FRI 93747 (3); *Whitmore*, FRI 12040 (6); FRI 12056 (6); FRI 12311 (4); FRI 12427 (1); FRI 12429 (1); FRI 12468 (3); FRI 12535 (1); FRI 12824 (10); FRI 12829 (10); FRI 12865 (10); FRI 15126 (4); FRI 15129 (4); FRI 15201 (4); FRI 15208 (6); FRI 15217 (11a); FRI 15223 (11a); FRI 15253 (6); FRI 15254 (6); FRI 15268 (6); FRI 15284 (11a); FRI 15286 (11a); FRI 15290 (6); FRI 15297 (6); FRI 15301 (11a); FRI 15306 (6); FRI 15340 (11a); FRI 15342 (6); FRI 15356 (6); FRI 15702 (4); FRI 15726 (9); FRI 15731 (11a); FRI 15741 (9); FRI 15762 (9); FRI 15808 (11a); FRI 15859 (1); FRI 15860 (1); FRI 15924 (4); FRI 15977 (4); FRI 200 (4); FRI 20038 (11a); FRI 20206 (11a); FRI 20271 (6); FRI 20305 (11a); FRI 20592 (1); FRI 20689 (4); FRI 3221 (10); FRI 3226 (10); FRI 3484 (10); FRI 3664 (4); FRI 3808 (1); FRI 3850 (4); FRI 3991 (4); FRI 4048 (9); FRI 4132 (5); FRI 4200 (5); FRI 4282 (11a); FRI 4287 (6); FRI 4291 (9); FRI 4294 (6); FRI 4297 (9); FRI 4298 (6); FRI 4355

(4); *FRI 4428* (11a); *FRI 4498* (11a); *FRI 4590* (10); *FRI 4607* (4); *FRI 4609* (4); *FRI 4650* (2); *FRI 611* (11a); *FRI 615* (11b); *FRI 626* (11b); *FRI 633* (3); *FRI 6528* (9); *FRI 765* (4); *FRI 8608* (11a); *FRI 8875* (9); *FRI 8912* (6); *Wong, W7* (5); *Wray, 1413* (11a); *Wray Jr.*, 396 (9).
Yao, FRI 53832 (3); *FRI 53849* (1); *FRI 55937* (11a); *FRI 57911* (4); *Yap, FRI 28464* (5); *SK 30490* (11b); *SK 571* (10); *SK 620* (4); *SK 637* (11a).

