



A new species of *Freycinetia* Gaudich. (*Pandanaceae*; *Freycinetoideae*) with pseudopetioliform leaves from Arfak Mountains, Papua, Indonesia

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Key words

Arfak
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Abstract A new species of *Freycinetia* Gaudich. (*Pandanaceae*; *Freycinetoideae*) with obvious pseudopetiolate basal leaf from Mount Tombrok in the vicinity of the Arfak Mountains, West Papua, Indonesian New Guinea, is newly described as *Freycinetia pseudopetiolata* A.P.Keim, K.Kartawinata & W.Sujarwo. The possession of the pseudopetiolate basal leaf form places this new species in the section *Pseudopetiolosae*; thus marking the first presence of the section for mainland New Guinea.

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INTRODUCTION

Freycinetia Gaudich. is one of the five extant genera of *Pandanaceae* (the others are *Benstonea* Callm. & Buerki, *Martellidendron* (Pic.Serm.) Callm. & Chassot, *Pandanus* Parkinson, and *Sararanga* Hemsl.) and consists of approximately 300 species (Stone 1982, 1983a). The genus is unique in the *Pandanaceae*, a large palm-like monocotyledonous dioecious family, with three or four lanceolate-elongate leaves terminally arranged and confined to the Old World tropics with approximately 1000 species (Stone 1982), as it is the only genus that possesses the climbing habit. So far, there are only three taxa in the genus known to be non-climbing: *F. arborea* Gaudich. (Stone 1983b), *F. dewildeorum* Pasaribu (Pasaribu 2010a, b), and *F. kwerbaensis* A.P.Keim (Keim 2012). Furthermore, *Freycinetia* also retains auricles, which are small ear-like projections in the margin of the leaf sheath. In *Freycinetia* the auricles are longer and much more distinct than in the other genera within the family (the auricles in the other genera easily disintegrate); so much that the auricles are used as one of the distinctive morphological characters for the infra-generic classification of the genus (Stone 1968). The genus has its main diversity in New Guinea, where 163 species were known prior to this current study, of which 34 species were recorded from Indonesian New Guinea only (Sinaga et al. 2010, Sinaga 2011).

The Bird's Head (then Vogelkop) Peninsula in the north-western corner of mainland New Guinea is the area, where the Arfak

Mountains are located. Prior to this study, 15 species of the genus were recognised from this area (Solms & Graffen 1883, Martelli 1910, Rendle 1917, Kanehira 1941, Sinaga 2010).

None of the species mentioned above possesses the distinctive morphological character of pseudopetioliform leaf, species with which can be straightforwardly classified as belonging to section *Pseudopetiolosae* B.C.Stone, following the infra-generic classification proposed by Stone (1968).

Section *Pseudopetiolosae* itself is a small section consisting of only two species; *F. caudata* Hemsl. and *F. petiolacea* Merr. & L.M.Perry, which do not occur in New Guinea. *Freycinetia caudata* is found only in Fiji (Hemsley 1896; see also Warburg 1900a, b) and *F. petiolacea* is restricted to a few islands within the Solomon Islands (Merrill & Perry 1939).

When Stone (1968) proposed the infra-generic classification, he mentioned that he had seen an inadequate specimen (without flower or fruit) said to be collected from the extreme west end of New Guinea (thus, within the vicinity of Arfak Mountains in the Bird's Head Peninsula) with the striking possession of the pseudopetioliform leaves that characterises the section. No further information on the specimen that he observed was provided.

The here newly described species shows the presence of a conspicuous pseudopetioliform leaf. It might belong to the same species as the one reported by Stone (1968). The specimen studied by us is regarded and proposed here as a species new to science and as a new member of section *Pseudopetiolosae*: *F. pseudopetiolata* A.P.Keim, K.Kartawinata & W.Sujarwo.

Furthermore, the result of this present study also shows the presence of section *Pseudopetiolosae* in mainland New Guinea for the first time. This raises the possibility of the existence of a strong biogeographical connection between the widespread distribution of the genus *Freycinetia* and the distribution of their pollinators, bats (particularly the genus *Pteropus*) in the eastern part of the Malesiana floristic region to the South Pacific

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Fig. 1 *Freycinetia pseudopetiolata* A.P.Keim, K.Kartawinata & W.Sujarwo from which the holotype (W.A. Mustaqim 1478, BO) is made. a–b. Habit; c. leaf with bright orange colouration in the basal part; c–e. quaternate infructescence. — Scale bars c–e = 1 cm. — Photos: W.A. Mustaqim, 2016.

including the Solomon Islands up to as far as Fiji and the Hawaii Islands (Cox 1982, 1990, Cox et al. 1991). A good example of the possibility of the existence of such a biogeographical connection is in the widespread distribution of *F. marginata* Blume (Keim 2012). Further study is needed.

The holotype was collected by one of the authors (Wendy Achmmad Mustaqim) in 2016 during the *Ekspedisi NKRI Koridor Papua Barat* (the expedition of the United Republic of Indonesia, corridor of West Papua) funded by the Government of the Republic of Indonesia.

KEY TO THE SPECIES OF FREYCINETIA SECTION PSEUDOPETIOLOSAE

- 1. Auricle with spines in the margin; stigmatic remains 2–4, never more than 4. — Mainland New Guinea *F. pseudopetiolata*
- 1. Auricle smooth, without spines in the margin; stigmatic remains never less than 3. — Fiji, Solomon Islands 2
- 2. Stigmatic remains strictly 3. — Fiji *F. caudata*
- 2. Stigmatic remains 3–10. — Solomon Islands *F. petiolacea*

TAXONOMIC TREATMENT

Freycinetia pseudopetiolata A.P.Keim, K.Kartawinata & W.Sujarwo — Fig. 1, 2

Etymology. The epithet refers to the possession of a pseudopetioliform leaf that characterises the section in which the species is placed.

Diagnosis — Medium-sized climbing pandan with a conspicuous pseudopetioliform leaf, auricle with spines in the margin, number of stigmatic remains 2–4. — Type: W.A. Mustaqim 1478 (holo BO!), Indonesia, West Papua, Arfak Regency, Angga Gida District, Mount Tombruk, S1°21'54.0" E133°55'53.7".

Medium-sized climbing pandan; climbing up to 5 m high. *Stem* greyish green to grey, 0.7–0.8 cm diam, glabrous. *Leaf*: sheath 8–9 cm long, glabrous; auricle tapered (not lobed), margin with spines; blade lanceolate-elongate, c. 53 by 2.5 cm, subbasally pseudopetiolate for c. 2 cm long, apex acute, leaf margin throughout with spines, surfaces glabrous, green, reddish green in the basal part. *Infructescence* terminal, ternate or quaternate (with 3 or 4 cephalia per infructescence), 13–14 cm long; peduncle c. 4 cm long; pedicel 3.5–4 cm long, stout, scabrous. *Cephalia* 3 or 4 per infructescence, elongate

Table 1 Morphological differences between *Freycinetia caudata*, *F. petiolacea*, and *F. pseudopetiolata*.

Species	Leaf dimension	Margin of auricles	Number of cephalia per infructescence	Number of stigmatic remains	Distribution
<i>Freycinetia caudata</i>	5–20 by c. 2.5 cm	Without spines	3	3	Fiji Islands
<i>F. petiolacea</i>	c. 35 by 3.5–5 cm	Without spines	3	3–10	Solomon Islands
<i>F. pseudopetiolata</i>	c. 53 by 2.5 cm	With fairly obvious spines	3–4	2–4	Mainland New Guinea

ellipsoidal, 6–9 by c. 2.5 cm wide. *Berry* prismatic; stigmatic remains 2–4.

Distribution — Endemic to the Bird's Head Peninsula (Arfak Mountains) in the extreme north-western corner of mainland New Guinea.

Habitat & Ecology — Lower mountain forest at mountain ridges at about 2250 m altitude.

Conservation Status — Likely, Critically Endangered (CR) as *F. pseudopetiolata* is only known from the type.

Notes — This species can easily be distinguished in the field by the presence of the pseudopetioliform leaf as *F. pseudopetiolata* is, so far, the only species in mainland New Guinea with this character. Pseudopetioliform is defined here as a narrowing in the basal part of the lamina to the extent that the leaf seemingly has a petiole (hence the origin of the epithet *pseudopetiolata*). Because of the rather unique pseudopetiole and irrespective of also having fairly obvious spines in the margin of the auricle, *F. pseudopetiolata* is regarded here to be better classified in section *Pseudopetiosae* than the section *Hemsleyella* B.C.Stone (see Stone 1968). The differences between *F. pseudopetiolata* and the other two members of the section *Pseudopetiosae* are described in Table 1.

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Fig. 2 *Freycinetia pseudopetiolata* A.P.Keim, K.Kartawinata & W.Sujarwo, holotype showing the pseudopetioliform leaf and quaternate infructescence. — Photo: A.P. Keim, 2022.

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