



# The *Pleuranthodium* (Zingiberaceae) of Mount Wilhelm, Papua New Guinea

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## Key words

Chimbu  
Eastern Highlands  
*Pleuranthodium corniculatum*  
*Pleuranthodium piundaundense*  
*Pleuranthodium sagittatum*  
taxonomy  
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**Abstract** Three species of *Pleuranthodium* were encountered and collected during a survey of gingers at Mount Wilhelm, Chimbu Province, Papua New Guinea. Based on new material, the only previously known *Pleuranthodium* from this area, *P. piundaundense*, is described in more detail highlighting new diagnostic characters and its known distribution range is expanded based on identification of older specimens at Edinburgh from two other provinces. Two species so far only known from Mount Wilhelm could not be identified after studying all protologues, types and material from several herbaria. These are here described as new species, *P. corniculatum* and *P. sagittatum*. A key with both floral and vegetative characters is provided to all three species. *Pleuranthodium corniculatum* is distinct in having apical appendages on the calyx, and *P. sagittatum* has a wrinkled calyx. All species are described and illustrated, and conservation assessments are made.

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## INTRODUCTION

*Pleuranthodium* (K.Schum.) R.M.Sm. was published by Smith in 1991 and currently consists of 23 species (Zingiberaceae Resource Centre, ZRC 2020; Cámara-Leret et al. 2020) restricted to the island of New Guinea, the Bismarck Archipelago, the Autonomous Region of Bougainville, the Solomon Islands and Australia. Of the 23 species, Papua New Guinea harbours 17 (74 %) of which 14 are currently thought to be endemic.

The species are grouped into two sections (Schumann 1904, Smith 1991). *Pleuranthodium* sect. *Pleuranthodium* (13 species) is characterised by

1. the sheath-like calyx;
2. the linear filament with entire margin;
3. the labellum being connate with the filament; and
4. the apex of the anther often being rounded

whereas *P.* sect. *Psychanthus* (K.Schum.) R.M.Sm. (10 species) is characterised by

1. the bell-shaped calyx;
2. the cymbiform filament with subapical teeth;
3. the labellum curved behind the filament; and
4. the apex of the anther often being pointed.

These sections were first described by Schumann (1904) as *Alpinia* Roxb. subg. *Autalpinia* K.Schum. sect. *Psychanthus* K.Schum. and *Alpinia* subg. *Autalpinia* sect. *Pleuranthodium* K.Schum., respectively.

Within the subfamily *Alpinioideae* Link, *Pleuranthodium* forms a strongly supported monophyletic clade with *Riedelia* Oliv. (New Guinea), *Burbridgea* Hook.f. (Borneo), and *Siamanthus* K.Larsen & Mood (Thailand), which Kress et al. (2002) recognised as the tribe *Riedelieae* W.J.Kress, in which the fruit is ± elongate with longitudinal dehiscence. In New Guinea, this tribe is only represented by *Pleuranthodium* and *Riedelia*, both regarded as sister groups by Kress et al. (2002). Based on observations in the present study, *Pleuranthodium* usually has leafy shoots longer than 2 m with a terminal pendulous and unbranched inflorescence, whereas *Riedelia* is usually less than 1.5 m high, with an erect and branched inflorescence.

The checklist of Mount Wilhelm (Johns & Stevens 1971) included five ginger species (two *Alpinia* and three *Riedelia*). One of these, *Alpinia* sp. 1 was represented by three collections (*Van Balgooy* 584, *Vandenberg* NGF 39516, *Wade* ANU 7269), which Van Royen (1979) later identified as *Riedelia piundaundensis* P.Royen, choosing the first collection as the type. In 1979, the genus name *Pleuranthodium* was not yet available to Van Royen, but placing it in the sister genus, *Riedelia*, rather than *Alpinia*, demonstrates that he was close to the target.

In 2016, 37 years after *Riedelia piundaundensis* was published, a survey focusing on the Zingiberaceae of Mt Wilhelm revealed that three species occur at this site. After studies of herbarium material including all types available (BM, BO, CNS, E, K, L, LAE, SING) and protologues, it is concluded that two of the species are new. All species found at Mt Wilhelm belong to *Pleuranthodium* sect. *Pleuranthodium*. A key to the three species as well as a full description of each, including illustrations, are presented below.

The descriptions of the vegetative characters are based on studies of living plants in the field as well as dry herbarium specimens. Measurements of fertile parts were made from herbarium material of which the collections from 2016 preserved in spirit were essential. The general plant descriptive terminology follows Beentje (2016).

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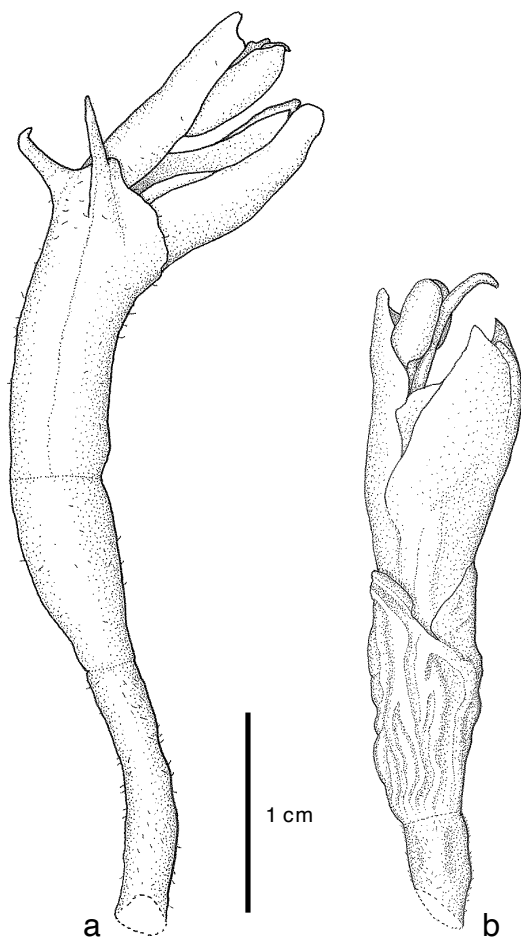
## KEY TO THE PLEURANTHODIUM SPECIES OF MOUNT WILHELM

1. Lamina strigose along veins underneath; calyx with 2(–3) appendages horn- or knob-like at apex; corolla dark reddish brown; labellum pale yellow-green with reddish centre . . . . . 1. *P. corniculatum*
1. Lamina glabrous underneath; calyx without appendages; corolla yellow to pale orange; labellum pale orange . . . . . 2
2. Leafy shoots 3–4.3 m long; calyx pale yellow-green, smooth, leathery and persistent when fruiting; fruit clearly trigonous . . . . . 2. *P. piundaundense*
2. Leafy shoot 1.6–1.8 m long; calyx pale red, distinctly wrinkled, membranous, not fully persistent when fruiting; fruit slightly trigonous . . . . . 3. *P. sagittatum*

### 1. *Pleuranthodium corniculatum* Lofthus & A.D.Poulsen, sp. nov. — Fig. 1a, 2, 3

This species is distinguished from *Pleuranthodium piundaundense* (P.Royen) R.M.Sm. by having a dark reddish brown calyx with at least 2 appendices at the apex, dark reddish brown corolla lobes and a pale yellow-green labellum with reddish centre (vs pale yellow-green calyx lacking appendices, pale orange-yellow corolla lobes and an orange labellum). The lamina has strigose hairs on the veins beneath while the other species on Mt Wilhelm are glabrous. — Type: A.D. Poulsen, T. Jimbo, W. Banda & T. Muanda 3019 (holo LAE; iso E), Papua New Guinea, Chimbu Province, slope of Mt Wilhelm, Wonn, montane forest, S5°48'48.2" E145°4'57.6", 2875 m, 18 Apr. 2016, flowering and fruiting.

**Etymology.** The epithet is derived from the Latin diminutive, *corniculata*, describing the presence of small horn-like structures, in this case on the apex of the calyx.



**Fig. 1** a. *Pleuranthodium corniculatum* Lofthus & A.D.Poulsen. Lateral view. — b. *Pleuranthodium sagittatum* Lofthus & A.D.Poulsen. Lateral view (a: Poulsen et al. 3019; pickled material at E; b: Poulsen et al. 3017; pickled material at E). — Drawing by Øystein Lofthus.

Terrestrial herb in clump. *Rhizome* stout, fleshy, deeply subterranean, moderately creeping. *Leafy shoot* to 5 m long with up to 25 leaves per shoot; bases to 25 cm apart, to 8 cm across, smooth, shiny, green; pseudostem distinctly flattened; sheath smooth, mid-green, with scattered hairs transitioning to pubescent towards the ligule; ligule truncate to irregularly lobed, to 1.5 mm long, reddish brown when young, pubescent, margin pubescent; petiole to 15 mm long, pale green, pubescent; lamina narrowly ovate, c. 80 by 19 cm, dark to mid-green above, pale green beneath, glabrous above, strigose along veins beneath, base obtuse, margin strigose, apex acuminate. *Inflorescence* subterminal by 30–40 cm, to 40 cm long; free part of peduncle pendulous, round in cross-section, to 10 cm long, yellowish green to pale reddish brown, tomentose; peduncular bracts to 3, cucullate, enclosing the young inflorescence, decreasing in size towards inflorescence, most distant bract to 47 cm long, persistent until fruiting (sometimes with laminoid apex of c. 9 by 2 cm), proximate bracts shorter and caducous, all bracts red when young, dark brown when old, tomentose; spike cylindrical, to 30 cm long with a rachis of similar length with numerous flowers, flowering starting from middle of spike and continuing towards base and apex. *Flower* 4.6–5 cm long, resupinate; pedicel 12–15 mm long, reddish brown, puberulous; calyx 14–16 mm long, dark reddish brown, puberulous, especially on lateral ridges and increasingly towards apex, apex with 2 appendages,  $\pm$  horn-shaped, to 4 mm long, usually bent, sometimes reflexed, sometimes reduced to distinct knobs (rarely a third appendage present, horn-like or reduced to a knob); floral tube c. 11 mm long, pale red, externally and internally glabrous; corolla lobes dark purple, minutely pubescent along margin; dorsal lobe cymbiform with cucullate and acuminate apex, reaching middle or apex of anther, c. 13 by 5 mm; lateral lobes triangular, with broad cucullate apex, overlapping each other and clasping apex of labellum, attached at a c. 30° angle to tube, inserted alongside dorsal lobe, 10–12 by c. 5.5 mm; staminal tube c. 3 mm long; labellum rounded, cucullate, c. 8 by 5 mm, apex slightly bifid (incision c. 0.5 mm deep), pale yellow-green with reddish centre, densely pubescent throat and mouth, otherwise glabrous; stamen c. 11 mm long, cream to pale yellow-green; filament ventral side flattened with a broad groove, dorsal side rounded, c. 5 by 3.5–4.5 mm, hirsute in and on edges of groove and below thecae, anther parallel-sided, c. 6 by 4 mm, glabrous, apex shallowly incised; thecae dehiscing along their entire length, cream, glabrous; ovary narrowly pyriform, c. 10 by 5 mm, orange-red to reddish brown at base and apex, sparsely puberulous; epigynous gland enclosing style from one side, bilobed conical, c. 4 by 3 mm long, apex acute, surface verrucose; style 2.5 cm long, cream, glabrous; stigma claviform, glabrous, 0.9 by 1.3 by 0.5 mm, pointing downwards, at apex with a transverse, bilabiate ostiole, glabrous, c. 0.25 mm wide. *Infructescence* subterminal, pendulous, free part of peduncle to 10 cm long, distal peduncular bract persistent, others caducous leaving scars; fruit head cylindrical, to c. 25 by 8 cm; pedicel 1.3–1.5 cm long; capsule pyriform, fleshy, c. 2 by 1.1 cm, orange-yellow, very sparsely pubescent, splitting lengthwise from apex downwards in 3 parts along the locules; seeds 4–10 per locule, rounded outwards but flattened when in contact with others, c. 5.5 by 4 mm, green, smooth, shiny; aril pinkish red, covering only base, leaving apex of seed exposed.

**Distribution** — Only known from Mt Wilhelm, Chimbu Province, Papua New Guinea.

**Habitat & Ecology** — This species occurs in montane forest and on a grassy slope. Budding, flowering and fruiting were recorded in early February and flowering and fruiting continued at least till mid-April. The altitudinal range of this species is 2580–2875 m.

**Ethnobotany** — The vernacular name is *merutamban* in the Kuman language. This information was given by William Banda,



**Fig. 2** *Pleuranthodium corniculatum* Lofthus & A.D.Poulsen. a. Habit (Thomas Mundua demonstrating the size of the plant); b. bases of leafy shoots and new shoot; c. cross-section of pseudostem; d. ligule; e. inflorescence; f. flower, lateral view; g. flower, dorsal view; h. calyx; i. stamen, dorsal and ventral view; j. infructescence; k. fruit; l. fruit, part of capsule removed exposing green seeds and pinkish red aril; m. fruit, cross-section (Poulsen et al. 3019; E, LAE). — Photos by Axel Dalberg Poulsen.



**Fig. 3** William Banda demonstrating how to extract the strong fibres from the sheaths of *Pleuranthodium corniculatum* (Poulsen et al. 2019; E, LAE). — Photo by Axel Dalberg Poulsen.

who demonstrated that fibres taken from the sheath can be used to make ropes and snares (Fig. 3). He also said that the leaves are used for making *mumu* (ground oven with hot rocks).

**Conservation status** — With only two collections, which were made in the same area, the population size is unknown, though these collections were made 52 years apart, which indicates that the population is somewhat stable in that area. A potential threat to the species is extraction by the local people but, as only the vegetative parts are used, it is unlikely that this will pose a major threat to the species and the conservation status can be assessed as Least Concern (LC; IUCN 2019).

**Additional specimen.** PAPUA NEW GUINEA, Chimbu, Keglsugl, S6° E145°, 2580 m, 2 Feb. 1964, flowering and fruiting, Millar NGF 23122 (LAE).

**Note** — This species, first collected at Mt Wilhelm by Millar in 1964, is the only one of the three species so far recorded at this site, that does not have yellowish orange flowers. The emerging vegetative shoots are thick with conspicuous yellow scales with a red margin, which is a sterile character easy to recognise. A peculiar trait to this species is that it starts flowering in the middle of the inflorescence, as opposed to the other two, where flowering starts at the base. Furthermore, the flowers are resupinate, they turn 180°. In effect the dorsal corolla lobe is still upwards even though the spike is pendulous. This is an unusual trait in *Pleuranthodium* and further investigation is needed to clarify how many species have resupinate flowers.

## 2. *Pleuranthodium piundaundense* (P.Royen) R.M.Sm. — Fig. 4

*Pleuranthodium piundaundense* (P.Royen) R.M.Sm. (1991) 65. — *Riedelia piundaundensis* P.Royen (1979) 875, t. 294. — *Psychanthus piundaundensis* (P.Royen) R.M.Sm. (1990) 81. — Type: *M.M.J. van Balgooy 584* (holo L (barcodes L 0041159–61); iso A, CANB n.v., K, LAE, SING), Papua New Guinea, Eastern Highlands, Pindunde [corrected to Piundaunde in Van Royen (1979)] Valley, above Kombugomambuno, 3350 m, 7 June 1965.

**Etymology.** The epithet refers to the Piundaunde valley with the two lakes Piunde (c. 3600 m) and Aunde (c. 3700 m) on the slopes of Mt Wilhelm above the type locality.

Terrestrial herb in clump. **Rhizome** fleshy, 3–4 cm across, short-creeping. **Leafy shoot** to 3–4.3 m long; bases 6–7 cm apart, to 3 cm across; sheath longitudinally ribbed, pale yellow-green tinged brown, glabrous except pubescent below ligule, lowermost sheaths decaying with age; ligule shallowly bilobed, 2–3.5 mm long, reddish brown, pubescent, margin finely ciliate; petiole to 6 mm long, reddish brown, glabrous; lamina ovate to elliptic, 15–33 by 5–11 cm, mid-green, beneath pale green

with reddish midrib, glabrous, base rounded to cuneate, margin ± pilose with antrorse hairs, apex acutely subcaudate. **Inflorescence** terminal, 12–26 cm long; free part of peduncle ascending at first, later pendulous, slightly trigonous in cross-section, 6–13 cm long, pale green, very minutely to minutely pilose; peduncular bracts 3, cucullate, enclosing the young inflorescence, decreasing in size towards inflorescence: most distant one leaf-like, to 18 by 6 cm, rounded at apex, proximate bracts linear, 1.5–4.5 cm long, with involute appendage, caducous, all bracts yellow, turning reddish brown when dead, glabrous except for dense silky pubescence on apical appendage; spike ovoid-ellipsoid, 6.5–13 by 5–7 cm, composed of a 4–12 cm long rachis with numerous flowers, flowering starting from base. **Flower** c. 5 cm long, not resupinate; pedicel 2–3.5 mm long, pale red, minutely pilose; calyx 18–20 mm long, pale yellow-green, glabrous, smooth, leathery, margins scarious, sometimes sparsely fimbriate, bilobed, without appendages; floral tube 22–28 mm long, yellow to pale orange-yellow, externally glabrous, internally glabrous near base, colliculate to echinate towards insertion of lobes; corolla lobes bright yellow or orange, sometimes tinged green at base, glabrous, slightly longer than labellum; dorsal lobe 15–17 by 5–8 mm, c. 2 mm shorter than anther, oblong-elliptic, with rounded and cucullate apex; lateral lobes c. 11 by 7–8 mm, dorsal margin involute; labellum infundibuliform, c. 6 by 10 mm almost entirely adnate to stamen, pale orange, margin erect, wavy and glabrous, central lobe bilobed (incision c. 3 mm deep); stamen 7–8 mm long, cream; filament ventrally colliculate along central furrow, c. 3 by 4–5 mm, glabrous; anther broadly elliptic, c. 5 by 4 mm, apex emarginate; thecae dehiscing along their entire length, cream, glabrous; ovary ellipsoid or ovoid, trigonous, 4–7 by 3.5–5 mm, red, glabrous; epigynous gland enclosing the style from one side, irregularly bilobed, verrucose, c. 1.2 by 2 mm; style c. 4.7 cm long, cream, glabrous; stigma claviform, glabrous, 0.8 by 1.3 by 0.7 mm, pointing downwards, apex with a transverse, bilabiate ostiole, glabrous, c. 0.4 mm wide. **Infructescence** terminal, pendulous, free part of peduncle 10–17 cm long, bracts caducous leaving scars except for most distal 1 (or 2); fruit head cylindrical, to 18 by 6 cm; pedicel to 1 cm long, spreading, capsule ellipsoid, clearly trigonous (with 3 distinct ridges), fleshy, 3–3.5 by 1–1.3 cm, red, glabrous, splitting lengthwise from apex in 3 parts along ridges, calyx persistent; seeds 3–5 per locule, irregularly folded to ruminate, 3–5 by 4–5 mm, green with small red aril at base.

**Distribution** — *Pleuranthodium piundaundense* is endemic to Papua New Guinea and has mainly been recorded on the lower slopes of Mt Wilhelm, Chimbu Province, but also at Mt Kerigomna (Eastern Highlands Province) and at Mt Hagen (Western Highlands Province).

**Habitat & Ecology** — This species occurs in montane forest and on stream banks in moss forest. At Mt Wilhelm it has been collected between 3000–3600 m. During the collecting of *A.D. Poulsen et al. 3023* in April 2016, it was found fruiting only at 3100 m and the only flowering shoot was encountered 200 m higher. It has also been collected once at Mt Hagen at 2580 m. Flowering and fruiting occur from mid-March to mid-October.

**Ethnobotany** — When collecting *A.D. Poulsen et al. 3023*, the local guide, William Banda, relayed the information that this species is called *anger keneh yaundo* (in the Kuman language: *anger* = arrow, *keneh* = head, *yaundo* = leaf). This refers to the shape of the spike resembling an arrowhead. The leafy shoots are used for constructing walls of bush huts.

**Conservation status** — The species is well documented, grows in areas with low human impact and is not harvested beyond subsistence scale, which would not involve destruction of whole individuals. It is therefore to be considered Least Concern (LC) according to IUCN (2019).



**Fig. 4** *Pleuranthodium piundaundense* (P.Royen) R.M.Sm. a. Habit (Thomas Mundua demonstrating the size of the plant); b. ligule; c. inflorescence; d. whole flowers; e. calyx; f. stamen, ventral view; g. ovary, style and stigma; h. infructescence; i. fruit; j. fruit, part of capsule removed; k. fruit, cross-section; l. seeds and aril (Poulsen et al. 3023; E, LAE). — Photos by Axel Dalberg Poulsen.



**Fig. 5** *Pleuranthodium sagittatum* Lofthus & A.D.Poulsen. a. Habit; b. leaf base, ligule and pseudostem; c. inflorescence; d. close up of spike; e. flowers; f. calyx; g. stamen, dorsal view; h. ovary, style and stigma; i. infructescence; j. fruits; k. fruit, cross-section; l. seeds and aril (Poulsen *et al.* 2017; E, LAE). — Photos by Axel Dalberg Poulsen.

**Additional specimens.** PAPUA NEW GUINEA, Chimbu Prov., Pengagl Creek, 25 Aug. 1964, A.N. Millar & C.D. Sayers NGF 23778 (LAE); Mt Wilhelm, Kegelsuhl–Pindaunde trail, 2 June 1966, L.K. Wade ANU 7269 (LAE); Mt Wilhelm, North side of Pindaunde Valley, 8 Oct. 1971, J.M.B. Smith ANU 15214 (LAE); *ibid.*, 12 Mar. 1981, J. Sterly 80648 (E); Mt Wilhelm, Kambuglo Mabuno, 19 Apr. 2016, A.D. Poulsen et al. 3023 (E, LAE); Kundiawa subdistrict, near walking track 1.5 miles from field station, 13 June 1968, J. Vandenberg NGF 39516 (LAE). – Eastern Highlands Prov., Goroka, Mt Kerigomna, 22 June 1971, P.F. Stevens & P. Grubb LAE 54646 (E). – Western Highlands Prov., Mt Hagen, 18 July 1970, P.F. Stevens LAE 50250 (E).

**Note** — The original description of *Riedelia piundaundensis* was thorough and elaborate but, as it was placed in *Riedelia*, the diagnostic characters emphasized were selected to distinguish it from other species of that genus. The description above incorporates the description by Van Royen (1979) and has been amended, taking into account the additional collections presently known.

### 3. *Pleuranthodium sagittatum* Lofthus & A.D.Poulsen, *sp. nov.* — Fig. 1b, 5

Similar to *P. piundaundense* in its yellow-orange flowers but differs by the shorter leafy shoots (1.6–1.8 m vs 3–4.1 m), the calyx being pale red and distinctly wrinkled (vs. pale yellow-green and smooth) and entire apex of the labellum (vs bilobed with a 3 mm incision). — Type: A.D. Poulsen, T. Jimbo, W. Banda & T. Muanda 3017 (holo LAE; iso E), Papua New Guinea, Chimbu Province, slopes of Mt Wilhelm, S5°48'52" E145°4'57", 2875 m, 18 Apr. 2016, flowering and fruiting.

**Etymology.** The epithet is derived from the Latin *sagitta*, which means arrow and refers to the vernacular name *anger keneh yaundo* that indicates the resemblance between the spike and an arrowhead.

Terrestrial herb in clump. *Rhizome* fleshy, short-creeping. *Leafy shoot* 1.6–1.8 m long, with up to 24 leaves; bases to 6 cm apart, distinctly swollen, c. 2.5 cm across, yellow-green, brownish pubescent; sheath scabrid, yellow-green, lower sheath dead and pale brown, glabrous except pubescent below ligule; ligule shallowly bilobed, 2–3 mm long, reddish brown, pubescent including margin; petiole to 4 mm long, pale green, glabrous; lamina narrowly ovate, to 30 by 7 cm, mid-green, pale green beneath, glabrous, base  $\pm$  cordate, margin pilose, apex acuminate. *Inflorescence* subterminal by c. 8 cm, to 15 cm long; free part of peduncle pendulous, round in cross-section, 4–8 cm long, pale yellow-green, minutely tomentose; peduncular bracts 3, cucullate, enclosing the young inflorescence, decreasing in size towards inflorescence, most distant bract to 14 cm long with small, laminoid appendage apically, proximate bracts short and caducous, all bracts red when young turning dark brown when old, glabrous; spike obpyriform, c. 9 by 7 cm composed of a 7–8 cm long rachis with numerous flowers, flowering starting from base. *Flower* 3–3.4 cm long, not resupinate; pedicel subsessile, pale red, minutely pubescent; calyx 11–13 mm long, distinctly wrinkled, membranous, pale red, glabrous, apex bilobed, irregular, semi-operculate, partly ruptured by the emergence of the corolla, without appendages; floral tube 14 mm long, pale orange, sparsely minutely pubescent outside, puberulent inside; corolla lobes pale orange, minutely pubescent along margin, increasingly so towards apex; dorsal lobe c. 8 by 5 mm, oblong elliptic, boat-shaped, acute and cucullate at apex, 3–5-nerved,  $\pm$  as long as anther ( $\pm$  0.5 mm), 1–2 mm longer than labellum; lateral lobes 9–5 by c. 6 mm, reaching c. 1 mm longer than labellum, triangular, acute, attached at an angle of c. 45°; labellum cup-shaped, c. 4 mm long, apex of central lobe entire, pale orange, margin sinuate, glabrous; stamen c. 7 mm long, pale orange; filament broadly canaliculate, broadest at base, c. 2 by 3 mm, pale orange, glabrous; anther broadly elliptic, c. 5 by 3.2 mm, apex emarginate (incision c. 0.8 mm deep); thecae dehiscing along their entire length, cream, glabrous; ovary ellipsoid, c. 4 by 3 mm, pale red, very sparsely puberulous; epigynous gland enclosing style from one side, truncate,

irregularly lobed, verrucose, c. 1 by 2 mm; style c. 2.4 cm long, cream, glabrous; stigma sigmoid, glabrous, 1 by 0.8 by 0.5 mm, pointing downwards, apex with a transverse, reniform ostiole, glabrous, c. 0.3 mm wide. *Infructescence* pendulous, free part of peduncle to 8 cm long; peduncular bracts caducous; fruit head cylindrical, to 10 by 4.5 cm; pedicel extending to 0.7 cm long, capsule ellipsoid, slightly trigonous, fleshy, c. 2 by 0.9 cm, orange, glabrous, splitting lengthwise from apex in 3 parts; seeds 3–5 per locule, irregularly folded to runcate, 5–6 by c. 4 mm, green with small, pinkish red aril.

**Distribution** — Only known from type collection at Mt Wilhelm, Chimbu province, Papua New Guinea.

**Habitat & Ecology** — The species has been recorded from an open gap in a montane forest at 2875 m. It was flowering and fruiting in mid-April.

**Ethnobotany** — During the collecting of the type of this species the local guide, William Banda, gave the information that this species is called *anger keneh yaundo* in the Kuman language. This vernacular name is also used for *P. piundaundense* (see above), which has a similar pointed spike and the leafy shoots are similarly used for the construction of bush hut walls.

**Conservation status** — Although this species has only been collected once, there are no obvious threats. Several populations were encountered during the survey and it seems stable. Even though the montane forest at Mt Wilhelm is not under any formal protection, there are as yet no large-scale logging activities taking place. Use by the local people does not pose a threat to the individuals that would resprout after some leaves had been removed. Thus, the current assessment is that this species is of Least Concern (LC) according to IUCN (2019).

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## REFERENCES

- Beentje H. 2016. The Kew Plant Glossary, an illustrated dictionary of plant terms (revised edition). Royal Botanic Gardens, Kew.
- Cámara-Leret R, Frodin DG, Adema F, et al. 2020. New Guinea has the world's richest island flora. *Nature*. <https://doi.org/10.1038/s41586-020-2549-5>.
- IUCN Standards and Petitions Subcommittee. 2019. Guidelines for using IUCN Red List Categories and Criteria. Version 14. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- Johns RJ, Stevens PF. 1971. Mount Wilhelm Flora: a checklist of the species. *Botany bulletin*, Department of Forests, Papua New Guinea 6: 1–60.
- Kress WJ, Prince LM, Williams KJ. 2002. The phylogeny and a new classification of the gingers (Zingiberaceae): evidence from molecular data. *American Journal of Botany* 89 (10): 1682–1696.
- Schumann KM. 1904. Zingiberaceae. In: Engler HGA (ed), *Das Pflanzenreich* IV.46 (Heft 20): 1–458. Engelmann, Berlin.
- Smith RM. 1990. *Psychanthus* (K.Schum.) Ridley (Zingiberaceae): its acceptance at generic level. *Edinburgh Journal of Botany* 47 (1): 77–82.
- Smith RM. 1991. *Pleuranthodium* replaces the illegitimate *Psychanthus* (Zingiberaceae). *Edinburgh Journal of Botany* 48 (1): 63–68.
- Van Royen P. 1979. The alpine flora of New Guinea 2, taxonomic part: Cupressaceae to Poaceae. Cramer, Vaduz.
- ZRC. 2020. Zingiberaceae Resource Centre. Available at [padme.rbge.org.uk/ZRC](http://padme.rbge.org.uk/ZRC).