Names of Tapeinochilos (Costaceae) in Wallacea
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Abstract. Four species of Tapeinochilos have been described from material collected in Wallacea. We designate the lectotype of the genus, T. pungens, which was synonymized with T. ananassae in 1917 and add here T. teysmannianus as another synonym. The type of T. koordersianus from Sulawesi has been rediscovered at Herbarium Bogoriense and is identified as Etlingera heliconifolia (Zingiberaceae), the combination of which is published here. After establishing that T. koordersianus applies to a species of Etlingera, there is no evidence that any species of Tapeinochilos occurs in the island of Sulawesi; the westernmost presence of the genus being in the Sula Islands represented by T. ananassae, the only species thus presently occurring in Wallacea.

INTRODUCTION

Tapeinochilos Miq. is a genus of about 16 species found from eastern Indonesia and New Guinea eastwards into the Pacific (Solomon Islands and Vanuatu) and southwards to Queensland, Australia (Gideon 1996). The type species, T. pungens (Teijsm. & Binn.) Miq. is from Seram, Indonesia, but most of the species occur in New Guinea. The western limit of the genus is in the archipelago between Borneo and New Guinea, called Wallacea (Fig. 1).

In this paper, we examine all names of Tapeinochilos based on material collected in Wallacea, namely T. ananassae (Hassk.) K.Schum., T. koordersianus Ridl., T. pungens, and T. teysmannianus Warb. Valeton (1917) first suggested that T. pungens is a synonym of T. ananassae and this was followed by Smith in the Flora of Australia (Smith 1987), but the other two names have not been dealt with until now. Tapeinochilos teysmannianus was published by Warburg (1891) but the type is assumed lost at Berlin in the Second World War. Ridley (1900) published Tapeinochilos koordersianus. He only mentioned the type locality as 'Celebes' but, as noted by Turner & Cheek (1998), Koorders is the obvious collector. Unfortunately, the type could not be found (Turner & Cheek 1998, Turner 2000). Originally, it was unclear who the author was but as Turner & Cheek (1998) convincingly argued, it must be Ridley who was one of the most prominent ginger experts in SE Asia at the time, based at Singapore Botanic Gardens.

MATERIAL

We have studied collections determined as Tapeinochilos from Wallacea at eight herbaria (BM, BO, E, G, K, L, SING and the herbarium in Bogor Botanic Garden). In Herbarium Bogoriense (BO) we found three collections by Koorders identified as Tapeinochilos koordersii: Koorders 19668β, Koorders 19667α, Koorders 19667β. Koorders 19668β (accession no. BO 084894) from Lolombulan, consists of one sheet with one leaf and half a spike with peduncle being cut just below (it is fruited at the base and may have flowered simultaneously at the top). It has a handwritten Latin diagnosis (probably by Koorders) that matches the one published by Ridley except the latter is in English and all measurements are non-metric. Thus the height of the plant which, on the label, is given as 7.5 m, is in Ridley’s published protologue 25 feet.

In the folder with Koorders 19668β in BO were two additional unlabelled sheets: 19674β (BO 084895) and 19675β (BO 084896) each consisting of a folded lamina where the base is obscure. Annotations indicate that they represent the same species as 19668β but they lack proper labels (with locality, description etc.) and a written note by Koorders indicates he could not find them. On 19674β and 19668β it is written '19668 = 19674, spiritus' which means that pickled material was collected and the two sheets are the same species. On 19675β Koorders wrote that Ridley had added the species name to the left in his own handwriting but maybe because it has been remounted this is unfortunately no longer visible.

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At the herbarium in Singapore Botanic Garden (SING), Koorders 1967/4/i (forest number 3822) is found with a proper label. The collection again only contains one big leaf with the base missing and is made on Soputan Mountain, also in N Sulawesi, on 5 May 1895, at 1100 m, and the plant is 5–6 m high. Koorders-Schumacher (1914: 21) in the catalogue of her husband’s collections explains that the identifications of the species of Zingiberaeae were all made by Ridley. The list of gingers from Sulawesi includes ‘T. koordersi’ with only one collection listed, namely 19668/3425, collected on 12 April 1895. It is curious why 1967/4/i or 1967/5/i are not mentioned. Perhaps because the labels were missing by the time the material was returned from Ridley’s inspection in Singapore.

RESULTS AND DISCUSSION

Except for the collections by Koorders, all collections are of T. ananassae from several islands in Wallacea (Fig. 1).

Tapeinochilos ananassae (Hassk.) K.Schum.

Tapeinochilos ananassae (Hassk.) K.Schum. (1899) 349; K.Schum. (1904) 436; Valeton (1917) 165; K.Heyne (1922) 595; (1927) 504; R.M.Sm. (1987) 36. — Costus ananassae Hassak. (1866) 333; Miq. (1869) 102; Valeton (1917) 165. — Type: lecto designated here, t. 22, f. 2 in Rumphius (1755); (http://www.botanicus.org/item/31753000819463), Indonesia, Ceram and neighbouring islands.

Tapeinochilos pungens (Teijms. & Binn.) Miq. (1869) 101, t. 4; F.Muell. (1872–1874) 26; Benth. & F.Muell. (1873) 267; F.Muell. (1875) 13; K.Schum. (1899) 346; F.M.S.Bailey (1902) 1593; K.Schum. (1904) 433, f. 52; Valeton (1913) 983; (1917) 165; Loes. (1930) 480, f. 289 (copy of Schumann 1904: f. 52). — Costus pungens Teijms. & Binn. (1866) 58, nom. nud. (Ceram); Costus pungens Teijms. & Binn. (1867) 244. — Type: Teijmann s.n. “22” (lecto BO 1290645, designated here; isolecto BO 1290646, SING), Indonesia, Ceram and neighbouring islands.

Tapeinochilos teysmannianus Warb. (1891) 277, syn. nov.; K.Schum. (1899) 348; (1904) 434. — Tapeinochilos pungens var. teysmannianus (Warb.) Valeton (1913) 983. — Type: Warburg 21052 (B, assumed lost in the Second World War), Indonesia, Moluccas, Kai Islands, Lesser Kai [Key], on limestone ridge.


Key morphological characters and identification — Terrestrial herb in clump. Leafy shoots 1.5–3 m high with a main stem that may have several branches at apex. Leaves to 13–18 by 4–6 cm, spiralling, spike terminal on the leafy shoot or on a separate leafless shoot, cylindrical resembling a pineapple, to 30 by 11 cm, bracts red each subtending one flower. Flower yellow, hardly exceeding the bract, ovary 2-locular.

In Wallacea T. ananassae can only be confused with Cheilocostus speciosus (J.König) C.D.Specht (Costaceae) which may be of similar size, and has spiralling leaves, a terminal red spike but differs by its smaller spike, conspicuous flowers that exceed the bracts for most of their length, are white with yellow centre, and have a 3-locular ovary. The type locality was presented as Amboina (Schumann 1899 etc). Rumphius’s plate which is informative and serves as a proper ‘new key’ the page number of the protologue changed from the original 333 to 191 but the text remained identical. One may infer that Valeton’s ‘type!’ had already designated Rumphius’s ‘Tubu Tubu Ananas’ the mean of all Costaceae with pineapple-like spike (cf. Ananas comosum (L.) Merr.), which was again Hasskarl’s (1866) reason for choice of epithet.

Conservation status — Categorized as LC (least concern) because of its wide distribution and persistence in open or disturbed habitats (IUCN 2001).

Other material examined. Alston 12607 (BO), Seram Island, Cult. Hort. Bog. II.B.V.91; Bloembergen 4302 (BO, L), Sula Islands, Sula Sanana Island, Sanana-Molufia, 25 July 1939; Bloembergen 4644 (BO, L, SING), Sula Islands, Sula Mangoli Island, Kampong Mangoli, E above Wj Mana, 21 Sept. 1939; Bloembergen s.n. (BO 1672623), Sula Islands, Sula Mangoli Island; Chaiul & Arial Hijdat AH 323 (L), Seram Island, Desa Sepa, Kec. Amahai, Kab. Maso, 20 July – 8 Aug. 1997; Eyma 1843 (BO, L), Seram Island, Pileana-Bivouak, Wape Pileana, 28 Oct. 1937; Eyma 2127 (BO, L), Seram Island, Maraina-Bivouak I, Kobiopototo, south slope of Seahari, 10 Nov. 1937; Eyma 2528 (BO, L), Seram Island, Wae Bekai-Seakasale, 7 Jan. 1938; Iwatsuki et al. C-90 (L), Seram Island, southern side of C Seram: en route from Hatumete (3°19’S, 129°35'E) to Sikewa Walal (3°15'S, 129°36'E), along a trail to Hoale Pass, 4 Nov. 1983; Kato et al. 915 (L), Seram Island, C Seram, along Trans-Seram road between Amahai and Selemam, 20–37 km NE of Maso, Wai Pia, Kecamatan (District) T.N.S., 19 Dec. 1996; Kuswata & Soepadmo 36 (G, L), Seram Island, W Seram, Kairatu, Gembu, 2 June 1959; Moseley s.n. (K), Little Kei Island, Sept. 1874; Moseley s.n. (K), Little Kei Island, Sept. 1874; Piru, June 1929; Rutten & Kornassi 17 (Botog Botanic Garden Herbarium), Seram Island, Wahai, Cult. Hort. Bog. X.B.V.91, vouchered 24 Feb. 1940, field collected probably 1917 or 1918; Teijmann 14252 (BM), no label, sent by Teijmann 1886, probably from Bogor; Teijmann s.n. (Botog Botanic Garden Herbarium), Seram Island, Cult. Hort. Bog. XI.B.V.91; Van Hulstijn s.n. (Botog Botanic Garden Herbarium), Sula Islands, Gunung Aponthia, Cult. Hort. Bog. X.B.V.25, vouchered 28 July 1925, field collection from 1914.

Hasskarl when describing Costus ananassae in 1866 was not the first to suggest that Rumphius’s ‘Tubu Tubu Ananas’ (1755: 52) belongs in the genus Costus. As Miquel (1869) noted, Heneschel (1833: 202) had previously suggested that an update of Rumphius’s name should include Costus.

Smith in Flora of Australia (1987: 36) referred to the type of T. ananassae as being ‘Neue Schlussel 191; n.v.’ which is a misinterpretation most likely based on Valeton (1917) who by ‘(Neue Schlussel 191) (type!)’ referred to Hasskarl’s protologue of C. ananassae (1866: 333) in his article entitled ‘Neuer Schlüssel zu Rumph’s Herbarium amboinense’ which, in turn, refers to Rumphius (1755: 52) including the plate ‘22.2’ with no mention of any collections. In the reprinted version of Hasskarl’s ‘new key’ the page number of the protologue changed from the original 333 to 191 but the text remained identical. One may infer that Valeton (1917) with his ‘type!’ had already designated R Humphius’s plate which is informative and serves as a proper type. To rule out any misunderstanding we designate this plate as lectotype here.

The type locality was presented as Amboina (Schumann 1899) or more commonly just as Seram (Schumann 1904 etc). Rumphius (1755: 53) clearly specified four localities, all of which we have been able to find a present-day position for (Fig. 1): 1) Seram.
Island, north coast at Hatuwu Bay (2°58’S, 129°8’E); 2) Seram Island, south coast, Sepa District (c. 3°21’S, 129°6’E), and two islands between Seram and Buru; 3) Bona (Boano; 3°0’S, 127°54’E); and 4) Manipa (3°18’S, 127°33’E). Rumphius did not specify that Sepa was identical to the mentioned area on the south coast of Seram but as such a place name is there, we assume this is the case. Sepa was already an important political domain in the 17th century (pers. comm. Roy Ellen). In addition to these four places, Rumphius also refers to the ‘Loeboeensee’, the people from Lubu. On a Dutch map from 1739, ‘Loeboe’ is situated on the Hoamoal Peninsula, W Seram (cf. Luhu 3°23’S, 128°0’E). It is not known whether the plate in Rumphius (1755) was based on material and observations of T. ananassae at all five localities or fewer.

Miquel (1869) cited Hasskarl (1866: 333) so it is strange that he did not use Hasskarl’s epithet ananassae for the type of his new genus. Perhaps he thought that Costus pungens was already validly published by 1866 as it is listed in the catalogue of Bogor Botanic Garden (Teijjsman & Binnendijk 1866) but was a nomen nudum only validly published the following year. Miquel (1869: 102) in his comments to his plate of T. pungens, stated he had no doubt that this species was the same as Rumphius’s ‘Tuba Tubu Ananas’ and that if one disregarded the lateral branches below the spike, they would be in total agreement.

In both species identification keys by Schumann (1899, 1904) T. ananassae is listed as unplaced. He is completely aware that this species is in the same ‘peculiar’ genus as the one Miquel had described with T. pungens and knew that both names were based on material from Seram. Schumann (1899) was opposing to the synonymy of the latter (because of the branching below the spike, as mentioned above), but saying that if Miquel is correct, then T. ananassae should take priority because it was published earlier. Which of course it takes, but the first to actually propose this synonymy was Valeton (1917).

From the title of the paper in which C. pungens is published, it is obvious that Teijjsman & Binnendijk (1867) based their description on a live plant flowering in Bogor Botanic Garden. Miquel likewise based his description of T. pungens (1869) on a plant in this garden which is very likely to have been the very same plant originally collected by Teijjsman in Seram. Having a live flowering plant in Bogor allowed Miquel to present an elaborate description including the wonderful and informative plate even though he was not in Java himself.

It is likely that over time several vouchers were made of the plant that Teijjsmann brought back to Bogor from Seram. In Herbarium Bogoriense, two duplicates have the number ‘22’ (BO1290645: with leaves and the apex of a spike; BO1290646: leaves only) and Teijjsmann is noted as the collector and the origin of the plant cultivated in Bogor Botanic Garden is Seram. Both have the annotation ‘Tapeinochilos pungens Miqu., specim. original’ and, in Dutch, ‘Sent to Singapore for further identification in 1896’. The latter is odd because why distribute for identification if it is known to be the type material? On the first set, however, Valeton wrote in 1916 that it is Teijjsmann s.n., cultivated in Bogor, so possibly the number was added when the duplicate was sent to Singapore to make the link clear. On Valeton’s determination slip both Costus pungens and Tapeinochilos pungens are mentioned. A collection at SING, also bearing a tag with ‘No. 22’ in the same hand as the tag on BO1290646, originates from Bogor Botanic Garden but with no other information on collector or origin. A voucher of Teijjsmann’s live collection from Seram is also found in the herbarium of Bogor Botanic Garden, but the three sheets at BO and SING mentioned above are certainly of the same gathering. As Miquel seems to have seen the collection annotated ‘22’ and Valeton had annotated their significance, it is an appropriate candidate as lectotype of Tapeinochilos pungens and we designate the most informative sheet at BO as lectotype.

We have been unable to find any duplicates of Warburg 21052, the type of T. teysmannianus but the description matches what we know of T. ananassae, of which we have seen other material from Lesser Kai Island (Moseley s.n., K) that anonymously had been annotated as T. teysmannianus. Schumann (1899, 1904) also commented that this species was very close to T. pungens and Valeton (1913) made it a variety of this.

Gideon (1996), in his monumental monograph of the genus Tapeinochilos, listed T. koordersianus as an excluded species because the leaves in the original description were four feet long — far too long to be a Tapeinochilos. Unfortunately we have not been able to find the pickled flowers that Koorders-Schumacher (1914) mentioned but the large leaves with clasping leaf bases, the huge infructescence with obpyriform, golden sericeous and spiny fruits, as well as the flower described as ‘red’ makes it easy to identify it as Etlingera heliconiifolia; a species that the first author collected as part of a currently ongoing revision of the genus Etlingera at the same locality as Koorders 1966β with flowers and fruits (Poulsen et al. 2822). One of the two collections (Warburg 15139) mentioned by Schumann (1899) when he described Amomum heliconiifolium is also from Lolombulan (above Boyong).

It is perhaps surprising that Ridley could make such a big mistake. Maybe he was misled into thinking that the material represented a member of the Costaceae because the vegetative material in the collection mainly consists of one large lamina without a proper sheath and one cannot see if the leaf arrangement is spiral. Also, the large infructescence bears resemblance to the typical pineapple-like spike of Tapeinochilos. If Ridley had seen the open sheath he would undoubtedly have realized that this material could not represent a member of the Costaceae.

Koorders first identified his collections 1966β, 19674β, and 19675β as Amomum anthodioides (Teijjsm. & Binn.) Koord. (Koorders 1898) which is a synonym of Etlingera hemisphaerica (Blume) R.M.Sm. indicating that he was on the right track towards a correct identification. He hinted that there was a problem with this identification because his collection was much bigger than Amomum anthodioides and suggested (Koorders 1988) that the description in Miquel (1859: 602) should have been ‘octometralis’ and not ‘octopedalis’ (8 metres not 8 feet).

Obvious from annotations on Koorders 1966β, Valeton had spotted the mistake that Ridley had made. In 1919, he made the annotation ‘Geanthus nova spec. affinis G. roseus’ but we have not been able to find that Valeton actually published this as a new species or new combination. Geanthus is in any case presently a synonym of Etlingera.

Unlike all other new species names of Amomum from Sulawesi that Karl Schumann introduced (Schumann 1899), A. heliconiifolia is in the key (p. 311) only mentioned as likely being affiliated with five other species that are properly keyed out (‘Hierher wahrscheinlich auch’). The notes (p. 319), however, include information on locality and habit: ‘auf dem Gunung Mahawu, am äusseren Kraterabsturz grosse Dickichte von 5 m Höhe bilden’ (forming thicket of more than 5 m on outer slopes of the Mahawu crater). Although Schumann did not place it accurately in the key he knew it was a new species and emphasized its large size which was a useful diagnostic character compared to the other species he knew from Sulawesi at that time. Thus one can reasonably argue that it is validly published in 1899.

Because Schumann (1904) mentioned his 1899 paper, the combination made by Poulsen (2003), who only cited Schumann
(1904), is not validly published (see Art. 33.4 & 33.7 of the ICBN, McNeill et al. 2006) and is therefore made again below.

**Etlingera heliconiifolia** (K.Schum.) A.D.Poulsen, comb. nov.


*Tapeinochilos koordersianus* Ridl. (1900) 99, syn. nov. — Type: **Koorders 19668**, forest number 3425, lecto, designated here: BO, N Sulawesi Province, Lolombulan at Paku-ure [today Pakure], 950 m, flowering and fruiting 12 April 1895, to 7.5 m tall, flowers red.


*Tapeinochilos koordersianus* was only entered in Index Kewensis after Turner & Cheek (1998) clarified that the Ridley paper (1900) was actually written by Ridley. Ridley (1900) did not mention any of Koorders collections in his description and we know he saw at least two of the three (19668β, 19674β, 19675β). In Koorders (1898) only two localities are mentioned: Lolombulan (19668β) and Soputan (19674β) and we do not know where 19675β is from. Koorders (1898) only ever mentioned two localities for this taxon. Of the remaining two collections, we designate Koorders 19668β as lectotype because it is the best material and the height mentioned in the label matches that in the protologue.

As *T. koordersianus* has been shown above to be synonymous with *Etlingera heliconiifolia*, there is no evidence that the genus *Tapeinochilos* occurs in Sulawesi; at present *T. ananassae* is only documented as far west as the Sula Islands (Fig. 1). In 1904, Schumann thought the western limit of the genus was Manipia Island between Buru and Seram. We predict that *T. ananassae* also occurs on Buru Island that is situated between the islands of Sula and Seram. It may also occur in Halma-hera. Future collecting, especially on the central-eastern arm of Sulawesi that stretches east toward the Sula Islands may, however, still reveal that *Tapeinochilos* also reaches as far west as Sulawesi.

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