

Zingiberaceae of the Ternate Island: Almost A Hundred Years After Beguin's Collection

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ABSTRAK

Zingiberaceae Pulau Ternate: Hampir Seratus Tahun Koleksi Beguin. Ditemukan sepuluh jenis Zingiberaceae yang mewakili lima marga (*Alpinia*, *Etlingeria*, *Hornstedtia*, *Globba*, *Boesenbergia*) di Pulau Ternate. *Alpinia novae-pommeraniae* K. Schum. dan *A. pubiflora* (Benth.) K. Schum. merupakan catatan baru untuk Maluku. Pengoleksian kembali *Alpinia regia* dari lokasi tipe memberikan tambahan informasi baru di mana spesimen tipe (*Beguin* 1234 di herbarium L) tidak lengkap.

Kata kunci: jahe-jahean, Maluku, Pulau Ternate, Beguin.

INTRODUCTION

The Zingiberaceae with about 54 genera and over 1200 species is the largest of the eight families comprising the monophyletic tropical order Zingiberales. There have been revisions of this family for certain areas in Malesia (e.g. Malay Peninsula by Holttum (1950); Borneo by Smith (1985, 1986, 1987, 1988, 1989) and Sakai and Nagamasu (2000, 2000b, 2003, 2006), but few taxonomic studies have been carried out especially in E Wallaceas line. Furthermore, the existing taxonomic treatments are mostly old references without keys, illustrations and incomplete descriptions of the species. Important references include the monograph by Schumann (1904, 1899) and for the local treatments, especially in the Mollucas and Papua New Guinea, are by Valetton (1913, 1914) and Smith (1975, 1977).

In order to update the gingers study of Moluccas, the author has conducted an exploration to the Ternate Island in July to August 2009, almost a hundred years after Beguin's collection between 1920 and 1922 (Fl. Malesiana Foundation, 1974). Ternate is an island in the Maluku Islands of eastern part of Indonesia, located off the west coast of the larger island of Halmahera. The only collection of gingers recorded from this island is by Beguin, representing nine species altogether, that are deposited at Herbarium Bogoriense (BO). The taxonomic treatment is presented here to support the existing accounts on the family in this region.

MATERIALS AND METHODS

Collecting methods follow that of Burt & Smith (1976) and Poulsen (2006). Since additional flowering material was collected, measurements of

generative characters that are damaged in herbarium specimens were included in species description. Herbarium specimens deposited at BO were also examined.

RESULTS

The recent collection comprised of ten taxa in five genera, namely *Alpinia*, *Boesenbergia*, *Etilingera*, *Globba* and *Hornstedtia*. This result is similar to Beguin’s collection from the same area except for the sterile *Boesenbergia* (Table 1).

The gingers can be found from low to high altitude. *Alpinia regia* and *A. gigantea* were recorded from 700 to 1,500 m altitude, while the rest were only

found from the lower altitude including *Alpinia novapommeraniae*, *A. nutans*, *Etilingera rosea*, *E. elatior*, *Globba marantina*, and *Hornstedtia scottiana*.

The author also collected several cultivated species, which are not treated here, namely *Alpinia purpurata*, *A. galanga* (L.) Willd., *A. vittata* W. Bull, *Costus speciosus* (J.König) Sm., *Costus globosus* Blume, *Curcuma longa* L., *Hedychium coronarium* Koen., *Kaempferia* sp. and *Zingiber cassumanan* Roxb.

Wild gingers are not common in Ternate, probably due to the absence of river in Gamalama mountain, because the habitat is too dry for this plants. Nutmeg and Cloves plantations, however, were found up to c. 1,100 m alt. (Wallace 1996).

Key to The Genera of Zingiberaceae In Ternate Island (Fertile Species)

- 1 Lateral staminodes well developed..... **1. Globba**
- Lateral staminodes reduced or absent..... **2**
- 2 Inflorescence terminal on the leafy shoot..... **2. Alpinia**
- Inflorescence radical on separate shoot at the base..... **3**
- 3 Labellum and filament connate to form a staminal tube above the insertion of the petals..... **3. Etilingera**
- Labellum and filament not connate..... **4. Hornstedtia**

Table 1. List of gingers collection by Beguin (1920–1922) and Marlina *et al.* (2009)

No. Species	Beguin (1920–1922)	Marlina <i>et al.</i> 2009
1 <i>Alpinia gigantea</i> Blume	√	√
2 <i>Alpinia nova-pommeraniae</i> K. Schum.	√	√
3 <i>Alpinia nutans</i> (L.) Roscoe	√	√
4 <i>Alpinia pubiflora</i> (Benth.) K. Schum.	√	√
5 <i>Alpinia regia</i> K. Heyne ex R.M. Sm	√	√
6 <i>Boesenbergia</i> sp.		√
7 <i>Etilingera rosea</i> B.L. Burtt & R.M. Sm.	√	√
8 <i>Etilingera elatior</i> (Jack) R.M. Sm.	√	√
9 <i>Globba marantina</i> L.	√	√
10 <i>Hornstedtia scottiana</i> (F. Muell.) K. Schum.	√	√
Total	9	10

TAXONOMY

1. *Globba* L., Mant. pl. (1771) 170. — Type species: *Globba marantina* L. Valeton, Nova Guinea, Bot. 8 (1913) 925. Distribution — Thailand, Sumatra, Peninsular Malaysia, Singapore, Sarawak, Brunei, Sabah, Kalimantan, Java, Philippines, Moluccas, Papua New Guinea.

1. *Globba marantina* L., Mant. pl. (1771) 170. — Type: *Cat.Linn.herb.* 45/1 (holo LINN); K. Schum., Pflanzenr. IV, 46 (1904) 156; Zingib. Malesia (2004) 100.

Description

Terrestrial herb. Leafy shoot to 45 cm long, with up to 9 leaves per shoot; base to 1 cm diameter, yellow-brown; sheath light green, glabrous; ligule ca. 1 mm long, hairy; petiole to 2 mm long, light green, glabrous; lamina elliptic, to 14.5 — 5.2 cm, green and glabrous above, pale green and hairy beneath; base acute; apex caudate. Inflorescence terminal. No flowers found in the specimens, only bulbs in the inflorescence. Inflorescence

according to Schumann (1904), panicle globose without bract at the lowest part, bracts 1.2-2.2 cm long, imbricate, elliptic, or suborbicular, slightly acute. According to Holttum (1950), flowers when present yellow, staminodes longer than corolla-lobes, lip with apex much base of corolla-lobes, anther 4 spurs.

Vernacular name:

Not recorded

Uses:

Not recorded

Distribution:

Widespread

Ecology and habitat:

In nutmeg plantations.

Materials examined:

North Moluccas. Ternate, Ake Bobotja, 25 m, 4 October 1920, *V.M.A. Beguin* 840 (BO!); Ternate, Kotta Baroe, ca. 3 m, 6 May 1921, *V.M.A. Beguin* 1556 (BO!); Ternate, Loboso, c.10 m, 5 March 1938, *Anang* 121; Ternate, Maliaro (00°47.098'N, 27°21.200'E), 425 m, 29 July 2009, *Marlina Ardiyani* 204 with *Rudi Samsudin* (BO!).

Key to species of *Alpinia*

- 1. Flowers white or greenish white..... 2
 - Flowers dark red..... **2.1. *A. nutans***
- 2. Inflorescence branched and secund..... **2.2. *A. regia***
 - Inflorescence branched or not, not secund **3**
- 3. Leaves hairy beneath; labellum large c. 3.8 × 4.3 cm; fruits **2.3. *A. novae pommeraniae***
 - Leaves puberulous or glabrous beneath; labellum small c. **4**
 - 12-17 × 7-9.5 mm; fruits glabrous
- 4. Inflorescence not branched; fruits c. 2.5 cm diameter..... **2.4. *A. gigantea***
 - Inflorescence not branched; fruits small c. 5 mm diameter ... **2.5. *A. pubiflora***

2. *Alpinia Roxb.*, Asiat. Res. 11 (1810) 350; Valetton, Nova Guinea, Bot. 8 (1913) 937; R.M. Smith, Notes Roy. Bot. Gard. Edinburgh 34 (1975) 180; R.M. Smith, Notes Roy. Bot. Gard. Edinburgh 35 (1977) 195. Distribution: Throughout Malesia.

2.1 *Alpinia nutans* (L.) Roscoe, Exot. Bot. 2 (1805) 93. (Figure 1)

Basionym: *Globba nutans* L., Mant. pl. (1771) 170. Type: Herb. amboin. 6: 140, t. 62, 63 (1750).

Synonym: *Alpinia molucana* Gagnep., Bull. Soc. Bot. France 48 (1901) XC. Type: *C. Gaudichaud-Beaupré 101*, Moluccas, Pulau Lawak (holo P).

Terrestrial herb in dense clump (to 13 cm between leafy shoots), without stilted-root. Leafy shoot to 7.2 m long, with up to 19 leaves per shoot; base to 11 cm diameter, light green with brown scale, rhizome yellowish white inside, mild taste; sheath green, glabrous; ligule ca. 2 cm long, apex acute-rounded, coarse and scarcely hairy, with brown margin; petiole 1.5–2.5 cm long, green, reticulate; lamina lanceolate, 81–150 × 15.5–27 cm, dark green, base rounded, oblique, margin slightly undulate, yellow, ciliate with brown hairs, apex acute to acuminate, both surfaces glabrous. Inflorescences not branched, terminal, with ca. 20 flowers, 1 open at a time; peduncle erect then pendent, to 60 cm long, yellowish green, glabrous; peduncular bracts to 51 cm long, light green with drying brown apex; spike ca. 76 × 11.5 cm; fertile bracts, spatulate, ca. 8 × 3.6 cm, dark red, margin undulate; bracteole tubular, to 2.5 × 1.5 cm, drying brown. Flowers

3.5–4.2 cm long; calyx ca. 1.6 × 8–10 mm, apex 3-toothed with spiny tips, dark red, glabrous, persistent at fruiting stage; corolla tube ca. 1.3 cm long, red; dorsal lobe hooded, ca. 14 × 7 mm, margin incurved, red, glabrous; lateral lobes hooded, ca. 11 × 9 mm, margin incurved, red, glabrous; labellum elliptic, ca. 14 × 8 mm, apex acute-rounded, dark red, glabrous; filament ca. 15 mm long, red, glabrous; anther ca. 11 × 5 mm; style ca. 3.1 cm long, white; stigma white; ovary to 1 × 1 cm, white-green, glabrous; infructescences ca. 67.5 × 8.5 cm, with ca. 47 capsules. Capsule globose, 1.5–3.1 × 1.8–2.7 cm, light green with reddish brown tinge when immature, turning to reddish orange or dark red at maturity, glabrous; seeds brown, aril greyish brown transparent.

Vernacular name:

Manoa, Moa, Goloba koi.

Uses:

The young shoots are used for cooking and the mature one for making rope.

Etymology:

The specific epithet *Alpinia nutans* refers to the nodding inflorescences.

Ecology and habitat:

Widespread in the Ternate Island. Found in disturb forests, and also in clove and nutmeg plantations.

Distribution:

Moluccas

Materials examined:

North Moluccas. Ternate Island: Foramadiah, 350 m alt., 26 December 1920, flowering & fruiting, *V.M.A. Guin 1273* (BO!); Tabahawa, 300 m

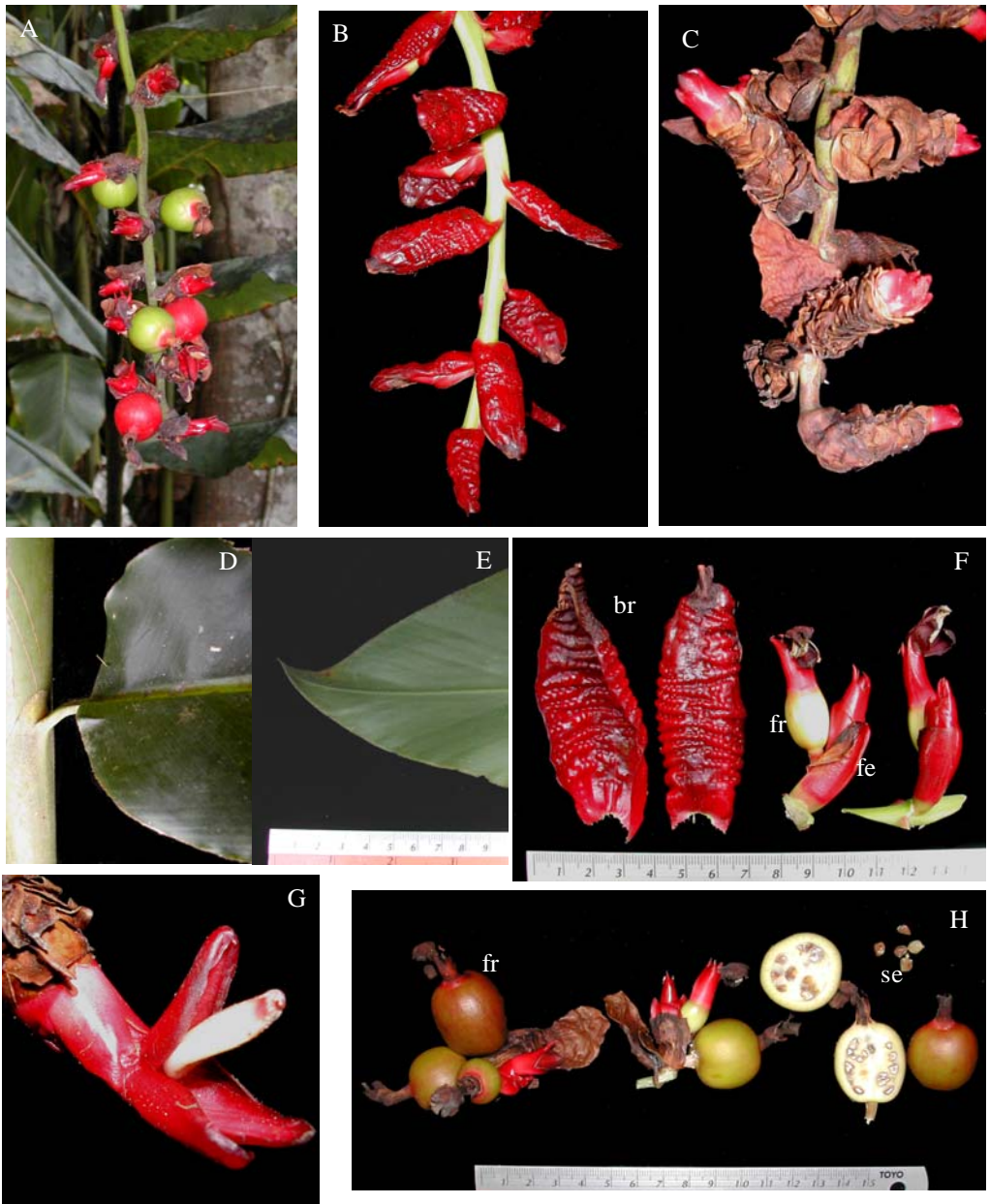


Figure 1. *Alpinia nutans*. **A.** Infructescence. **B.** Young inflorescence. **C.** Old inflorescence. **D.** Ligule and base of leaf blade. **E.** Apex of leaf blade. **F.** Young fruits and bracts: br = bract, fe = fertile bract, fr = fruit. **G.** Flower. **H.** Fruits: fr – fruit, seed. *M. Ardiyani 203*. Photographs by M. Ardiyani.

alt., 15 October 1920, flowering & fruiting, *V.M.A. Beguin 944* (BO!, L); Maliaro, 00°47.130'N, 127°21.328'E, 385 m alt., 29 July 2009, flowering & fruiting, *Marlina Ardiyani & Rudi Samsudin 203* (BO!).

2.2. *Alpinia regia* K. Heyne ex R.M. Sm., Notes Roy. Bot. Gard. Edinburgh 35 (1977) 203; Checkl. Zingib. Malesia (2004) 28. Type: *V.M.A. Beguin 1234*, Moluccas, Pulau Ternate (holo L; iso BO!, E). (Figure 2)

Terrestrial, giant herb in dense clump (to 15 cm between leafy shoots), with stilted-root. Leafy shoot to 5–10 m long, 11.5 cm diameter, with up to 13 leaves per shoot; base to 22 cm diameter, orange-brown, glabrous; sheath yellowish green with brown spots except drying orange-brown towards basal part, glabrous; ligule to 4.5 cm long, apex acute-rounded, yellowish brown, hairy; petiole to 11 cm long, winged, basal part ear-shaped, crenulate, yellowish green, glabrous; lamina lanceolate, ± plicate, easily torn, to 245 × 45 cm, base cuneate, oblique, apex acute, upper surface dark green, lower surface yellowish green, glabrous. Inflorescences 3–4 branches, with ca. 145 flowers, 10–15 open at a time; peduncle erect, to 78 cm long, 2 cm diameter, yellowish green, densely tomentose except for lowest before branches glabrous; peduncular bracts to 85 × 12 cm, drying brown; fertile bracts tubular, ca. 1.5 × 1.2 cm, mouth slanting to 2/3 of length, drying brown; bracteole tubular, to 16 × 8 mm, apex asymmetric, light green on lower 3/4, brown on upper 1/4. Flowers glabrous: hermaphrodite

flowers ca. 4.2 cm long; calyx ca. 12 × 6 mm, apex 3-toothed, light green with drying brown edges; corolla tube ca. 11 × 4.5 mm, cream-white; dorsal lobe hooded, ca. 2.2 × 1.2 cm, slightly boat-shaped, apex cucullate, greenish white; lateral lobes lanceolate with slightly hooded apex, ca. 18 × 8 mm, margin slightly wrinkled; lateral staminodes 3 mm long, white; labellum lanceolate, ca. 26 × 9.5 mm, apex rounded, fimbriate, cream-white; filament ca. 22 × 8 mm, very thick, white; anther ca. 8 × 1.5 mm, anther crest ciliate with short hairs; style ca. 3 cm long, white; stigma light green; ovary to 9 × 8.5 mm, green. Infructescence to 64 × 9.5 cm, with ca. 40 capsules. Capsule globose, 2.5 × 1.7 cm, green, glabrous; seeds white, aril white.

Vernacular name:

Dubele.

Uses:

The young shoot eaten raw or used for cooking.

Etymology:

The epithet *regia* refers to the habit of the species.

Ecology and habitat:

Alpinia regia only can be found from 700 m to 1500 m alt. in Mt. Gamalama near Maliaro. There are only two populations observed along the trail to the mountain from Maliaro village between 00°47.494' N, 127°20.809' E at 740 m alt. to 00°47.764' N, 127°20.749' E at 1003 m alt. In the North Foradiahi, the species was collected at 1400–1450 m alt. by Beguin.

Distribution:

Celebes, Moluccas, Papua New Guinea.



Figure 2. *Alpinia regia*. **A.** Inflorescence with some open flowers. **B.** Inflorescence, close-up, shows secund inflorescence. **C.** Young inflorescence. **D.** Base of leafy-shoot. **E.** Ligule and base of winged petiole. **F.** Petiole. **G.** Leaves. **H.** Flowers, close-up. **I.** Flowers: fe = fertile bract, bl = bracteole, ca = calyx, cl = corolla lobe, la = labellum, ov = ovary, ss = stamen and stigma, fr = fruit. *M. Ardiyani* 220. Photographs by M. Ardiyani.

Materials examined:

North Moluccas. Ternate Island: West Sanoto Besar, 600 m alt., 4 April 1922, flowering & fruiting, *V.M.A. Beguin 1943* (BO!); Mt. Gamalama, 00°47.764'N, 127°20.749'E, 1003 m alt., 1 August 2009, flowering & fruiting, *Marlina Ardiyani et al. 220* (BO).

Notes. *Alpinia regia* is rare, since only two populations were found, in Mt. Gamalama and observed to be slow in reaching its giant state. Its young shoots are harvested for food, thus conservation effort is needed for this species from extinction in the wild. Smith (1977) stated that this species has sessile leaves as she did not observe the basal part of the leaf on the material examined. However, based on the recent collection from the type locality and the isotype specimen deposited in BO, this plant is petiolate; petiole is up to 11 cm long.

2.3. *Alpinia novae-pommeraniae* K. Schum., Bot. Jahrb. Syst. 27 (1899) 285; Checkl. Zingib. Malesia (2004) 24. Type: *F.O. Dahl 131* (syn B, probably lost in Second World War), *O. Warburg 16158* (syn B, probably lost in Second World War). (Figure 3)

Terrestrial herb in dense clump (to 4.5 cm between leafy shoots), without stilted-root. Leafy shoot to 1.6 m long, with up to 7 leaves per shoot; base to 3.5 cm diameter, yellow-white; sheath yellowish green, glabrous; ligule to 8 mm long, slightly bilobed, green, puberulous; petiole to 8.5 cm long, green, puberulous; lamina lanceolate, to 76 × 11 cm, plicate, margin undulate, dark green and glabrous above, shiny pale green, velvety beneath;

base oblique, obtuse; apex caudate. Inflorescences terminal, ca. 29 cm long, with ca. 9 flowers, 2 open at a time; peduncle erect, to 6.5 cm long, green, velvety; peduncular bracts to 35 cm long forming sheath and lamina, green; no fertile bracts; bracteole enclosing the ovary, slit to base on one side, to 25 × 8 mm, white, puberulous. Flowers ca. 5 cm long; ovary to 1 × 6 mm, yellowish green; calyx tubular, 3-toothed, 18.5 mm × 6 mm, white, hairy; corolla tube ca. 14.5 × 8 mm, white; dorsal lobe oblong, with slightly hooded apex, ca. 2.5 × 1.65 cm, yellowish white, slightly transparent; lateral lobes lanceolate with round apex, apex slightly hooded, ca. 2.1 × 1.1 cm; lateral staminodes ca. 3.5 mm long, pinkish; labellum obovate, ca. 3.8 × 4.3 cm, ca. 1.1 cm wide at the narrowest part, red with yellow margin and red lines; filament ca. 12 × 3 mm, yellowish green with pinkish base; anther ca. 11 × 8.5 mm, cream-white; style ca. 3.4 cm long, white; epigynous glands ca. 3 mm long; stigma yellowish white. Infructescence head to 14 × 7 cm, with ca. 9 fruits per head, fruit globose, ca. 3 × 2.4 cm, red, hairy; seed black, aril white.

Vernacular name:

Madamonge.

Uses:

Fruits eaten.

Ecology and habitat:

This species was only found in Air Tege-tege where there was spring water. This species probably prefers moist area as it was not found in relatively dry places.

Distribution:

Moluccas (new records), Papua New Guinea.



Figure 3. *Alpinia novae-pommeraniae*. **A.** Inflorescence. **B.** Infructescence. **C.** Ligule and petiole. **D & E.** Flowers, close-up. **F.** Base of leaf blade. **G.** Apex of leaf blade. **H.** Flower, side view. **I.** Flowers: wf = whole flower, fe = fertile bract, ca = calyx, cl = corolla lobe, la = labellum, ov = ovary, ss = stamen and stigma, fr = fruit. *M. Ardiyani 231*. Photographs by M. Ardiyani.

Material examined:

North Moluccas. Ternate, s.d., flowering and fruiting, *V.M.A. Beguin 1263* (BO!); Ternate, Air Tege-tege (00°47'280"N, 127°21'20.7"E), 404 m, 3 August 2009, flowering and fruiting, *Marlina Ardiyani et al. 231*(BO!).

2.4. *Alpinia gigantea* Blume, Enum. pl. Javae (1827) 59; Checkl. Zingib. Malesia (2004) 16. Type: *C.G.C. Reinwardt s.n.* (holo BO!, syn E). (Figure 4)

Description

Terrestrial herb in dense clump, with stilted-root. Leafy shoot to 4-6 m long; base to 8.5 cm diameter, orange-brown, glabrous; sheath greenish brown, glabrous; ligule to 1.2 cm long, apex acute-rounded, brownish green, coarse; petiole to 4.5 cm long, light green, glabrous; lamina lanceolate, plicate, to 124 × 26.5 cm, dark green and glabrous above, pale green, glabrous beneath; base acute-rounded; apex acuminate. Inflorescence terminal, to 100 cm long, with ca. 25 flowers, ca. 2 open at a time; spike to 60 × 5.5 cm, not secund; peduncle pendent, to 40 cm long, green, glabrous; peduncular bracts to 67 cm long, drying brown; fertile bracts forming tube, slit to the base at one side, ca. 2 × 1.2 cm, drying brown; bracteole enclosing the ovary, tubular, to 15 × 7 mm, light green, glabrous. Male flower ca. 3 cm long; ovary to 5 × 4 mm light green, glabrous; calyx tubular, 3-toothed, 10 × 6 mm, green with brown edge at apex, glabrous; corolla tube 15 × 5 mm, cream-white; dorsal lobe flat, erect, with slightly

hooded apex and with brown edge, to 15 × 9 mm, light green, transparent on sides and on the lowest part, glabrous; lateral lobes elliptic, sides slightly folded, with slightly hooded apex, hooded apex with brown tinge, to 9.5-12 × 5.5-7 mm, light green, transparent on the lower part; teeth 3 mm long, cream; labellum spatulate, to 12-17 × 7-9.5 mm, cream yellow, wrinkled and white-green at apex, glabrous; filament thick, ca. 9.5-12 × 6.5 mm, cream-white; anther ca. 6-8 × 4.5-6.5 mm, cream; epigynous glands ca. 1.5 mm long, cream. Infructescence: fruit elongate, ca. 2.5 × 2 cm, green, glabrous; seed white transparent, aril white.

Vernacular name:

not recorded.

Uses:

not recorded.

Etymology:

gigantea means giant though *A. regia* is much bigger.

Ecology and habitat:

In secondary forest. The leafy shoot looks similar to the giant *Alpinia regia*.

Distribution:

Moluccas.

Materials examined:

North Moluccas. Ternate, North Foradiahi, *V.M.A. Beguin 1489* (BO); Ternate, North Foradiahi, c.1450 m, 14 March 1921, flowering, *V.M.A. Beguin 1529* (BO!); Ternate, North Foradiahi, c.1400 m, 13 March 1921, flowering, *V.M.A. Beguin 1524* (BO!); Ternate, North Foradiahi, 1450 m, 14 March 1921, flowering, *V.M.A. Beguin 1530* (BO!); Ternate, s.d., *V.M.A.*

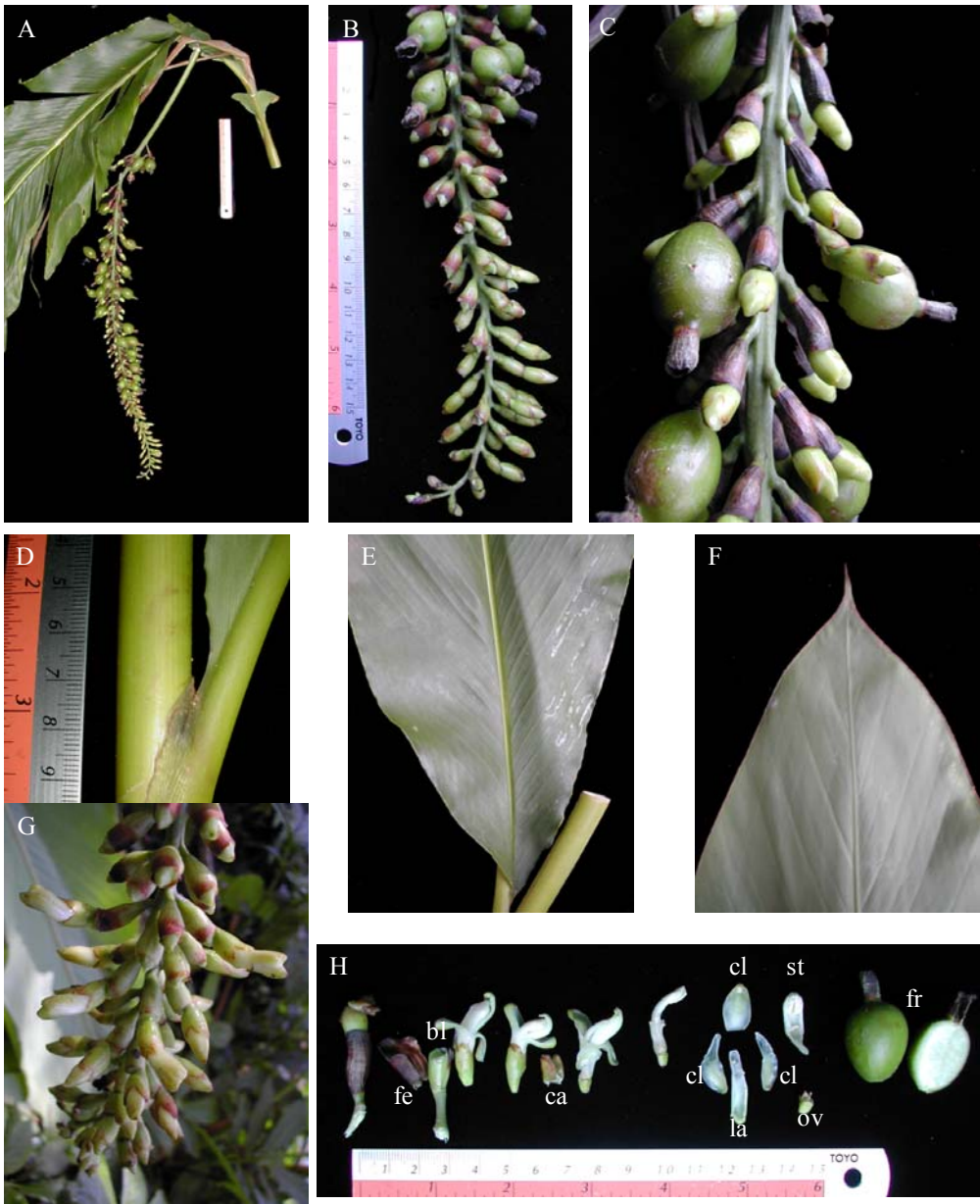


Figure 4. *Alpinia gigantea*. **A.** Inflorescence. **B & C.** Inflorescence, close-up. **D.** Ligule. **E.** Base of leaf blade. **F.** Apex of leaf blade. **G.** Young inflorescence. **H.** Male flowers, close-up: fe = fertile bract, bl = bracteole, ca = calyx, cl = corolla lobe, la = labellum, ov = ovary, aborted, st = stamen, fr = fruit. *M. Ardiyani* 222. Photographs by M. Ardiyani.

Beguin 1664 (BO!); Ternate, Gamalama mountain (00°47'54.1"N, 127°21'35.0"E), 1206 m, 1 August 2009, flowering and fruiting, *Marlina Ardiyani et al. 221*(BO); Ternate, Gamalama mountain (00°47'45.7"N, 127°20'44.8"E), 992 m, 1 August 2009, flowering and fruiting, *Marlina Ardiyani et al. 222* (BO).

2.5. *Alpinia pubiflora* (Benth.) K. Schum., Pflanzenr. IV, 46 (1904) 313; Checkl. Zingib. Malesia (2004) 27. Basionym: *Hellenia pubiflora* Benth., London J. Bot. 2 (1843) 235; *Languas pubiflora* (Benth.) Merr., Enum. Philipp. fl. pl. 1 (1923) 233.

Type:

G.W. Barclay s.n. (August 1840)(syn K), Pulau Yapen, *R.B. Hinds s.n.* (syn K).

Description

Terrestrial herb with leafy shoot to 2.5 m long; ligule to 1.2 cm long, apex acute-rounded; petiole to 5 mm long, glabrous; lamina lanceolate, to 30 × 5 cm, dark green and glabrous above, pale green, glabrous beneath; base acute; apex acuminate. Inflorescences branched, terminal, to 20 cm long, with ca. 25 flowers; peduncle erect, to 5 cm long, green, pubescent. Flowers ca. 1 cm long, white-green; calyx tubular, 3-toothed, ca. 2.5 cm long, pubescent; corolla tube ca. 3 cm long; dorsal lobe flat, to 25 × 9 mm, pubescent; lateral lobes elliptic, sides slightly folded, apex slightly hooded, to 25 × 7 mm; labellum spatulate, to 30 × 9.5 mm, pubescent. Infructescence: fruit round, ca. 5 × 5 mm, green, glabrous.

Vernacular name:

not recorded.

Uses:

not recorded.

Etymology:

pubiflora means the flowers are pubescent.

Ecology and habitat:

In secondary forest.

Distribution:

Philippines, Moluccas, West Papua.

Materials examined:

North Moluccas. Ternate, c.20 m, 9 May 1921, flowering & fruiting, *V.M.A. Beguin 1615* (BO!).

Notes:

The author did not find this species during the exploration. More work is needed before we confirm that they are extinct in the wild.

3. *Hornstedtia* Retz., Observ. bot. 6 (1791) 18. Valeton, Nova Guinea, Bot. 8 (1913) 927; Checkl. Zingib. Malesia (2004) 111. Type: *Hornstedtia scyphifera* (J. König) Steud.

Distribution:

Sumatra, Peninsular Malaysia, Singapore, Sarawak, Sabah, Kalimantan, Java, Philippines, Sulawesi, Moluccas, West Papua, Papua New Guinea.

3.1 *Hornstedtia scottiana* (F. Muell.) K. Schum., Pflanzenr. IV, 46 (1904) 194; Checkl. Zingib. Malesia (2004) 116.

Basionym: *Elettaria scottiana* F. Muell. Lectotype: *J. Dallachy s.n.* (MEL, designated by Smith, 1987), Queensland; *Amomum lycostomum* Lauterb. & K. Schum. ex K. Schum., nom. nud., Bot. Jahrb. Syst. 27 (1899)

305; *Hornstedtia lycostoma* Lauterb. & K. Schum., Fl. Schutzgeb. Südsee (1900) 228. — Type: *C.A.G. Lauterbach 2495, 2542* (syn B), Papua New Guinea. (Figure 5)

Terrestrial herb in dense clump (to 6 cm between leafy shoots), without stilted-root. Leafy shoot to 5.35 m long, with up to 33 leaves per shoot; base to 6.5 cm diameter, golden brown; sheath green, glabrous; ligule 8–13 mm long, apex rounded, dark green, hairy; subsessile or petiolate, petiole ca. 6 mm long, green, pubescent except glabrous on lower part; lamina lanceolate, ca. 69.5 × 14.5 cm, base cuneate, apex acuminate, upper surface green, lower surface pale green, both surfaces glabrous. Inflorescences radical, 10–15 cm long, erect, ca. 1 flower open at a time; peduncle 4–8 cm long; peduncular bracts slightly boat-shaped, brown, darker on margin; sterile bracts concave, 7.2–8.5 × 3.1 cm, inner part reddish grey, outer maroon, puberulous; fertile bracts boat-conical-shaped, ca. 6.7 × 2.5 cm, pinkish white, glabrous; bracteole boat-shaped, 45 × 7 mm, apex caudate, translucent white with pinkish apex. Flowers to 8 cm long; calyx tubular, ca. 60 × 8.5 mm, deeply bilobed, transparent tinged with pink at apex and basal part, persistent at fruiting stage; corolla tube ca. 6.4 cm long, pinkish white at 2/3 lower part, dark red on 1/3 upper; dorsal lobe lanceolate, ca. 17 × 11.5 mm, apex slightly hooded,

with rounded tips, translucent red on margin; lateral lobes lanceolate, ca. 17 × 8 mm, apex rounded; labellum ovate, ca. 1.7 × 1.4 cm, white with median red; filament ca. 6.4 cm long, pinkish white; anther ca. 13 × 4.5 mm, cream-white; style ca. 7.7 cm long, white; stigma white; epigynous glands ca. 4 mm long, yellowish white; ovary to 7 mm, golden-white, hairy. Infructescences ca. 11.5 × 5.5 cm. Capsule elongate, ca. 3.2 × 1.2 cm, cream-white with red tinge at apex; seeds black, aril white.

Vernacular name:

Goloba kusi; Goloba boboedo.

Uses:

Fruits eaten.

Ecology and habitat:

In disturbed forests.

Distribution:

Moluccas, Papua New Guinea.

Materials examined:

North Moluccas. Ternate, Foramadiah, 350 m, 9 December 1920, flowering, *V.M.A. Beguin 1208* (BO!); Ternate, Foramadiah, 500 m, 22 November 1920, flowering and fruiting, *V.M.A. Beguin 1165* (BO!); Ternate, *s.d.*, flowering, *V.M.A. Beguin 1272* (BO!, L, K); Ternate, *s.d.*, flowering, *V.M.A. Beguin 1663* (BO!); Ternate, Maliaro (00°47.112'N, 127°21.452'E), 318 m, 31 July 2009, flowering & fruiting, *Marlina Ardiyani 219 with Rudi Samsudin* (BO!).

Key to The Species of *Etilingera*

1. Peduncle of inflorescence long, to 30 cm; fruit spiny.....**4.1. *E. rosea***
- Peduncle of inflorescence short, to 9 cm; fruit smooth.....**4.2. *E. elatior***



Figure 5. *Hornstedtia scottiana*. **A.** Radical inflorescence. **B.** Inflorescence, close-up with dissection. **C.** Ligule and base of leaf blade. **D.** Apex of leaf blade. **E.** Base of leaf blade. **F.** Flower, close-up. **G.** Flowers, close-up: ifr = infructescence with dissection, ifl = inflorescence with dissection, fe = fertile bract, bl = bracteole, ca = calyx, cl = corolla lobe, la = labellum, ov = ovary, ss = stamen and stigma, fr = fruit. *M. Ardiyani 219*. Photographs by M. Ardiyani.

4. *Etilingera* Giseke, Prael. ord. nat. pl. (1792) 209; Valetton, Nova Guinea, Bot. 8 (1913) 930; Checkl. Zingib. Malesia (2004) 72. Type: *Etilingera littoralis* (J. König) Giseke.

Distribution:

Thailand, Sumatra, Peninsular Malaysia, Sarawak, Brunei, Sabah, Kalimantan, Java, Philippines, Sulawesi, Moluccas, West Papua, Papua New Guinea.

4.1. *Etilingera rosea* B.L. Burtt & R.M. Sm., Notes Roy. Bot. Gard. Edinburgh 43 (1986) 240., nom. nov.; *Donacodes roseus* Teijsm. & Binn., nom. nud., Catalogus van 's Lands Plantentuin te Buitenzorg (1854) 58; *Cardamomum roseum* Kuntze, nom. illeg., Revis. gen. pl. 2 (1891) 687; *Amomum roseum* K. Schum., nom. illeg., Pflanzenr. IV, 46 (1904) 256; *Geanthus roseus* Loes., nom. illeg., Nat. Pflanzenfam. ed. 2, 15,A (1930) 593. Type: J.E. Teijsmann s.n. (BO!, K). (Figure 6)

Terrestrial herb in dense clump (to 20 cm between leafy shoots), without stilted-root. Leafy shoot ca. 5 m long, with up to 21 leaves per shoot; base to 6.5 cm diameter, golden brown, hairy; sheath green, glabrous; ligule to 1.2 cm long, ± rounded, dark green, glabrous; petiole ca. 2.5 cm long, green, glabrous; lamina lanceolate, 75 × 15.4 cm, green and glabrous above, pale green and glabrous beneath; with hairy margin; base round; apex acuminate. Inflorescences to 17 cm long, arising from base of leafy shoot, erect, with 32 flowers, ca. 8 open at a

time; peduncle to 9 cm long; peduncular bracts boat-shaped, apex rounded, mucronate, creamish yellow; sterile bracts slightly boat-shaped, ca. 3.2 × 1.7 cm, apex hooded, acute, spiny, light green with yellow-orange tinge except golden brown towards the base; fertile bracts elongate, folded inward, ca. 4.5 × 1.6 cm, light green with yellow-orange tinge except golden brown towards the base, hairy; bracteole boat-shaped, enclosing the ovary, ca. 1.7 × 1 cm, translucent with golden brown tinge, hairy. Flowers ca. 5 cm long; calyx tubular, ca. 20 × 4 mm, apex 3-toothed, golden cream-yellow, hairy; corolla tube 18 × 3 mm, white with yellowish tinge, lobes white with yellowish tinge, edges curved inwards, apex curled inwards; dorsal lobe ca. 2.4 cm long, ca. 3 mm wide at base, ca. 6 mm wide at apex, lateral lobes ca. 1.9 cm long, ca. 3.5 mm wide; staminal tube ca. 3 mm long, white; labellum ca. 2.8 cm long with ca. 9 mm wide at apex, sides overlapped, apex curled outwards; filament ca. 13 × 3 cm, white, scarcely hairy; anther ca. 5.5 mm long, ca. 3.5 mm wide, white-yellow, anther crest absent; epigynous glands ca. 3 mm long; style ca. 3.5 cm long, white; stigma ca. 1.5 mm wide, white-yellow; ovary to 6 mm long, golden yellow-brown, hairy. Inflorescences head to 9 cm long and 6 cm diam., subglobular, bracts not persistent, with ca. 30 fruits per head, fruit ca. 1.8 × 1.7 cm, globular, spiny with calyx remnant at apex, cream-yellow with cream-yellow to pink spines, spines to 3 mm long, curved; seed white, aril white transparent.



Figure 6. *Etlingera rosea*. **A.** Inflorescence, close-up. **B.** Infructescence, close-up. **C.** Ligule. **D.** Base of leaf blade. **E.** Apex of leaf blade. **F.** Inflorescence and infructescence. **G.** Flowers, close-up: fe = fertile bract, bl = bracteole, ca = calyx, cl = corolla lobe, la = labellum, ov = ovary, ss = stamen and stigma, fr = fruit. *M. Ardiyani 218*. Photographs by M. Ardiyani.

Vernacular name:

Goloba Papua.

Uses:

Fruits eaten.

Etymology:

rosea refers to the colour of the flower that is pink, but sometimes the flowers are white-yellow.

Ecology and habitat:

In disturbed forests.

Distribution:

Celebes, Moluccas.

Materials examined:

North Moluccas. Ternate, Foramadiahi, 600 m, 22 November 1920, flowering and fruiting, *V.M.A. Beguin 1167* (BO!); Ternate, *s.d.*, flowering, *leg. ign. 1024* (BO!); Ternate, Lagoena, 450 m, 12 May 1920, fruiting, *V.M.A. Beguin 684* (BO!); Ternate, Maliaro (00°47.112'N, 127°21.452'E), 318 m, 31 July 2009, flowering and fruiting, *Marlina Ardiyani 218 with Rudi Samsudin* (BO!).

4.2. *Etilingera elatior* (Jack) R.M.

Sm., *Etilingera elatior* (Jack) R.M. Sm., Notes Roy. Bot. Gard. Edinburgh 43 (1986) 244; Checkl.Zingib.Malesia (2004) 75. Basionym: *Alpinia elatior* Jack, Descriptions of Malayan Plants 2(7) (1822) 2; *Nicolaia elatior* (Jack) Horan., Prodr. Monogr. Scitam. (1862) 32. — Type: *W. Jack s.n. (1818)*, specimen lost.

Nicolaia intermedia Valetton, Bull. Jard. Bot. Buitenzorg ser. 3, 3 (1921) 133. — Type: *Anon. s.n. (HB XI B IV 101)* (holo BO), Java: *W. Jack s.n. (1818)*, specimen lost.

Distribution:

Widespread.

Description

Terrestrial herb in dense clump (to 20 cm between leafy shoots), without stilt-rooted. Leafy shoot to 4 m long, with up to 22 leaves per shoot; base to 7 cm diameter, light green with drying brown scales; sheath light green with greenish brown marks, glabrous; ligule to 1.6 cm long, apex slightly bilobed to rounded, yellowish green, glabrous; petiole ca. 2.5 cm long, yellowish green, glabrous; lamina lanceolate, ca. 85 × 18.5 cm, yellowish green and glabrous above, light green and glabrous beneath; base cordate, oblique; apex acuminate, oblique. Flowering shoot to 1.5 m long, arising from base of leafy shoot, erect, with ca. 17 flowers open at a time; peduncle to 1.5 m long, glabrous; peduncular bracts ca. 10 cm long, green, glabrous; spike ca. 8 cm long and ca. 2 cm wide in lower part, conical-shape; sterile bracts obovate to lanceolate with acute apex, ca. 11 × 7 cm, pink with darker pink tinge on margin, greenish yellow on lowerpart; fertile bracts lanceolate, ca. 7 × 1.7 cm, red with pink transparent margin, creamish white on lower part, glabrous; bracteole boat-shaped, deeply slit in one side, ca. 2.6 × 1.3 cm, dark pink, transparent, lanceolate to broadly lanceolate. Flowers ca. 5 cm long; corolla tube ca. 1.3 cm long, cream white with pink tinge, lobes red, dorsal lobe ca. 25 × 7 mm, lateral lobes ca. 25 × 5 mm; staminal tube ca. 1 cm long, white; labellum folded on sides, forming a tunnel, ca. 12.8 cm long and ca. 2 cm wide at the widest part, dark red with

yellow margin; filament ca. 25 × 3 mm, white; anther ca. 9 mm long, ca. 3.5 mm wide, red with white tinge; epigynous glands ca. 4 mm long, light yellow; style ca. 3.5 cm long, pink; stigma maroon; ovary to 4.5 mm long, white, hairy; calyx tubular, deeply slit in one side, ca. 3.4 cm long and ca. 1.3 cm diameter, red, glabrous. Infructescences head to 10 cm long and ca. 8 cm diam., subglobular, with ca. 50 fruits per head, fruit ca. 1.8 × 1.7 cm, globular, with brown drying calyx remnant, red.

Vernacular name:

Patikala.

Uses:

Flowers, fruits and young shoot are used for cooking.

Ecology and habitat:

In disturbed forest.

Distribution:

Widespread.

Materials examined:

North Moluccas. Ternate, 1921, *V.M.A. Beguin 1250* (BO!); Ternate, Laguna, 350 m, 24 April 1920, flowering, *V.M.A. Beguin 594* (BO!); Ternate, Maliaro (00°47.144'N, 127°21.205'E), 437 m, 29 July 2009, flowering and fruiting, *Marlina Ardiyani 207 with Rudi Samsudin* (BO).

Incomplete Species

1. *Boesenbergia* sp.

Description

Terrestrial herb, rhizomes smell like *Boesenbergia rotunda*. Leafy shoot to 45 cm long, with up to 4 leaves per shoot; base to 1.5 cm diameter, red-brown; leafless sheath red; sheath green, glabrous; ligule ca. 1 mm long; petiole to 8 cm long,

green, glabrous; lamina elliptic, to 23 × 10 cm, green and glabrous above, pale green and glabrous beneath; base acute; apex slightly acuminate.

Ecology and habitat:

In nutmeg plantations.

Materials examined:

Ternate, Maliaro (00°47.098'N, 127°21.200'E), 425 m, 29 July 2009, *Marlina Ardiyani 208 with Rudi Samsudin* (BO!).

ACKNOWLEDGEMENT

The exploration was funded by Iptekda Khusus, LIPI (Indonesian Institute of Sciences) as part of the project "IPTEKDA KHUSUS Ternate Expedition 2009". The author is indebted to Dr Ibnu Maryanto who organized the expedition; Drs Syamsir Andili, Major of Ternate and his staff who have helped the team in the field. I appreciate valuable comments on the manuscript from Ms. Avelinah Julius from FRIM, Malaysia. Many thanks are also due to Dr Mark Newman who helped to identify *Alpinia* species.

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Submitted: September 2009

Accepted: Maret 2010