

Revision of the Genus *Zingiber* in Peninsular Malaysia

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Abstract

Zingiber (Boehm.) comprises nineteen species in Peninsular Malaysia. Seventeen of these are included in the section *Zingiber* while two belong to the section *Cryptanthium* Horan. A new species, *Z. fraseri*, from Fraser's Hill in Pahang, and a new variety, *Zingiber officinale* var. *rubrum*, are described. The latter is widely used in malay traditional medicine. A new combination *Z. montanum* (Koenig) Theil. **comb. nov.** is proposed based on the rediscovery of some of Koenig's collections from Phuket. *Z. griffithii* var. *citrinum* Holtt., and the four varieties of *Z. gracile* Jack recognized by Holttum have been ranked as species. Key to the species and varieties are provided, as well as species descriptions, distribution and specimen citations. The taxa have as far as possible been typified.

Contents

Introduction	151
Material and methods	152
Notes on the key	152
Taxonomic characters	152
Floral biology and seed dispersal	153
Relationships within the Malaysian species of <i>Zingiber</i>	154
Origin and evolution	155
Key to the genus <i>Zingiber</i> in Peninsular Malaysia	156
References	176

Introduction

The genus *Zingiber* is distributed throughout tropical Asia with the center of diversity in Southeast Asia. It is a large and complicated genus comprising of about 100 species (Burtt 1972, Larsen 1980). Within the last few years several undescribed taxa have been found during field work in China, Thailand and Malaysia, indicating an even greater species diversity.

Zingiber is a constituent of the undergrowth in the tropical forests. The plants are perennial and grow mainly in damp places, but they are also frequent in secondary forest and disturbed sites. In Peninsular Malaysia they are most common in lowland and mid-mountain forest, but a few species grow on high mountain ridges (Holttum 1950).

The genus is characterized by the long, curved anther appendage enfolding the style, the three-lobed lip, and the relatively large bracts, each subtending a non-tubular bracteole and a single flower. At the time of flowering the bracts are usually orange or red, and often change to a darker colour as they grow older. The lip is cream or white in some species, and purple mottled with cream in others.

The existing classification of *Zingiber* is based on the eminent works of Schumann (1904) and Valeton (1918), which are still very useful in revising the genus. Ridley described many new Malayan species in his Flora of the Malay Peninsula (1924). Similarly the later revision of the genus by Holttum (1950) deals with the species in the Malay Peninsula. The key presented here largely follows that of Holttum. Two species, *Z. sulphureum* Burkill ex Theilade, *Z. fraserii* sp. nov., and one variety *Z. officinale* var. *rubrum* var. nov. have been added. *Z. griffithii* var. *citrinum* and the four varieties of *Z. gracile* recognized by Holttum (1950) have been ranked as separate species. Apart from that only minor additions have been made. The author is working on a similar revision for *Zingiber* in Thailand and in Sabah, Malaysia.

Materials and Methods

The present revision is based primarily on the study of collections of *Zingiber* from the following herbaria: AAU, C, E, K, KEP, L, P, PSU, SING, and UKM. *Z. gracile*, *Z. elatior*, *Z. auranticum*, *Z. griffithii*, *Z. puberulum*, *Z. montanum* and *Z. officinale* var. *officinale* and var. *rubrum* were studied in the field as well. All measurements refer to dried material, except those of floral parts. Flowers were boiled in spirit prior to measuring. Most of the type collections have been examined.

Notes on the Key

A major difficulty in working with the genus *Zingiber* is that many of the collections are incomplete. Most of them include an inflorescence, but often no flowers. Even when present at the time of collection, the delicate flowers often deteriorate during the drying procedure. Therefore, vegetative characters and the structure of the inflorescence have been used in the key whenever possible. Hairiness is a variable character and has been added only when it is very conspicuous. Colours of the labellum have been included as supplementary characters. An attempt has been made to offer a simple and workable key for the genus as it is found in Peninsular Malaysia, but it does not necessarily reflect the true relationship within the genus. It should allow identification of species whenever an inflorescence is available regardless of the presence of flowers. In many cases vegetative characters are sufficient for a proper identification though some species of *Zingiber* are difficult to distinguish based on these characters alone.

It should be kept in mind that the large, juicy inflorescences shrink considerably when dried. A key with measurements based on live specimens for identification in the field is desirable, but this will need more field study.

Taxonomic Characters

Measurements of leaves and ligula are taken from the middle of the stem. Dimensions of inflorescences are given at anthesis. The spikes alter shape according

to age, older and fruiting inflorescences are much wider and the bracts are loosely imbricate. Finally the bracts spread irregularly as the fruits dehisce within them giving the spike a shaggy appearance. The measurements of the bracts are given for the lower to middle ones. The lowest bracts are much bigger than the others. The colour of the bracts changes as they grow older, that at anthesis is indicated in the descriptions. The length of the calyx, corolla and labellum includes the ovary. The width of the corolla lobes is measured at the base. For the labellum, the length of the midlobe is from the junction with the sidelobes to the apex, and the length of the sidelobes is from the junction with the midlobe to the apex (Fig. 1). The characters of the ovary, stylodes and stigma are not distinctive and have been omitted in the descriptions.

Floral Biology and Seed Dispersal

For each species flowering time is given following the description, whenever data are available. Most species flower mainly between July and September and fruiting occurs from November to January.

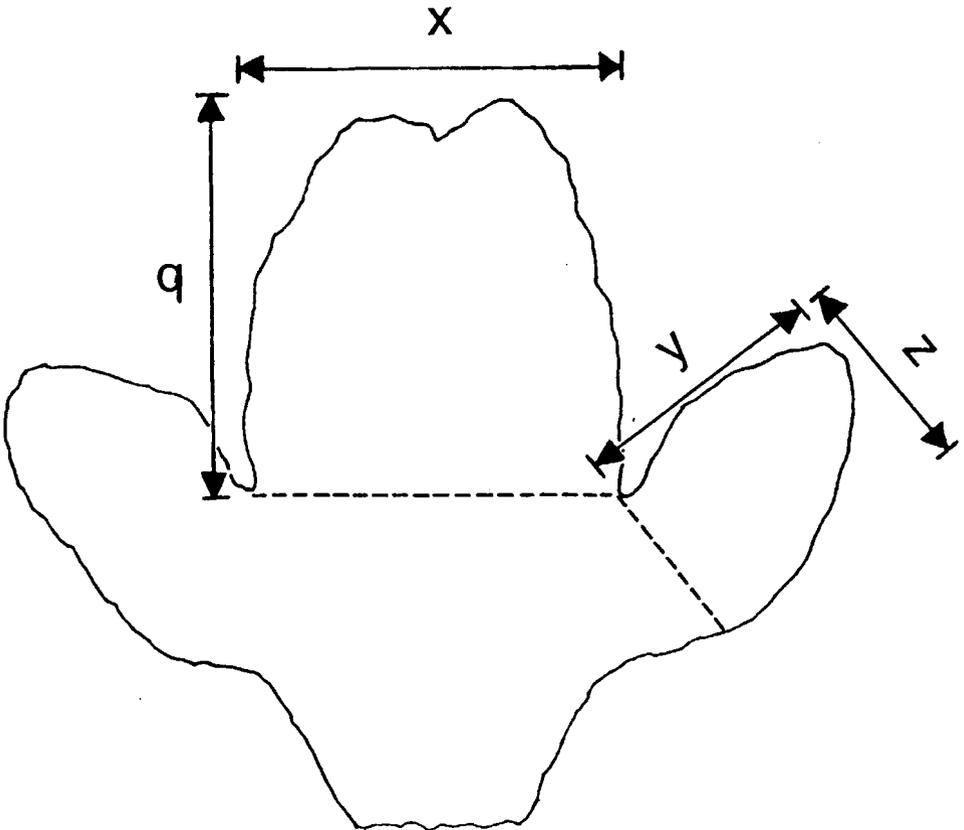


Fig. 1. Labellum outline showing the measurements of the length and width of the midlobe (q , x) and sidelobes (y , z).

The flowers are tubular in their lower part and contain nectar. The yellowish colour of many species of *Zingiber* is common of flowers with entomogamy (Jones 1983) and is thought to be important in attracting pollinators. The broad labellum provides an excellent landing place for insects. The contrasting deep red-purple markings on the labellum of some species presumably act as nectar guidelines helping insects to find the entrance to the nectar and pollen store.

The flower is constructed so that the long anther at the back of the flower is bent forward in the flower mouth with the long, curved, hornlike anther appendage extending in front of it. The downbent stigma just emerges at the top of the appendage and occupies the entrance of the mouth a little above the lip. The pollen sacs and the stigma are oriented towards the labellum. Bees visiting the flower must force their way in between the anther and lip. Thus the visitor will be covered by pollen, which at anthesis hangs in loose clusters under the anther. When a visitor leaves the flower some of the pollen may be rubbed off against the stigma (Valeton 1918). Whether this results in self-pollination, or whether some kind of self-incompatibility system has developed, is not known.

Few observations have been made on the pollination of *Zingiber*, and no details on the pollination or breeding system of *Zingiber* have been published. Flowers of *Z. aromaticum* open before noon and are regularly visited by swarms of *Apis indica* and stray individuals of *Anthophora zonata* (Valeton 1918). *Z. zerumbet* is regularly visited by small, solitary bees collecting pollen (personal observation).

The fruits are dehiscent loculicidally within the persistent bracts. At the time of fruiting the bracts bend obliquely outwards presenting the black seeds surrounded by the fleshy, white arils. The conspicuous red bracts together with the fruit valves, which are bright red inside, and the fleshy, white or yellow aril are suggested to be an adaptation to bird dispersal. However, so far no observations have been made to confirm this. Further field studies are necessary to elucidate the pollination and seed dispersal in the genus.

Relationships Within the Malayan Species of *Zingiber*

Of the nineteen species of *Zingiber* described from Peninsular Malaysia sixteen are thought to be indigenous while the widely cultivated *Z. officinale*, *Z. zerumbet* and *Z. montanum* are regarded as introduced.

Seventeen of the nineteen Peninsular Malaysian species have the inflorescence on a radical, erect peduncle and are included in the section *Zingiber*. Only two species, *Z. wrayi* and *Z. fraseri*, have a radical procumbent or very short peduncle and belong to the section *Cryptanthium*.

Within the section *Zingiber* the species may be divided into two groups. One group have bracts which are incurved or curved outwards and the labellum mottled purplish or red-brown and cream. The other group is characterized by closely overlapping bracts with no curvature, and the labellum cream or white without

mottling. Within the first group *Z. kunstleri* and *Z. wrayi* have apices of the bracts pointed and curved outwards. The remaining species in the group have rounded bracts with incurved margins. Of these, the smaller species *Z. officinale*, *Z. curtisii* and *Z. chrysostachys* are similar in having light green to yellow bracts, while the larger species *Z. spectabile*, *Z. ottensii* and *Z. multibracteatum* have yellow-orange, red or dull purple bracts. Thus, it seems that the character of the bracts together with the colour of the labellum make up the most important features for classifying the genus as it occurs in Malaysia. The size of the species and the hairiness are more variable characters.

The relationship within the group with closely overlapping bracts and cream labellum is more difficult to outline. The complex of species comprising *Z. griffithii*, *Z. puberulum* and *Z. gracile* has long caused much confusion. Holttum (1950) reported that there seemed to be no clear line of distinction between *Z. griffithii* and *Z. gracile* and possibly hybridization could take place. However, the description of *Z. sulphureum* cleared up some of the confusion (Cowley & Theilade 1995). *Z. sulphureum* is a small species with ovate leaves like *Z. griffithii* but an inflorescence like *Z. gracile*, and for long it blurred the distinction between the two species. Thus, it seems that it was an undescribed species rather than a hybridization, which caused identification problems.

Holttum (1950) recognized four varieties of *Z. gracile*: var. *gracile*, *elatior*, *aurantiacum*, and *petiolatum* although they vary greatly in size and morphology, and he found it likely that all four varieties would later rank as distinct species. In fact, *Z. elatior* was described as a species by Ridley (1899). *Z. gracile* is a small plant with a long, thin ligule, while *Z. elatior*, *Z. aurantiacum* and *Z. petiolatum* are much larger plants, *Z. elatior* and *Z. aurantiacum* with short ligules. *Z. elatior* is distinguished by its linear leaves, short petiole and pubescent bracts, and as such it has affinity to *Z. montanum*. *Z. aurantiacum* is distinguished by its wider, lanceolate leaves but otherwise it is much like *Z. elatior*. *Z. petiolatum* is a much larger species distinguished by the tall, leafy stems, the long petiole, large leaves, the extremely long scape and spike and the tough pink bracts. *Z. petiolatum* is most similar to *Z. puberulum* in the large leaves and tough pink bracts. In this treatment all varieties have been ranked as separate species.

Origin and Evolution

The Zingiberaceae is a pantropical family. The largest concentration of genera and species is in Southeast Asia, and judging by the existing distribution of the family the place of origin was within the Indo-Malayan region (Holttum 1950). Through geological time, the landmass of the Malayan Peninsula was unaffected by glaciation, drastic climatic changes or sea flooding, permitting a continuous evolutionary history of about 140 million years (Flenley 1979, Whitmore 1984). Presumably *Zingiber*, like many genera of the family, evolved in the stable climate in the landmass of the Malay Peninsula and later spread to its present distribution.

Seventeen of the nineteen species of *Zingiber* found in Peninsular Malaysia belong to section *Zingiber*. In the neighbouring territories of Thailand and Borneo the genus has proliferated not only within section *Zingiber* but also within section *Cryptanthium*. If the ancient rain forest of Peninsular Malaysia is assumed to be the center of origin of the genus, section *Zingiber* may be regarded as primitive while section *Cryptanthium* is derived or advanced. Thailand and Borneo would then be secondary centers of diversity.

Most of the species of the Malay Peninsula are large plants with fairly large, lanceolate or oblong leaves and a relatively tall, erect inflorescence with tough bracts. It is suggested that these are primitive characters, which are retained in species like *Z. spectabile*, *Z. multibracteatum*, *Z. puberulum* and *Z. ottensii*. However, for a better understanding of the evolution within the genus a proper cladistic analysis, preferably including chloroplast DNA analysis, would be desirable.

Key to the genus *Zingiber* in Peninsular Malaysia

- 1a. Inflorescence radical, procumbent, sect. *Cryptanthium* 2
- 1b. Inflorescence radical, erect, sect. *Zingiber* 3
- 2a. Leafy shoots 3-4 m long, scrambling, leaves lanceolate, inflorescence ovate tapering to a pointed apex, bract closely overlapping 1. *Z. fraseri*
- 2b. Leafy shoots to 2 m long, leaves elliptic, inflorescence cylindric, bracts deflexed 2. *Z. wrayii*
- 3a. Bracts with their apical margins incurved; or with their apices curved outwards and free, not closely imbricating, labellum mottled purplish or red brown and cream 4
- 3b. Inflorescence ovoid to fusiform or cylindric, the bracts closely overlapping their apices not curved, labellum cream or white without mottling 10
- 4a. Apices of bracts narrowed to a blunt point and curved outwards 3. *Z. kunstleri*
- 4b. Apices of bracts rounded and slightly incurved or with incurved margins 5
- 5a. Leafy shoots 60-100 cm tall, largest leaves to 20 cm long 6
- 5b. Leafy shoots 150-300(-350) cm tall, leaves commonly 30 cm long or more 8
- 6a. Leaves linear, 15-23 by 1.5-2.5 cm 4. *Z. officinale*
- 6b. Leaves lanceolate or ovate, 12-17 by 4-5.5 cm 9
- 7a. Labellum closely blotched with purple throughout, including the sidelobes, bracts about 3-3.5 by 1.5 cm 5. *Z. curtisii*
- 7b. Labellum with almost entirely crimson midlobe and white sidelobes, bracts about 2.7 by 2.4 cm 6. *Z. chrysostachys*
- 8a. Inflorescence 12-30 cm tall, cylindric, bracts with their apices free forming open pouches 7. *Z. spectabile*
- 8b. Inflorescence usually less than 12 cm long, ovoid to ellipsoid, bracts not forming open pouches 9
- 9a. Leaf sheaths and ligule sparsely hairy, labellum pale yellow with faint red-brown markings, village plant 8. *Z. ottensii*
- 9b. Leaf sheaths and ligule velutinus, labellum dark purple spotted with cream, mountain plant 9. *Z. multibracteatum*
- 10a. Leaves linear, about 20-30 by 2-3 cm 11
- 10b. Leaves lanceolate, 4 cm or more wide, proportionately wider than above 12
- 11a. Inflorescence fusiforme or cylindric-ovate, 3-3.5 cm wide, bracts brownish with a green margin, village plant 10. *Z. montanum*

- 11b. Inflorescence slender fusiform, 2-2.5 cm wide, bracts orange turning red, forest plant 11. *Z. elatior*
- 12a. Bracts green when young turning red, slightly convex, ligules 1.5-2.5 cm long, papery, inflorescence 4-5 cm wide 12. *Z. zerumbet*
- 12b. Bracts pink, yellow or orange sometimes turning red, ligule short or ligule 1.5-1.8 cm and spike less than 2 cm wide 13
- 13a. Leaves lanceolate-ovate 15-30 by 5-10 cm or 12-14 by 4-4.5 cm 14
- 13b. Leaves lanceolate, proportionately narrower 16
- 14a. Leaves 15-20(-25) by 5-8 cm with fine silky hairs below, bracts pink to red 3. *Z. griffithii*
- 14b. Leaves 24-30 by 8-10 or 12-14 by 4-4.5 cm, bracts yellow sometimes turning red 15
- 15a. Leaves 24-30 by 8-10 cm, inflorescence cylindrical, 12-15 by 4-5 cm, bracts lemon yellow 14. *Z. citrinum*
- 15b. Leaves 12-14 by 4-4.5 cm, inflorescence fusiform, slender, 8-10 by 1.5 cm, bract sulphur yellow 15. *Z. sulphureum*
- 16a. Leafy shoots 1-2 m tall, leaves to 27 by 4.0 17
- 16b. Leafy shoots 2-3 m tall, leaves to 40 by 8 cm 18
- 17a. Leafy shoots to 1 m tall, leaves to about 18 by 4 cm, ligule 1.5-1.8 cm long 16. *Z. gracile*
- 17b. Leafy shoots 1.5-2.0 m tall, leaves 20-27 by 3.5 cm, ligule 0.5 cm long 17. *Z. auranitium*
- 18a. Leaf sheaths glabrous, inflorescence fusiform, slender, 30-45 cm long, apices of bracts acute 18. *Z. petiolatum*
- 18b. Leaf sheaths hairy to velutinous, inflorescence ovoid, to 15 cm long, apices of bracts obtuse 19. *Z. puberulum*

Zingiber Boehmer in Ludwig, *Defin. Pl.* (1760) 89; vide Dandy, *Ind. Gen. Vasc. Pl.* (1967) 1753-74 (*Regn. Veg.* 51) 91. - nom. cons.

Adans., *Fam. Pl.* 2 (1763) 66; Roscoe, *Monandr. Pl. Scitam.* (1828) 33, t. 83; Horan., *Prodr. Monogr. Scitam.* (1862) 27; Benth. & Hook. *f.*, *Gen. Pl.* 3 (1883) 646; Baker in Hook. *f.*, *Fl. Br. India.* 6 (1892) 243; Schumann in *Pflanzenr. Zing.* (1904) 163-64; Holttum, *Gdns' Bull. Singapore.* 13 (1950) 48-49. R. Dahlgren *et al.*, *Fam. Monocot.* (1985) 364; — *Lampujang* and *Thumung* König in *Retz. Observ.* 3 (1783) 62. — *Jaegera* and *Dietrichia* Giseke. *Prael. ord. nat. pl.* (1792) 203, 208. — *Cassumunar* Colla, *Novi Scitaminearum generis* (1830) 1 tab. 1. — *Zerumbet* Lestib. in *Ann. Sci. Nat.* 2. Ser. 15 (1841) 329. — *Dymczewiczia* Horan., *Prodr. Monogr. Scitam.* (1862) 26.

Rhizome horizontal, at or near surface of ground, tuberous, aromatic. *Leafy shoots* 0.5 - 3.5 m tall, plane of leaves parallel with the rhizome. *Leaves* distichous, linear or oblong-lanceolate, sessile or with short petioles, ligules short to long, entire or deeply bilobed. *Inflorescence* a spike, usually radical, rarely terminal on the leafy stem; scape erect, procumbent or very short at base of leafy stem; spike compact, fusiform or ovoid to cylindrical. *Bracts* persistent, closely imbricating or with apices free, single flowered, at first green, yellow or reddish turning bright yellow or red. *Bracteoles* one to each flower facing the bract, narrower than the bract, usually persisting and enclosing the fruit. *Calyx* hyaline, tubular-spathaceous, usually shorter than the bracteole, tripartite. *Corolla* tube slender; dorsal lobe broader than lateral lobes, concave; lateral lobes below the lip, usually joined partly together by adjacent sides and to the lip. *Labellum* 3-lobed, cream to white with or without purple mottling; midlobe oblong-obovate, apex retuse or cleft; lateral staminodes oval or

acute, adnate to the midlobe. *Filament* short; anther 1-1.5 cm long, narrow; connective prolonged into a slender, curved beak embracing the style. *Stigma* protruding just below the apex of the appendage, with a circular apical aperture surrounded by stiff hairs. *Ovary* trilocular with two, slender epigynous glands. *Fruit* a capsule, oblong with a fleshy wall when fresh, more or less leathery when dry, trilocular with axil placentation, dehiscent loculicidally within the persistent bracts. *Seeds* numerous, ellipsoid, black or maroon, covered by a saccate, fleshy, white or yellow. lacerate aril.

Type: *Zingiber officinale* Roscoe, Trans Linn. Soc. London 8 (1807) 358; Monandr. Pl. Scitam. (1824-1828) t. 83.

Distribution: Throughout tropical Asia and to tropical Australia and Japan.

Ecology: Tropical evergreen and monsoon forests, in moist, humus rich soils in shady habitats. Secondary forests, open habitats at the edges of the forests, disturbed places, and bamboo thickets on rocky ground, up to 3000 m.

Uses: The only species extensively used as a flavouring in food is the true ginger *Z. officinale*. Several species of the genus are known to be used in local medicine throughout Asia. Some species are grown as ornamentals.

1. *Zingiber fraseri* Theilade **sp. nov.** (Figs. 2 & 3)

Type: Peninsular Malaysia, Bukit Fraser, trail 4, behind the golf course, Sep. 1993, Theilade 12 (AAU holotype!, K isotype!).

Species Z. griffithii affinis a qua differt surculis longis scadentibus, foliis angustioribus lanceolatis glabris, scapo brevi procumbente, inflorescentia ovoidea in apicem acuto angustata, bracteis et bracteolis longioribus

Leafy shoots slender, to 4 m long with a scrambling habit, leaf sheaths finely hairy. *Ligula* 2 mm, hairy. *Petiole* 2 mm, hairy. *Leaves* lanceolate, 14-20 by 3.5-5.0 cm, glabrous. *Inflorescence* radical, procumbent. *Scape* to 8 cm, whitish. *Spike* ovate to fusiform, 12 by 3.0 cm, tapering to a pointed apex. *Bracts* lanceolate, 4.0-5.0 by 1.5 cm, bright red, hairy, apex acuminate. *Bracteole* 3.5 by 0.7 cm, whitish. *Calyx* 3.0 cm long. *Flowers* unknown.

Z. fraseri is related to *Z. griffithii* but differs in the long, scrambling leafy stems, the narrower, lanceolate, glabrous leaves, the short, procumbent scape, the ovoid inflorescence tapering to a pointed apex and the longer bracts and bracteoles. Vegetatively *Z. fraseri* is easily recognized by the long, scrambling leafy stems, which is unlike any *Zingiber* described so far.

Collections other than type: Bukit Fraser, trail 5 behind Rompin's House, Nov. 1995, Theilade 68 (AAU). In cultivation at Waimea Botanical Gardens, Hawaii.

Ecology: Montane forest at 1300 m altitude. Flowering in August-September, fruiting in October. Probably endemic to Fraser's Hill.

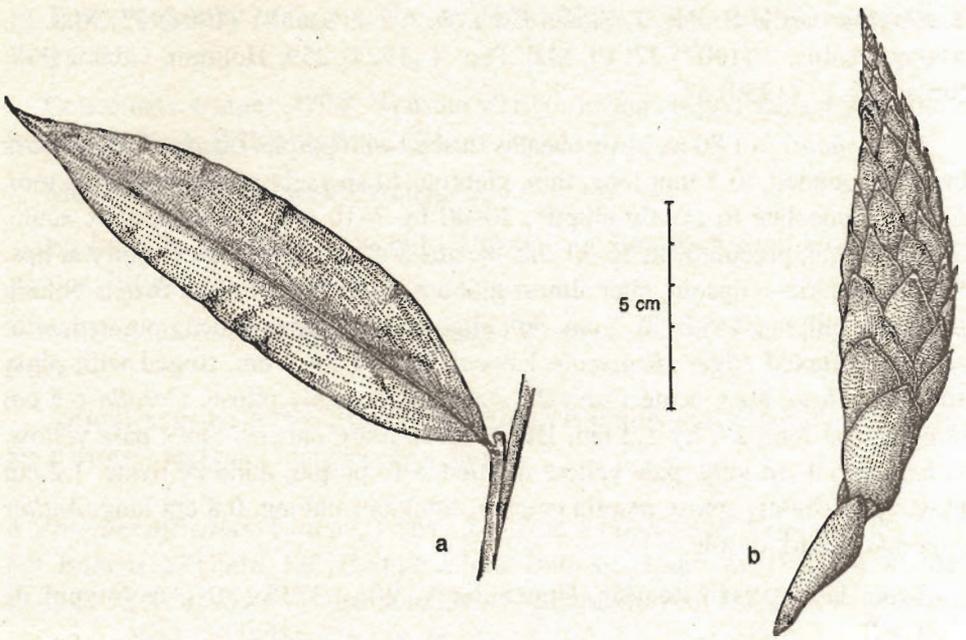


Fig. 2. *Zingiber fraseri* Theilade sp. nov. a: leaf b: inflorescence.



Fig. 3. *Zingiber fraseri* Theilade sp. nov. Leafy shoot and inflorescence.

2. *Zingiber wrayi* Ridley, J. Straits Brch. R. Asiat. Soc. 41 (1904) 31; Mat. Fl. Malay. Penins. 2 (1907) 27; Fl. Mal. Pen. 4 (1924) 259; Holttum, Gdns'. Bull. Singapore 13 (1950) 53.

Leafy shoots to 1.80 m, lower sheaths flushed with purple. *Ligula* bilobed, lobes broadly rounded, to 5 mm long, thin, glabrous to sparsely pilose. *Petiole* 2 mm. *Leaves* lanceolate to evenly elliptic, 30–40 by 7–10 cm, glabrous, apex acute. *Scape* radical, procumbent, 10–30 cm; sheaths 5–8 cm long, slightly hairy at tips. *Spike* cylindric–ellipsoid, later almost globose, 6–13 by 5–10 cm. *Bracts* oblong to evenly elliptic, 4–5 by 2–3 cm, red, slightly hairy, apex shortly pointed, with slightly inflexed edges. *Bracteole* lanceolate, 3–4 by 1 cm, tinged with pink, sparsely pilose, apex acute. *Calyx* 2.8 cm long, sparsely pilose. *Corolla* 6.5 cm long; dorsal lobe 2.0 by 1.2 cm; lateral lobes more narrow, lobes pale yellow. *Labellum* 6.0 cm long, pale yellow mottled with purple; midlobe ovate, 1.2 cm long, apex slightly retuse margin crenate; sidelobes oblong, 0.8 cm long. *Anther appendage* dark purple.

Type: Peninsular Malaysia, Upper Perak, Wray 3735 (SING holotype!, K isotype!).

Collections: Corner 37054; A. Latiff 88; Md. Nur 18569; Md. Shah & Md. Nur 1990; Moysey & Kiah 33712; Sinclair 6181.

Distribution: Peninsular Malaysia and Peninsular Thailand.

Malaysia: Johor, Pahang, Perak, Terengganu.

Ecology: At streams, to 800 m. Flowering in July to September.

Note: Easily recognized by the deflexed bracts and the broad leaves. The inflorescence of *Z. wrayii* has affinity to *Z. kunstleri* but *Z. wrayi* is a smaller plant and the leaves are broader.

3. *Zingiber kunstleri* Ridley, J. Straits Brch. R. Asiat. Soc. 32 (1899) 127–128; Mat. Fl. Malay. Penins. 2 (1907) 27; Fl. Mal. Pen. 4 (1924) 259; Schumann in Pflanzenr. Zing. (1904) 180; Holttum, Gdns'. Bull. Singapore 13 (1950) 52.

Rhizome internally purplish–lilac. *Leafy shoots* to 2 m tall, slightly swollen at base with a pale lilac hue, internally purplish–lilac. *Leaf sheath* glabrous. *Ligula* bilobed, lobes broadly rounded, 1–2 mm long, glabrous. *Petiole* 4–5 mm. *Leaves* linear-lanceolate, 45 by 6 cm, glabrous, apex acuminate. *Scape* radical, erect, 30 cm; sheaths 7.5 cm long, slightly hairy at the tips. *Spike* ovate to cylindric, later globose, to about 14 by 9.0 cm. *Bracts* densely imbricate, linear to slightly lanceolate, about 6 by 2–3 cm, pink to red, glabrous, apex narrowed, bluntly pointed, curved outwards or deflexed. *Bracteole* nearly 5 cm long. *Corolla* shorter than bracts, pale white. *Labellum* narrow, lanceolate, shorter than corolla lobes, reddish-brown, apex acute; side-lobes hardly distinct.

Type: Peninsular Malaysia, Taiping Hills. Ridley 11449 (SING lectotype!, K isotype!).

Collections: Corner 30588; Kunstler 2219 (drawing only); Kiah s.n. July 1936; Sinclair & Kiah 38784; Ridley 2401.

Malaysia: Pahang, Perak, Terengganu.

Ecology: In swamps and in hills, 150–950 m, flowering from late July until August, fruiting in November.

Note: *Z. kunstleri* is easily recognized by the deflexed bracts and the linear leaves.

Affinities: In the deflexed bracts *Z. kunstleri* is similar to *Z. wrayi*, but the leaves are narrower and the inflorescence is larger.

4. *Zingiber officinale* Roscoe, Trans. Linn. Soc. 8 (1807) 348; Valetton, Bull. Jard. bot. Buitenz. 27 (1918) 128; Holttum, Gdns' Bull. Singapore. 13 (1950) 54; Backer, Fl. Java. 3 (1968) 45-46. — *Amomum zingiber* Linné, Sp. Pl. 1 (1753) 1. — *Curcuma longifolia* WALL. (1828), Cat. No. 6612.

Key to varieties:

- 1a. Rhizomes yellow externally, leafy shoots green basally, labellum dark purple mottled with cream var. *officinale*
 1b. Rhizomes reddish externally, leafy shoots red basally, labellum scarlet red mottled with cream. var. *rubrum*

var. *officinale*

Rhizome yellow inside. *Leafy shoots* 0.5-1.0 m, glabrous except for short hairs near base of each leaf-blade. *Petiole* 2 mm long. *Ligula* 3-5 mm, slightly bilobed, glabrous. *Leaves* linear, 15-23 cm by 1.5-1.8 cm, narrowed to a slender tip. *Scape* radical, erect, slender 15-20(-30cm) tall; sheaths tightly appressed, 4-5 cm long, the upper sometimes enlarged and leaf-like. *Spike* elliptic or oblong, 4.0-5.0 by 1.5-2.0 cm. *Bracts* obovate, 2.0-3.0 by 1.5-2.0 cm, light green turning yellow, glabrous with a thin, slightly incurved, margin. *Bracteole* elliptic, 2.5-3.0 cm long, often longer than the bract. *Calyx* 1.2 cm long. *Corolla* 4.5 cm long, lobes yellow; dorsal lobe 1.8 by 0.8 cm; lateral lobes 1.6 by 0.6 mm. *Labellum* dull purple mottled with cream; midlobe circular, entire, 1.2 cm long; side-lobes rather narrow, 0.6 by 0.4 cm, acute. *Anther* cream. *Appendage* dark purple. *Capsule* red. *Pollen* globose with cerebroid sculpturing.

Type: Drawing in Roscoe Monandr. Pl. Scitam. t. 83 (1828). Lectotype here selected. No specimen at LINN or in Herb. Cliff (BM) (Burt 1972).

Distribution: Cultivated in tropical Asia from ancient times and now throughout the tropics. Its country of origin is unknown. It is considered to be indigenous

to Eastern India (Dahlgren et al., 1985). On the other hand it is suggested that the area of origin could be somewhere between the Yangtze and Yellow Rivers, and that due to great changes in natural environments wild ginger disappeared from its original range (Wu, 1985). *Z. officinale* grows well in Thailand and Malaysia.

Ecology: Occurs as naturalized on wasteground, in deciduous forests and dry rocky bamboo thickets.

Uses: Medicinal plant and spice throughout Southeast Asia. Various races are grown in Malaysia and Thailand where it is a common village plant. The aromatic rhizomes are widely used in cooking or made into marmelade. Occasionally the young rhizomes and parts of the stem are eaten raw. It is also boiled, sun-dried and made into powder, and then used as a condiment to flavour cakes and ginger-beer. Commercially, Jamaica, India, Sri Lanka and China are the most important producer countries.

Medicinally, the rhizome is considered to have diaphoretic, stomachic, carminative and diuretic properties. It is prescribed for heavy colds, coughs and congestion of the chest. It is also used as a remedy for diarrhoea and dysentery. The juice of the rhizome is used to treat migraine and it relieves menstrual cramps. Various lotions, decoctions or poultices may be rubbed on the body after childbirth, applied to swellings, contusions, for rheumatism and further as a bath to lower fever. The crushed rhizome is often smeared on the head for headaches. In China it is used as an antidote to fish and crab poison.

Malay name: “*Halia betul*” or “real ginger”.

Notes: *Z. officinale* is recognized by the linear leaves and glabrous ligula; the flowers are characterized by the dull purple labellum which is spotted with yellow.

Affinities: In its narrow leaves *Z. officinale* resembles *Z. montanum* Roxb. but the latter has much taller leafy stems and may be distinguished by its hairy ligules and ferruginous, pubescent bracts.

var. rubrum Theilade **var. nov.** —*Haliya padi* Valetton, Bull. Jard. bot. Buitenz. 27 (1918) 128; —*Halia bara or padi* and *Halia udang* Holttum, Gdns' Bull. Singapore 13 (1950) 54. (**Figs. 4a & 4b**)

A varietati officinale differt rhizomatibus minoribus externe rubellis, surculis foliosis ad basin rubris, petiolis rubellis, labello scarlatino cremicoloro maculato.

Rhizome reddish outside, yellow inside, pungent. *Leafy* shoots 0.5-1.25 m, basally dark red, glabrous except for short hairs near base of each leaf-blade. *Petiole* 2 mm long, more or less reddish. *Ligula* 1-5 mm, slightly bilobed, glabrous. *Leaves* linear, 25-32 by 1.5-1.8 cm, narrowed to a slender tip. *Scape* radical, erect, slender 20-30 cm tall; sheaths tightly appressed, 4-5 cm long. *Spike* elliptic or oblong, 4.0-5.0 by 1.5-2.0 cm. *Bracts* obovate, 2.0-3.0 by 1.5-2.0 cm, green with a thin, slightly involute

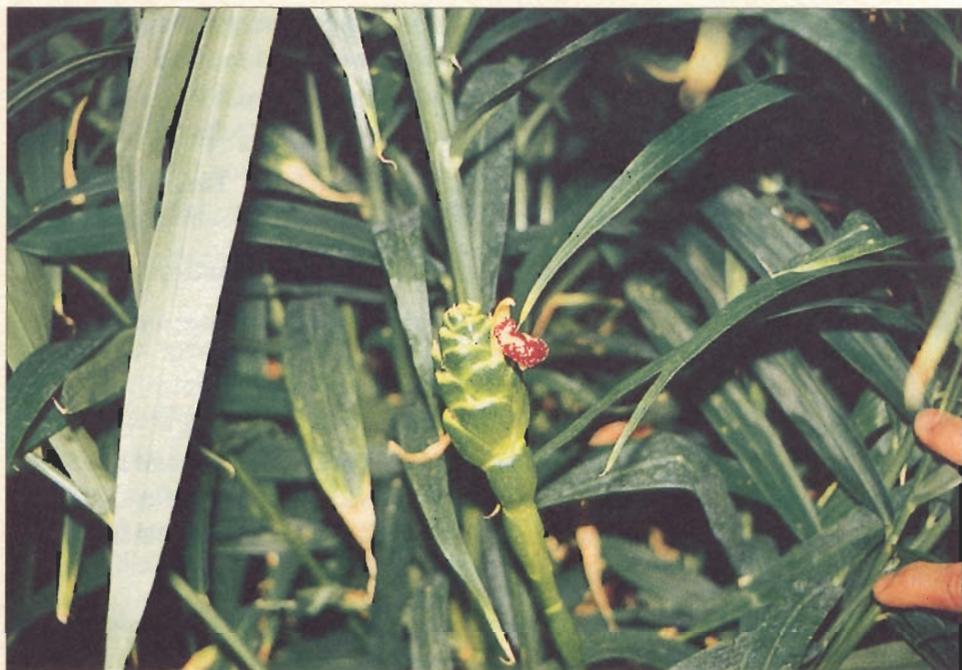


Fig. 4a. *Zingiber officinale* var. *rubrum* Theilade var. nov. Inflorescence with flower.



Fig. 4b. *Zingiber officinale* var. *rubrum* Theilade var. nov. Leafy shoot showing reddish petioles.

margin. *Bracteole* elliptic, 2.5-3.0 cm long, often longer than the bract. *Calyx* 1.2 cm long. *Corolla* 5.0 cm long, yellow. *Labellum* scarlet red mottled with cream; midlobe circular, 1.5 cm long, apex retuse; side-lobes oblong, 6 by 4 mm. Anther cream. *Appendage* dark purple. *Capsule* red. *Pollen* globose, sculpturing cerebroid.

Type: Malaysia, Sabah, Kota Kinabalu, Central Market, Theilade 66 (SAN holotype! incl. spirit coll. and photos, AAU, SING isotypes). In cultivation at AAU.

Collections other than type: Weber s.n. 1988; Theilade 60 in cultivation at UKM.

Distribution: Cultivated in Southeast Asia for medicinal purposes and as a spice. Frequently sold at markets in Malaysia.

Ecology: *Z. officinale* var. *rubrum* grows well in Malaysia, but rarely flowers.

Uses: Var. *rubrum* is grown on a small scale for medicinal use and as a spice. Various lotions, decoctions or poultices may be rubbed on the body after childbirth. The juice of the rhizome is used to relieve menstrual cramps. See Burkill (1966) for a more extensive account on medicinal uses.

Malay names: The Malays recognize more kinds of the red variety; “*halia merah*” (*merah* means red), “*halia padi*” (small), “*haliya bara*” (hot coals) and “*halia hudang*” (prawn). Whether these differ is not certain, but they are all used medicinally like “*halia padi*”. Ridley (1912) regards “*halia bara*” as synonymous with “*halia padi*”.

Notes: *Z. officinale* var. *rubrum* differs vegetatively from var. *officinale* by the smaller, red colored rhizomes which have a stronger, more pungent smell, the red coloring of the basal parts of the leafy stems and petioles and larger leaves. Furthermore, the labellum is larger and scarlet red mottled with cream.

According to Burkill (1966) Rumphius in his *Herbarium Amboinense* (1747) first described two varieties of *Z. officinale* as *Z. majus*— the larger plant known in Malay as “*halia*” and *Z. minus*— the smaller plant, or “*halia padi*”. Of the latter Rumphius distinguished two forms. Valetton (1918) stated that the Javanese “*haliya padi*” or “*sunti*” differs from normal *Z. officinale* in the rhizome and the ovate staminodes with a rounded base. This study has shown that the size of var. *rubrum* varies greatly with growing conditions. Grown in the villages the plant is usually smaller than var. *officinale*, but a rhizome brought back to Denmark and cultivated at AAU in rich soil grew 1.25 m tall and has larger leaves. The red coloring of the petioles was most distinct at the time of flowering. It remains to ascertain how many races enter into var. *rubrum* and whether they genetically differ in size.

5. *Zingiber curtisii* Holttum, Gdns' Bull. Singapore 13 (1950) 54-55. (Figs. 5)

Leafy shoot 0.6-1.0 m, slender, the lower sheaths flushed with purple. *Ligula* 4-5 mm long, thin, hairy towards the base. *Leaves* ovate, 12-17 by 4-5.5 cm, base broadly cuneate, apex acute, glabrous except for the hairy base of the lower surface

of the midrib. *Scape* about 10 cm long, sheaths purple. *Spike* to 14 by 3 cm, cylindrical, apex obtuse. *Bracts* elliptic, 3-3.5 by 1.5 cm, pale yellow-green, glabrous, apex obtuse and slightly inflexed. *Bracteole* slightly shorter than bract. *Calyx* 2.0 cm long. *Corolla* 5.5 cm long, lobes about 2.0 cm long, white. *Labellum* same length as corolla lobes, with deep purple markings throughout including the sidelobes. *Anther appendage* deep purple.

Type: Peninsular Malaysia, Bujong Malacca, August 1898, Curtis s.n. (SING holotype!).

Notes: This species is not distinguishable vegetatively from *Z. chrysostachys*. However, the inflorescence is longer and more slender, the bracts are longer and narrower, pale yellow green, only slightly inflexed at the tips and forming a closer spike. The lip has deep purple markings throughout including the sidelobes and the anther appendage is deep purple. The type was cultivated in The Botanical Garden, Penang where it flowered in June 1902. Known only from the type collection and a coloured drawing by Hussein done when the species flowered in Penang and now deposited in the Singapore Herbarium.

6. *Zingiber chrysostachys* Ridley, J. Straits Brch. R. Asiat. Soc. 32 (1899) 129; Fl.

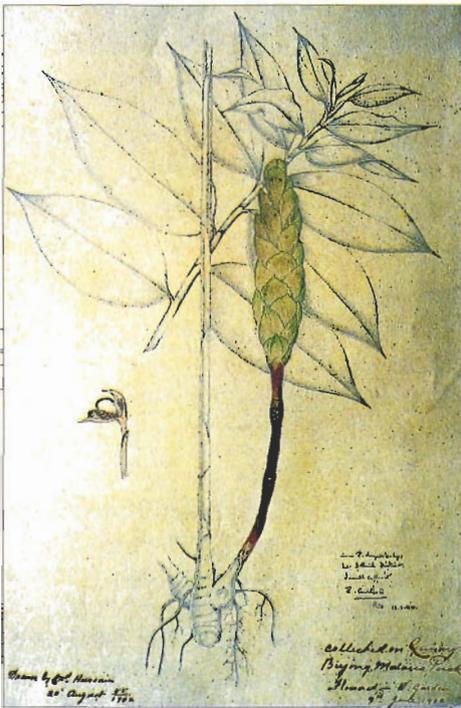


Fig. 5. *Zingiber curtisii* Holttum.
Drawing by Hussein.



Fig. 6. *Zingiber chrysostachys* Ridley.
Drawing by De Alwis.

Mal. Pen. 4 (1924) 260; Holttum, Gdns'. Bull. Singapore 13 (1950) 55. (**Fig. 6**)

Leafy shoots 0.6 m tall. *Leaf sheaths* the lower sheaths flushed with purple. *Ligula* 5 mm, glabrous or hairy, bilobed; lobes green with scarious margin. *Leaves* lanceolate, 12-17 by 4.0-5.5 cm, glabrous except for the hairy base of the midrib below, base broadly cuneate, apex acuminate. *Scape* radical, erect, 7-10 cm long, often two or more in succession from the same rhizome; sheaths flushed with purple. *Spike* oblong, to 10 cm long and 4 cm wide, apex rounded. *Bracts* loosely imbricating, obovate-suborbicular, 2.5-3.0 by 2.3-2.5 cm, bright yellow, sparsely hairy, convex with inflexed upper margin. *Bracteoles* 2.5 cm long, hairy at base. *Calyx* 1.5 cm long. *Corolla* about 4.5 cm long, pale yellowish. *Labellum* as long as corolla lobes; midlobe obovate, 1.2 cm long, almost entirely crimson with irregular white margins, apex broadly rounded; side-lobes ovate, 0.8 by 0.5 cm, white, spreading to a width of 1.5 cm when flattened. *Anther appendage* mottled pink to red. *Pollen* globose with cerebroid sculpturing.

Type: Peninsular Malaysia, Bukit Stau, 1891, Ridley s.n. (SING lectotype!, K isotype!). Lectotype here selected.

Collections: Burkill & Haniff 13830; Curtis 2716; Hervey s.n. 1889, Kiah S.341; Ridley 5199; SFN 35834; Wray 3549, 3110; Zainudin 4471.

Malaysia: Kedah, Perak.

Ecology: Evergreen forest and dry bamboo forest on limestone hills, 200-1400 m.

Uses: In 1924 a bomoh (Malay traditional healer) of Grik in Upper Perak brought leaves of what appeared to be this species to Burkill and Haniff stating that in fever a decoction is administered. He called it "lempui", a form of "lampoyang" (Burkill 1966).

Affinities: *Z. chrysostachys* is most closely related to *Z. curtisii* but the latter has the labellum coloured purple throughout including the side-lobes. No other small species has yellow bracts of this character. In the inflexed bracts and red-marked lip *Z. chrysostachys* appears to be related to *Z. ottensii* and *Z. spectabile* but it is a very much smaller species than either.

7. *Zingiber spectabile* Griffith, Not. pl. asiat. 3 (1853) 413; Baker in Hook. f., Fl. Br. India 6 (1892) 247-248; Ridley, Mat. Fl. Malay. Penins. 2 (1907) 26-27; Fl. Mal. Pen. 4 (1924) 258; Holttum, Gdns'. Bull. Singapore 13 (1950) 56.

Leafy shoots 2.0-3.5 m, basal leafless part to 1 m tall, swollen at base. *Leaf sheaths* sparsely pilose, margin scarious. *Ligula* deeply bilobed, the lobes to 1.5 cm long, broad, pale green. *Leaves* lanceolate, 30-50 by 6-10 cm, glabrous or slightly hairy at the base below. *Scape* radical, erect, 20-40 cm; sheaths 5 cm long, green to reddish. *Spike* cylindric, 10-30 by 6-7 cm, apex rounded. *Bracts* obovate, 4.5 cm

long, at first yellow turning orange, when old entirely red, fleshy, curved outwards with the broadly rounded edge incurved forming open pouches. *Bracteole* linear, to 4 cm. *Calyx* to 35 mm long, cream–pinkish. *Corolla* 70 mm long, yellow; dorsal lobe to 30 by 17 mm; lateral lobes 18 by 6 mm. *Labellum* 40–60 mm, dark purple with yellow spots; midlobe ovate, 16 by 14 mm, shorter than or of equal length with the lateral corolla lobes, apex cleft; side-lobes broadly rounded, 10 by 10 mm. *Anther* yellow. *Anther appendage* purple. *Capsule* ovoid, 30 by 10 mm, sparsely pilose. *Pollen* spherical with cerebroid sculpturing.

Type: Peninsular Malaysia, Malacca, Griffith 5762 (K lectotype!).

Collections: Burkill 1985; Corner 1587; Curtis 1978, 2161; Henderson 21851; Dr. King's Collector s.n., 3205; Maingay 1567; Nur 34215; Ridley, s.n. (1895); Sinclair 7856; Wray 3578.

Distribution: Peninsular Thailand and Peninsular Malaysia

Malaysia: Penang, Perak, Terengganu, Pahang, Selangor, Negri Sembilan.

Ecology: In evergreen forests, along trails, roadsides, streams and edges of the forest, on hillsides, disturbed sites, up to 1000 m. Flowering July till September. Fruiting in November.

Uses: Its leaves may be pounded and used for poulticing swellings. Used by Orang Asli against headaches and backaches. Sometimes used by the Malays as a flavouring (Burkill 1966). The tall, colourful inflorescences are sometimes cut and used as ornamentals.

Affinities: *Z. spectabile* has affinity to *Z. ottensii*, but it is a much larger species easily recognized by the large, orange inflorescence with incurved bracts forming open pouches. It has the largest inflorescence of any Malayan species.

8. *Zingiber ottensii* Valetton, Bull. Jard. Bot. Buitenz. 27 (1918) 136, t. 19. Ridley, Fl. Mal. Pen. 4 (1924) 259.

Rhizome pale grey-purple within having a pungent smell. *Leafy shoots* to 1.5 m tall. *Leaf sheaths* broad, slightly hairy near base and apex. *Ligula* broad, thin, entire, to about 1.2 cm long, hairy towards the base. *Petiole* 5 mm, finely hairy. *Leaves* elliptic or widest above the middle, 35(-40) by 6(-8) cm, lower surface slightly hairy towards the base, apex acuminate. *Scape* radical, erect, 25-40 cm. *Spike* evenly ellipsoid to cylindrical with a broad apex, 10-12 by 4 cm. *Bracts* obovate, 4 cm long and almost as wide, convex with incurved tips, dull red to bright red when old. *Bracteole* linear to lanceolate, 3.2 cm long. *Calyx* 2.3 cm long, white. *Corolla* 5.7 cm long, cream to yellow; dorsal lobe 2.2 by 1.1 cm; lateral lobes 2.0 by 0.6 mm. *Labellum* 5.5 cm long, pale yellow with faint red-brownish markings; midlobe oblong almost round, 2.0 by 1.5 cm, apex rounded and slightly cleft; side-lobes ovate, 1.5 by 0.9 cm. *Anther* 1.2 cm long, pale yellow. *Capsule* oblong, red.

Type: Java, Bogor, Ottens 676 (L lectotype ex Hort. Bot. Bog.!, K isotype).
Lectotype here selected.

Collections: Curtis Apr. 1900; Birch Oct. 1901; Burkill July 1914; Henderson 20200; Holttum 17671; Ridley 7799, s.n. Jun 1893.

Distribution: Thailand, Malaysia, Java and Sumatra.

Malaysia: Penang, Kedah, Selangor, Terengganu.

Uses: *Z. ottensii* is cultivated and used in traditional medicine. The rhizomes are pounded into a poultice used after childbirth.

Malay name: “*Lempoyang hitam*” or “*bonglai hitam*” referring to the grey-purple colour of the rhizome.

Affinities: *Z. ottensii* is closely allied to *Z. zerumbet* but differs in the convex bracts with incurved tips and the pale yellow flowers with faint red or brownish markings. Furthermore, *Z. ottensii* can be distinguished by the rhizome, which is dark purple inside in contrast to the yellow rhizome of *Z. zerumbet* and *Z. cassumunar*.

9. *Zingiber multibracteatum* Holttum, Gdns' Bull. Singapore. 13 (1950) 57.

Key to varieties:

- 1a. Leaves 6.0-9.5 cm wide, spike ovoid to oblong, bracts dull purple var. *multibracteatum*
1b. Leaves to 5.0 cm wide, spike cylindrical, bracts light green var. *viride*

var. *multibracteatum*

Leafy shoots to 3 m tall. *Leaf sheaths* brownish velutinus. *Petiole* 2-3 mm long, velutinus with brown-yellowish hairs. *Ligula* 3-5 mm long, brownish velutinus. *Leaves* lanceolate or obovate, 35-40 by 6.0-9.5 cm, lower surface sericeous, midrib pubescent or densely so, edge hairy in the young leaves, apex acute. *Scape* radical, erect, 25-85 cm; sheaths pubescent. *Spike* ovoid to oblong, 10-12 by 4.5-7.5 cm, apex obtuse. *Bracts* obovate, convex, 3.5-4.0 by 3.2 cm, dull purple, pubescent, apex broadly rounded, incurved, margin 1.5 mm wide, thin. *Bracteoles* lanceolate, 3.0-3.5 by 1.5 cm. *Calyx* tubular, 3.0 cm long. *Corolla* 8.0 cm long, lobes 3.0 cm long, reddish. *Labellum* purple, spotted cream; midlobe obtuse, 2.5-3.0 cm long, apex retuse; side-lobes oblong, 0.8 cm long. *Capsule* 2.0 cm long. *Seeds* maroon.

Type: Peninsular Malaysia, Pahang, Fraser's Hill, 1300 m. Corner S.F.N. 33174 (SING holotype!, K, L isotypes).

Collections: Burkill & Haniff 12765; Mohd. Shah et al. 1059; Nur S.F.N. 32869; Sinclair 6083, 38693; Theilade 17, 18.

Malaysia: Kelantan, Pahang, Perak.

Ecology: Common in the Cameron Highlands, 1100-1300 m.

Notes: *Z. multibracteatum* is a large plant only found at high altitudes. It is characterized by the velutinus petiole and ligule, the very broad ovoid inflorescence of convex, firm, dull purple bracts with thin edges, and the large flowers with purple cream-spotted lip.

Affinities: Vegetatively *Z. multibracteatum* is similar to *Z. puberulum* Ridl., but in the inflorescence and colour of labellum it is clearly allied to *Z. spectabile* and *Z. ottensii*.

var. viride Holtum (1950), l.c.

Z. multibracteatum var. *viride* differs from the typical form in having leaves to 5.0 cm wide, a cylindrical inflorescence and bracts to 5 cm wide, light green.

Type: Peninsular Malaysia, Cameron Highlands, Tanah Rata, Holtum s.n. Aug. 1946 (SING holotype).

Collections: Lewis 166.

Malaysia: Pahang.

Ecology: Upper montane forest in Cameron Highlands, 1800-2000 m.

10. *Zingiber montanum* (Koenig) Theilade **comb. nov.**— Basionym *Amomum montanum* Koenig in Retz. Observ. 3 (1783) 51. — *Z. purpureum* Roscoe, Trans Linn. Soc. 8 (1807) 348; Scitaminae (1828) t. 85. — *Zingiber cassumunar* Roxb., Asiat. Res. (1810) 347, t.5; Fl. Ind. 1 (1820) 49. Bot. Mag. t. 1426. Schumann in Pflanzenr. Zing. (1904) 179. Valetton, Bull. Jard. bot. Buitenz. 27 (1918) 138, t.15 f.13, t.20 f.14,15. Ridley, Fl. Mal. Pen. 4 (1924) 259. (**Fig. 7**)

Rhizome pale carrot colour internally, strongly aromatic. *Leafy stems* 1.2-1.8 m, sheaths glabrous or hairy near edges. *Ligula* bilobed, about 2 mm, hairy. *Leaves* linear, 20-35 by 2-4 cm, pubescent beneath, evenly narrowed to the tip. *Scape* erect, 20-25 cm long. *Inflorescence* fusiforme or cylindric-ovate, 10-16 by 3.0-3.5 cm, apex acute. *Bracts* ovate, 3-3.5 cm long, brownish with green, papery edges, pubescent. *Bracteole* 1-1.5 cm. *Calyx* 1.2 cm. *Corolla* 6.0 cm long, pale yellow. *Labellum* 6.0 cm long, pale yellow; midlobe broadly rounded, 2.0 cm, apex bilobed, deeply split when old; side-lobes oblong.

Type: Thailand, Phuket, Koenig s.n. (C holotype!).

Collections: Burkill & Haniff 14066, 16482, 17551; Gianni 416.

Distribution: This species is probably native to India. In Sanskrit it is called “*vanaardraka*”, in Hindi “*banada*” and in Kannada it is called “*kadu shunti*”. All the names signify that it is a “wild ginger”, i.e. a forest ginger in contrast to the cultivated *Z. officinale*. It occurs widely in Southeast Asia as a village plant. According to Holtum (1950) it is not very common in Malaysia.



Fig. 7. *Zingiber montanum* (Koenig) Theilade **comb. nov.** Inflorescence with opened flowers.

Malaysia: Pahang, Perak.

Uses: *Z. montanum* is used in traditional medicine all over tropical Asia. It is primarily a carminative and a stimulant for the stomach used in cases of diarrhoea and colic. In Malay medicine the rhizome is rubbed on the body to reduce fever and to heal a person infiltrated by spirits. Other uses of the plant are very similar to those of *Z. officinale* and it can be regarded as a substitute for this species.

Vernacular names: In Ayurvedic medicine *Z. montanum* is sometimes called “camphor ginger” to distinguish it from *Z. zerumbet* called “stone ginger”. The latter has some bitterness in the taste while *Z. montanum* has not. In Malaysia *Z. montanum* is called “bunglai” or “bolai”.

Notes: Koenig’s specimens from Phuket have long been considered lost at sea and it was impossible to verify the species he named from his rather short descriptions. Recently some of his collections were rediscovered in the herbarium in Copenhagen including a collection of this species to which Koenig then gave the name *Amomum montanum* providing the first valid epithet. Notwithstanding the above findings the species has for long wrongly been named *Z. cassumunar*. As Roscoe described the species in 1807 as *Z. purpureum* this provides an earlier epithet than *cassumunar* used by Roxburgh three years later in 1810.

Affinity: This species is related to *Z. zerumbet* but can be easily distinguished

by the linear leaves and very short ligules as well as the brown bracts.

11. *Zingiber elatior* Ridley (1899), J. Straits Brch. R. Asiat. Soc. 32: 130; (1924) Fl. Mal. Pen. 4: 260. — *Z. gracile* var. *elatior* Holttum (1950), Gdns' Bull. Singapore 13: 64.

Leafy shoots to 2 m tall. *Ligula* bilobed, 4 mm, pubescent. *Leaves* linear, 20-30 by 2.0-2.8 cm, lower surface and the midrib towards the base pubescent. *Scape* to 30(-40) cm long. *Spike* slender fusiform, 10-20(-25) cm long and 2.0-2.5 cm wide. *Bracts* orange turning red, pubescent along margin. *Bracteoles* 2.5-3.0 cm *Calyx* about 2.5 cm long. *Corolla* 6.0 cm cream. Labellum deeply bifid, yellow.

Type: Peninsular Malaysia, Penang, Apr. 1896, Ridley 9340 (SING lectotype!, K isotype!). Lectotype here selected.

Collections: Burkill 1529, 3312; Burkill & Haniff 12712; Dr. King 7954; W. Fox 61; Mohd. Shah & Sanusi 2166; Ridley 7954, Aug. 1904, Dec. 1905.

Affinities: Vegetatively *Z. elatior* resembles *Z. montanum*, a species native to India, in the linear leaves. *Z. elatior* is recognized by the somewhat narrower leaves, and the slender fusiform inflorescence with orange to red bracts.

Malaysia: Johore, Penang, Perak, Selangor.

Ecology: Up to 1150 m.

Notes: The plants here represent a distinct species as proposed by Ridley. Whether the lip has always the small red and black lines reported only by Burkill for SFN. 3312 is unknown.

12. *Zingiber zerumbet* Smith, Exot. bot. 2 (1805) 105 t. 112; Roscoe, Trans. Linn. Soc. Lond. 8 (1817) 348; Monandr. pl. Scitam. (1828) 35; Blume, Enum. pl. Javae (1827) 42; Roxb., Fl. ind. (1832) 47; Baker in Hook. f., Fl. Brit. India 6 (1892) 247; Hook. f. in Trimen, Handb. fl. Ceylon 4 (1898) 259; Schumann in Pflanzenr. Zing. (1904) 172-173; RIDLEY, Mat. Fl. Malay. Penins. 2 (1907) 27-28; Gagnepain in M. Lecomte, Fl. Gen. Indo-Chine 6 (1934) 84-85; Valeton, Bull. Jard. bot. Buitenz. 27 (1918) 129-131; Holttum, Gdns'. Bull. Singapore 13 (1950) 59-60; Backer & Bakh. f., Fl. Java 3 (1968) 45. — *Ammomum zerumbet* Linn., Sp. pl. 1 (1753) 1. — *A. spurium* J. Gmelin, Syst. nat. 1 (1792) 6. — *Z. amaricans* Blume, Enum. pl. Javae 1 (1827) 43. — *Z. aromaticum* Valeton, Bull. Jard. bot. Buitenz. 27 (1918) 131-133 — *Z. ovoideum* Noronha, Verh. Batav. Genootsch. Kunst. Wet. ed. 1 5(4) (1790) 28; Blume (1827), l.c. — *Z. spectabile* Griffith, Not. pl. asiat. 3 (1851) 412, Icon. (1847) t. 351. — *Z. truncatum* STOKES, Bot. mat. med. 1 (1848) 68. — *Z. blancoi* Hassk. in Flora Philip. 47 (1864) 20. — *Z. aromaticum* Valeton, Bull. Jard. bot. Buitenz. 27 (1918) 131; Ridley, Fl. Mal. Pen. 4 (1924) 259. — *A. silvestre* Poiret, Encycl. met. bot. suppl. 5 (1817) 548. — *A. zingiber* Blanco, Fl. Philipp. ed. 3 (1837) 2-3, non L. — *Zerumbet zingiber* Lestib. f. in Ann. Sci. nat. 2. ser. 15

(1841) 329.

Rhizome tuberous, internally pale to brighter yellow, aromatic. *Leafy shoots* 1.25–1.75 m. *Leaf sheaths* sparsely hairy. *Ligula* papery, 1.5–2.5 cm long, scarious. *Petiole* finely hairy. *Leaves* broadly lanceolate, 25–40 by 5–8 cm, apex acuminate. *Scape* radical, erect, 10–30 cm; sheaths green. *Spike* cylindric to ovate, 6–14 by 4–5 cm, apex obtuse. *Bracts* obovate, 3.0–4.0 by 2.5 cm, green when young, red when old, convex near upper edge, apex broadly rounded with a thin, papery margin. *Bracteoles* linear to lanceolate, 2.5–3.5 long. *Calyx* 2.5 cm long, shorter than bracteole, white. *Corolla* 5.5 cm long, lemon yellow; dorsal lobe 2.5 by 2.0 cm; lateral lobes 1.6 by 0.7 cm. *Labellum* 5.5 cm long, lemon yellow, margin crenate; midlobe oblong almost round, 1.5 cm long, apex cleft; side-lobes ovate, 0.8 cm long. *Anther* pale yellow. *Capsule* oblong, 1.5 cm long, red.

Type: Burma, Pegu, 1826, C.W. s.n. (K lectotype!). Lectotype here selected. No specimen in LINN or Herb. Cliff (BM).

Collections: Burkill & Haniff 13712, 13421; Collins 1053, 1611; Corner 31559; Curtis 1924; Zainudin 3826, 4466.

Distribution: Cultivated in India, China and throughout Southeast Asia. It is probably indigenous to India.

Malaysia: Kedah, Perak, Selangor, Johor.

Ecology: Cultivated or naturalized on margins of forests or waste ground near villages. Grown up to 1200 m alt. flowering June to September, fruiting October till January.

Uses: The rhizome is used as a spice as well as for medical purposes.

Vernacular names: India and Malaysia: “*Lampoyang*”. In Ayurvedic medicine *Z. zerumbet* is called “stone ginger” in order to distinguish it from *Z. montanum* called “camphor ginger”. *Z. zerumbet* has some bitterness in the taste which *Z. montanum* lacks.

Notes: Valeton (1918) described three species from Java, *Z. amaricans*, *Z. aromaticum* and *Z. littorale*, as closely allied to *Z. zerumbet*. It might be possible to distinguish *Z. aromaticum* by its fleshy white rhizome and stronger taste as described by Valeton. Unfortunately both characters require live material, which was not available for this study. In this treatment *Z. amaricans*, *Z. aromaticum* and *Z. littorale* are regarded as varieties of *Z. zerumbet*.

Affinities: *Z. zerumbet* is allied to *Z. ottensii* but the bracts are green at anthesis and the labellum is lemon yellow without markings. Furthermore, *Z. ottensii* can be distinguished by the rhizome, which has a purplish color inside.

cultivar *darceyi* Veitch Burt, Notes Roy. Bot. Gard. Edinb. 31 (1972) 315–316. — *Zingiber darceyi* hort. syn. Veitch, Veitch Cat. (1890) 13; Wien Ill. Gart. Zeit. (1890)

398; Garden (1890) 43; Kew Bull. app. 2 (1891) 54; Roy. Hort. Soc. Dict. 4 (1951) 2310.

This cultivar is similar to the typical form except for the variegated leaves which are bright green with a broad white margin and oblique stripes of the same colour. Furthermore, the bracts of the inflorescence have whitish stripes near the margin.

Note: This cultivar is the only known *Zingiber* with variegated leaves and has great horticultural potential. *Z. zerumbet* cultivar *darceyi* was introduced to Kew in 1890 from Sydney Botanic Garden and is said to come from the South Sea Islands (Burt 1972).

13. *Zingiber griffithii* Baker in Hook. f., Fl. Brit. India. 6 (1892) 246; Ridley, Asiat. Soc. Beng. (1899) 131; Schumann in Pflanzenz. Zing. (1904) 177; Ridley, Fl. Mal. Pen. 4 (1924) 260. Holttum, Gdns'. Bull. Singapore 8 (1950) 60-61.

Leafy shoots 0.5-1.2 m tall. *Leaf sheaths* pubescent, indumentum increasing towards the petiole. *Petiole* 2-3 mm long, pubescent. *Ligula* bilobed, lobes broadly rounded, 3 mm long, pubescent, margin scarious, dotted. *Leaves* broadly lanceolate or ovate, 15 by 5 cm to 20(-25) by 8 cm, upper surface smooth, lower surface and midrib sericeous, finely dotted throughout, base broadly to narrowly cuneate, apex mucronate, sidenerves finely raised in dotted lines when dried giving a finely ribbed appearance. *Scape* radical, more or less erect, 4-10(-15) cm. *Spike* 10-15 by 1.5-3.5 cm, fusiform when young, wider and nearly evenly cylindrical when in fruit, apex acuminate. *Bracts* elliptic, 2.5-4.0 by 1.5-2.5 cm, thin, pink turning red, finely hairy. *Bracteoles* absent. *Calyx* 2.5 cm long, longer than the bracteole. *Corolla* 5.0 cm long, white to cream; dorsal lobe 2.0 by 1.0 cm; lateral lobes joined together for nearly half their length below the lip. *Labellum* white to cream; midlobe triangular, 1.7 by 0.6 cm, apex acute or sometimes cleft; lateral staminodes ovate, 0.8 by 0.4 mm, tips rounded. *Capsule* glabrous, flowers persisting on top of the fruit. *Seeds* maroon. *Pollen* globose, sculpturing cerebroid.

Type: Peninsular Malaysia, Malacca. Griffith, Kew Distrib. 5731 (K lectotype).

Collections: Burkill 1170, 4485; Corporal s.n. Feb. 1890; Goodenough 1434, s.n. (12 Feb. 1890); Holttum 9393, 10926; s.n. 10 Apr. 1890; Lake & Kelsall s.n. 22 Oct 1892. Latiff 856, 3151; Mohd. Shah et al. S.1700, 3633; Ridley s.n., s.n. (20 Aug. 1892), 6011, 9188; Sinclair 5105, s.n. 25 Feb. 1950, 10616; Smith 11; Symington 22750, 25669.

Distribution: Peninsular Thailand, Malaysia and Singapore

Malaysia: Johore, Melaka, Negri Sembilan, Pahang, Selangor, Terengganu.

Ecology: Lowland evergreen forest or secondary forest in damp, shady places in humus rich soil. Common in lowland forests in the southern half the Malay Peninsula.

Uses: The plant may be used for poulticing.

Vernacular names: “*Tepus merah*” (red gingerwort), “*Tepus kechil*” (little gingerwort), “*Tepus huma*” (uplands clearing gingerwort).

Notes: *Z. griffithii* is well characterized by its broad leaves with silky hairs on the lower surface and finely raised veins when dried. Holttum regarded *Z. griffithii* var. *major* as a synonym to *Z. puberulum* and his view has been followed in this treatment.

Affinities: *Z. griffithii* is closely related to *Z. puberulum* and *Z. gracile*, but the leaves are broader and the inflorescence is more cylindric than either of these. Furthermore, the bracts in *Z. griffithii* are much less tough than in *Z. puberulum* and *Z. gracile*.

14. *Zingiber citrinum* Ridl. (1899), J. Straits Brch. R. Asiat. Soc. 32: 129; (1907) Mat. Fl. Malay. Penins. 2: 28–29; (1924) Fl. Malay. Penins. 4: 260; Schumann in Pflanzenz. Zing. (1904) 174. — *Zingiber griffithii* var. *citrinum* Holttum, Gdns’ Bull. Singapore 13 (1950) 61.

Leafy stem 0.5–0.6 m, flushed with purple. *Leaf sheath* usually glabrous, margin scarious. *Ligula* entire, 2–4 mm long, glabrous. *Petiole* 2 mm, sparsely hairy. *Leaves* lanceolate to ovate, 24–30 by 8–10 cm, sparsely sericeous, base cuneate, apex acuminate. *Scape* radical, erect, 7.0 cm long. *Spike* cylindric, 12–15 by 4–5 cm, apex acute. *Bracts* densely imbricate, elliptic to ovate, 3.5–4.0 by 2–3 cm, lemon yellow turning pink to red in fruit, glabrous or sparsely pilose, margin scarious, apex acute. *Bracteoles* absent. *Calyx* 2.5 cm long, translucent–yellow. *Corolla* 5.6 cm long, white to yellow; dorsal lobe 2.4 by 0.8 cm. *Labellum* 5.4 cm, white to yellow; midlobe elliptic, 1.0 by 0.6 cm, apex bifid; lateral staminodes 0.5 by 0.4 cm.

Type: Peninsular Malaysia. Genting Bidai, May 1896, Ridley 7797a (K lectotype!). Lectotype here selected.

Collections: Burkill & Haniff 16444; Foxworthy & Burkill 1921; Holttum 9621; Dr Kings coll. 10263; Lake & Kelsall 1892; Ridley s.n. (1900), s.n. 1899.

Malaysia: Johor, Negri Sembilan, Perak, Selangor,.

Ecology: On rich soil, 120–180 m, flowering in May–June.

Vernacular name: “*Tepus tenok*” meaning tapir’s gingerwort (Ridley 1924).

Notes: Easily recognized by the lemon yellow bracts. Ridley’s drawing of the plant brought from Dusun Tua is found at Kew. Holttum (1950) considered it doubtful whether the large leaves were always associated with the lemon colour of the bracts and included *Z. citrinum* in *Z. griffithii*.

Affinities: *Z. citrinum* has affinity to *Z. griffithii*. It is distinguished by the larger leaves, the broader inflorescence and the lemon yellow bracts.

15. *Zingiber sulphureum* Burkill ex Theilade, Curtis's Bot. Mag. 12 (1995) 7377.

Leafy shoots to 0.7 m tall. *Petiole* 3-4 mm, yellowish pubescent. *Ligula* 4-6 mm, biparted, hairy when young. *Leaves* ovate, 12-14 by 4.0-4.5 cm, glabrous above, hairy below. *Scape* 5-10(-15) cm long. *Spike* fusiform, slender, 8-10 by 1.5 cm, apex acuminate. *Bracts* ovate, 3.5 by 1.5 cm, sulphur yellow later turning pink, pubescent, apex acute, finely dotted along the margin when dried. *Bracteole* absent. *Calyx* 2.3 cm long, pale yellow. *Corolla* 5.5 cm long, pale yellow; dorsal corolla lobe 2.3 by 0.4 cm; lateral corolla lobes 1.8 by 0.3 cm *Labellum* 5.0 cm long, pale yellow; midlobe oblong, 1.3 by 0.4 cm, retuse; side-lobes 0.5 by 0.4 cm, oblong, total width when flattened 1.5 cm. *Anther* pale yellow. *Pollen* globose with cerebroid sculpturing.

Type: Peninsular Malaysia, Pahang, Gunung Tahan, 1150 m, 18 June 1922. Haniff & Nur SNF 8016 (K holotype!, SING isotype!).

Collections: D. Cooke 23. Evans s.n. (June 1917). Willis R. Littke 421.

Distribution: Malaysia in Pahang state. Localities: Taman Negara, Gunung Senyum, Fraser's Hill.

Ecology: Evergreen rain forest, on granite or limestone, 50-1200 m. Flowering June to August.

Notes: *Zingiber sulphureum* is closely related to *Zingiber griffithii* and *Zingiber aurantiacum* but it is a smaller plant than either of these. *Zingiber sulphureum* is recognized by the small ovate leaves, the short, narrow spike with sulphur yellow bracts and the short calyx. Burkill used the epithet *sulphureum* on herbarium specimens SNF 8016.

16. *Zingiber gracile* Jack, Malayan Misc. 1 (1820) 1; Baker in Hook. f., Fl. Brit. India. 6 (1892) 246; Ridley, J. Straits Brch. R. Asiat. Soc. 32 (1899) 130; Fl. Mal. Pen. 4 (1924) 260. Holttum, Gdns' Bull. Singapore 13 (1950) 63-65.

Leafy shoots to 1 m tall. *Ligula* about 1.8 cm, bilobed, scarious, with black dots. *Leaves* lanceolate, to 18 by 4.0 cm, upper surface smooth, lower surface and midrib pubescent or sericeous, base cuneate, apex acuminate. *Scape* to 10-20 cm. *Inflorescence* cylindrical about 15 by 1.5 cm. *Bracts* ovate, 3.5-5.0 by 2.0 cm, pink or orange when young later turning red, pubescent, apex acute. *Bracteole* 2.0-2.5 cm shorter than calyx. *Calyx* 2.5-3.0 cm long. *Corolla* 6.0 cm; lobes 1.5-2.0 cm long, cream. *Labellum* to 6.0 cm, cream; midlobe oblong, 2.2 cm long, apex retuse or bifid; side-lobes 0.2 cm long, oval. *Capsule* 2.5 cm long, glabrous; seeds maroon. *Pollen* globose, sculpturing cerebroid.

Type: Peninsular Malaysia, Penang, Waterfall, Apr. 1890, Curtis (SING lectotype!). Lectotype here selected. No authentic specimens of Jack's plants exist.

Collections: Burkill 16141; Fox 12708; Foxworthy & Burkill Nov. 1921; Mohd. Shah 2460; Ridley 1640, 7235, 12700.

Malaysia: Johore, Malacca, Pahang, Penang, Perak, Selangor.

Uses: The use of the name “*mempoyang*” for “*lemtoyang*” suggests that it may be a substitute for other gingers. The name was obtained by Ridley and Goodenough in Malacca (Burkill 1966).

Note: This is the species that corresponds to Jack’s original description. Holttum recognized in addition to the typical form three varieties of *Z. gracile*. In this treatment they have been ranked as separate species. *Z. gracile* is distinct by the long thin ligule; the lanceolate leaves and the short scape and spike. It is probably closely related to *Z. griffithii*.

King’s 7954 and Hullett’s 854, cited by Baker (1892) as probably *Z. gracile*, have been identified as *Z. elatior* and *Z. aurantiacum*.

17. *Zingiber aurantiacum* Theilade **stat. nov.** — *Zingiber gracile* Jack var. *aurantiacum* Holttum, Gdns’. Bull. Singapore. 13 (1950) 63.

Leafy shoots 1.5 to 2 m tall. *Ligula* 5 mm long. *Leaves* narrowly lanceolate, to 27 by 3.5 cm. *Scape* 15 to 35 cm. *Spike* slender, 15-20 cm long and 2.5 cm wide. *Bracts* bright orange turning red when fruiting. *Bracteole* 2.5 cm long. *Calyx* 2.5-3.0 cm long. *Corolla* 6.0 cm; lobes 2.0 cm long, cream. *Labellum* to 6.0 cm, cream; midlobe oblong, 2.2 cm long, apex retuse or bifid; side-lobes oval. *Capsule* to 2.5 cm long, glabrous; seeds maroon. *Pollen* globose, sculpturing cerebroid.

Type: West Malaysia, Pahang, Fraser’s Hill, Burkill & Holttum SFN. 8806 (SING lectotype!). Lectotype here selected.

Collections: Burkill 2337, 3162, 5988; Burkill & Holttum 8633; Corner Nov. 1935, Aug. 1937, 33191; Henderson 11416; Hullett Apr. 1888; Kelsall 1978; Mohd. Shah 2765; Ridley Jun. 1889, Dec. 1920; Wray 5365.

Malaysia: Johore, Malacca, Negri Sembilan, Pahang, Selangor.

Ecology: Common at moderate elevations on the southern part of the Main Range in Cameron Highlands (Holttum, 1950).

Note: This species is distinguished by the long, slender inflorescence, and the orange bracts later turning red. It has affinity to *Z. gracile* but differs in being a larger plant with a short ligule. The long and slender inflorescence approaches *Z. petiolatum* but the leaves are much smaller.

18. *Zingiber petiolatum* Theilade **stat. nov.** — *Zingiber gracile* Jack var. *petiolatum* Holttum, Gdns’. Bull. Singapore. 13 (1950) 63.

Leafy shoots to 2.5 m tall. *Petiole* 10-15 mm. *Ligula* bilobed, 3-4 mm. *Leaves* lanceolate, to 40 by 8 cm, lower surface glabrous. *Scape* to 75 cm long. *Spike* 30-45 cm long, fusiform. *Bracts* lanceolate, 7.0 by 3.0 cm, tough, rose-pink, apex acute. *Bracteole* to 3.0 cm long. *Corolla* 6.0 cm; lobes 2.0 cm long, cream. *Labellum*

to 6.0 cm, cream; midlobe oblong, 2.5 cm long, apex retuse or bifid; side-lobes 0.3 cm long, oval.

Type: Peninsular Malaysia, Kedah, Pass from Kroh to Baling, 350 m. Corner S.F.N. 31570 (SING holotype!, E!, K! and L isotypes).

Collections: Henderson 21794; Kerr 7353; Md. Nur 34284; Ridley s.n. Aug. 1891, s.n. 18 Mar. 1893.

Distribution: Peninsular Thailand and Peninsular Malaysia.

Malaysia: Kedah, Pahang.

Ecology: Evergreen forest at low elevations.

Note: *Z. petiolatum* is distinct by the large leaves, the long petiole, the extremely long scape and the long, slender spike with large tough bracts. In the large leaves and tough bracts *Z. gracile* var. *petiolatum* approaches *Z. puberulum*.

19. *Zingiber puberulum* Ridley, J. Straits Brch. R. Asiat. Soc. 32 (1899) 131; Fl. Mal. Pen. 4 (1924) 261; Holtum, Gdns' Bull. Singapore. 13 (1950) 61-62. — *Z. griffithii* var. *major* Ridley, J. Straits Brch. R. Asiat. Soc. 32 (1899) 132.

Key to varieties:

- 1a. Inflorescence ovoid, apex rounded var. *ovoideum*
 1b. Inflorescence fusiform to ovoid tapering to a pointed apex 2
 2a. Leaf sheaths velutinous with brownish hairs, bracts pink var. *puberulum*
 2b. leaf sheaths slightly hairy, bracts yellow var. *chryseum*

var. *puberulum*

Leafy shoots 2-3 m tall. *Leaf sheaths* brownish velutinous. *Ligula* entire, to 5 mm long, yellowish hairy or velutinous. *Leaves* lanceolate or widest above the middle, 25-55 by 6-10 cm, upper surface smooth, rather grey-green, lower surface sometimes pubescent throughout, densely so on midrib towards the base, hairs yellowish-brown, margin hairy, apex acuminate. *Scape* radical, erect, 10-25 cm long. *Spike* 10-15 by 2.5-3.5 cm, fusiform to ovoid tapering upwards to a pointed apex. *Bracts* ovate, 3.5-5.0 by 2.0-3.0 cm, texture firm, pink, pubescent, apex obtuse, margin scarious, usually conspicuously hairy. *Bracteole* ensiforme, 1.5-2.0 by 2.4-2.8 cm. *Calyx* 2.5-3.3 cm long. *Corolla* to 6.5 cm, white to cream; dorsal lobe 2.5 by 0.7 cm wide; lateral lobes 2.0 by 0.4 cm. *Labellum* nearly as long as the corolla lobes, cream; midlobe about 1.2 by 0.7 mm, apex obtuse with a crenate margin; side-lobes oblong, reaching nearly half the total length of lip, spreading to a total width of 1.6 cm when flattened. *Anther* yellow. *Capsule* 2.5 cm long, pubescent. *Pollen* globose, sculpturing cerebroid.

Type: Singapore, Bukit Timah, Ridley s.n. 1894, (K lectotype!, SING isotype). Lectotype here selected.

Collections: Burkill 2670, 5990; Corner 30112, 30266; 30969, 31477; Curtis 3037; Dr Kings Coll 2163; Henderson 22380, 25003, 36608; Holttum 10842; Maxwell 81-96, 81-133; Md. Nur sn. 1937; Ridley s.n. Bukit Timah 1892, s.n. Bukit Tangga 1920, 4613; Sinclair 10616, 10622; Stone 10877.

Distribution: Peninsular Thailand, Peninsular Malaysia, and Singapore.

Malaysia: Penang, Perak, Terengganu, Pahang, Selangor, Johore.

Ecology: Evergreen forest in damp places, peaty soil in fresh-water swamp forest, up to 600 m.

Vernacular name: "*Lempoyang anjing*" or dog's "*lempoyang*" (Burkill 1966).

Notes: The indumentum of *var. puberulum* is very variable, but it is always hairy on the ligule and leaf sheaths. According to Ridley (1899) *Z. griffithii* var. *major* differs from *var. puberulum* in the glabrous leaf sheaths. In Ridley's type specimen of *Z. griffithii* var. *major* (s.n. July 1891, Kuala Sembiling, Pahang) the leaf sheaths and petioles was found to be hairy though the indumentum was missing in some parts of the leaf sheaths. Holttum (1950) considered *Z. griffithii* var. *major* Ridl. to be a synonym to *Z. puberulum* and his view is followed here.

Affinities: *var. puberulum* is closely allied to *Z. griffithii* and *Z. petiolatum*, but has larger leaves than the former, smaller inflorescence than the latter, and is easily recognized by the velutinus leaf sheaths and ligules.

var. ovoideum (Ridl.) Holttum, Gdns' Bull. Singapore 8 (1950) 63.

This variety is rarely, if ever, as hairy as the typical form, but otherwise it is indistinguishable vegetatively. It differs from the typical form in the following: *Scape* 5-10 cm long. *Spike* ovoid, about 8 cm long, apex rounded.

Type: Peninsular Malaysia, Pahang, river Tahan, Ridley s.n. Aug. 1891 (SING lectotype!). Lectotype here selected.

Henderson S.F.N. 21781, 21857, 22554, 19566; Moysey & Kiah 33732; Ridley s.n. 1892.

Malaysia: Kelantan, Perak, Pahang.

Notes: This variety has been collected mainly in Pahang. The less hairy character, the short scape and the short, ovoid inflorescence with rounded apex seems to be constant.

var. chryseum (Ridl.) Holttum, Gdns' Bull. Singapore 8 (1950) 62. —*Zingiber chryseum* Ridley, J. Straits Brch. Asiat. Soc. 50 (1908) 149. Fl. Mal. Pen. 4 (1924) 260.

Differs from the typical form in having pale yellowish bracts and in the whole plant being almost glabrous.

Type: Singapore, Stagmount, Ridley 13330, 1908 (SING holotype!, K isotype!)

Collections: Corner 30658 Sungai Panti, Pahang.

Distribution: Pahang and Singapore. The type specimen was collected in a wood at Stagmount in 1908 but the habitat was cleared and burnt a year or so later (Ridley, 1924).

Ecology: lowland forest, up to 200 m.

Notes: In size and shape of the leaves and inflorescence it does not differ in any way from var. *puberulum*, and the flowers are described in same terms by Ridley. Var. *chryseum* differs in the pale yellowish bracts and in the whole plant being almost glabrous. Whether the yellow bracts and general glabrous character is always associated is not known.

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The drawings of *Zingiber curtisii* (Fig. 4) and *Z. chrysostachys* (Fig. 5) are in the collection of the Singapore Botanic Gardens and are used here with permission.

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