

PROTEACEAE

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A family of flowering plants about 60 genera with at least 13,000 species belonging to the tropics, is widely distributed in both hemispheres. Only two genera, *Helicia* (7 species) and *Heliciopsis* (1 species) are found in Thailand vernacularly known as Muat Khon.

KEY TO GENERA

1. Leaves always regular; flowers bisexual; ovules anatropous. 1. *Helicia*
2. Leaves often dimorphous; flowers unisexual; ovules orthotropous. 2. *Heliciopsis*

1. HELICIA

Lour. Fl. Cochinch. 1 : 83, 1700; Sleum., Blumea 8 : 7—79, 1955, et in Fl. Mal. 1. 5 : 164. 1955.—*Helittophyllum* Bl., Bijdr. 652. 1825.—*Castronia* Noronha, Verh. Bat. Gen. K.W. 5: 65. 1827, *nom. nud.*, cf. Hassk., Cat. Hort. Bog. 317. 1844.—*Cyanocarpus* F.M. Bailey, Rep. Exp. Bel.—Ker: 55. 1889.

Trees or shrubs. Leaves mostly spiral, rarely subopposite or 3–4 verticillate, simple entire or serrate, sessile or petiolate. Racemes simple, many flowered, axillary or ramiflorous; flowers bisexual; bracts small, ovate-acuminate to subulate. Bracteoles minute; pedicels mostly in two or solitary, free or connate at the lower part. Perianth segments 4, tube straight, somewhat swollen at base. Stamens 4 nearly sessile inserted at the base of perianth-segment; anthers oblong, connective apiculate. Ovary ovoid or globose, sessile; style slender, clavate towards the apex, stigma punctiform; ovules 2, anatropous, disk glands 4, free (spaced or very near) or connate into a cup. Fruit nut or drupe-like; seeds 1–2 subglobose, respectively hemispheric.

KEY TO SPECIES

1. Ovary densely hairy.
 2. Leaves small 8–21 by 3–6 cm, oblanceolate or narrow-oblong; perianth 6–8 mm 2. *H. excelsa*
 2. Leaves larger 15–28 by 6–8 cm, obovate-oblong; perianth 16–18 (–20) mm 7. *H. vestita*

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1. Ovary entirely glabrous
 3. Fruit broadly ellipsoid or ovoid with $6 \pm$ distinct longitudinal ribs
1. *H. attenuata*
 3. Fruit obliquely globose, subglobose to obovoid, broadly obliquely ellipsoid without ribs
 4. Leaves oblanceolate, narrow, 15–35 by 3–7.5 cm
3. *H. formosana* var. *oblanceolata*
 4. Leaves not oblanceolate
 5. Perianth 12–14 mm
4. *H. nilagirica*
 5. Perianth 18–25 mm
 6. Petiole (10–) 15–25 (–40) mm long; base of leaves cuneate and slightly decurrent
5. *H. petiolaris*
 6. Petiole 1–6 (–8–10) mm long; base of leaves abruptly obtuse or truncate or subcordate
6. *H. robusta*

1. *Helicia attenuata* (Jack) Bl., Ann. Sc. Nat. II, 1 : 216. 1834; Meisn. in DC., Prod. 14: 439. 1856; Hook. f., Fl. Br. Ind. 5: 190. 1886; Ridl., Fl. Mal. Pen. 3: 141. 1924; Sleum., Blumea 8: 61. 1955 et in Fl. Mal. I. 5: 186. 1955; Backer, Fl. Java 1: 275. 1963.—*Roupala attenuata* Jack, Mal. Misc. 1: 10. 1820 (Rhopala), reimpr; Hook., Bot. Misc. 2: 65. 1830; Walp., Ann. 1: 592. 1848/49.—*H. obovata* Meisn. in DC., Prod. 14: 440. 1856 incl. var. *minor* Meisn. — *H. oblongifolia* Meisn. in DC., Prod. 14: 438. 1856; *H. suffruticosa* Ridl., Fl. Mal. Pen. 3: 141. 1924.— Fig. 21

Thailand.— PENINSULAR: Pattani (Ban Wo, Toh Moh).

Distribution.— Malay Peninsula, (Penang type), Sumatra, Borneo, Java, and Bali.

Ecology.— Near stream in evergreen forest.

2. *Helicia excelsa* (Roxb.) Bl., Ann. Sc. Nat. II, 1 : 219. 1834; Meisn. in DC., Prod. 14 : 441. 1856; Hook. f., Fl. Br. Ind. 5 : 191. 1886; Ridl., Fl. Mal. Pen 3 : 143. 1924; Burk., Dict. Eco. Pl. 1: 1133. 1935; Kanjilal & Das, Fl. Assam 4 : 107. 1940; Sleum., Blumea 8: 36. 1955 et in Fl. Mal. I. 5 : 174. 1955.—*Roupala excelsa* Roxb., (Hort. Beng 1814, 83, nomen) Fl. Ind. 1 : 363. 1820; Wight, Ic. t. 190. 1839.— *H. salicifolia* Meisn. in DC., Prod. 14 : 439. 1856; Kurz, For. Fl. Br. Burma 2 : 312, 1877.— *Alseodaphne crassipes* Hook. f., Fl. Br. Ind. 5 : 146. 1886; Ridl., Fl. Mal. Pen. 3 : 100. 1924.— Fig. 22

Thailand.— PENINSULAR: Chumphon, Ranong, Surat Thani, Trang (Khao Chong).

Distribution.— E. Bengal, (Type), lower Burma, Indo-China, Malay Peninsula, Sumatra, Borneo.

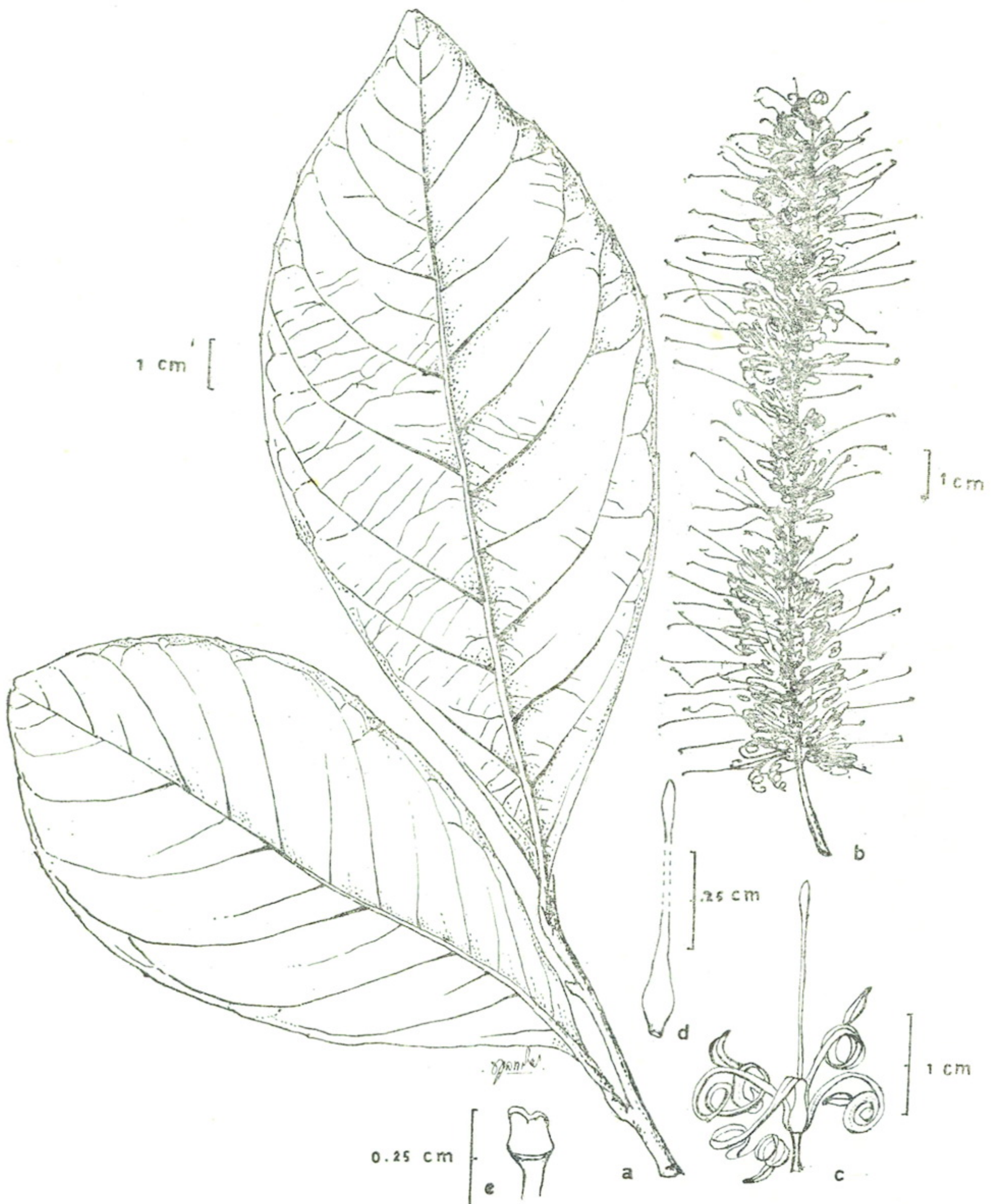


Fig. 21 *Helicia attenuata* (Jack) Bl., a. Habit; b. Inflorescence; c. Open flower; d. Ovary; e. Torus with disk glands.

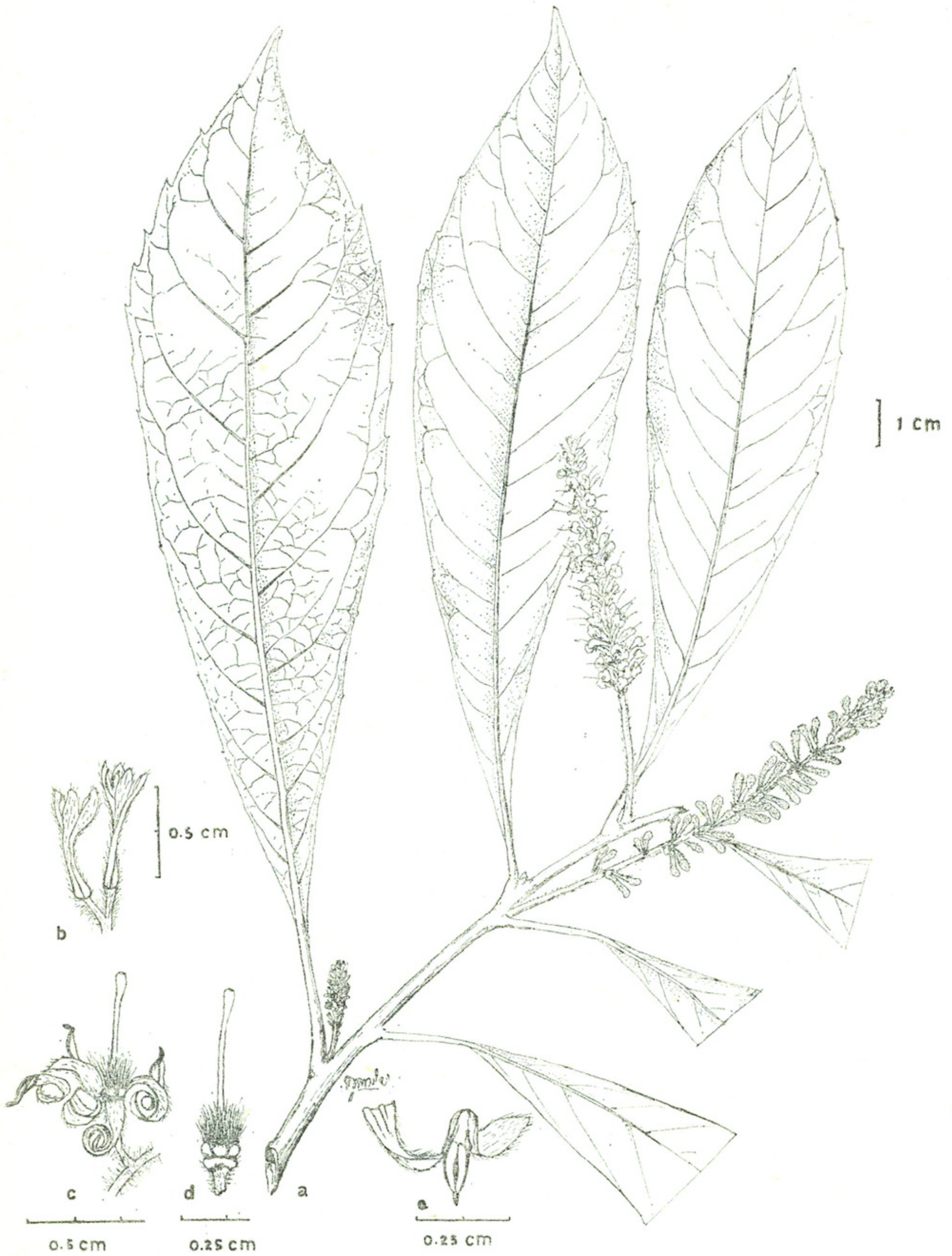


Fig. 22 *Helicia excelsa* (Roxb.) Bl., a. Habit; b. Young flowers; c. Open flower; d. Pistil with disk glands; e. Anther with perianth.

E c o l o g y.— In evergreen forest and in open deciduous forest, from low altitudes 10 m up to 300 m.

V e r n a c u l a r.— Phrom-Khot พรหมกต (Surat Thani).

3. *Helicia formosana* Hemsl. in Forb & Hemsl., J. Linn. Soc. **26** : 394. 1891; Kanehira, Formosan Trees, 175. 1936.— *H. tsangii* Li, J. Arn. Arb. **24** : 363. 1943 var. *oblanceolata* Sleum., Blumea **8** : 53. 1955.—**Fig. 23**

T h a i l a n d.— **NORTHERN:** Chiang Mai (Chiang Dao, Doi Suthep, Doi Inthanon), Nan (Doi Tiu), Nakhon Sawan (Khao Pado); **EASTERN:** Chaiyaphum (Phu Khieo), Nakhon Ratchasima (Khao Khieo in Khao Yai National Park).

D i s t r i b u t i o n.— China (Hainan), Laos, Thailand (type).

E c o l o g y.— Frequent in evergreen forest from 400 m up to 1,300 m.

V e r n a c u l a r.— Phak Yu ผักยู (Chiang Mai); Khem เข้ม (Chiang Mai—Chiang Dao); Mueat Khon Dong หม้อดคนดง (Chiang Mai—Doi Suthep).

4. *Helicia nilagirica* Bedd., Madr. J. Lit. Sci **23** (III, 1, 1864): 56, pl. 11 (fl.); Hook. f. in Hook. f., Fl. Bl. Ind. **5** : 190. 1886; Gamble, Fl. Madras **7** : 1243. 1925; Sleum., Blumea **8** : 71. 1955;— *H. cochinchinensis* Meisn. in DC., Prodr. **14** : 442. 1856, quoad pl. assam. non Lour.; Kurz, For. Fl. Br. Burma **2** : 311. 1877.— *H. erratica* Hook. f., Fl. Br. Ind. **5** : 189. 1886; Kanjilal, De & Das, Fl. Assam, **4** : 106. 1940.—**Fig. 24**

T h a i l a n d.— **NORTHERN:** Chiang Mai (Doi Inthanond, Doi Phahom Pok, Fang, Pang Ton, Doi Suthep), Chiang Rai (Phu Langka); **NORTH-EASTERN:** Loei (Phu Kradueng, Phu Luang, Phu Ruea, Wang Saphung).

D i s t r i b u t i o n.— S. India (Type), Burma (Upper and Lower), China (Yunnan), Indo-China (Tonkin, Annam, Cambodia).

E c o l o g y.— In evergreen forest.

V e r n a c u l a r.— Mueat Khon Tua Mae หม้อดคนตัวแม่ (Chiang Mai); Duea Hin เต๋อหิน Pho Salong โพธิ์สลอง (Loei—Phu Kradueng); Ta Khab Ton ตะขามต้น (Loei—Phu Luang); Mueat Khon Khao หม้อดคนขาว (Loei—Wang Saphung).

5. *Helicia petiolaris* Benn. in Benn. & Br., Pl. Jav. Rar. **84**. 1838; Meisn. in DC., Prod. **14** : 438. 1856; Hook. f., Fl. Br. Ind. **5** : 190. 1886; Ridl., Fl. Mal. Pen. **3** : 141. 1924; Burk., Dict. **1134**. 1935; Sleum., Blumea **8** : 67. 1955 et in Fl. Mal. I. **5** : 188. 1955.—**Fig. 25**

T h a i l a n d.— **NORTH-EASTERN :** Loei (Phu Kradueng). **PENINSULAR :** Phang-nga (Khao Kathakhwam).

D i s t r i b u t i o n.— Malay Peninsula (Penang (Type), Kedah, Perak, Kelantan, Selangor, Johore), Borneo.

E c o l o g y.— In evergreen and deciduous forest.

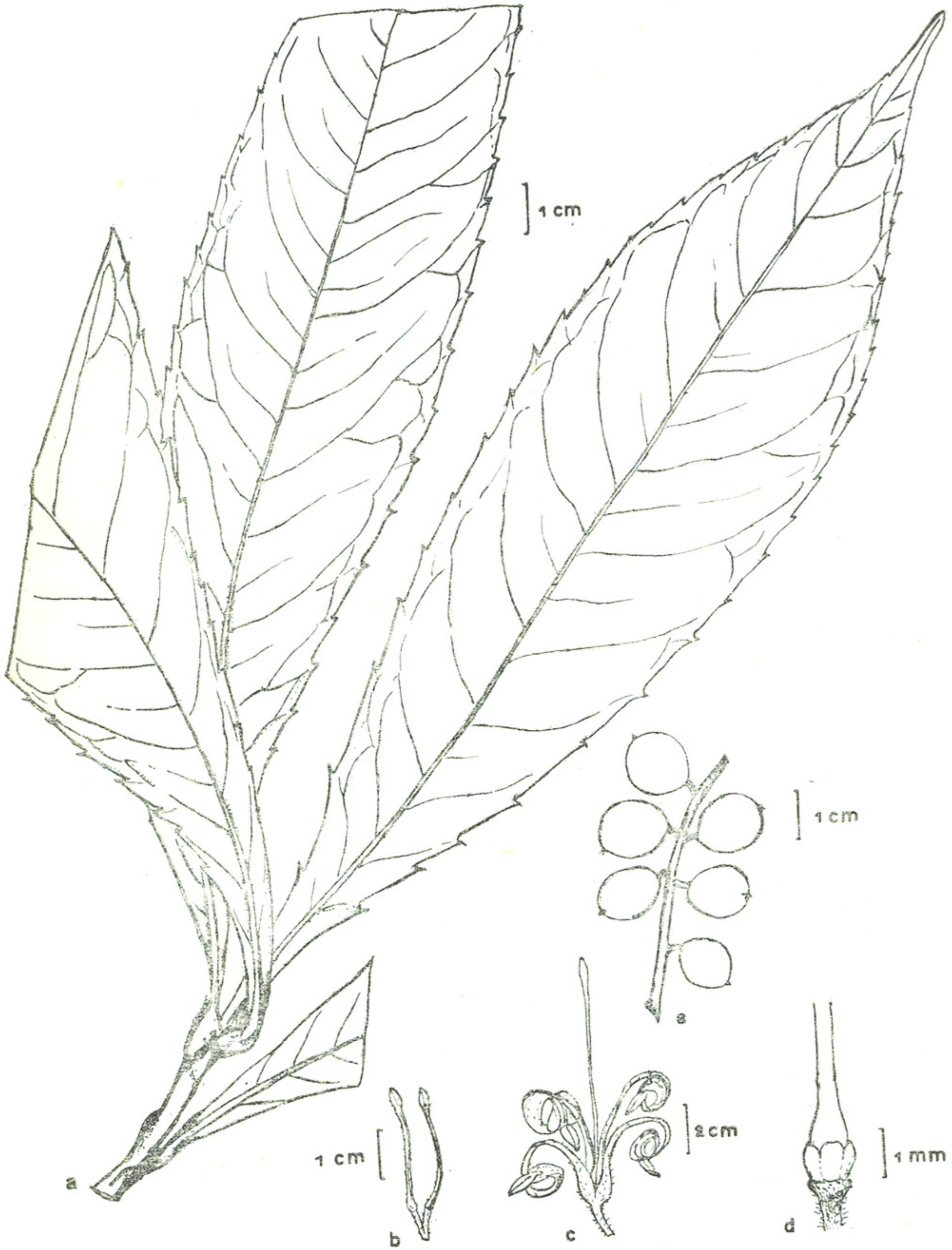


Fig. 23 *Helicia formosana* Hemsl. var. *oblanceolata* Sleum. a. Habit; b. Young flowers; c. Open flower; d. Torus with disk glands and ovary; e. Fruit.

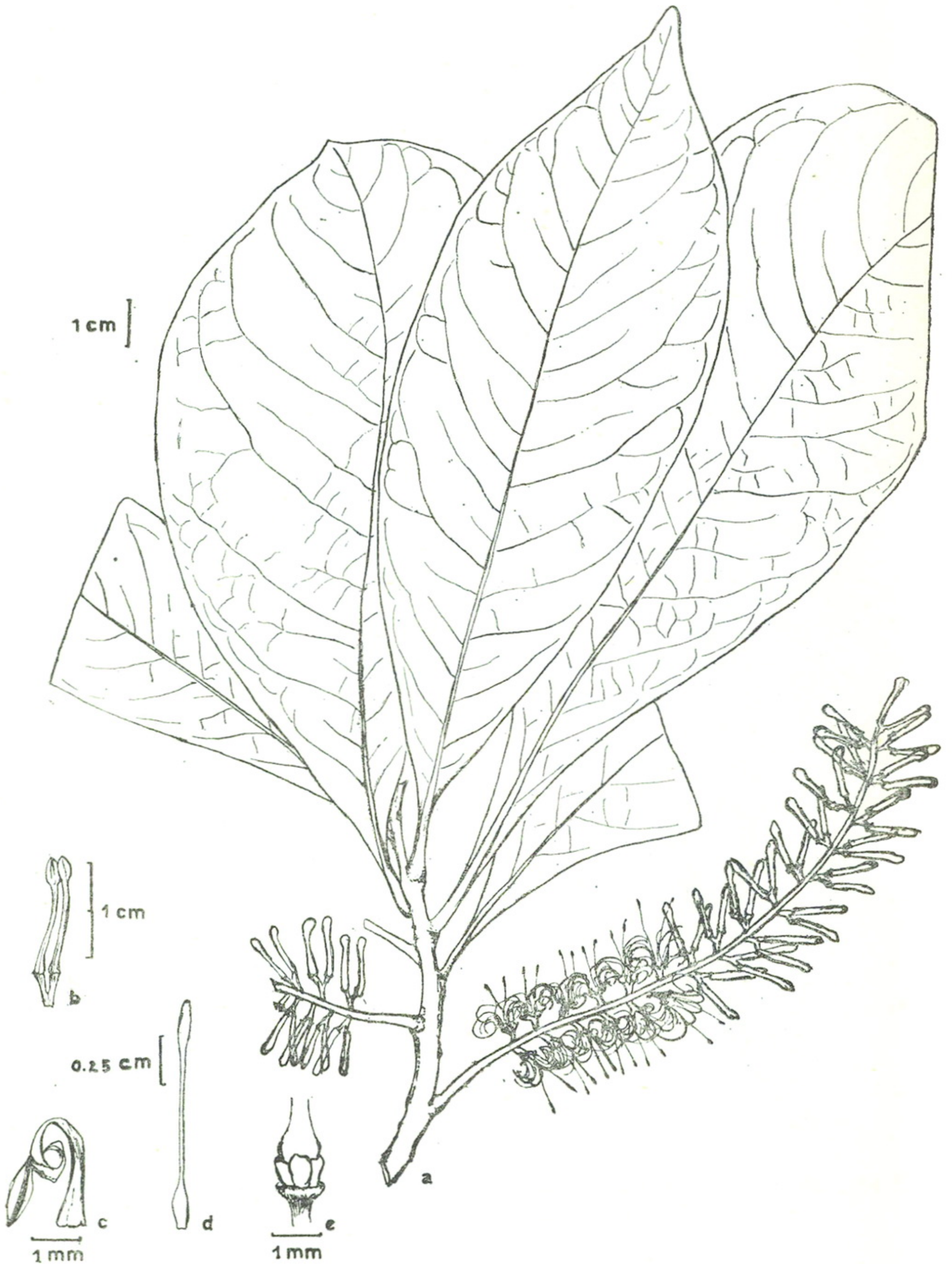


Fig. 24 *Helicia nilagirica* Bedd. a. Habit; b. Young flowers; c. Perianth with anther; d. Ovary; e. Torus with disk glands.

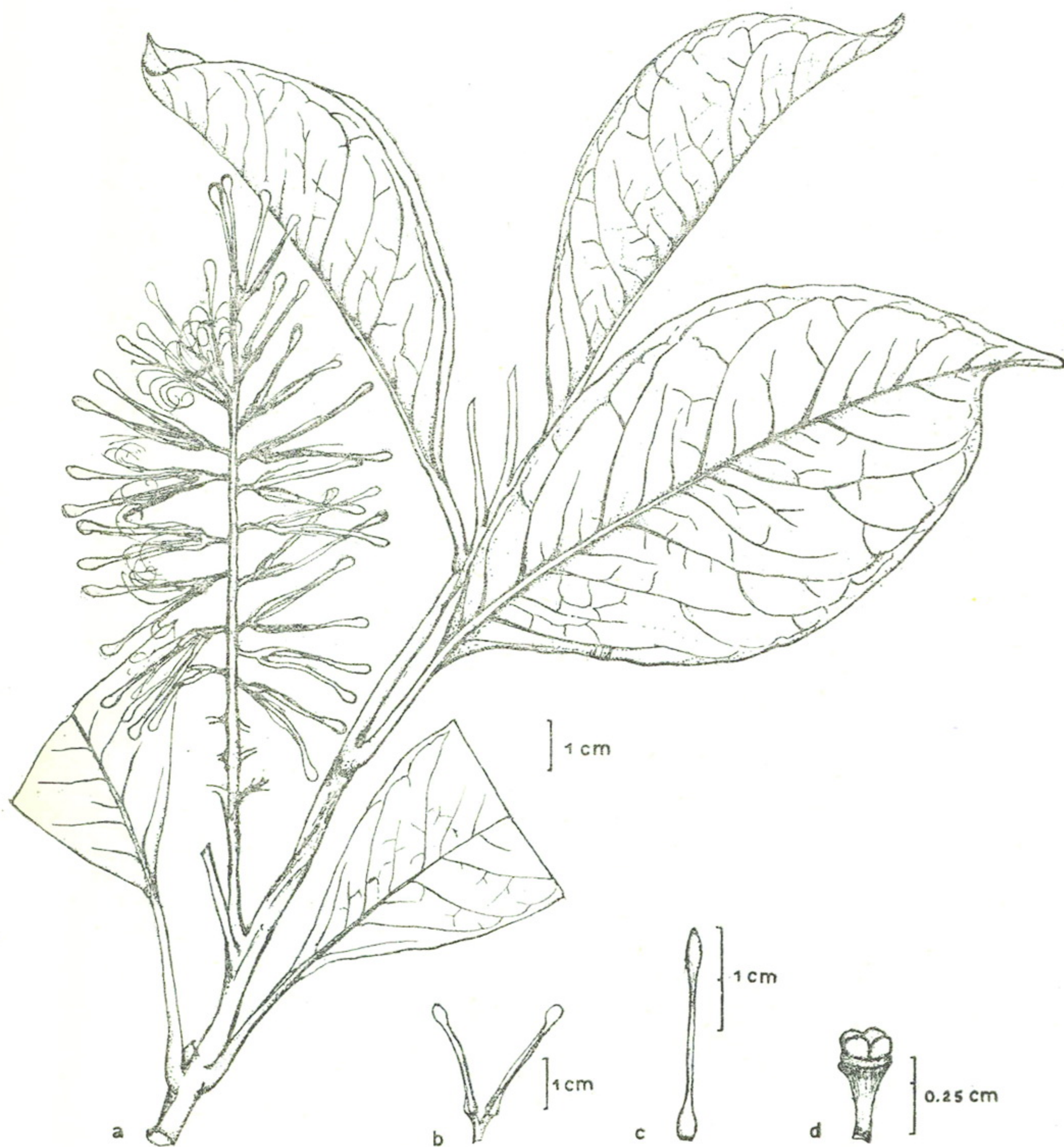


Fig. 25 *Helicia petiolaris* Benn. a. Habit; b. Young flowers; c. Ovary; d. Torus with disk glands.

Note.— Sleumer (1955 : 67) designates *Kerr 18491* to *H. petiolaris* var. *kingiana*, but owing to its long petiole (15–30 mm), it should be rightly assigned to the typical *H. petiolaris* Benn.

6. *Helicia robusta* (Roxb.) R. Br. ex Wall., Cat. (1831) sub no 2702; Bl., Ann. Sc. Nat. II. 1 : 220. 1834; Meisn. in DC., Prod. 14 : 440. 1856; Kurz, Fl. Burm. 2 : 311. 1877; Hook. f., Fl. Br. Ind. 5 : 191. 1886; Ridl., Fl. Mal. Pen. 3 : 142. 1924; Gamble, Fl. Madras 2 : 1243. 1925; Kanjilal, De & Das, Fl. Assam 4 : 106. 1940; Sleum., Blumea 8 : 55. 1955 et in Fl. Mal. I. 5 : 184. 1955; Backer, Fl. Java 1. 275. 1963.— *Roupala robusta* Roxb., Fl. Ind: ed. Carey & Wall. 1 : 366. 1820 (Rhopala); Wight, Ic. Pl. Ind. Or. t. 191. 1839.— *H. javanica* Bl., Ann. Sc. Nat. II, 1 : 217. 1834; Meisn. in DC., Prod. 14 : 440. 1856; Burk., Dict. 1 : 1133. 1935.— *H. cumingiana* Presl, Meisn. in DC., Prod. 14. 440. 1856.— *H. philippinensis* Meisn. in DC., Prod. 14 : 441. 1856.— *H. glabrata* Meisn. in DC., Prod. 14 : 442. 1856.— Fig. 26

Thailand.— PENINSULAR : Ranong, Trang (Khao Chong).

Distribution.— S. India (Type), E. Bengal, Assam, Indo-China, Sumatra, Malay Peninsular, Banka, Biliton, Java, Borneo, Philippines.

Ecology.— Frequent by stream in evergreen forest.

Vernacular.— Duei เดือย (Ranong); Hang Karok หางกระรอก (Trang).

7. *Helicia vestita* W.W. Smith, Notes Bot. Gard. Edinb. 10 : 181. 1918; Sleum., Blumea 8 : 31. 1955.— Fig 27

Thailand.— NORTH-EASTERN : Loei (Phu Kradueng).

Distribution.— Yunnan (S. of Szemao, type).

Ecology.— Frequent along edges or evergreen forest by stream.

Vernacular.— Mueat Khon Daeng หม้อดคนแดง (Loei).

Use.— Bark locally used against food-poisoning.

2. HELICIOPSIS

Sleum., Blumea 8: 79. 1955 et in Fl. Mal. I. 5: 190. 1955.

Dioecious trees. Leaves spiral, simple and entire or lobed, not rarely pinnatisect, sessile or petioled. Racemes simple many flowered, axillary or rami-
florous; bracts subulate, small or linear elongate; bracteoles minute. Flowers
unisexual; pedicels mostly in two, free or connate. Perianth segments 4, tube
slender. Stamens 4 sessile or nearly so, inserted at the base of the segments;
anthers oblong with pollen in the male flowers, similar in shape but without pollen
in the female ones; connective apiculate. Ovary sessile; style slender, clavaet
towards the apex; stigma punctiform; disk glands 4 free mostly very near and

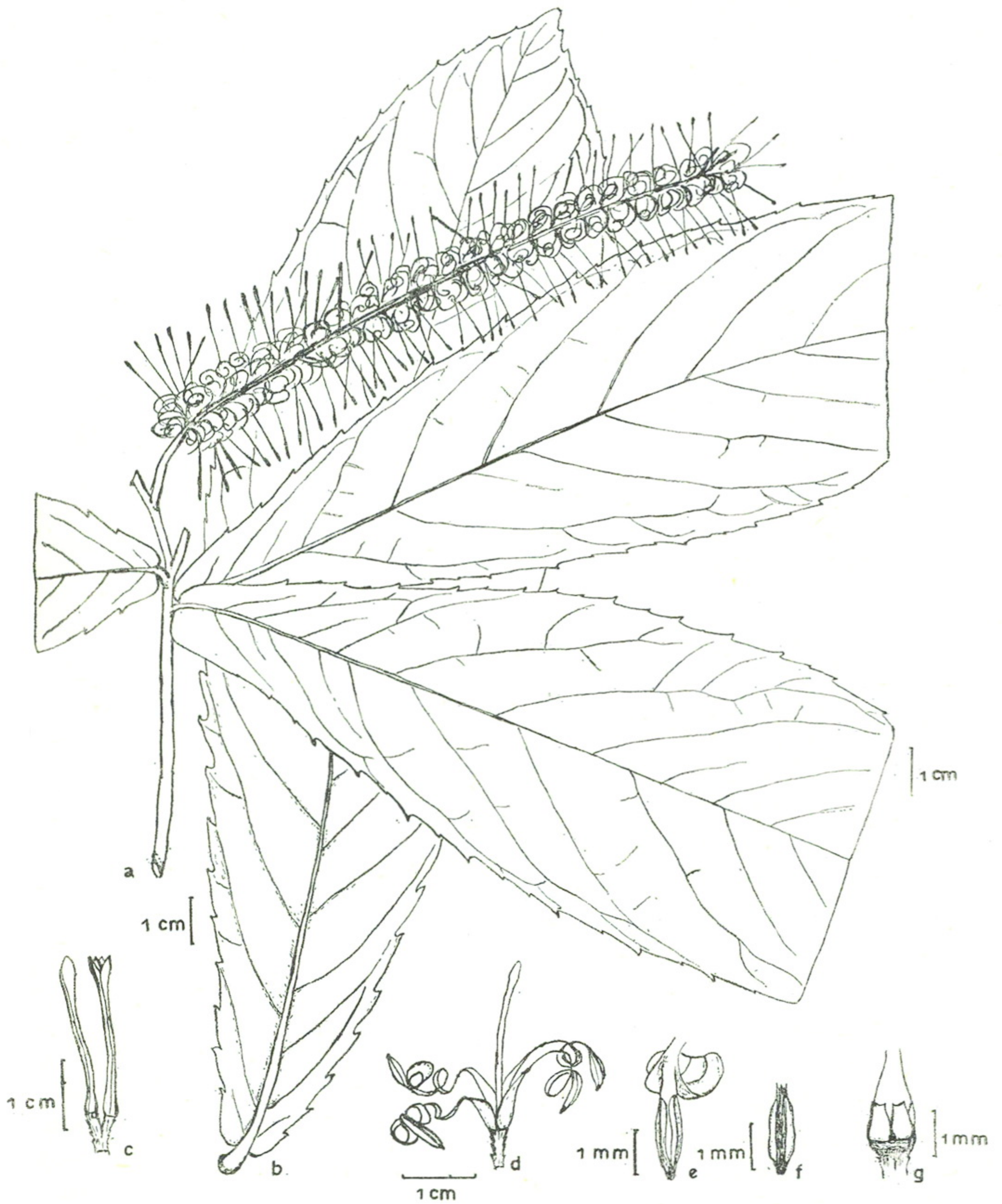


Fig. 26 *Helicia robusta* (Roxb.) R. Br. ex Wall. a. Habit; b. Leaf; c. Young flowers; d. Open flower; e. Perianth with anther; f. Back of anther; g. Torus with disk glands.



Fig. 27 *Helicia vestita* W.W. Smith, a. Habit; b. Mature leaf; c. Young flowers; d. Ovary; e. Torus with disk glands.

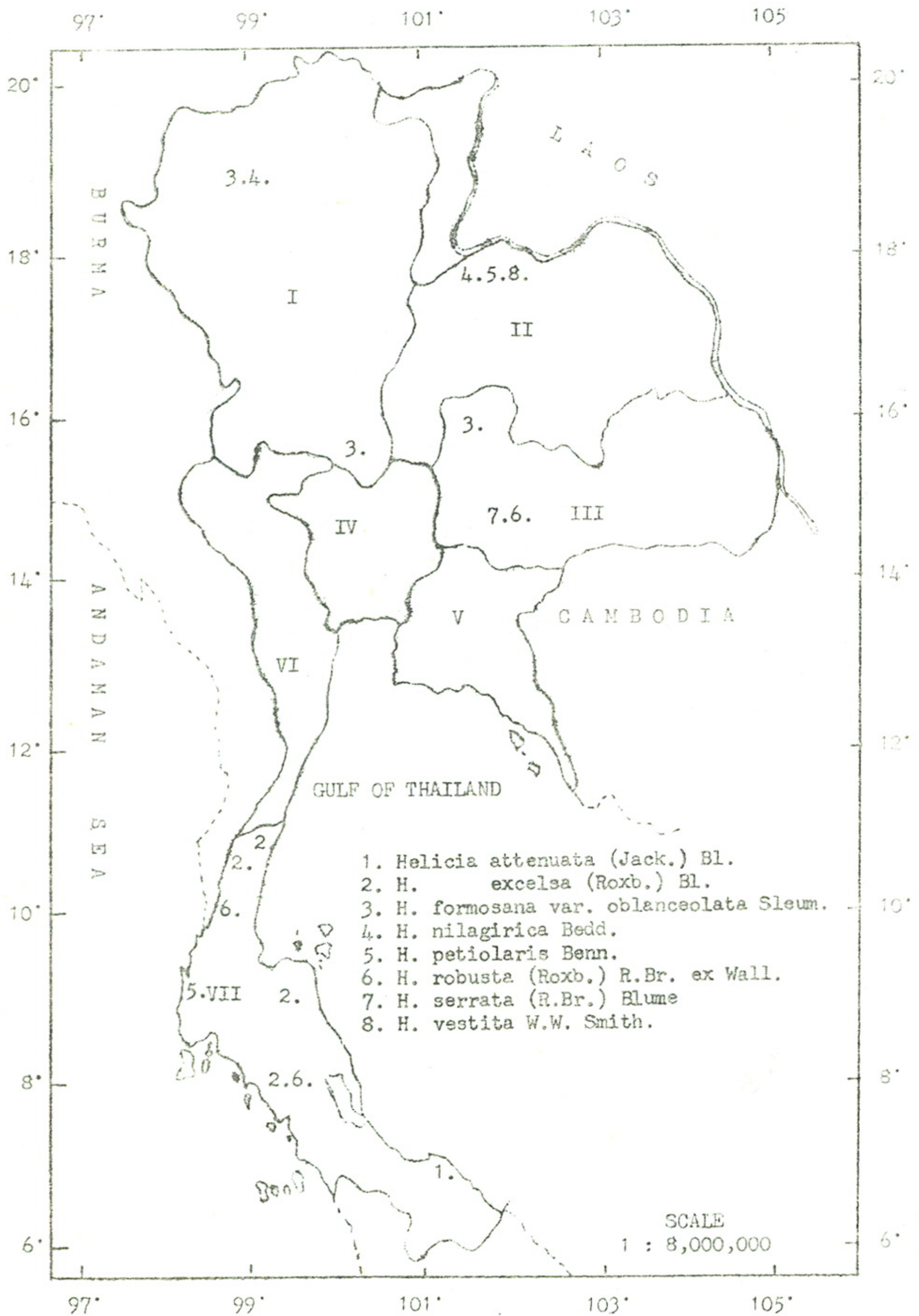


Fig. 28 Distribution of *Helicia* spp. in Thailand

seemingly forming a cup; ovules 2, orthotropous; fertile only in the female flowers, reduced in size or absent in the male ones. Fruit a drupe; 1-seeded nearly globose or 2-seeded, hemispherical, wrinkled in the upper part

The genus combines certain characters of *Helicia* Lour. (anthers sessile) with those of *Macadamia* F. v. M. (ovules orthotropous, pendent from the top of the cavity) but it is very different from both by the dioecious flowers, the peculiar differentiation of the pericarp, and a manifestly "reticulate" exine of the pollen (Sleumer 1955 : 190).

Distribution.— Seven species in Assam, Burma, S.E. China, throughout Southeast Asia.

Ecology.— In evergreen forest. Only *Heliciopsis terminalis* (Kurz) Sleum. is found in Thailand.

***Heliciopsis terminalis* (Kurz) Sleum., Blumea 8 : 80. 1955.— *Helicia terminalis* Kurz, For. Fl. Burma 2 : 312. 1877; Hook. f., Fl. Br. Ind. 5 : 190. 1866.— Fig. 29**

Thailand.— **NORTHERN :** Chiang Mai (Chom Thong), Lampang (Khun Tan), Phitsanulok; **NORTH-EASTERN :** Phetchabun, Loei (Dan Sai); **SOUTH-WESTERN :** Kanchanaburi, Ratchaburi; **PENINSULAR :** Ranong, Surat Thani, Chumphon (Lang Suan), Phang-nga (Takua Pa).

Distribution.— Assam, Burma (Type), China (Yunnan), Indo-China (Tonkin, Annam, Cambodia).

Ecology.— In evergreen forest. Flowering in May.

Vernacular.— Mueat Khon หม้อดคน (Kanchanaburi, Chiang Mai); Mueat Khon Dong หม้อดคนดง (Chiang Mai); Mueat Khon Tua Phu หม้อดคนตัวผู้ (Lampang); Mueat Khon Khao หม้อดคนขาว (Phetchabun); Phrom Khot พรหมกด (Surat Thani); Tai Khwan Chang ไตควานช้าง (Takua Pa); Kot กด (Ranong).

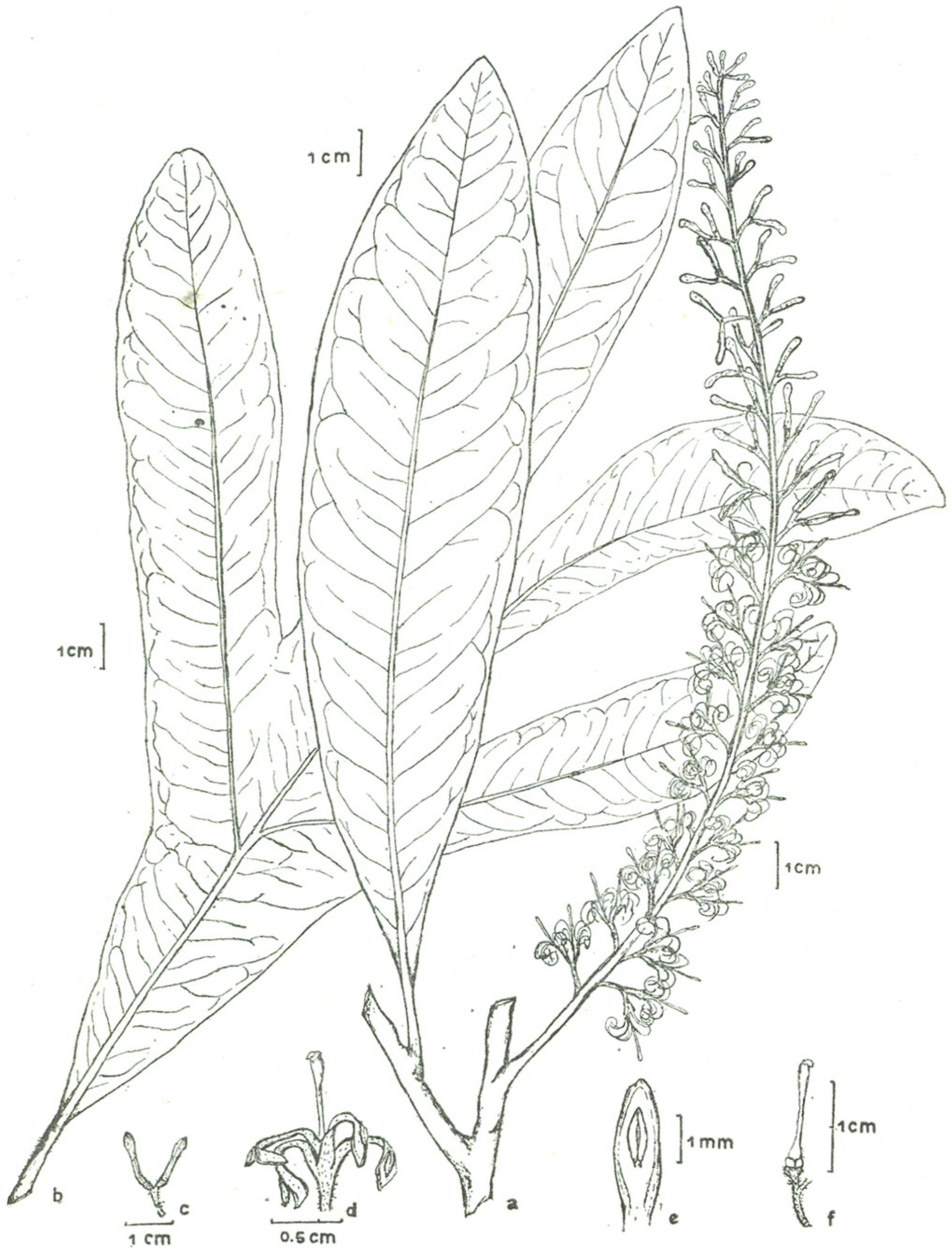


Fig. 29 *Heliciopsis terminalis* (Kurz) Sleum. a. Simple leaf and inflorescence; b. Young leaf; c. Young flowers; d. Open flower; e. Perianth with stamen; f. Torus with disk glands and pistil.

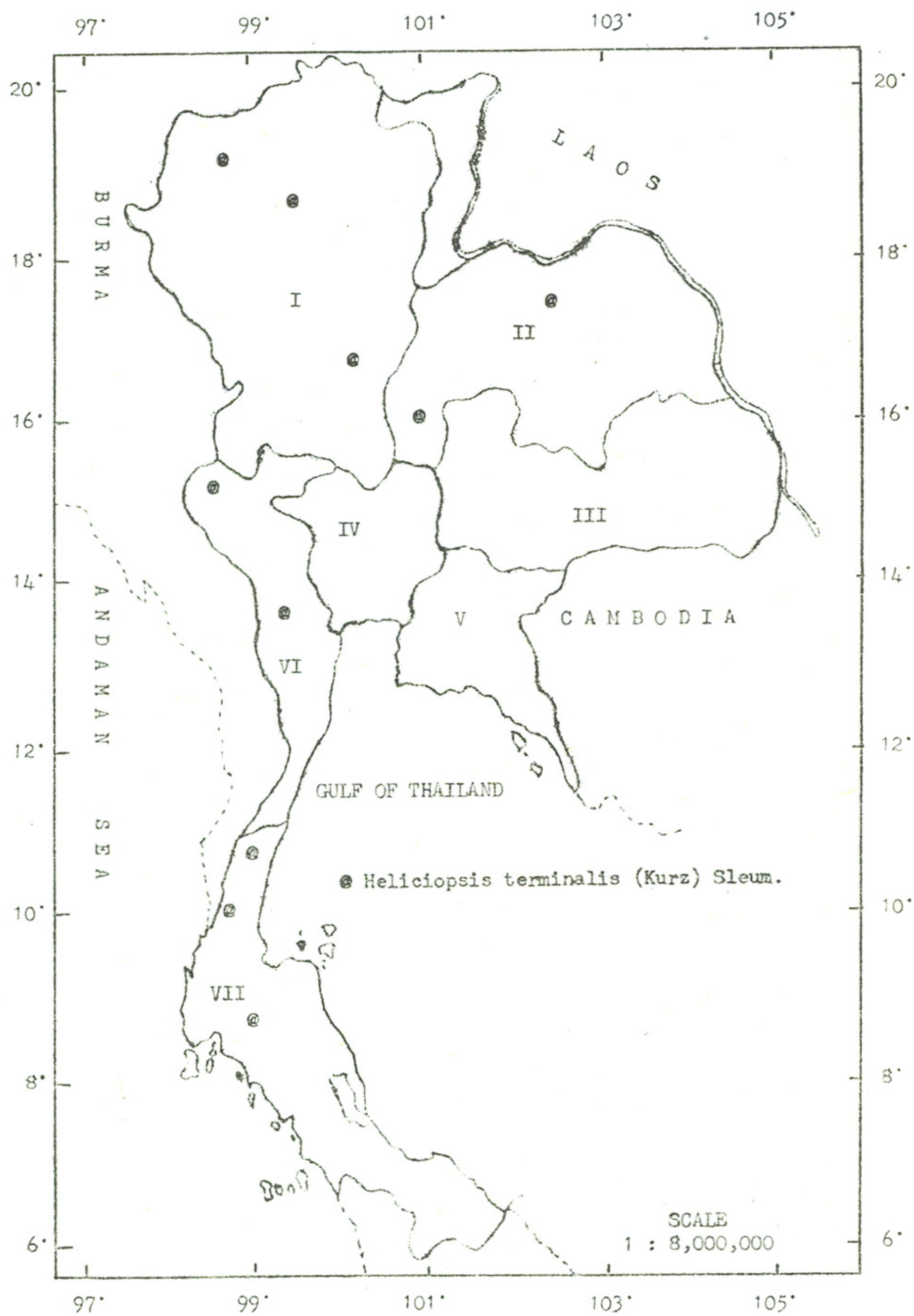


Fig. 30 Distribution of *Heliciopsis terminalis* (Kurz) Sleum. in Thailand

INDEX TO COLLECTOR'S NUMBERS

HELICIA

BOONKIRD	46 (4)
BUNCHUAI	100 (4), 202 (3)
BUNNAB	389 (2), 437 (2)
BUNPHENG	83 (7)
CHERMSIRVATHANA	523 (4), 864 (4)
GARRETT	399 (3)
KERR	5037 (3), 5195 (4), 5304 (4), 5335 (3), 6060 (3), 11593 (2), 12367 (2), 16231 (2), 16860 (6), 16860 A (6), 18108 (2), 18491 (5), 20058 (4), 20251 (3).
LAKSHNAKARA	693 (1), 1473 (3)
NAKKAN	91 (7), 124 (4), 156 (4)
PHENGKLAI & SANGKHACHAND	976 (4)
PUT	3328 (4), 3482 (3), 3782 (4), 3786 (4), 3911 (4), 3928 (3).
SMITINAND	2498 (4), 10118 (4), 10289 (3).
SMITINAND & SLEUMER	8335 (3)
SMITINAND et al.	102571 (3)
SUVATABHANDHU	128 (5)
TDBS	11381 (3)
TULAPHAND	84 (3)
VACHARAPONG	207 (2)
VANAPRUK	815 (2)
WINIT	1355 (4)

HELICIOPSIS

BUNCHUAI	71, 233
KERR	5781, 10408, 16852, 17051
PHAKTHUP	6
PUT	129
SMITINAND ⁵ & SUVANAKOSET	552
SUVANAKOSET	944
TDBS	10888

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