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CLITORIA (LEGUMINOSAE) OF SOUTH EASTERN ASIA

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ABSTRACT

A key and taxonomic treatment is provided for the ten species of *Clitoria* known from South-eastern Asia, Pakistan to Malaysia. Native species include *C. annua, C. cordiformis, C. hanceana, C. javanica, C. linearis, C. mariana* and *C. macrophylla.* The most commonly collected species, *C. ternatea,* is both cultivated and naturalized. Species known only from cultivation include *C. fairchildiana* and *C. laurifolia.* Excluded species, all reported from India, include *C. arborescens, C. heterophylla, C. vaupelli* and *C. virginianum.*

INTRODUCTION

CLITORIA L. (Leguminosae-Phaseoleae-Clitoriinae) comprises 60 species distributed primarily within the pantropical-subtropical belt worldwide. Most of the species are native to the neotropics with four native to Africa, six to Southeast Asia, and one to Australia. Many members are cultivated for their showy flowers and for their reported medicinal and economic properties (Fantz 1991; Lindley 1938; Morton 1983; Uphof 1968). Fantz (1979) provided the first monographic treatment of the genus since the revision by Bentham (1858), and presently has annotated over nine thousand vouchers of the genus. The objective of this paper is to provide a taxonomic treatment of those species of *Clitoria* that occur in South-eastern Asia, from Pakistan to China to Malaysia.

Clitoria characterized by its showy, resupinate, papilionaceous flowers, infundibular calyx with a pair of persistent bracteoles at its base, persistent stipules and stipels, and stalked ovaries with a geniculate, bearded style. *Clitoria* often is cited as herbaceous, but it is a woody genus consisting of trees, shrubs, lianas, and suffrutescent herbs. Suffrutescent species bear seasonal aerial ("herbaceous") stems that are prostrate, erect or climbing from a woody subterranean xylopodium.

Members of the genus *Centrosema* commonly are misidentified as that of *Clitoria* because of the showy, resupinate papilionaceous flowers and pubescent style. *Centrosema* is distinguished easily by the campanulate calyx, subsessile ovaries with a borad U-shaped style, and fruits always bearing pair of costa, each near the valve margin. Fruits of *Clitoria* are ecostate, or in sect. *Neurocarpum,* costate with one rib born medially per valve.

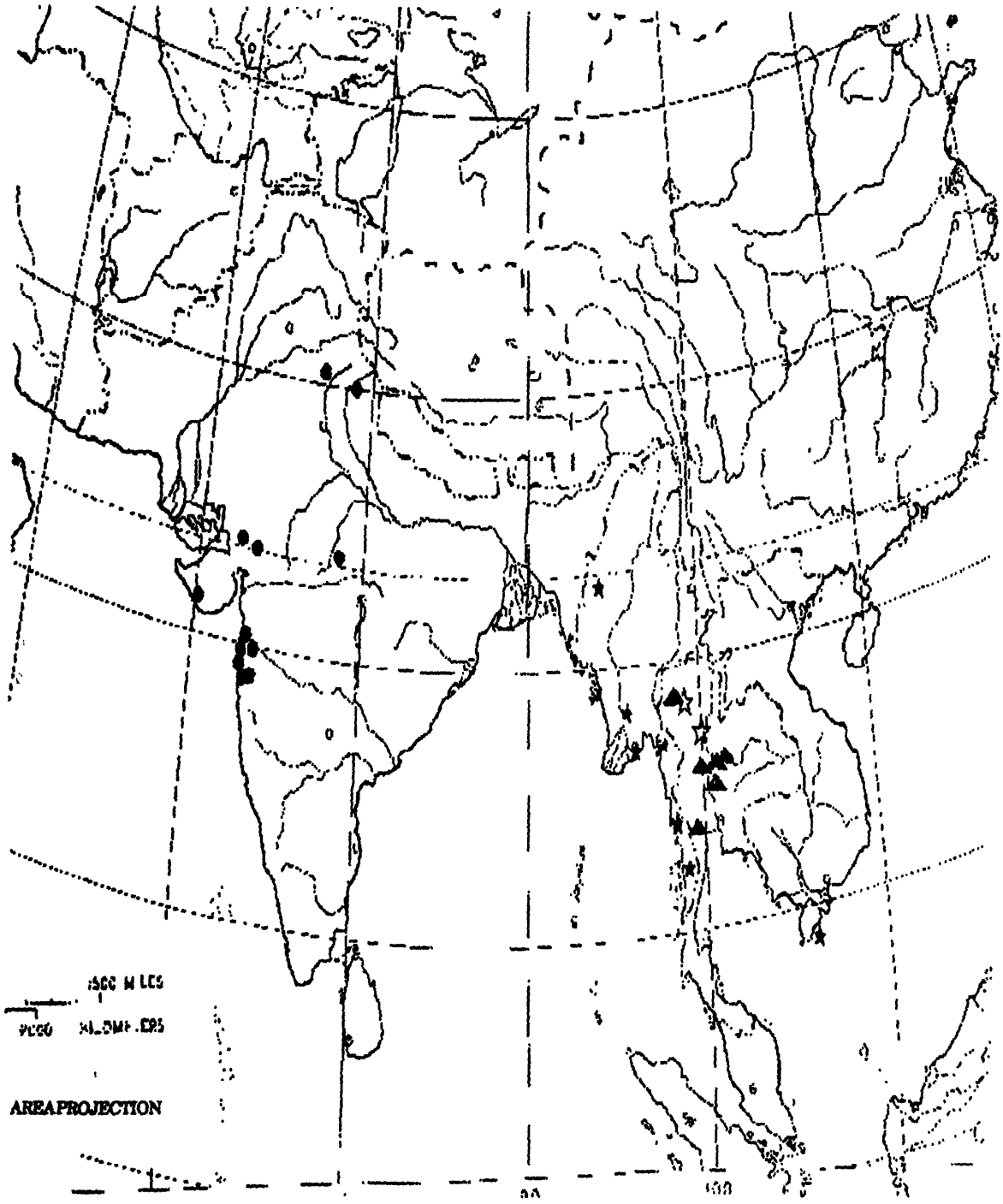
South-eastern Asia includes ten known species of *Clitoria.* Six species are Asian endemics : *C. annua* Grah., *C. cordiformis* Fantz, *C. hanceana* Hemsl., *C. javanica* Miq., *C. linearis* Gagnep., and *C. macrophylla* Wall. ex Benth. A seventh endemic is a disjunct variety of *C. mariana* L. of the United States of America. Three species are found in cultivation. An African species, *C. ternatea* L., has escaped and naturalized in South-eastern Asia. *Clitoria fairchildiana* Howard and *C. laurifolia* Poir. are neotropical species known only from cultivation. Distribution range of the species is shown in Maps 1-5.

TAXONOMIC TREATMENT

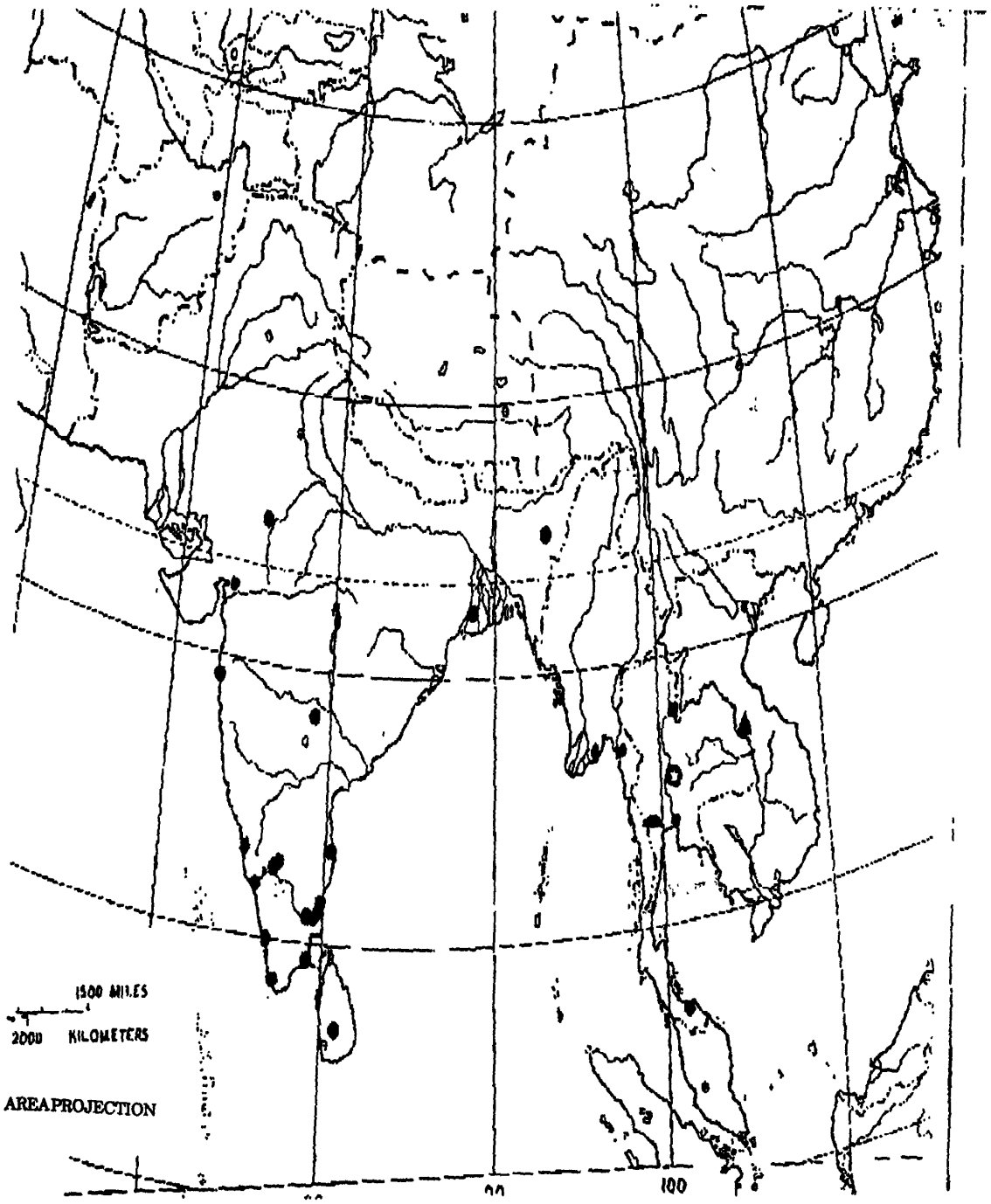
Clitoria L., Sp. Pl. 2:753. 1753; *Ternatea* Tourn. ex Mill., Gard. Dict. ed. 4.3:Ternatea. 1754. Lectotype : *C. ternatea* L.

Neurocarpum Desv., Journ. Bot. 1:119. 1813; *Neurocarpon* Desv. ex Ham., Prod. Fl. Ind. Occ. 50.

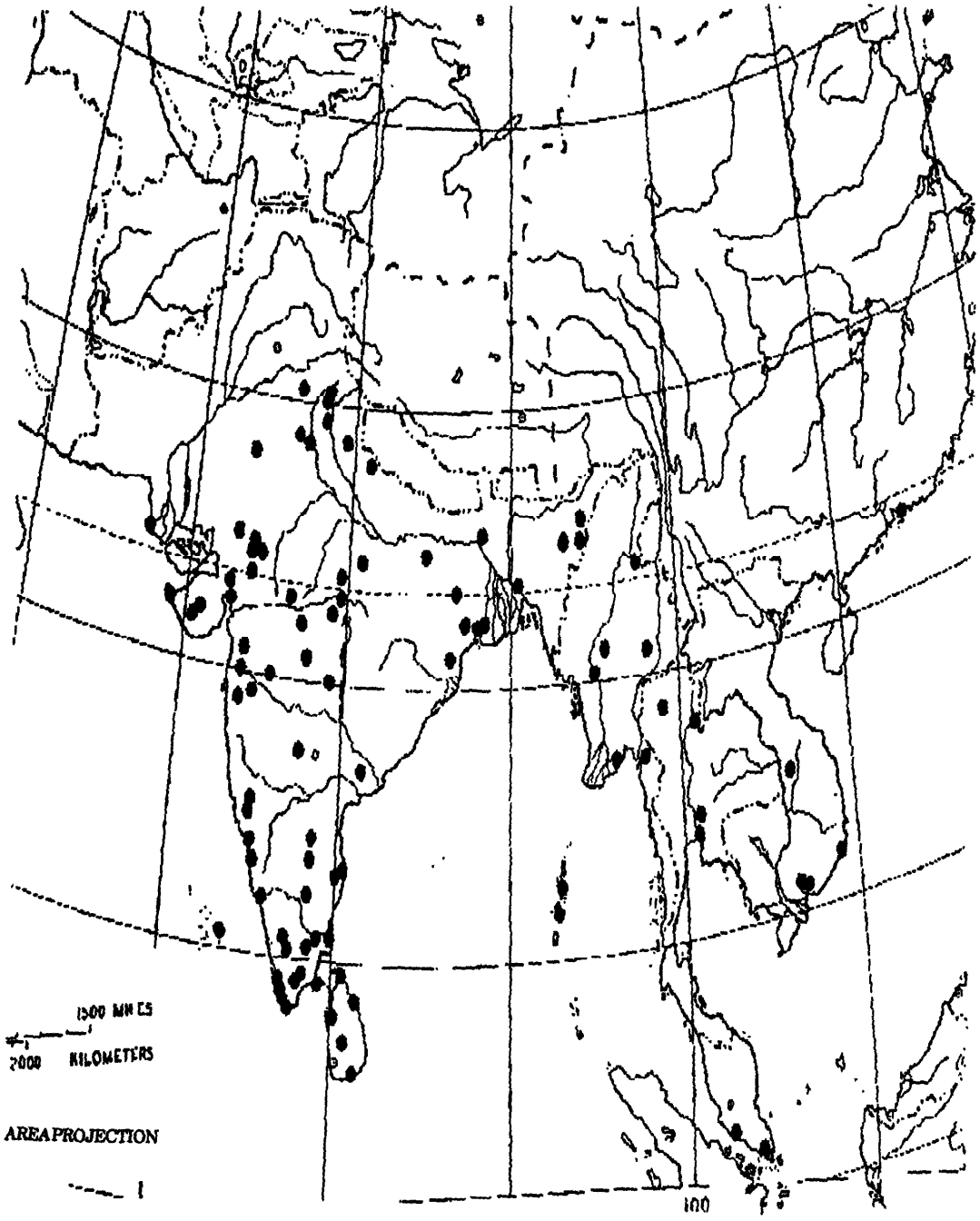
*Botanical Survey of Inida, Howrah.
Date of receipt : 29.7.93 Date of acceptance : 28.7.95.



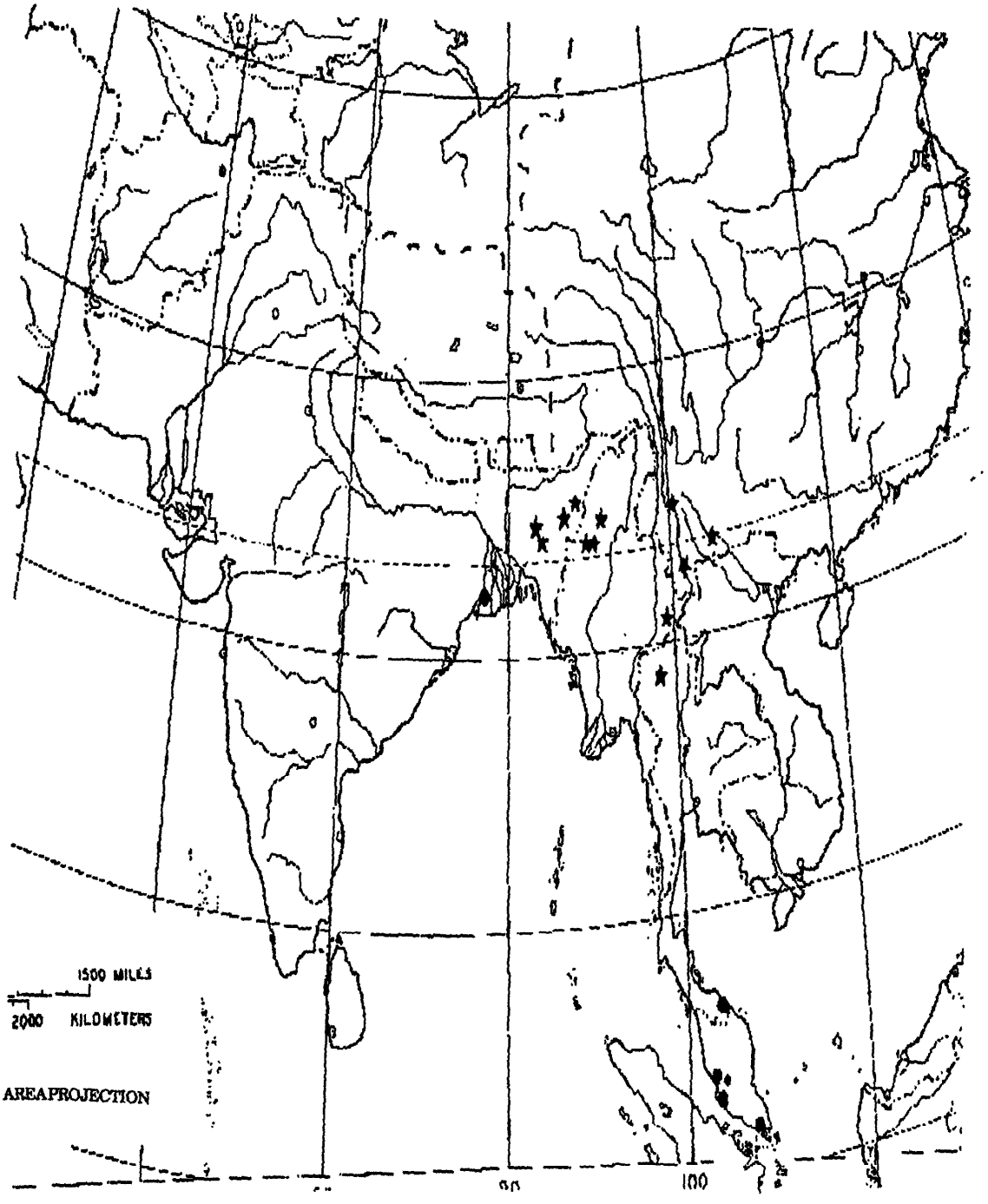
Map 1. Distribution of *Clitoria*. (●) *C. annua;* (★) *C. macrophylla* var. *macrophylla;* (▲) var. *sericea;* (✪) var. *stipulacea.*



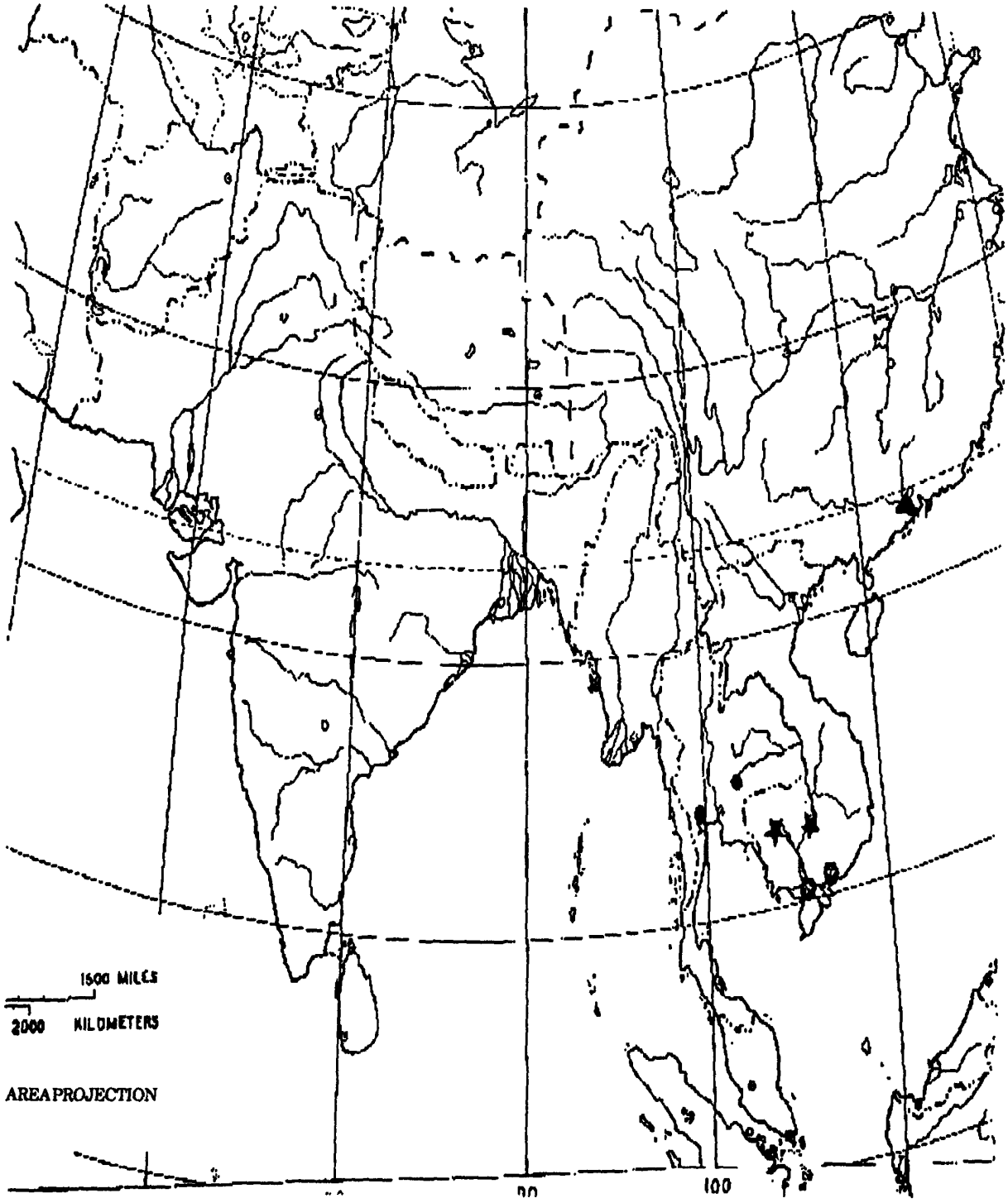
Map 2. Distribution of *Clitoria* (●) *C. ternatea* var. *ternatea* f. *albiflora*; (▲) *C. linearis*; (✪) *C. cordiformis*; (▲) *C. javanica*.



Map 3. Distribution of *C. ternatea* var. *ternatea* f. *ternatea*.



Map 4. Distribution of *Clitoria*. (●) *C. laurifolia;* (★) *C. mariana* var. *orientalis*.



Map 5. Distribution of *Clitoria hanceana*. (▲) var. *hanceana*; (✪) var. *laureola*; (★) var. *petiolata*; (●) var. *thailandica*; (★) var. *latifolia*.

1825; *Neurocarpus* Desv. ex Hassk., Cat. Hort. Bogor. Alt. 276, no. 1226. 1844. Lectotype : *N. janensis* Desv. (=synonym of *C. laurifolia* Poir.).

Perennial suffrutescent herb with annual aerial stems from a subterranean xylopodium, rarely shrubs or trees. Leaves stipulate, petiolate to subsessile, alternate, odd-pinnately compound, (1-) 3- (5-7-) foliolate; stipules and stipels persistent; petiolules subquadrate, rugose. Inflorescences axillary or terminal, pseudoracemose, pedunculate, 1-2-flowered to occasionally multiflowered; peduncles usually solitary; pedicels often paired at nodes. Bracts paired in each of three series below pedicels; middle pair opposite and appressed to pedicels, concave, striated, largest, persistent; inner and outer pairs between the pedicels, striated, smaller, deciduous to semipersistent. Bracteoles paired at pedicel apex, striate, persistent, usually appressed to calyx, sometimes enlarged and obscuring it, reduced in size in cleistogamous flowers. Flowers showy, chasmogamous or infrequently cleistogamous, then small and apetalous. Calyx infundibular, 10-veined or rarely striate, persistent in fruit, 5-lobed, upper pair subconnate lowermost longest, narrower. Corolla papilionaceous, resupinate or rarely actinomorphic; standard enlarged, complicate, short-clawed, pubescent adaxially; wings longer than keel, both long-clawed, rarely both standard-like.

Fantz (1979a-b, 1988) circumscribed three subgenera of *Clitoria*. Subg. *Bractearia* (Mart. ex Benth). Fantz included 31 neotropical species. One species is cultivated in Asia. Subg. *Clitoria* included four African species and one species endemic to western India, *C. annua* Grah. The African species, *C. ternatea*, is widely cultivated in Asia and naturalized. Subg. *Neurocarpum* (Desv.) Baker emend. Fantz included 24 species, mostly distributed in the New World. Six species are endemic to South-eastern Asia and one species is endemic to northern Australia.

Fantz (1979b, 1988) circumscribed three sections of Subg. *Neurocarpum*. Sect. *Tanystyloba* Fantz includes five species native to South-east Asia and one endemic of northern Australia. Sect. *Mexicana* Fantz includes seven species of North America with one species endemic to northern Argentina. A variety of *C. mariana* is endemic to South-eastern Asia. Sect. *Neurocarpum* is a South American group of 10 species with three members extending their ranges into Central America and the West Indies, and one introduced and naturalized in Africa. One species is cultivated in Asia.

KEY TO THE SPECIES

1a. Calyx subcoriaceous, multi-veined; inflorescence lignose, nodosa, multi-flowered; staminal sheath 25-32 mm long; fruit long-stipitate, stipe 13-22 mm long; seeds orbicular lenticular, 11-17 mm diam.; petiolules 5-10 mm long; leaves long-petiolate, leaflets large, matured ones commonly greater than 8 cm long × 3 cm wide. ... Subg. BRACTEARIA

2. Bracteoles 17-23 mm long, 7-11 mm wide; legume flat, 120-280 mm long; leaflets 3; tree, 3-8 m; cultivated ... 1. *C. fairchildiana*

1b. Calyx chartaceous to subpellucid, prominently 10-veined; inflorescence sublignose, few-flowered; staminal sheath 10-23 mm long; fruit short-stipitate, stipe 1-14 mm long; seeds subreniform, 3-8 mm diam.; petiolules 1-4 mm long; leaves short-petiolate, leaflets medium to small, matured ones commonly less than 8 cm long × 3 cm wide :

3a. Leaflets 5-7; calyx subpellucid, persistent but shrinking in fruit; legume flat, subsessile, stipe 1-4 mm long; seeds smooth ... Subg. CLITORIA

4a. Flowers actinomorphic, petals 4-5, all banner-like ... 3. *C. ternatea*

4b. Flowers papilionaceous, petals 5, pea-like with one banner, two wings and two forming a keel ;

5a. Flowers 2.5-3.5 cm long; calyx tube 5-8 mm long, lobes 4-8 mm long; staminal sheath 9-11 mm long; style 10-12 mm long; legume 25-50 mm long, 6-8 mm wide; aerial stems from xylopodium erect (W. India) ... 2. *C. annua*

5b. Flowers 3.5-5.5 cm long; calyx tube 8-14 mm long, lobes 7-12 mm long; staminal sheath 16-20 mm long; style 14-17 mm long; legume (50-) 70-110 mm long, 8-11 mm wide; aerial stems from xylopodium twining (cultivated and naturalized in S.E. Asia) ... 3. *C. ternatea*

3b. Leaflets 3; calyx subcartilaginous, persistent, retaining size in fruit; legume turgid, stipitate, stipe 4-14 mm long; seeds viscid ... Subg. NEUROCARPUM

6a. Calyx lobes shorter than the length of the calyx tube; flowers lilaceous to violaceous, 4-5.5 cm long; staminal tube 22-34 mm long :

7a. Legume costate; style 19-23 mm long; seeds with width (axis perpendicular to funiculus) slightly shorter than length; cleistogamy present with reduced calyx 5-7 mm long ... Sect. *Neurocarpum*

8. Leaves subsessile, petiole 0.2-0.4 cm long, shorter than 0.4-0.9 cm long rachis; shrub (S.E. Asia introduced via cultivation) ... 4. *C. laurifolia*

7b. Legume ecostate; style 14-20 mm long; seeds with width slightly longer than length; cleistogamy absent in Asia ... Sect. *Mexicana*

9. Leaves petiolate, petiole 4-10 cm long, much longer than 1-2.5 cm long rachis; suffrutescent perennial with aerial stems trailing to climbing (India to Thailand) ... 5. *C. mariana*

6b. Calyx lobes subequal to longer than the length of the calyx tube; flowers white, 2.5-3.5 (-4.5) cm long; staminal tube 14-22 mm long ... Sect. *Tanystyloba*

10a. Flowers 3.5-4.5 cm long; bracteoles 8-12 mm long; calyx tube 9-12 mm long, lobes 3-4 mm wide basally; inflorescence several-flowered; bracts 5-7 mm long; (Myanmar to Vietnam) ... 10. *C. macrophylla*

10b. Flowers 2.5-3.5 cm long; bracteoles 4-8 mm long; calyx tube 6-10 mm long, lobes 2-3 mm wide basally; inflorescence 1-2-(-4)-flowered; bracts 2-5 mm long:

11a. Calyx lobes subequal to tube length; staminal tube 17-21 mm long; petiole 3-6 cm long; wing blade 12-15 mm long; leaflets with length subequal width, ratio of L/W is 1-1.5:1; stems scandent :

12a. Leaves unifoliolate; leaflets 7-10 cm wide; petiolule 4-6 mm long; inflorescence to 0.6 cm long (Thailand) ... 6. *C. cordiformis*

12b. Leaves 3-foliolate; leaflets 2-5 cm wide; petiolule 3-4 mm long; inflorescences 0.5-1.5 cm long (Thailand) ... 8. *C. javanica*

11b. Calyx lobes longer than tube length; staminal tube 13-18 mm long; petiole 0.3-2 cm long; wing blade 7-9 mm long; leaflets elongated, ratio of L/W is 2-5:1; stems erect :

13a. Leaflets narrow, 0.8-2 cm wide; petiole longer than rachis; pedicels 1-2 mm long; leaflets 3 (Laos) ... 9. *C. linearis*

13b. Leaflets broadened, 2-5 (-8) cm wide; petiole shorter than rachis; pedicels 3-6 mm long; leaflets 3 or occasionally 1 at lower nodes (China to Vietnam) ... 7. *C. hanceana*

A. Subg. BRACTEARIA (Mart. ex Benth.) Fantz, Sida 8 (1):91. 1979; *Clitoria* Sect. *Bractearia* Mart. ex Benth., Ann. Weiner Mus. Naturgesch. 2:115. 1837. Lectotype : *C. amazonum* Mart. ex Benth.

Trees. Leaves 3-foliolate, long-petiolate, petiole longer than rachis. Inflorescence axillary or terminal, lignose, nodose, multiflowered. Bracteoles broad, coriaceous, hiding subequal calyx. Calyx multiveined, subcoriaceous, lobes shorter than tube. Petals long-clawed. Staminal tube and ovary elongated. Fruit long-stipitate, large, flat, ecostate. Seeds smooth, lenticular.

1. **Clitoria fairchildiana** Howard, Baileya 15:16. 1967; *Clitoria racemosa* Benth., Ann. Weiner Mus. Naturgesch. 2:115. 1837, *non* G. Don (1832), *nec* Sesse & Moc. (1889); *Ternatea racemosa* (Benth.) Kuntze, Rev. Gen. Pl. 1:210. 1891. Lectotype : Brazil : Natividade, 1836. *Pohl* 2375 (W!). Isolectotype : F!K, M!NY!S!- photo of K.

Tree, 3-8 m tall. Leaflets lanceolate-elliptic to oblong-elliptic, 6-18 cm long, 3-7 cm wide. Petioles 3-9 cm; rachis 1.5-3 cm; petiolules 5-9 mm. Stipules 6-12 mm long. Inflorescences 8-42 cm long, primary branches that bear pedicels to 4 mm long; pedicels 3-8 mm long. Bracts 6-10 mm long, 2-4 mm wide. Bracteoles persistent, coriaceous, striate, subequal and enclosing calyx, 17-23 mm long, 7-11 mm wide. Flowers violaceous to rosaceous, 4-6 cm. Calyx tube 11-16 cm long, lobes ovate-deltoid, 4-6 mm long. Staminal sheath 25-32 mm. Ovary 14-17 mm, style 12-16 mm, geniculate 5-8 mm apically. Legume 120-280 mm long, 22-33 mm wide; stipe 13-22 mm. Seeds black, *ca* 11-27 mm diam., 5-12 seeds per pod.

Phenology : Flowering recorded in May-June.

Distribution : Endemic to the deltas of North-eastern Brazil, cultivated elsewhere as an exotic tree, especially in vicinity of Rio de Janeiro. Worldwide, this species in cultivation rarely vouchered with fruit. Rare in cultivation in Asia (India and Philippines).

INDIA : West Bengal : Indian Botanic Garden, Howrah, *Bhaumik* 11021 (FLAS); *l.c.*, *Predeep* 13254 (CAL).

B. Subg. CLITORIA; *Ternatea* Tourn., Mém. Math. Phys. Acad. Roy. Sci. p. 103. 1706, *nom. inval.* *Ternatea* Tourn. ex Mill., Gard. Dict. ed. 4, 3: TERNATEA. 1754; *Ternatea* Tourn. ex Kunth, Nov. Gen. Sp. 6:415. 1824; *Clitoria* Sect. *Ternatea* (Tourn. ex Kunth) DC., Prodr. 2:233. 1825; *Clitoria* Subg. *Ternatea* (DC.) Baker in Hook. f., Fl. Brit. India 2:208. 1876. Lectotype: *C. ternatea* L.

Suffrutescent perennials; ariel stems from subterranean xylopodium erect or twining. Leaves 5-7-foliate, small, petiolate, petioles shorter than rachis. Bracteoles broad, membranaceous, subpellucid, one-half to occasionally subequalling the calyx and obscuring it. Calyx subpellucid, 10-veined, persistent but shrinking in fruit. Petals short-clawed. Staminal sheath and ovary short. Fruit subsessile, flat, ecostate. Seeds smooth, compressed, subreniform.

2. **Clitoria annua** Grah., Cat. Pl. Bombay 47. 1839. Neotype : India. Malabar Hill, 1986, *Almeida* 5890 (BLAT). *Clitoria biflora* Dalz. in Hook., Kew. Journ. 2:35. 1850; *Ternatea biflora* (Dalz.) Kuntze, Rev. Gen. Pl. 1:210. 1891. Lectotype : India. Bombay, *Hb. Dalzell* s.n. (K-Hb. Dalzell!). Isolectotype : K-Hb. Hooker! Syntype : *l.c., Hb. Dalzell* 1694 (GH!). (Fig. 1, Map 1.)

Suffrutescent herb; stems erect to 1 m, unbranched to sparsely branched, weakly flexuous, conspicuously pubescent, trichomes stiff, 1-1.3 mm long. Leaves 5-foliolate, lowermost lateral pair near stem segregated by elongate internode from upper leaflets; leaflets polymorphic, concolourous, lanceolate, linear-lanceolate to ovate-lanceolate to ovate, less commonly oblong to oval to subcordiform to suborbicular, apex tapered acute to obtuse to abruptly short-acuminate, 3-9 (-12) cm long, 1.5-3 (-4) cm wide (0.5-1 cm wide in linear-lanceolate leaves). Petioles subhispid, 0.5-1 (1.5) cm; rachis subhispid, 3-7 cm with first internode 2-5 cm long; petiolules 2-3 mm. Stipules linear to setaceous, 3-veined from base to near middle with midrib persisting to apex, apically awnlike ciliate, 6-11 (-16) cm long. Inflorescence axillary, biflowered, to 0.5 cm long; pedicels 2-44 mm long, borne laterally at peduncle apex. Bracts 2-6 mm long, to 1 mm wide. Bracteoles oblong to ovate, 6-11 mm long, 2-5 mm wide. Flowers blue to light purplish, 2.5-3.5 cm. Calyx tube 5-8 mm long, shrinking to 4-6 mm long in fruit, lobes ovate, awned, 4-8 mm long. Staminal sheath 9-11 mm. Ovary 4-6 mm, style 10-12 mm, geniculate 2 mm apically. Legume subfalcate apically, microuncinate beneath, suberect trichomes of *ca* 1 mm length, 25-50 mm long, 6-8 mm wide; stipe to 2 mm; spiral dehiscence 1-1.5 (-2) turns. Seeds black, oblong-reniform, 4-6 × 3-5 × 0.5-2 mm, 2-4 seeds per pod. Chromosome number n=7, 8.

Graham (1839) did not cite any specimens, but noted it as "common on Malabar Hill." Almeida & Almeida (1987) provided arguments that a specimen of *C. biflora* collected from Malabar Hill *(Almeida* 5890) is Graham's taxon, thus the name *C. annua* has priority. Fantz and Predeep (1992) questioned the validity of the arguments that lead Almeida and Almeida to the conclusion that Graham's taxon is a true *Clitoria* and equivalent to Dalzell's, but lacked hard evidence to refute their arguments.

Dalzell did not designate any type collection when the species was described originally. The lectotype was part of N.A. Dalzell's herbarium presented to Kew in 1878 by Mrs. Dalzell. This specimen has flowers and more closely matches Dalzell's published description that the specimen in Hooker's herbarium also deposited at Kew. *Dalzell* 1694 (GH) bears the written notation "*Clitoria biflora,* an erect sp. mihi in Hook," and the specimen is in fruit. The Gray Herbarium specimen (syntype) is the only known specimen with fruits collected by the original author (*i.e.* Dalzell).

Indian specimens of 5-foliate vouchers of *C. ternatea* have been identified sometimes as *C. biflora.* Dalzell's *Clitoria* is identified easily by its subhispid stems bearing 5-foliate leaves with the lowestmost pair of leaflets conspicuously separated from the other three, and the subsessile inflorescences bearing two small blue flowers.

Is this species a herbaceous annual (unique within the genus) or a perennial ? Field observations by Predeep indicate the herbaceous habit. Most of the species have a subterranean xylopodia that seasonally send up aerial stems (*i.e.* rainy season) that die back to the ground at the end of the growing season. As plants age, stems lignify basally and produce branches. Collections of young, unbranched aerial stems has led to the description "annual" whereas older vouchered plants are described as "subshrub or suffrutescent" (*e.g.* also in *C. ternatea, C. laurifolia).*

Phenology : Flowering August-September with fruits mid-September through October. However, collectors rarely note phenology in their label data.

Distribution : Endemic in Western India (Map 1). Gravelly moist soil, shady forests, wooded stream banks, and grassy slopes, to 1500 m.

INDIA : Gujarat : Dangs dt., Pimpri, *Jain* 4309 (BSI); Waghi, *Panthaki* 1692 (BLAT); Pimpri, *Panthaki* 2371 (BLAT); Waghi Rest House Hill, *Santapau* 19013 (BLAT); Sasangir, *Rao* 63843 (BSI). Himachal Pradesh : Simla, *Thompson s.n.* (K).

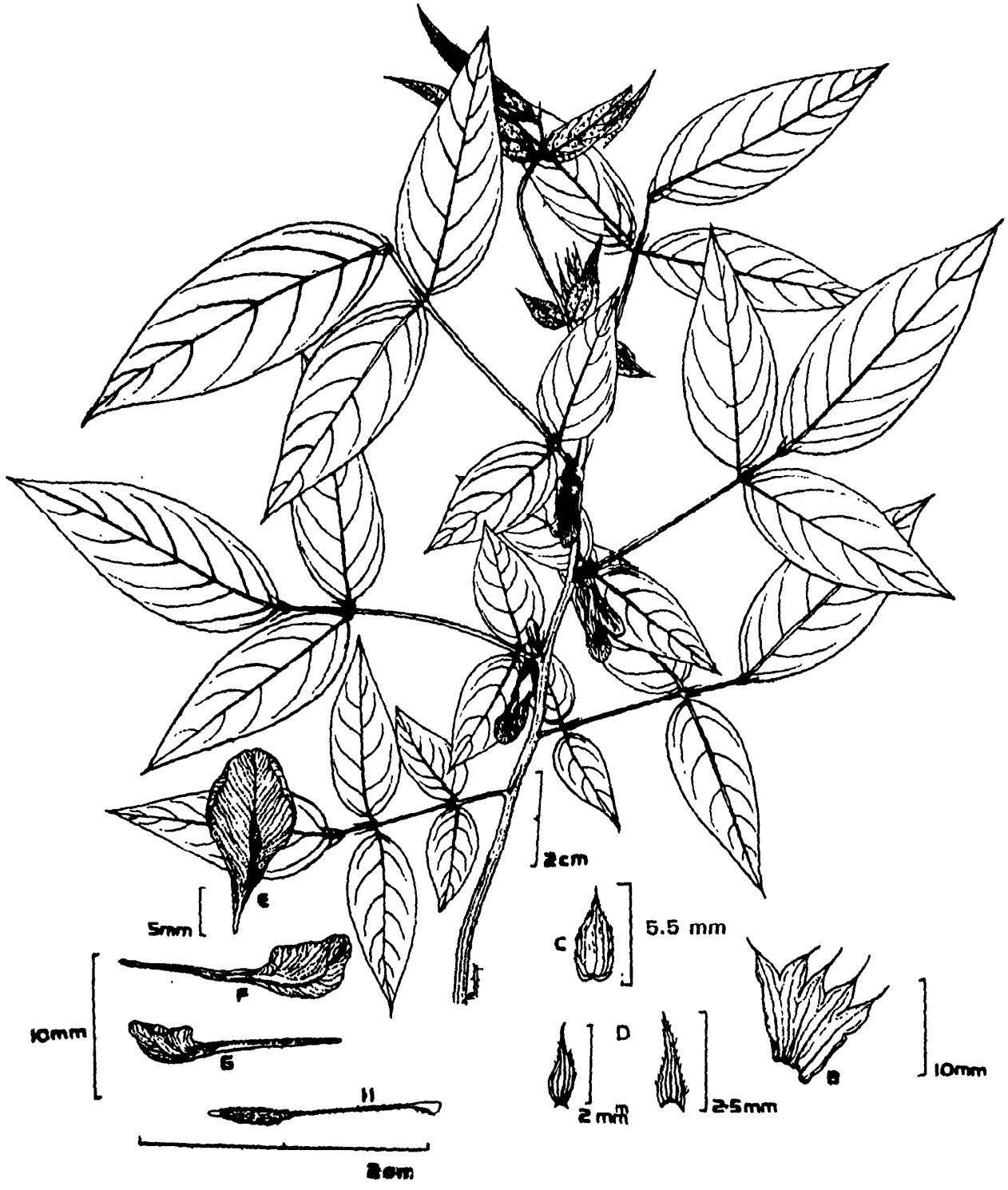


Fig. 1. A-H : *Clitoria annua* Grah. A. portion of stem; B. calyx; C. bracteole; D. bracts; E. banner petal; F. wing petal; G. keel petal; H. gynoecium

Madhya Pradesh : NE of Ranipur towards Kotbandhani, *Pataskar* 101485 (CAL). Maharashtra : Srihagadh, Haveli taluka, Poona, *Ansari* 101544 (BSI, MO); Thana dt., Udhawa Range, *Billore* 113040 (BSI); Bombay Island, Matunga, *Blatter* 11056 (BLAT); Bombay, *Getune s.n.* (K); Poona dt., Junnar, Shivneri hill, *Hemadri* 89983 (BSI, CAL); Borivli National Park, *Herbert* 2224 (BSI); Bassein, *Hugel* 1665 (W); near Matheran, 1890, *Kanetkar s.n.* (E); Bombay, *Law s.n.* (K); Nasik dt., Dangsandana, *Narasimhan* 165411 (BSI); Poona dt., Khandala, *Panthaki* 1692 (BLAT); Borivli National Park, *Predeep* 13273 (CAL); Bombay, 1835, *Roux s.n.* (G-mixed with *C. ternatea);* Mumbra, near Bombay, *Shenoy* 4956 (BLAT); Ambioli near Jogeshwari, *Sinclair* 4434 (E); Concan, *Stocks s.n.* (BM, CAL, CGE, G, Gh, K, M 15344, S, US, W; *non* M 12417); Goregaon, Aarey Milk Colony, *Tavakari* 1571 (BLAT). Nagar Haveli : Sindhoni Forests, *Ansari* 127072 (BSI); Dhapsa, *Ansari* 127197 (BSI). Rajasthan : W. Abu, Rajputana, *Blatter* 5782 (K); Mount Abu, *Blatter* 11993 (BLAT); Banswara, Bijha Forest, Kushalgadh, *Kanodia* 75689 (BSI); Banswara, Anand Sagar, *Singh* 2972 (BSJO, CAL). Uttar Pradesh : Dehra Dun, Robbers Cave, *Babu* 29699 (BSD); Cult., Chandbagh Exp. Sta., Dehra Dun, *Gupta* 191 (K).

3. **Clitoria ternatea** L., Sp. Pl. ed1. 2 : 753. 1753; *Ternatea vulgaris* Kunth. in H.B.K. Nov. Gen. Sp. 6 : 415. 1823. Lectotype : India. Suratt, *Anonymous* s.n. (LINN 902.1, microfische!).

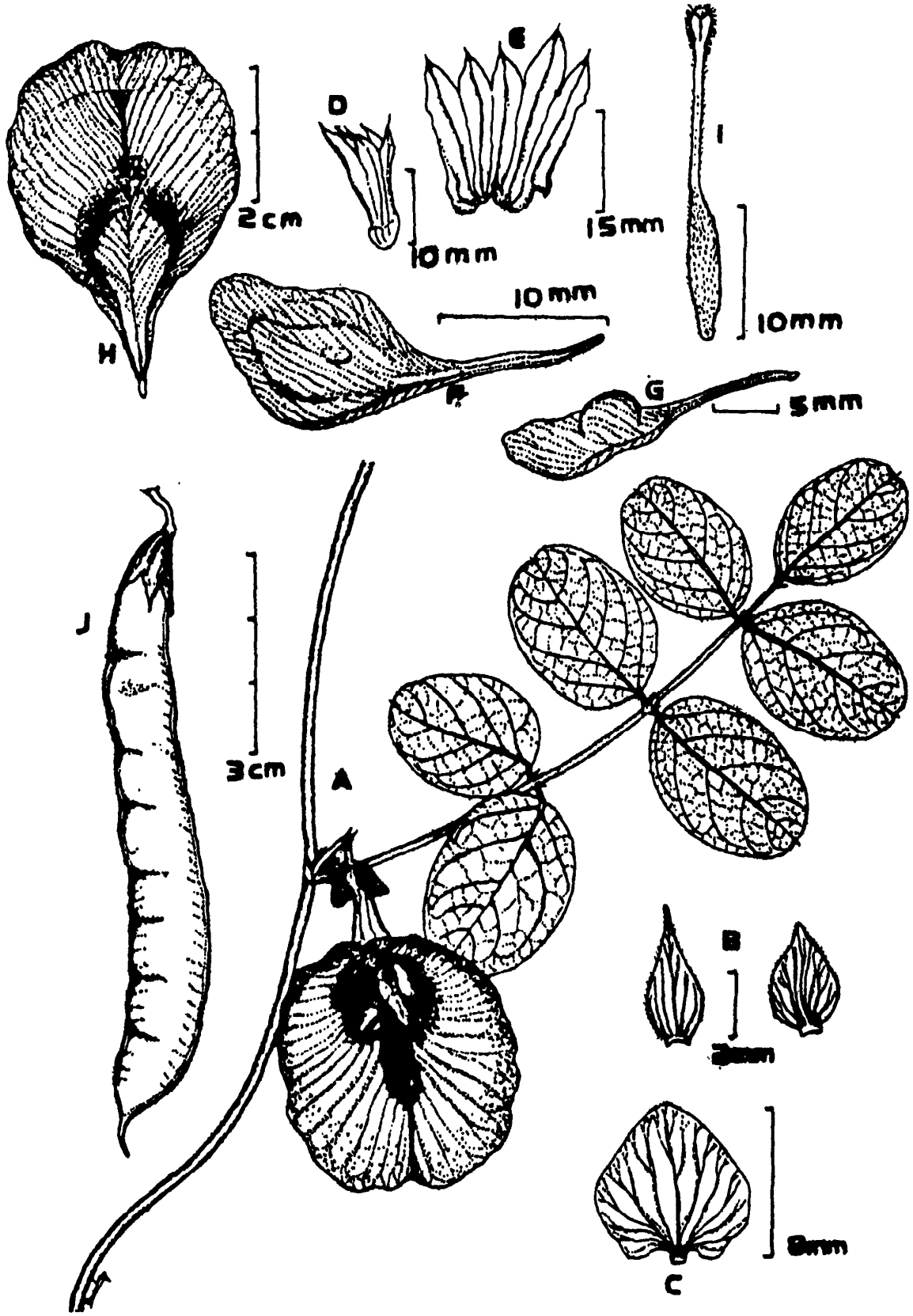
Clitoria pilosula Wall., Cat. Herb. Ind. 185 no. 5347. 1831 1832, *nom. nud.; Clitoria pilosula* Wall. ex Benth., Journ. Linn. Soc. 2:37. 1858; *C. ternatea* var. *pilosula* (Wall. ex Benth.) Baker in Hook. f., Fl. Brit. India 2:208. 1876. Lectotype : India. Hort. Bot. Calcutti, *Wallich* 5347B (K!-as *Clitoria pilosula* Wall.) Isolectotype : India, *Wallich* 5347 (BM!).

Fig. 2

Suffrutescent perennial vine to low shrub; stems to 5 m long, basally suberect, lignose, branching, apically infrequently branched, herbaceous, trailing and intertwining to form tangled mats, or high climbing. Leaves 5- and/ or 7-foliate, leaflets ovate, elliptic, obovate or ovate-elliptic, 1-5 cm long, 1-4 cm wide. Petioles 1-4 cm; rachis 2-7 cm, internode segments 1-2.5 cm; petiolules 1-3 mm long. Stipules linear, 4-10 mm. Inflorescences axillary, solitary, 1-(2-) flowered, or rarely fasciculate; pedicels 3-6 mm borne laterally from peduncle apex. Bracts 2-5 mm long, 1 mm wide. Bracteoles very conspicuous, broadly ovate to suborbicular, ciliolate, 6-12 mm long and wide, shorter than the calyx tube to subequalling the calyx and obscuring it, deciduous by fructification. Flowers showy, pale blue to azure to violaceous-blue, or white, 3.5-5.5 cm, usually papilionaceous, occasionally actinomorphic with 4-5 banner-like petals. Calyx subpellucid, shrinking and shriveling slightly in fruit, tube 8-14 mm long, lobes oblong, 7-12 mm long, apically vein excurrent, 1-2 mm. Stamens diadelphous (9+1), sheath 16-20 mm long, or subpolyadelphous to free in actinomorphic flowers. Ovary 6-9 mm; style 14-17 mm, geniculate 2-4 mm apically. Legume straight to subfalcate apically, microuncinate beneath strigose to spreading trichome, (50-) 70-110 mm long, 8-11 mm wide; stipe 1-2 mm; spiral dehiscence 1-3 turns. Seeds brown to black, subreniform, 4-5 × 5-6 × 1.5-2 mm, 7-10 seeds per pod. Chromosome number n=7, 8.

This species is identified quickly by its twining stems with 5-7-foliolate leaves and short inflorescences with solitary azure or white flowers that quickly mature into elongated, flat fruits. This is the species most commonly collected in Southeast Asia.

Vernacular names : This species has numerous vernacular names noted by plant collectors and by authors of published manuscripts. However, they failed to report the language used. This inventory is a summary of common names reported within each country, except for two names used by the British botanists. British : Butterfly pea, mussel-shell creeper. India : aparajit, aparajita, asphota, bhovera, chandra kanta, dhanattar, dintana, dintena, garani, ghiria, ghutti, girikarni-balli, gokaran, gokarna, gokarnamul (gokarna-mul), gokarni, gokurna, kajali, kajili, kajina, kakkanam, kakkanam-kodi, kakkattan, kalina, kalizer, kanni-kodi, karakartan, karisanni, karkakartum, karkurattai, karudakkovai, karundattondai, karuvilai, kaurigeni, kavali, kava-



Figs. 2. A-J : *Clitoria ternatea* L. A. portion of stem; B. bract; C. bracteole; D-E. calyx; F. wing petal; G. keel petal; H. banner petal; I. gynoecium; J. fruit.

thenthi, kazuli, kemachi, kevari, khagin, khurne, kigini, kiriganni, kirgunna, kiruttini, kova-theti, koyala, mazeriyuni-hindi, mella, minni, nalla-ghentana, nalla-vusinitige, neel-aparajita, nil-aparajita, nilaghiria, nilaghirie kurni, nila-dintana, onasi, oporajita, phiki, sanka, sanka-gida, sankhupushpam, sankhapushpa-balli, shobanjan, sholonga, shwet-uparajita, supli, swet-aparajita, taruganni, tella-dintana, uparajita, uyavai, viranu, vishnu kantisoppu, vishnukranta, visnukranti. Laos : bang san deng, bang san 'Khao, Khao poun, 'thoua keo. Malaysia : aral, bonga biru, bonga calente, bunga biru, kachang telang. Myanmar (Burma) : aung-mai-phya, bukiyu, bukyu, oung mai phyu, pai noung ni, pe-nauk-ni. Sri Lanka (Ceylon) : catharodu, kata-rodu, kataroduwael, katarodu-wel s, katrodu (white fl.), katte roddoe, nil-kata-rolu s, siel catta kodoe. Thailand (Siam) : aug chan. Vietnam : bong biet, dau mang chiem.

Economic importance : Fantz (1991) summarized data reported on herbaria lebels supplemented by literature. This species is used medicinally, as a dye, as food and fodder, and as an ornamental. Table 1 summarizes the reported economic uses.

Phenology : Vouchers are collected from January to December with flowers and fruits.

Distribution : Native to Eastern Africa, cultivated pantropical-subtropical where it often naturalizes. Naturalized populations are known from United States of America to Uruguay, the Caribbean Islands, Southeast Asia. Australia, Melanesia, Micronesia, and Polynesia.

Subspecific taxa : The species is polymorphic with three known types (blue, white, and doubled flowered) in pre-Linnaean literature. Variety *angustifolia* Hochst. ex Baker f. (East Africa) with white flowers does not occur in Asia. Forms noted aid understanding of this complex species. The following key segregates our members :

1a. Flowers papilionaceous, petals 5, pea-like; stamens diadelphous (9+1) ... 3A. VAR. *TERNATEA*

2a. Petals blue to purplish-blue with standard medially yellow to white :

3a. Peduncles 1 per leaf axil, 0.5-1 (-1.5) cm long, rigid ... c. f. *TERNATEA*

3b. Peduncles 1-4 per leaf axil, 1-4 cm long, rigid basally, slender and lax apically ... b. f. *FASCICULATA*

2b. Flowers white with standard medially greenish to greenish-white ... a. f. *ALBIFLORA*

1b. Flowers actinomorphic, petals (4-) 5 banner-like; stamens free or subpolyadelphous ... 3b. VAR. *PLENIFLORA*

4a. Stamens subpolyadelphous, some free with remainder connate below in 2-3 bundles of 2-6 stamens ... f.f. *SUBPOLYADELPHA*

4b. Stamens all free :

5a. Flowers blue to purplish-blue ... e. f. *PLENIFLORA*

5b. Flowers white ... d. f. *LEUCOPETALA*

3A. var. TERNATEA. Flowers papilionaceous, blue or occasionally white, 4-5.5 cm. Petals 5 consisting of a keel, wings and a banner. Stamens diadelphous (9+1).

a) f. ALBIFLORA (Voigt) Fantz, Moscosoa 6:164. 1990; *Clitoria ternatea* var. *albiflora* Voigt, Hort. Suburb. Calcutten. 213. 1845. Neotype : India. Bengal, *Capt. Jenkins s.n.* (E-Hb Ball!).

Clitoria pilosula Wall., Cat. Herb. Ind. 186 no. 5347. 1831-1832, *nom. mud.; Clitoria pilosula* Wall. ex Benth., Journ. Linn. Soc. 2:37. 1858; *Clitoria ternatea* var. *pilosula* (Wall. ex Benth.) Baker in Hook. Fl. Brit. Ind. 2:208. 1879. Lectotype : India. Hort. Bot. Calcutti; *Wallich* 5347B (K!-as *Clitoria pilosula* Wallich); Isolectotype : India, *Wallich* 5347 (BM!).

Clitoria candtde Carey, *nom. in sched.* Lectotype : E. India, *Carey s.n.* (K!). Map 2.

Flowers solitary or rarely biflowered borne at the peduncle apex, white with greenish to greenish-white medial strip on standard basally and purplish veins. Peduncles solitary, rigid, short, 0.5-1.5 cm long.

Economic uses : Fantz (1991) reported that the white-flowered form has been designated specifically for medicinal treatments of hemicrania (root juice) in India and Sri Lanka, poultices (leaves) in Java, and inflamed eyes (floral juice) in Malaysia.

Phenology : Collected August to March in flowers and fruits in southeastern Asia.

Distribution : Commonly cultivated and sporadic in wild populations throughout native plus naturalized range, occurrence infrequent as compared to the typical blue-flowered form. Map 3.

Asia, Pondeinah, *Hugel* 2933 (W). BANGLADESH. Chittagong : Cox's bazar, Bengal, *Sinclair* 3335 (E.) CHINA. Hainan : Sam Ah, *Chun & Tso* 43329 (NY); *Wang* 34839 (NY, S). INDIA. *Beauv. s.n.* (PH); Ameraponna, *Hamilton s.n.* (BM); *Leitz s.n.* (M); Nilgeries, Penin. Ind., *Perrottet* P149 (W). Andhra Pradesh : Dhone, Kurnool dt., Madras, *Lushington s. n.* (K); Karimnager dt., Bhupathipur, *Rao* 25703 (CAL). Assam : Cachar, Kooki Chara, *Mokim s.n.* (CAL). Gujarat : Baroda, Kanjeta, *Bedi* 1163 (DD); Khistrah R, Dewar Sehore, *Campbell s.n.* (E). Karnataka : prope Mulki, Canara Terr., *Hohenacker* 267 (A, BM, G, M); Mandya dt., *Murthy & Prakash* 4568 (CAL); Mysore, Kumuranhalli, between Hemali & Marihar, *Rao* 86847 (CAL); Dharwar jungles, *Wight* 870 (E-mixed, G, HAL, S; *non* BM, CGE, G-DC, NY). Kerala. Trivandrum, Travancore, *Erlanson* 5404 (NY, W); Cannanore dt., Manantody, *Ramachandran* 53908 (CAL); Malabar concan, *Stocks & Law s.n.* (BM, CGE, G-mixed, W).

Maharashtra : Bombay, *Roo s.n.* (G). Rajasthan. Kota, *Wadhwa* 1971 (CAL). Tamil Nadu : Ramanathapuram dt., *Nair* 61084 (CAL); Pondicherry, *Perrottet s.n.* (E); Tiruchi, Srirangam Island, Kondayampettai, *Periyanayagam* 12207 (CAL, RHT); Thanjavur dt., Aduthurai-Wayurani, *Ramamoorthy* 53651 (CAL); Madras, *Roxburgh s.n.* (K). West Bengal : Calcutta, *C.B.D. s.n.* (E); Bengal, *J. D. Hooker & Thomson s.n.* (NY-mixed, S, U-mixed, W); *l.c. Pierre s.n.* (E). MYANMAR (BURMA) Inesin dt., Myaukhlaing Reserve, *Khant* 459 (DD); Minjoo, upper Burma, *King* 293 (MIN); *Wallich* 5344K (BM). Pegu : Kamayut, Rangoon, *Parkinson* 14813 (DD, GH). SRI LANKA (CEYLON). Hermann *s.n.* (M); *Kelaarb* 61 (G). Central : Kandy, *Rudd & Balakrishnan* 3063 (MO). Southern : Nazone a Karrouch prope Kirinda, *Anonymous s.n.* (W). THAILAND (SIAM). *Bradley* 99 (GH-mixed, PH-mixed. *non* UC); *Schmidt* 253 (M). Central : Bangkok, *Hasse s.n.* (BM); *l.c. Zimmermann* 15 (G, M, MO, PR, S, U, W) and 156 (G, M, MO, PR, S, U, W). North : Den Chai (Prae), *Franck* 104 (S). South : near Klong, *Smith* 161 (BM).

b) f. FASCICULATA Fantz, Moscosoa 6:164. 1990. Holotype : Jamaica. St. Andrew : thicket along Mondo Road, 550 ft, 8 Nov 1957, *Yuncker* 17313 (MO!). Isotypes : F!G!MICH!S!

Peduncles 1-4 per axil, fascicled, 0.4-4 cm long, base rigid becoming lax, slender apically, rarely with rachis 2-9 mm long. Flowers blue, solitary at peduncle apex, rarely biflowered.

Originated apparently in Burma or India where it is commonly distributed, and where the oldest vouchers occur. Also known more recently from a

few widely scattered locations in Jamaica and the Fiji Islands, introductions that are escaping.

INDIA : Andhra Pradesh : pr Madras, *Griffith* 208 (CGE); Prakasam dt., Adinarayanapuram, Chirala, *Mohan* 169 (CAL). Gujarat : Sasan, upper Iran R., *Santapau* 16398 (CAL). Maharashtra : Ahmednagar dt., Rahuri, *Nana* 6256 (CAL). Tamil Nadu : Periakulam, *Vajravelu* 54579 (CAL) ; Ramanathapuram dt., Puduppettai to Krishnan koil, *Nair* 61084 (CAL, MH); Tinnevelly dt., near Ilengi tank, *Subramanyam* 3916 (CAL). West Bengal : Howrah dt., Makardah, *Banerjee* 25 (CAL); Hort. Bot. Calcut., *Wallich* 5344H (K-hb. Bentham, *non* BM, CGE, E, G, K-hb. Hooker). MYANMAR (BURMA). Bhamo, *Cubitt* 233 (CAL); 3-9-1890, *Huk s.n.* (CAL); Shan, upper Burma, *Huk* 29 (CAL); Kyankse, *King* 39 (CAL); Minjoo, *King* 294 (CAL); *King* 399 (CAL). MAGWE : Fort Stedman, *Huk s.n.* (CAL); Fort Stedman, upper Burma, *Khalil* 189 (U).

c) f. TERNATEA. Fig. 3, Map 3

Flowers solitary or rarely biflowered borne at peduncle apex, blue to purplish-blue. Peduncles solitary, rigid, 0.5-1.5 cm.

This is the most common form collected in Southeast Asia and cultivated and naturalized pantropically. An asterick after the herbarium indicates specimens lacking flowers, but are cited here with the typical form which is more common.

BANGLADESH : Dacca : *Clarke* 6691 (BM). CHINA. *Henry s.n.* (NY*) HONG KONG : *Bodinier* 668 (E); pres Bethanie, *Bodinier* 89988 (MPU); *Delavay s.n.* (K); *Forbes s.n.* (BM); above H.Q. house, *Urguhart* 1861 (CAL). Kwangtung : cult. canton, *Anonymous s.n.* (U). INDIA. *Anonymous s.n.* (MPU); *Banks s.n.* (W); *Boquert s.n.* (G); *Dalhouise* s.n. (G); Western Himalaya, *Duthie s.n.* (K); Bejwapalli [?], *Haines* 5244 (K*); *Heyne s.n.* (BM); U.P. Lucknow, Nat. Bot. Gard., *Husain* 87754 (MO); central India, *King s.n.* (W); *Koeing s.n.* (BM); Tittaghur, *Millspaugh* 3116 (F); *Porsenberg* 1352 (W); *Rottler* 50 (M); 6 mi on Dhurmarroa, W. India, *Ritchie* 172 (E) ; *Sharp s.n.*(W) ; N. W. India, *Stewart s.n.* (G); *Thunberg s.n.* (S); *Wallich* 5344B (BM). Andaman Islands. Port Blair, *Thothathri* 10209 (CAL); Mayabunder, *Bhargava* 6461 (CAL). Havelock Island : *Premanath* 6189 (CAL). Middle Andaman : near Mayabunder, *Bhargava et el.* 6461 (MO). Porlob Island : *Ram* 3742 (DD, E). Viper Island : *Balakrishnan* 991 (CAL). Andhra Pradesh : Srikakulam, *Balakrishnan* 1010 (CAL, FLAS); Polavaram Agency, *Raju* 431 (CAL). Assam : *Bal s.n.* (CAL); Naogong dt., *Balakrishnan* 39469 (CAL); Cachar, *Keenan s.n.* (K); Sibsagar dt., *s.l.* 302 (CAL); Singri Village, *Panigrahi* 14325 (CAL); *Prain s.n.* (CAL); Tamlu (?), *Watt* 11862 (MIN). Bihar : Chotangara, *Rao* 23159 (CAL). Delhi : Delhi, *Aparna* 50 (ASU); Lodi Gardens, New Delhi, *Chari s.n.* (SIU); Roshnara Gard., *Dewar s.n.* (U); Delhi Ridge, *Jain s.n.* (ASU); univ. campus, Delhi, 690 ft., *Gupta s.n.* (USF); Delhi. *Johri s.n.* (FLAS); Roshnara Gard., *Kunar s.n.* (NY); Delhi, *Lata s.n.* (UC); University Ridge, Delhi, *Malile* 41 (F); univ. campus, Delhi, *Sawhney* 89 (WIS); Roshnara Gard., Delhi, *Sehgal s.n.* (ARIZ). Gujarat : Ahmadabad dt., Bombay, *Lascton* 3316 (CGE); Divisar, *Raghavan* 114688 (BSI); Dwarka, Thor jungle, *Rao* 364 (CAL); Saurashtra coast, Beyt Island, *Rao* 1269 (CAL); Piram Island, *Rao* 2028 (CAL); Junagadh, Willingdon Dam, *Santapau* 16579 (BLAT); Dewar, Kaira, *Stocks s.n.* (K); Devar near Kaira, *Stocks* 288 (CAL); 'Cutch' (Kuch), *Stolizka s.n.* (CAL). Haryana : Hissar, *Nair* 19957 (BSD). Karnataka : near Mangalore, Canara terr. *Hohenacker* 117 (BM, G, K, M, W); S. Kanara dt., coondapur, *Saldanha* 2047 (CAL); Yalvigi, Dharwar dt., *Sedgewick* 5351 (K); Hosdurga-Holalkera Rd, *Singh* 141222 (BSI); Ramagiri, Closepet, *Venkatesh s.n.* (S); *Wight* 870 (BM, CGE, E-mixed, G, NY; non E, G, HAL, S). Kerala. Cannanore dt., Taliparamba, *Ansari* 64770 (CAL); Quilon dt., Shencotta to Aryancavu, *Calder & Ramaswamy* 681 (CAL) and 714 (CAL); Cannanore, *Campbell s.n.* (E); Trivandrum, *Erlanson* 5404A (W); Trivandrum dt. *Mohanan* 52776 (CAL, MH); Palghat dt., Walayar, *Predeep* 13002 (CAL); Alleppey, *Premakumari s.n.* (NCU). Lacdive Islands. Androth, *Wadhwa* 68478 (CAL).Madhya Pradesh : Indore, Alirajpur, *Arora* 5772 (CAL); Chaphal, *Deshpande* 166627 (BSI); Chindwara, *Duthie* 9378 (DD); Jabalpur, *Hole* 284 (CAL); Bhano tank, Khandwa, *Swami* 3678 (CAL); Santa dt., *Sebastine* 8887 (CAL). Maharashtra : College Bot. Gard., Poona, *Anonymous s.n.* (E) *Balapure* 66149 (M*); Nasik dt., *Gangurde* 9917

(CAL); Chanda dt., *Haines* 5900 (K*); Pune dt., Junnar, *Hemadri* 99509 (BSI); Aruna R., *Karthikeyan* 149230 (BSI); Punwat, near Nirgunda R, *Karthikeyan* 156691 (BSI); Akola dt., Chithalward Rd., *Kamble* 150127 (BSI); Raburi, Ahmadnagar dt., *Nana* 6256 (K); Ellora Hills, Deccan, *Ralph* 250 (G); cult. Bibi, Khed taluka, Poona dt., *Rao* 66106 (BM); Madh Island, *Shah* 7177 (BLAT); Concan, *Talbot s.n.* (BSI); Poona dt., Durg Khila, *Wadhwa* 128592 (CAL). Manipur : Singmai, *Singh* 286 (CAL). Orissa : Ganjam dt., Chilka, *Balugaon s.n.* (CAL); *Hooper* 39559 (CAL); Palaspal, Keonjhar *Mooney* 1158 (K); Lergaon, *Panigrahi* 20870 (CAL); Bahakund, *Panigrahi* 23414 (CAL). Punjab : cult., *Aitchison s.n.* (DD); *Drummond* 24631 (K); Hoshiarpur dt., Garhshankar, *Misra* 38250 (BSD); *Royale* 575 (DD). Rajasthan : Ajmer, *Merr s.n.* (CAL); Churu dt., Sardarshapur, *Roy* 4028 (CAL); Banswara dt., Forest Nursery, *Singh* 2958 (BSJO, CAL); Jodhpur, Pichiyak Dam site, *Singh* 4438 (CAL); Bhilwara, Khiniya-Mangri, *Singh* 6495 (CAL); Dongarpur, *Verma* 200 (CAL, MO); Kota dt., Barum-Kota Rd., *Wadhwa* 9407 (CAL). Tamil Nadu : Periakulam, Pulney Hills, Madura dt., *Anglade s.n.* (G, UC); Palar, South Arcot, *Barber* 8307 (K); Pulneys, *Evershed s.n.* (BM); Coimbatore, *Fisher* 442 (CAL); Coimbatore dt., Kanjikoil, *Fisher* 2140 (CAL); Road to Ambody, *Henry* 53259 (CAL, MH); Thirukarungudi, *Hooper & Ramaswamy* 38316 (CAL); Tinnevelly dt., Kalakkad R.F., *Joseph* 15172 (CAL); Hosur Taluk, Salem dt., *Kanothyeshoda* 229 (A, NY); Shobhanapuram, *Matthew et al.* 19210 (CAL); Thanjavur dt., Muthupet, *Nair* 56571 (CAL); Madras, *Rich s.n.* (K); Nellimalai, *Ramamoorthy* 14868 (CAL, MH); South Arcot dt., Bhuvanagiri to Paraippettai, *Ramamoorthy* 53570 (CAL); Rameswaram, *Rao* 1524 (CAL); Kanyakumari dt., Cape Comarin, *Rao* 8225 (CAL); Madras, *Remabai s.n.* (CAL); Maruthamalai *Sebastine* 1283 (CAL); Kayamali, *Sebastine* 13640 (CAL); way to Verapalayam, *Subramanyam* 394 (CAL); Madurai dt., on way to Nupuraganga, *Subramanyam* 5373 (CAL); Maisor & Carnatic, *Thompson s.n.* (BM, CGE, G, M, NY, S, U, W); Aliyarkoil forest, *Vajravelu* 33657 (CAL); Tiruchirapally dt., Thuraiyur, Sikkathambur, *Venugopal* 22292 (CAL); Paruanadussa, Madras, *Wight* 733 (CAL, K, M, NY, S, W); *Wight* 871 (CAL). Uttar Pradesh : Bijnor, *Athar s.n.* (BSD); Dehra Dun, *Gamble* 27155 (K); Dudhwa Range, Ganetic Plain, Kheri (Oudh) dt., *Inayat* 21469 (K); Saharanpur, Badshatibay, *Murthy & Goel* 493 (BSD); Dehra Dun, *Parker* 9162 (DD); Banda, *Sinha* 5794 (BSD); Moradabad, *Thomson* 209 (BM, E, K). West Bengal : Bengal, *Anonymous s.n.* (F); Howrah dt., *Banerjee* s.n. (CAL); Syampur, *Bennett* 686 (CAL); Baksara, *Bhoumik* 5275 (CAL); Cult. Hort. Bot. Calcutt., *Candolle s.n.* (G*); Calcutta, C.B.D. *s.n.* (E); *l.c.*, *Dalhousie s.n.* (GH); Malda dt., *Dutta* 541 (CAL); Calcutta, *Gamble* 5836A (K); *l.c.*, *Griffith s.n.* (CGE); Bengal, *J.D. Hooker & Thomson s.n.* (CGE, F, M, NY-mixed, U-mixed, W 141756 & 141757;*non* NY, S, U, W 18672); Bengal, *Kurz s.n.* (CAL); Midnapore dt. Khanakul, *Maji* 1249 (CAL) ; Maltia, *Malick* 307 (NCU); Purulia, *Malick* 307 (CAL); 24-Parganas dt., Tollygunge, *Mitra* 382 (CAL); Diamond Harbour, *Ram* 13296 (DD); Calcutta, *Wallich* 5344H (BM, CGE, CGE-hb. Lindley, E, G; non K); Bengal, Gangetic Plain, Hooghly Dist., *Watt s.n.* (E) & 300 (E). LAOS. Champasak : Bassac, *Thorel s.n.* (F). Malaysia. Combang Talong, *Burmann s.n.* (G). Melaka : Malacca, *Griffith s.n.* (CGE) and 1728 (K). MYANMAR (BURMA). Kachin : Bhamo, *Anderson s.n.* (CAL). Karen : Kyondo, 15 Sep. 1868, *Anderson s.n.* (CAL); *Brandis* 1307 (CGE-mixed). Magwe : Fort Stedman, Jan. 1893, *Huk s.n.* (CAL); Minbu Dt., *Mokim* 546 (G); *l.c.*, *Lace* 4919 (CAL, E, K); Perak, *Scortechini s.n.* (CAL). Mandalay : Kyaukmagyi, Meiktila dt., *Smith* 13750 (K); Mandalay, *White* 42 (UC). Pegu. Thandaung, Rangoon, *Dickason* 5202 (W); Rangoon, *Dickason* 5696 (W); Oukkan, *McLelland s. n.* (K*); Victoria Lake, Ragoon, *Valentin s. n.* (S.) Shan : Saga, *Khali* 1893 (CAL). PAKISTAN. Sind : Karachi Univ., *Husain s. n.* (NY); *l.c.*, *Laidi* 60 (MO); Karachi, *Jafri s.n.* (BM). SINGAPORE : Singapore, *Beck s.n.* (W); Pulo Penang, *Beck s.n.* (W); Pulo-Pinang, *Delessert s.n.* (G); Singapore, Penang, *Walker* 117 (G.) SRI LANKA (CEYLON). *Burmann* 74 (G), 75 (G) and 109 (G); Taldena, Mar. 1890, *Deschamps* 2 (G); Akuramhadda, Aug. 1890, *Deschamps* 2 (G); Akuramhodda, *Deschamps* 21 (G); Teldena-do, *Deschamps* 27 (G); Ambagamawa, *deSilva* 87 (NY); *Kelaarb* 61 (G-mixed); *Schmiedel s.n.* (M*); *Thomson s.n.* (K); Ruhuna Nat. Park Patanagala, *Wirawan* 699 (MO). Central : Kandy,

Rudd & Balakrishnan 3064 (MO); Galagedera, Kandy dt., *Rudd* 3316 (MO, US); Peradeniya, *deSilva* 98 (NY). Eastern : Trincomalee, *Anonymous s.n.* (E); *l.c., Dunbar s.n.* (E). Northern : Jaffna, *Bates s.n.* (GH). Southern : *ca* 1.5 mi beyond Tissa resthouse, road to Kataragama, Hambantola dt., *Rudd* 3106 (MO, NY). Western : W of Pomparippa, Puttalam Dist., *Maxwell & Jayasuriya* 804 (MO); Kochikade, *Simpson* 7959 (BM). THAILAND (SIAM). *Bradley* 99 (GH-mixed, PH-mixed, UC). Central : Ayuthaya, *Bolinger s.n.* (NY, U); between Saraburi and Pok Chong, *Murata et al.* T16540 (MO); Bangkok, *Wall s.n.* (S); Tha Luang, 75 mi N Bangkok, *Smith s.n.* (GH); *Zimmermann* 5 (M, U-mixed; non BM, G, PR, U). North : Prae, *Franck* 103 (S); Den Chai, Prae, *Franck* 113 (GH); Chieng mai, *Kerr* 1530 (BM) and 1530B (BM, E). VIETNAM. Cochinchine : Bot. Gard. Saigon, *Anonymous s.n.* (G) and *Pierre s.n.* (A); *Germain* s. n. (F*); Tourcham, Phanrang prov., *Kloss s.n.* (BM); village So Phusc Duong, So Ninh Thuan prov., *Petelot* 2168 (GH); fluv. Mekong, Dec. 1867, *Pierre s.n.* (E, F) and Dec. 1868, *s.n.* (G); ad Thu *Dau* Mot, *Pierre s.n.* (F, G); *Thorel s.n.* (A, F); Long-Thanh, *Thorel,* 37 (BM, E).

3B. var. PLENIFLORA Fantz, Moscosoa 6:164. 1990. Holotype : Dominican Republic. Waste ground S. Avenida Bolivar, vic. Ciudad Trujillo, 0-25 m, 29 Dec. 1945, *Allard* 14400 (S!). Isotypes : GH!NY!

Flowers "double", actinomorphic, (4-) 5- merous. Petals blue or rarely white, all similar to standard of papilionaceous flowers. Stamens 10, filaments free or some free with others connate below in 2-3 fascicles. Peduncles solitary, rarely paired, usually bearing two flowers at the apex.

a). f. LEUCOPETALA Fantz, forma nov.

Clitoria ternatea L. *flore pleno alba* Wall., Cat. Herb. Ind. 185 no. 5344K. 1831-32; *nom. illeg.*

Forma nova Clitoria ternatea var. *pleniflora optimo distinguitaur petalis albis.* Holotype : Cuba. Las Villas : near Guabiro on road to Manicaragua, 13 Oct. 1941, *Gonzales* 273 (NY). Isotype : A.

Flowers white. Stamens 10, filaments all free. Post mature flowers dry to a pale yellowish hue and are not yellow as reported by *Groff* 5941. Known only from the wild in the type locality and in cultivation in Southeast Asia. INDIA. West Bengal : cult.. Salt Lake, Nicco Park, Calcutta, *Predeep & Vijaya Kumari* 132479 (CAL). THAILAND. Central : cult. Bangkok, 1-29 Jun. 1920, *Groff* 5941 (F, GH, NY, PH, UC).

b) f. PLENIFLORA.

Flowers blue. Stamens 10, filaments all free. Uncommon, primarily collected in the West Indies and rarely in South America, both naturalized and cultivated, and apparently cultivated only in Asia.

MYANMAR (BURMA). Bhamo Div., Bhamo, *Cubitt* 235 (CAL). HONG KONG : Chung Chi campus, Shatin, *Hu* 6013 (K). INDIA. Assam : Tamlu, *Anonymous* 11862 (BM). Kerala : Kottayam, *Predeep* 68242 (CAL). Uttar Pradesh : Allahabad, cult. in C.B.L., B.S.I. compound, *Hanfi* 1421 (CAL). West Bengal : Howrah, I.B.G., *Predeep* 14268 (CAL). SINGAPORE. Bot. Gard., Singapore, *Nur s.n.* (NY). THAILAND (SIAM). Central : Bangkok, *Zimmermann* 5 (BM, G, PR; *non* M, U-mixed, W). VIETNAM. Annam : Hue & vic., *Clemens & Clemens* 3678 (BM, NY, U, UC).

c) f. SUBPOLYADELPHA Fantz, forma nova. *Forma nova Clitoria ternatea* var. *pleniflora optimo distinguitar staminibus subpolyadelphis.* Holotype : Cuba. *Dossett s.n.* (WIS).

Flowers blue. Stamens 10, some filaments free (commonly 2 or more) with others connate below in 2-3 bundles of 2-6 stamens each. Rare, known primarily from Asia (including Sumatra). The holotype bears a dissected flower.

SRI LANKA (CEYLON). N of Carney up Adam's Peak Trail, Ratnapura dt., *Findley s.n.* (NY). THAILAND (SIAM) : Bangkok, *Zimmerman* 5 (U-mixed; *non* BM, G, M, PR, W).

C. Subg. NEUROCARPUM (Desv.) Baker in Hook. f. Fl. Brit. India 2:209. 1876, emend. Fantz, Brittonia 31(1):115. 1979.; *Neurocarpum* Desv., Journ. Bot. 1:119. 1813; *Neurocarpon* Desv. ex Ham., Prod. Pl. Ind. Occ. 50. 1825; *Neurocarpus* Desv. ex Hassk., Cat, Hort. Bogor. Alt. 276, no. 1226. 1844; *Clitoria* L. sect. *Neurocarpum* (Desv.) Benth., Journ. Linn.

Soc. 2:38. 1858. Lectotype : *N. janensis* Desv. (=synonym of *Clitoria laurifolia* Poir.).

Shrub or suffrutescent perennial with aerial stems from subterranean xylopodium erect, trailing, or scandent. Leaves (1-) 3-foliolate, small, petiolate or subsessile. Bracteoles smaller than calyces. Flowers papilionaceous, showy, rarely much smaller and apetalous (i.e. cleistagamous). Calyx chartaceous to subcartilaginous, 10-veined, persistent in fruit, size greatly reduced in apetalous forms. Petals short-clawed. Staminal tube and ovary short. Fruit stipitate, convex, weakly to strongly depressed between seeds, ecostate or rarely costate medially. Seeds viscid, subcuboidal.

I. Sect. NEUROCARPUM.

Leaves 3- and 1-foliolate, petiolate or subsessile with petiole shorter than rachis. Flowers medium-large (4-7.5 cm), pale lilaceous or violaceous, rarely white. Cleistogamy present. Calyx tube 11-25 mm long, lobes shorter than the tube length. Fruits turgid, costate. Seeds slightly longer than wide (length = parallel to funiculus; width = perpendicular to funiculus).

4. **Clitoria laurifolia** Poir. *in* Lam., Encycl. Supp. 2:301. 1811; *Neurocarpum laurifolium* (Poir.) Desv. in Ham. Prod. Pl. Ind. Occ. 51. 1825; *Ternatea laurifolia* (Poir.) Kuntze, Riv. Gen. Pl. 1:210. 1891. Lectotype : Puerto Rico. Savanne, 3 pied., *Ledru* 71 (P-Hb. Poiret!). Isolectotype : G-DC! (fragment).

Neurocarpum janensis Desv., Journ. Bot. 1:119. 1813, *nom. nud.*; N. *janensis* Desv., Journ. Bot. 2:75. 1814. Lectotype : *Hb. Desvaux s.n.* (P-59!).

Clitoria erecta Roxb., Hort. Bengal. 56. 1814, *nom. nud.*; *Neurocarpum erectum* (Roxb.) Voigt, Hort. Subur. Calcutten 213. 1845. Type : *Roxburgh s.n.* (not seen). *Neurocarpum cajanifolium* Presl., Symb. Bot. 17, t. 9. 1832; *Clitoria cajanifolia* (Presl.) Benth. in Mart., Fl. Brasil. 15(1):121. 1862. Type : locis siccis Americae meridionalis, *Hb. Presl.* (not seen).

Fig. 3, Map 4

Shrub to subshrub, erect, to 2m tall. Leaflets oblong to elliptic-oblong, obtuse, retuse to emarginate, 4-10 cm long, 1.3-3.5 cm wide. Petioles 0.2-0.4 cm long, conspicuously shorter than the rachis; rachis 0.4-0.9 cm long. Stipules 4-7 mm long. Inflorescences axillary, 1.5-7 cm long. Flowers showy, 4-5.5 cm long or inconspicuous, apetalous and cleistogamous. Bracteoles 6-9 mm long, 4-5 mm wide (4-5 x 1-2 mm in cleistogamous flowers). Calyx tube canescent, 11-15 mm long, lobes 6-9 mm long (tube 5-7 mm long, lobes 2-4 mm long in cleistogamous flowers). Staminal sheath 28-34 mm long. Ovary costate, 6-8 mm long; style 19-23 mm long, geniculate 6-8 mm apically. Legume costate, 35-65 mm long, 8-11 mm wide; stipe 9-11 mm. Seeds black, 5 mm long, 4-5 mm wide. Chromosome numbers 2n = 16, 24.

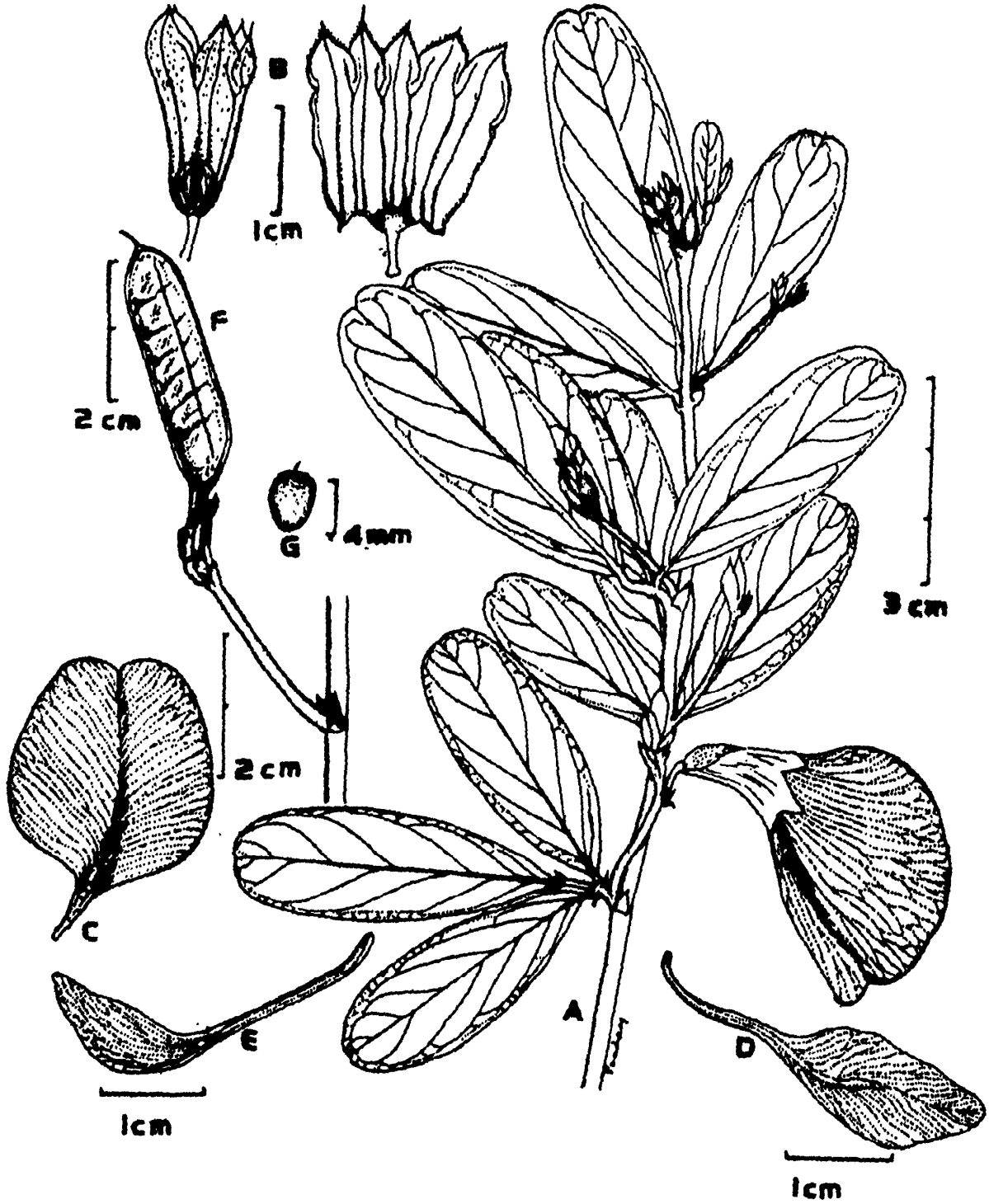
This species is the only member of the genus in southeast Asia with costate fruits, *i.e.* bearing a raised, medial rib on each valve. Introduced via cultivation.

Economic uses : Introduced into Sri Lanka (Ceylon) as an ornamental shrub and hedge plant, utilized to control erosion on steeped terraced slopes (Holland and Joachim 1933). Also reportedly used as a green manure and leaf poultrices to control pimples (Fantz, 1991).

Phenology : Vouchered from June through November, rarely to February.

Distribution : Coastal species native to southern Brazil to eastern Venezuela and the West Indies, introduced into the paleotropics, presently naturalized or cultivated in parts of Africa, southeast Asia (Map-4), East Indies and some Pacific Islands. Elevations rarely reported, to 20 m. Aubréville and Leroy (1979) report this species also occurring in Myanmar (reported as Burma), Thailand and Vietnam. Maxwell (1991) reported this species occurring in Colombo, Galle, Kandy and Napura Districts of Sri Lanka. We have not examined any vouchers of this species from these countries, but do not doubt its probable introduction. Roadsides, grassyfields dikes; distribution by viscid seeds attaching to animal hair.

CHINA : Fukien : *Chung* 7053 (A). INDIA. West Bengal : Calcutta, 1830, *C.B.D. s.n.* (E). MALAYSIA. Bukit Sabukor, *Derry* 72 (CAL). Malacca : vic Malacca, *Delessert s. n.* (G); *l.c., Griffith s. n.* (BM,



Figs. 3. A-G : *Clitoria laurifolia* Poir.: A. portion of stem; B. calyx; C. banner petal; D. wing petal; E. keel petal; F. fruit; G. seed.

CGE), 18 (CGE) and 1845 (GH); *l.c., Hervey s.n.* (CAL); 10 mi from Sawbegabatu, *Hervey s.n.* (BM); Malacca, *Maingui* 529 (CAL); *Mayer s.n.* (W). Selangor : Salak Laulte Rd. *Seward s.n.* (K). SINGAPORE : Singapore, MacRitchie Reservoir, *Abbe & Abbe* 10159 (A); Singapore, *Anderson* 36 (CAL) and 56 (BM); *l.c., Beck s. n.* (W); *l.c., Clemens & Clemens* 22546 (A, NY); *l.c., Dihm s.n.* (M); *l.c., Griffith* 1724 (GH, K); *Hullet* 24 (CAL); *King s.n.* (CAL); Singapore, Cluny Rd. *Kurz s.n.* (CAL); Singapore, *Kuntz.*6060 (NY) ; Chan-chu-kan, *Langlassé* 176 *(G);* Singapore, *Schomburgk* 85 (NY); *l.c., Sinclair s.n.* (E); Sungai Tukongestate, Johore, *Spare* 924 (K, NY); Singapore, *Thompson s.n.* (CAL, GH); Chuugi, *Treivor s.n.* (CAL); Singapore, *Tucin s.n.* (BM). THAILAND. Banglumtong, Takbai, Narathiwat, *Niyumdham* 738 (BKF, CAL).

II. Sect. Mexicana Fantz, Madroño 35 (2):29. 1988; *Clitoria* L. sect. *Euclitoria* DC, Prod. 2:233. 1825, *nom, illeg.* Holotype : *Clitoria mexicana* Link.

Leaves petiolate. Flowers pale lilaceous or violaceous, 4-5 cm long. Cleistogamy absent in southeastern Asian members. Calyx lobes shorter than the tube length. Fruits turgid, depressed between the seeds, ecostate. Seeds slightly wider than long.

5. **Clitoria mariana** L., Sp. Pl. 2:753 no. 4. 1753; *non* Sess. & Moc. (1832) *nec* Schlecht. ex Benth. (1837). Lectotype (Reveal 1986) : *Clayton* 108 (BM!).

var. **Orientalis** Fantz in Fantz & Predeep, Sida 15(1) : 2. 1992. Holotype : China. Yunnan : Szemao, 5500 ft., *Henry* 12242 (E!). Isotypes : K!MO!NY!

Fig 4, Map 4

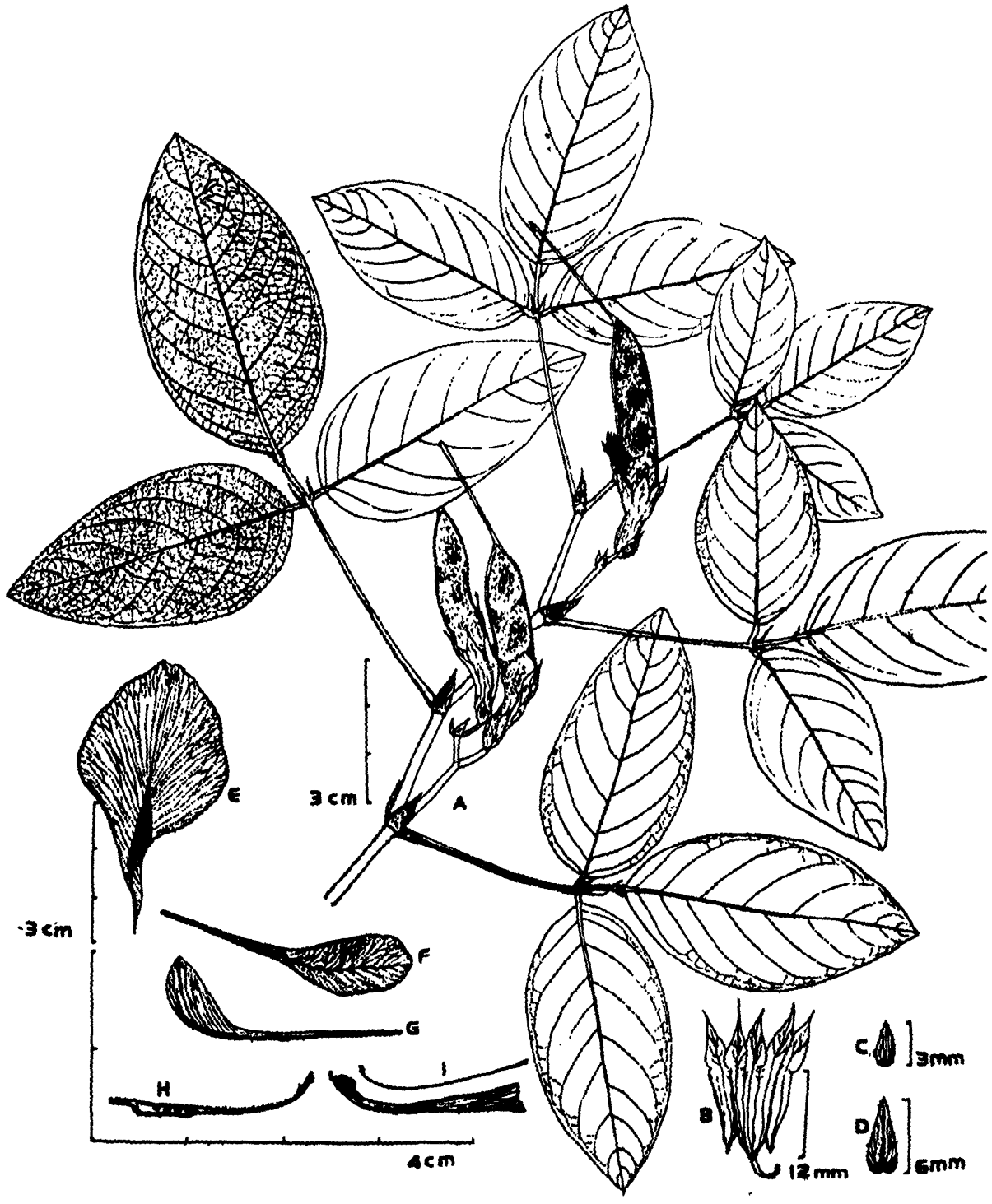
Suffrutescent perennial with aerial stems from subterranean xylopodium, trailing to climbing. Leaves 3-foliolate, polymorphic; leaflets ovate to lanceolate to oblong-ovate, acute to obtuse to infrequently short-acuminate, 4-11.5 cm long, (1.5-) 2-4 (-6.5) cm wide. Petioles 4-10 cm. Sitpules 6-10 mm long, 3-5 mm wide. Inflorescence axillary, solitary or paired, typically 1-6.5 cm long to occasionally elongated, 6-10 (-15) cm long, 2-4-(-6-8)- flowered; axis slender, subtwining to slightly stiff and arcuate. Flowers 4-5 cm, lilaceous. Bracteoles 4-9 mm long. Calyx tube 10-14 mm long, lobes 5-9 mm long. Staminal sheath 21-30 mm long. Ovary ecostate, 7-9 mm long; style 14-20 mm long, geniculate 5-8 mm apically. Legume ecostate, depressed between the seeds, 25-55 (-70) mm long, 6-9 mm wide. Seeds black, cuboidal to globular, 3-5 mm long, 4-6 mm wide.

Young individuals of var. *orientalis* exhibit trailing to suberect stems with weakly flexuous internodes and bear leaves with shorter petioles and size equivalent to American members. As individuals age, the upper stem portion climbs by twining and leaves become more robust in size. Inflorescences vary depending on location. Lower nodes and juvenile individuals exhibit inflorescence axes that are short and stiff, often bearing two flowers apically, as in American members. Upper nodes frequently bear more slender, somewhat twining, elongated axes, usually bearing four flowers but occasionally up to eight flowers.

Phenology : Vouchered from June to November.

Distribution : *Clitoria mariana* is commonly an American species with two collections known from adjacent Mexico. var. *orientalis* is a disjunct variety in southeast Asia (Map 4) commonly found on forested mountain slopes from NE India to S. China to Thailand, at elevations of *ca* 1000-3000 m.

CHINA : Yunnan : N of Tengyueh, *Forrest* 7767 (E, K, S); Tali Range, *Forrest* 11697 (BM, E, UC, W); Tengyueh, *Forrest* 18258 (BM,E,K,W,) ; Mengtze, *Henry* 11147 (K, MO); Szamao, *Henry* 12242A (Paratype : CAL!NY!) and 12507B (K-mixed); Tengyueh, *Howell* 122 (E, K) and 193 (E); Fo Hai, *Wang* 74489 (A); Nan Chiao, *Wang* 75244 (A); Dali, Cong-shan, Quing-bi-xi, *Xiwen* 115 (TENN). INDIA : Manipur : Ukrul, *Kingdon-Ward* 17562 (NY). Meghalaya (Assam, sensu lato): Pomrang, *Anonymous s.n.* (K); Sonapahar, 5 km towards Hahim, Khasi Hills, *Bhaumik* 60481 (CAL, FLAS-photo); Tsillong, Khasia, *Clarke* 5570 (K); Moflong, Khasia, *Clarke* 6082 (BM); Bishop's Falls, Shillong, *Clarke* 40549 (BM); Shillong, Khasia, *Clarke* 44094B (BM), 44094C (G) and 44102A (G); Vale of Rocks,



Figs. 4. A-I : *Clitoria mariana* var. *orientalis* Fantz:. A. portion of stem; B. calyx; C. bract; D. bracteole; E. banner petal; F. wing petal; G. keel petal; H. gynoecium; I. androecium.

Khasia, *Clarke* 45222B (G); Khasiya, *Griffith* 343 (BM, CGE, K); Khasia, *J. D. Hooker & Thomson s.n.* (BM, CGE, E, F, G GH, K, M, MO, NY, S, U, US, W); Khasiya Hills, *Lobb s.n.* (CGE, K); Jawai, *Mann s.n.* (E, U, W); Shillong, 0.5 mi from Kynshi Norgstoin area, Khasi Hills dt., 17 Jun. 1958, *Panigrahi* 16361-A (CAL); Tuisinhuau, *Parry* 76 (K); Shillong, *Ruse* 161 (A); upper Shillong, Umiasai, *Sinclair* 3007 (E). Nagaland. Naga Hills, Bainaho, *Bor* 5083 (K); Naga Hills, Lakema, *Bor* 2642 (K); Kohima, upper Shillong *Clarke* 4176A (K); Kohima, Naga Hills, *Prain s.n.* (BM, K). MYANMAR (BURMA). Kachin : Htawgaw, N of Htowgaro, *Forrest* 24551 (K, E, NY, W); Htawgaw, *Kingdon-Ward* 3647 (E). Sagaing : Naung Chaung valley, *Kingdon-Ward* 1698 (E). Shan : Keng Tung, *MacGregor* 2 (E). THAILAND (SIAM). North : Doi Sutep, Chiangmai *Anderson* 3738 (MO); Doi-Angká, Doi Pá-Mawn, *Garrett* 394 (BM); Doi Sutep, Chiangmai, *Hosseus* 536a (M); Doi Sutep, Chiangmai, *Kerr* 671 (BM, K); Diwangiri-Trashigung Rd, *Ludlow & Sheriff* 548 (BM); Doi Nang Ka, Chiamgai, *Putt* 3321 (BM, K) and 3424 (BM); Doi Hua Mot, *Smith* 665 (UC); Doi Sutep, Chiangmai, *Sorensen et al.* 3628.

III. Sect. Tanystyloba Fantz, Brittonia 31 (1): 115. 1979. Holotype : *Clitoria macrophylla* Wall. ex Benth. (non Hance, 1878).

Leaves 3- and 1-foliolate, petiolate or subsessile. Flowers white, 2.5-4 cm long. Cleistogamy absent. Calyx tube 6-12 mm, lobes subequal to longer than the tube length. Fruits turgid, weakly depressed between the seeds, ecostate. Seeds slightly wider than long.

This section is endemic to southeast Asia except for one species (*Clitoria australis* Benth.) that is endemic to northern Australia.

6. **Clitoria cordiformis** Fantz, Brittonia 31(1):116. 1979. Holotype : Thailand. Nakhorn Sawan, Nawing Takhli, 100 m, 22 Aug. 1963, *Smitinand & Sleumer* 1088 (K!).

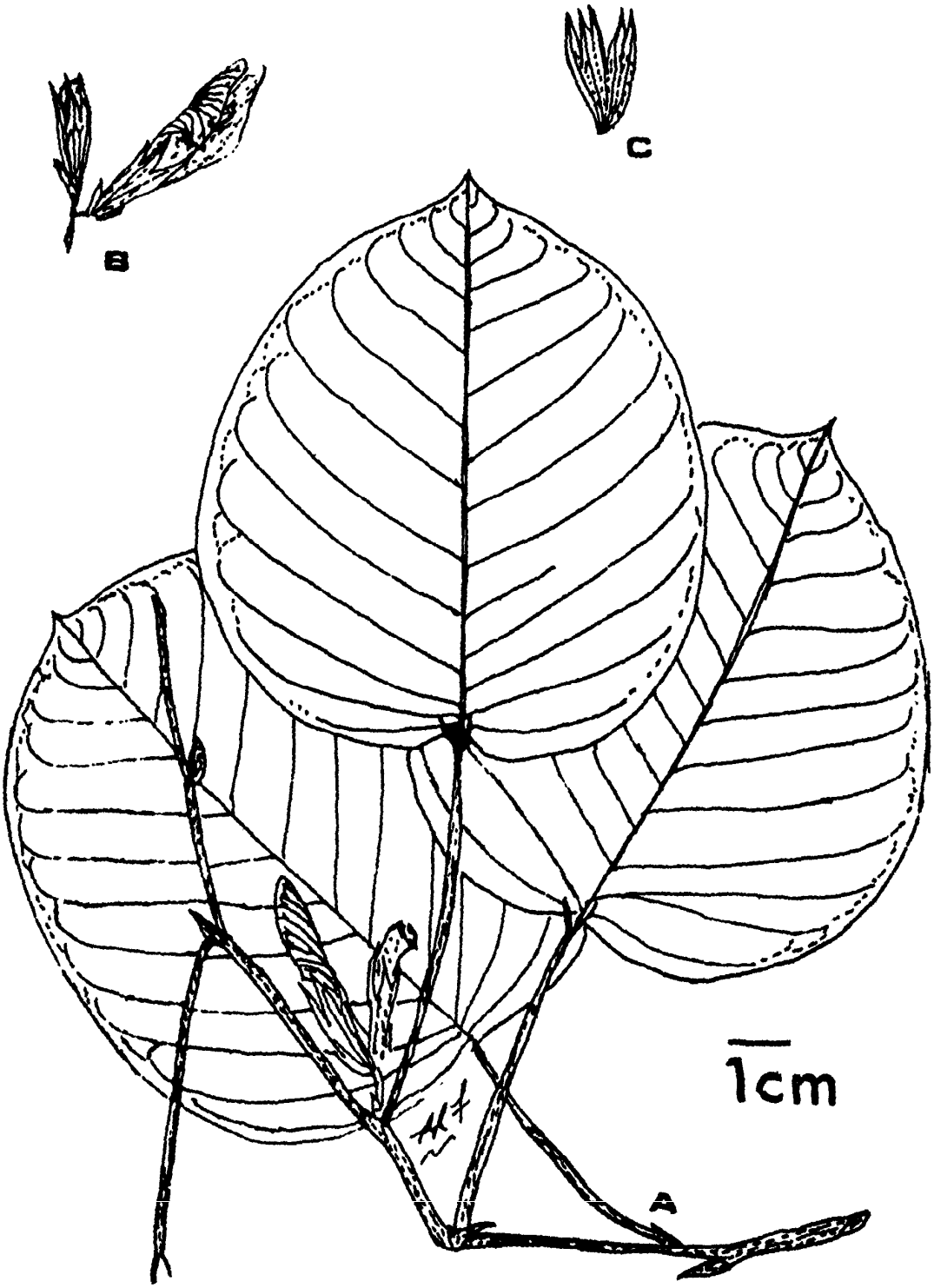
Fig. 5, Map-2

Scandent suffrutescent perennial. Leaves 1-foliolate, long-petiolate, broadly ovate to cordiform to nearly orbicular, abruptly short-acuminate, cordate; terminal leaflet 7-10 cm long, 7-10 cm wide. Petioles 4.5-6 cm. Stipules 5-10 mm long. Inflorescences solitary, axillary, conspicuously shorter than petiole, 0.4-0.6 cm long, biflowered apically. Flowers white, *ca* 3.5 cm. Bracteoles 7-8 mm long. Calyx tube 9-10 mm long, lobes subequal, 9-10 mm long. Staminal sheath *ca* 17 mm long. Ovary *ca* 6 mm long; style 12 mm long, geniculate 4 mm apically. Legume unknown.

Distribution : This endemic is known only from the type collection in Thailand (Map 2). It is distinct within the genus as the only species with unifoliolate, cordiform leaves.

7. **Clitoria hanceana** Hemsl., Journ. Linn. Soc. 23:187. 1887; *Clitoria macrophylla* Hance, Journ. Bot. 9.1878; *non* Wall. (1831-32) *nec* Wall. ex Benth. (1852). Lectotype : China, Kwangtung : North R. a Cantone, 23 Jul. 1864, *Sampson* 11364 (K!). Isolectotype : BM!

Shrub to subshrub, to 1 m tall; branchlet internodes flexuous, moderately to densely pubescent with trichomes subappressed suberect. Leaves 3-foliolate, subsessile to short-petiolate, infrequently 1-foliolate, sessile or rarely subsessile, borne at lower nodes; leaflets polymorphic, basically oblong, elliptic-oblong to lanceolate-oblong or obovate,-oblong, silvery-grayish sericeous below; trifoliate leaflets 5-10 (-14) cm long, 2-4 (-8) cm wide, unifoliate leaflets slightly larger. Petioles usually conspicuously shorter than the rachis, 0.3-2 cm long; rachis 1-4 cm long. Stipules 4-8 (-11) mm long. Inflorescences axillary, solitary to few-fascicled, contracted to globular, 2-4-flowered apically; peduncles 0.2-1 (-1.5) cm long. Bracteoles 4-8 mm long. Flowers white, 3-3.5 cm long. Calyx microuncinate-pubescent underneath subappressed to spreading 1 mm long trichomes, tube 6 10 mm long, lobes longer than tube, 8-13 mm long. Staminal sheath 14-18 mm long. Ovary 7-8 mm long; style 11-14 mm long, geniculate 4-5 mm apically. Legume short-stipitate, 33-60 mm long, 7-9 mm wide; stipe enclosed within calyx, 6-11 mm long. Seeds black, 4 mm long, 4.5-5 mm wide.



Figs. 5. a-c : *Clitoria cordiformis* Fantz : a. portion of stem; b. inflorescence; c. calyx. Based upon *Smitinand & Sleumer* 1088 (K).

Phenology : Flowers are collected from March to July with fruits collected from October to November, rarely in July.

Distribution : Endemic to southeastern Asia in disjunct localities (Map 5). This species was reported originally (Hance 1878) as *C. macrophylla*, a misidentification corrected by Hemsley (1887). Fantz (1993) corrected published errors on the lectotype by Aubréville & Leroy (1979). Fantz (1993) recognized five distinct varieties, separated geographically and morphologically. This species complex is in need of field studies. Varieties can be separated by the following key :

1a. Petiole (especially at middle & upper nodes) conspicuously shorter than the rachis, usually by a minimum of 5 mm shorter; petiole 0.3-1.3 (-1.8) cm long :

2a. Leaflets of 3-foliate leaves narrow, 2 4 cm wide; rachis 0.8 2.2 cm long :

3a. Inflorescence in loose racemes, solitary to fascicled in leaf axils, not in glomerules; peduncles 1-3 per axil, each 5 20 mm long with rachis internodes 2-8 mm long : calyx tube (7-) 8 10 mm.

4a. Leaves subsessile, petiole 0.3 - 0.8 cm; rachis 1.2 - 1.8 cm; stem internodes short, 2-4 cm, strongly flexuous; stipules 5-8 mm (China) ... 7A. var. *hanceana*

4b. Leaves short petiolate, petiole (0.6-) 0.9-1.8 cm; rachis 1.5-2.5 cm; stem internodes 3-9 cm, weakly flexuous; stipules 7-11 mm long (Thailand) ... 7E. var. *thailandica*

3b. Inflorescence in crowded, bracteated glomerules; peduncles 3-8 per axil each 2-4 mm long with rachis internodes of 1-2 mm; calyx tube 5-7 (-8) mm (South Vietnam) ... 7C. var. *laureola*

2b. Leaflets of 3-foliate leaves broad, 4-8 cm wide; rachis 2-3.7 cm long (Thailand) ... 7B. var. *latifolia*

1b. Petioles (especially at middle and upper nodes) slightly shorter than rachis (by 1-3 mm) to longer than rachis; petiole 1.5 4 cm long (Combodia) ... 7D. var. *petiolata*

7A. var. **hanceana** Fig. 6a-e, Map 5

Stem internodes 2-4 cm long, strongly flexuous. Leaves 3-foliolate, subsessile; leaflets narrow, 5-9 cm long, 2-3.5 cm wide, sericeous beneath. Petiole shorter than rachis, 0.3-1 cm long, rachis 1-2 cm long. Stipules 5-8 mm long. Inflorescences of lax racemes, 1-3 per axil; peduncles 5-15 mm long. Calyx tube 8-10 mm long.

The typical variety is recognized easily by the subsessile leaves borne on strongly flexuous stems, the leaflets narrow and densely pubescent beneath. This variety is endemic to China, known from only the type collection in Kwangtung. (CHINA, S.N.N., *Anonymous s.n.* (GH).

7B. var. **latifolia** Fantz, Novon 3 (4):353. 1993. Holotype : Thailand. Central : Petchaburi prov., Jun. 1968, *Pierre* 72 (E!). Isotype : K!

Fig. 6f, Map 5

Stem internodes elongated, 4-9 cm long, weakly flexuous. Leaves 3-foliolate, subsessile, moderately sericeous beneath; leaflets broad, 6-14 cm long, 4-8 cm wide. Petiole shorter than rachis, 0.3-0.9 cm long; rachis 2-3.7 cm long. Stipules 6-8 mm long. Inflorescence of lax racemes, 1-3 per axil. Calyx tube 8-9 mm long.

Figs. 6. a-j : *Clitoria hanceana* var. *hanceana* : a. portion of stem; b. stipule; c. petiole and rachis; d. calyx; e. fruit. Based upon *Sampson* 11364 (K). var. *latifolia* : f. leaflet. Based upon *Pierre* 72 (K). var. *laureola* : g. portion of stem with glomeruled inflorescences. Based upon Nov. 1867, *Pierre s.n.*, (E). var. *thialandica* : h. stipule; i. leaflet. Based upon *Put* 3074 (K). var. *petiolata* : j. petiole and rachis. Based upon *Thorel s.n.* (F. 540762).

Endemic, known only from the type locality in Thailand.

7C. var. **laureola** Gagnep., in Lecomte, Fl. Indo-Chine 2:313. 1916; *p.p. maj. emend.* Fantz, Novon 3(4):353 1993; *Clitoria laureola* Gagnep., *nom. in sched.* Lectotype : South Vietnam. Cochinchina : ad Chóben prope Baria, Oct. 1866, *Pierre s.n.* (K!). Isolectotype : F! Fig. 6g. Map 5.

Stem internodes 1.5-4 cm, flexuous. Leaves 3-foliolate, subsessile, leaflets narrow, 4-9 cm long, 1.5-3.5 cm wide, lower surface sericeous. Petiole shorter than rachis, 0.3-1.3 cm long; rachis 1-1.8 (-2.3) cm. Stipules 4-7 mm. Inflorescences fascicled in axillary glomerules, up to 1 cm diameter, highly bracteated; flowers crowded, numerous; peduncles 3-8 per axil, 2-4 mm long with rachis internodes of 1-2 mm; inflorescence axis 5-7 mm long. Calyx tube short, 5-7 (-8) mm long.

This variety is recognized easily by the fascicled inflorescences occurring in glomerules and the shorter calyx tube. All collections examined were collected in October or November, and lacked flowers. They either bore fruits or were collected after fruits had dropped. This variety is known only from the Cochinchina area of South Vietnam.

SOUTH VIETNAM. Cochinchina : Ad Montem Bay in profectura Chaudoc, *Pierre s.n.* (BM, E, F).

7D. var. **petiolata** Fantz, Novon 3 (4): 353. 1993. Holotype : Cambodia. Strung-streng, Me Kong Exp., 1866-68, *Thorel s.n.* (BM!). Isolectotypes : E!F! Fig. 6j, Map 5.

Clitoria hanceana Hemsley var. *laureola* Gagnep., in Lecomte, Fl. Indo-chine 2:313. 1916 : *p.p. min. emend.* Fantz, Novon 3 (4):353. 1993.

Stem internodes elongated, 3-10 cm long, weakly to strongly flexuous. Leaves 3-foliolate, short-petiolate; leaflets narrow, 5-10 cm long, 2-4 cm wide, lower surface with pubescence thinly sericeous to strigose. Petiole slightly shorter than to becoming longer than the rachis, 1.5-4 cm long; rachis 1-2.3 cm. Stipules (5-6) 8-10 mm. Inflorescence of lax racemes, non-glomerulate, 1-2 per axil; peduncles 3-5 mm.

This variety is recognized easily by the petiolate leaves, somewhat longer stipules, and a rachis commonly shorter than the petiole. This variety is vouchered in flower during June to July and is known only from Cambodia, to 400 m.

CAMBODIA. Cau-coy, *Thorel s.n.* (K). Pursat : Mont. de Pursat, *Godefroy* 348 (K).

7E. var. **thailandica** Fantz, Novon 3 (4):354. 1993. Holotype : Thailand. Northeast : Ban Chut Seng, Koret, 21 Mar. 1930, *Put* 3074 (K!). Isotype : BM!

var. *thailanensis* Fantz, *nom, in sched.*

Fig. 6h-i, Map 5

Stem internodes elongated, 3-9 cm, weakly flexuous. Leaves 3-foliolate, short-petiolate, leaflets narrow, 7-11 cm long, 2-4 cm wide, lower surface sericeous. Petiole shorter than the rachis, 0.5-2 cm long; rachis 1.5-2.5 cm long. Stipules 7-11 mm long. Inflorescences loose racemes, 1-2 per axil; peduncles 0.5-1.5 cm. Calyx tube 7-9 mm long.

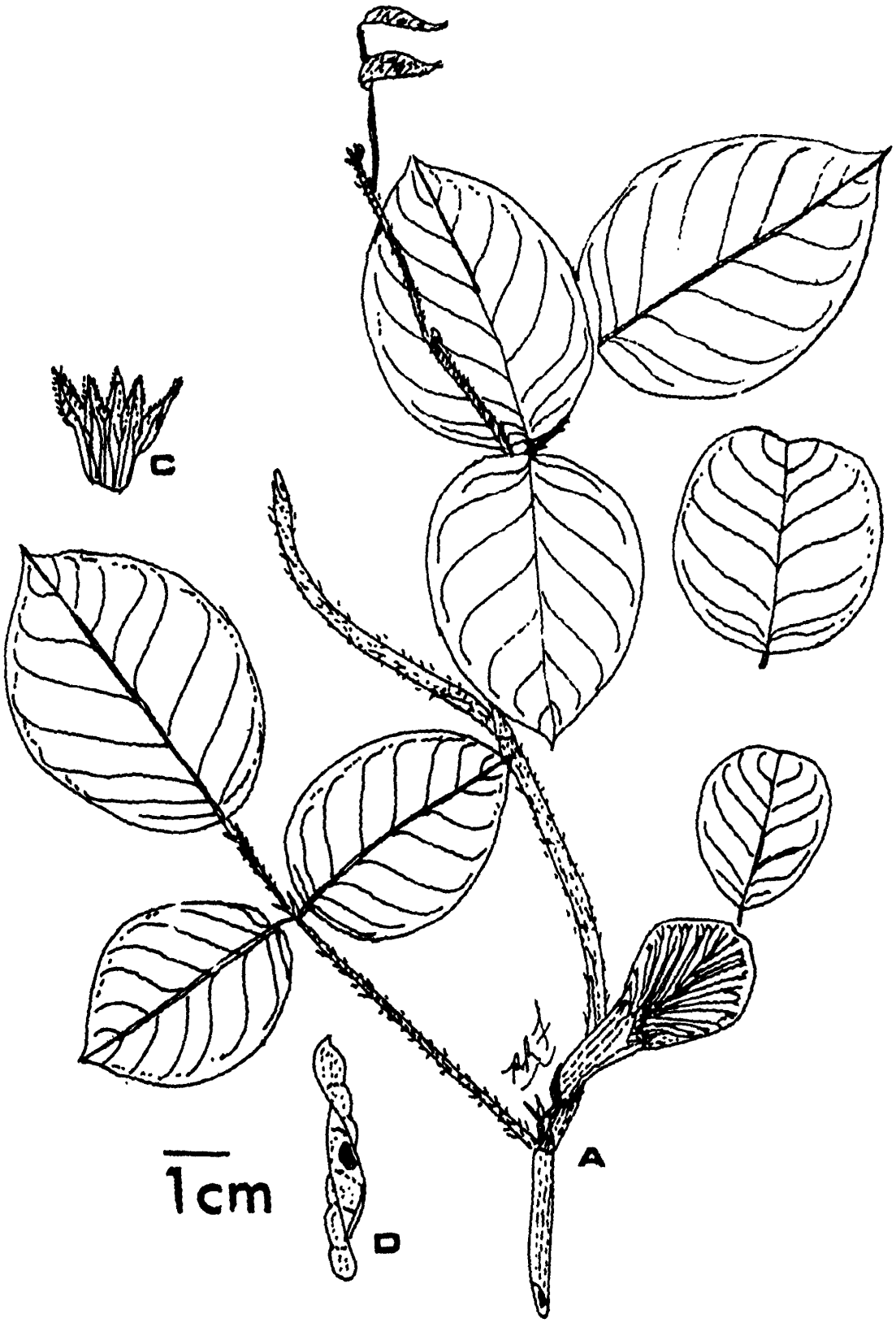
This variety is recognized easily by its short-petiolate leaves, the leaflets being narrow and densely pubescent beneath, any by the elongated stipules. Collected in flower from May to July, known only from the northeast and central provinces of Thailand.

Specimens of this taxon were annotated as variety *thailanensis* Fantz. Reviewers noted that "thailanensis" is an incorrect Latinization of Thailand, thus the epithet was corrected to "thailandica" following editor's recommendations.

THAILAND : Central : Ratburi, *Marcon* 1752 (K). Northeast : Ban Chum Seng, Korat, *Noe* 231 (BM, K).

8. **Clitoria javanica** Miq., Fl. Ind. Bat. 1:226. 1855. Lectotype : Java. Papitjan, door, *Dr. T. Horsfield* s.n. (BM!). Isolectotypes : K!U!-a fragmen). Fig. 7, Map 2

Suffrutescent herb, trailing to climbing, to 1.5 m long. Leaves 3-foliolate, leaflets braodly ovate to nearly orbicular, obtuse and abruptly broadly short-acuminate to truncate and retuse, broadly rotund,



Figs. 7. a-d : *Clitoria javanica* Miq. : a. portion of stem; b. leaflet variation; c. calyx; d. fruit. Based upon *Kerr* 13388 (K) and *Kerr* 19770 (BM).

sericeous and soon becoming strigose beneath, 3-5 (-7) cm long, 2-5 cm wide. Petioles 3-5.5 cm; rachis 1-2 cm. Stipules 5-7 mm long; stipels 3-6 mm long. Inflorescences axillary, 1 (-2) per node, each 1-2-flowered, 0.5-1.5 cm long. Bracts 2-5 mm long. Bracteoles 5-8 mm long. Flowers white, *ca* 3.5 cm long. Calyx densely microuncinate-pubescent beneath subappressed to suberect, 1-1.5 mm, white macrotrichomes, tube 8-9 mm long, lobes 8-9 mm long. Staminal sheath 17-21 mm long. Ovary 6-7 mm long; style 13-14 mm long, geniculate 4-5 mm apically. Legume short-stipitate, *ca* 40 cm long, 7 mm wide; stipe 8 mm long. Seeds brownish-black, 3 × 4-5 mm *ca* 6 seeds per pod.

The type collection was collected by Horsfield outside the door to his home. It must have been from a cultivated specimen. A number of Java collections of *Clitoria* have been examined; none belong to this species. All other collections of this species examined were collected in Thailand.

Clitoria javanica has been synonymized with *C. macrophylla* (Bentham 1858) and with *C. rubiginosa* (= *C. falcata)* by Backer and Brink (1963). Fantz disagrees with these decisions as it is distinct and is recognized easily by its small leaflets nearly as broad as long, calyx lobes subequalling the calyx tube, and smaller flowers with a shorter calyx tube and smaller bracteoles.

Phenology : The few collections of this species indicate that flowering occurs in August and fruits in October.

Distribution : *Clitoria javanica* is an apparent endemic of central Thailand (Map 2).

THAILAND : Sarat, kanchan..., *Kerr* 13388 (K). Central : Kao Tawn, Kanburi, 100 m, *Kerr* 19770 (BM, K).

9. **Clitoria linearis** Gagnep., in Lecomte, Nat. Syst. 3:108. 1915. Type : LAOS. Rive gauche du M'ekong, forets arides vers le 17 degr'e de latitude, *Harmand* (P-?).

Fig. 8, Map 2

Suffrutescent herb, erect, 25-40 cm tall. Leaves 3-foliolate, leaflets linear, apex gradually attenuate, mucronate, broadly cuneate to rotund, tomentose below, 6-11 cm long, 0.8-2 cm wide. Petioles 1-3 cm, densely pubescent with yellowish trichomes; rachis *ca* 1 cm. Stipules 8 mm long; stipels 3 mm long. Inflorescences axillary, subsessile, solitary, 1-2-flowered; peduncle 6-8 mm. Bracteoles 7 mm long. Flowers white, 2.5-3 cm. Calyx pilose, tube 8 mm long, lobes 12 mm long. Style 2-3 times longer than ovary, ciliate. Legume unknown.

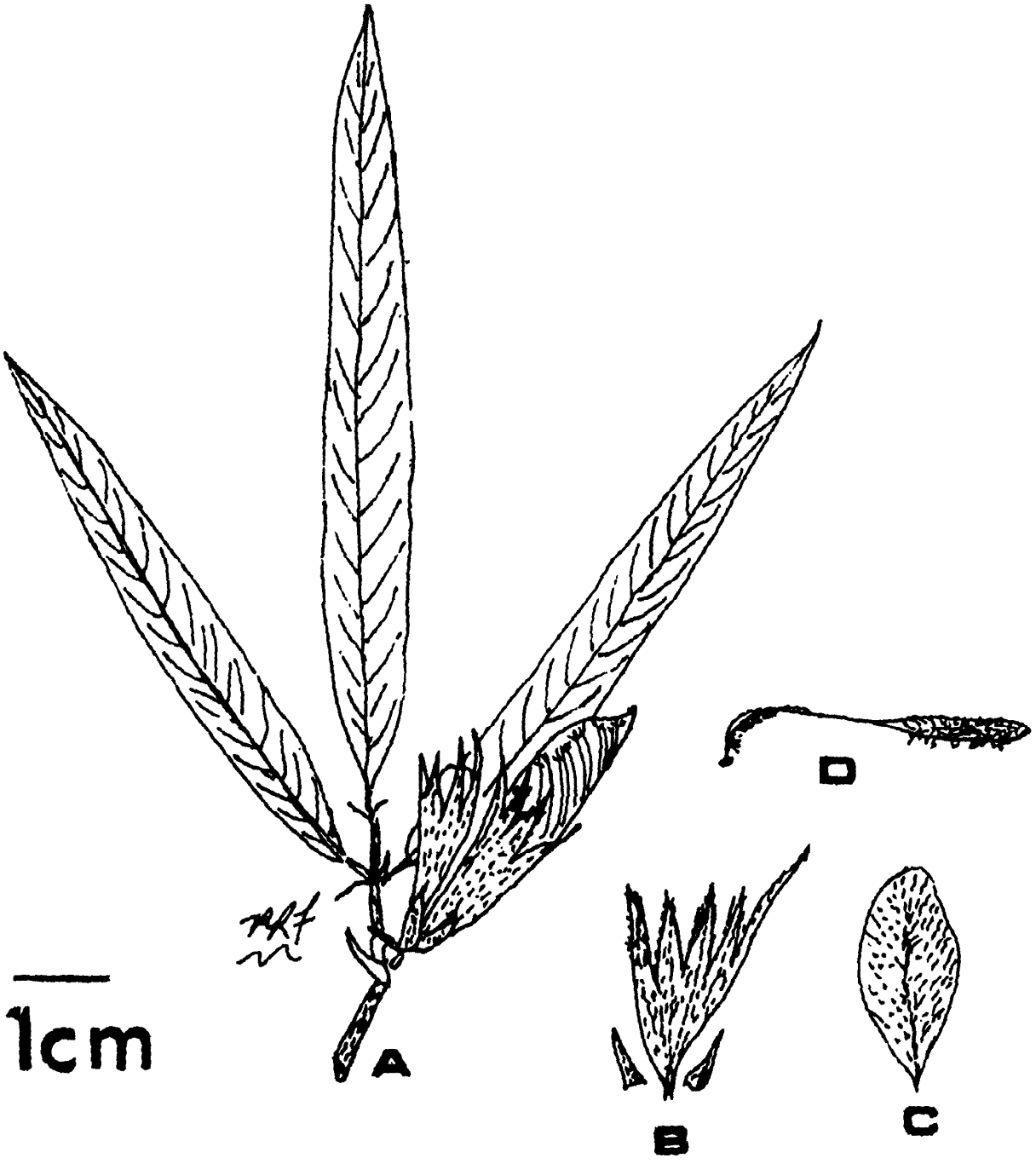
No specimen has been examined that agreed with the description of the species Gagnepain (1916) published a detailed description and an illustration of this species that clearly indicate that it is a species of the genus *Clitoria*. The distribution and diagnostic characteristics, especially the calyx lobes being conspicuously longer than the tube length, indicate that this species belongs to section *Tanystyloba*.

The phenology is unknown for the species, but based upon its closest affininties, the reproductive season is possibly near July to October. Known only from the type locality in Laos.

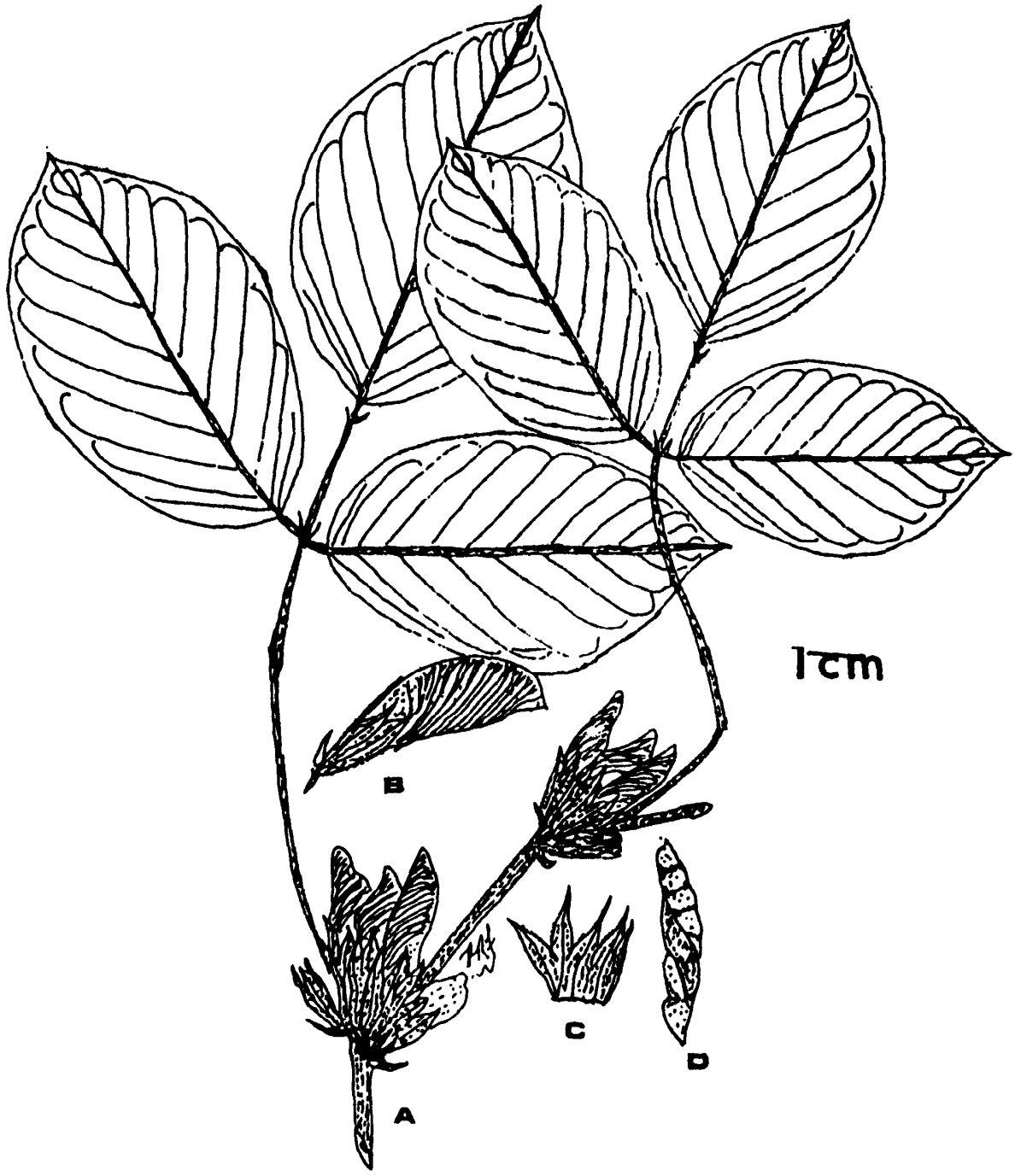
10. **Clitoria macrophylla** Wall. ex Benth. in Miq., Pl. Jungh. 2:232. 1852; *non* Hance (1878); *Clitoria macrophylla* Wall., Cat. no. 5345. 1831-1832, *nom. nud.* Lectotype : Burma. Pegu : Mount Prome, *Wallich Hb.* 5345 (K-hb. Bentham!). Isolectotype : BM! *Clitoria acuminata* Grah. ex Wall., Cat. no. 5346. 1831-32; *nom. nud.; Clitoria grahamii* (as *Clitoria grahami)* Steudel, Nom. Bot. ed. 2. 1:86. 1840, *nom. nud.; Clitoria grahamii* (as *Clitoria grahami*) Steud. ex Benth. in Miq., Pl. Jungh. 2:232. 1852, *p.p. min.* Lectotype : Burma. Tavoy. *Wallich Hb.* 5346 (K-hb. Bentham!). Isolectotype : BM!.

Fig. 9, Map 1

Subshrub to suffrutescent herb, erect to 80 cm tall, or stem apex arching toward ground, trailing to climbing, subtwining, to 2.5 m long. Leaves 3-foliolate, or rarely 3-foliolate with 1-foliolate leaves at lowermost nodes; leaflets polymorphic, oblong, elliptic-oblong, lanceolate, oblanceolate-oblong, ovate, elliptic-ovate, apex generally obtuse and abruptly short-acuminate (to 0.5 cm), occasionally tapered and acuminate, mucronate to 1 mm, base



Figs. 8. a-d : *Clitoria linearis* Gagnep. : a. portion of stem; b. calyx and bracteoles; c. banner; d. gynoecium. Based upon Fig. 33 (Gagnepain 1916).



Figs. 9. a-d : *Clitoria macrophylla* Wall. ex Benth. : a. portion of stem; b. flower; c. calyx; d. dehisced fruit. Based upon *Wallich* 5345 (K).

broadly cuneate to rotund, sericeous to scattered substrigose beneath; 3-foliolate leaves 5-11 (-14) cm long, 2.5-6 (-7) cm wide; 1-foliolate leaves with base rotund to subcordate, 10-16.5 cm long, 5-8 cm wide. Petioles 2-9 cm, those of unifoliolate leaves typically 5-9 cm; rachis (1.5-) 2.4 cm. Stipules ovate-lanceolate to deltoid-lanceolate, acuminate, 5-10 cm long or occasionally 12-18 cm long. Inflorescence axillary, contracted, 0.5-2 (-3) cm long, (2-) 4-6-flowered, crowded, (1-) 2-4 fascicled; peduncles 3-13 (-20) mm. Bracts ovate, 5-7 mm long, spreading to reflexed with age. Flowers white, 3.5-4.5 (rarely 5.5 cm) long. Calyx tube 9-12 mm long, lobes ovate lanceolate, long-acuminate, 9-15 mm long, subequalling the tube length or typically exceeding it by 1-3 mm. Staminal sheath 17-22 mm long. Ovary 8-9 mm long; style 13-16 mm long, geniculate 4-5 mm apically. Legume short-stipitate, 40-60 cm long, 7-9 mm wide; stipe 6-9 mm long. Seeds dark brownish-black, 4-4.5 mm by 4-5 mm; 4-8 seeds per pod.

Clitoria acuminata Graham ex Wallich and *C. grahamii* Steud. historically have been synonymized with *C. mariana* L. However, the type specimens agree with *C. macrophylla,* not with Asian *C. mariana* var. *orientalis. Clitoria acuminata* Grah. ex Wall. was published as a *nomen nudum* with Steudel (1840) changing the name to *C. grahamii* ('grahami'), citing *"C. acuminata* Grah. in Wall." in synonymy. Steudel's name was incorrect orthographically in accordance with Art. 73.10 of the International Code of Botanical Nomenclature (Voss 1983).

Fantz (1993) recognized three varieties based primarily upon consistant vegetative characters and geography. Variety *stipulacea* and var. *sericea* have conspicuously pubescent lower leaf surfaces. These members are often confused with *C. hanceana* (*e.g.* Hance 1878). Variety *macrophylla* often is confused with members of *C. mariana.*

Varnacular name : Thailand. Central : Poik tak katen.

Economic uses : This species is used locally as a natural pesticide in the Central Province of Thailand. Tubers are bruised and soaked in water, then sprayed on plants to kill green flies in pepper gardens (Fantz 1991). Root juice is used for killing worms in buffalo's backs (Fantz 1991).

Phenology : Reproduction of this species occurs from late June through early November, with a peak occurring in July and August. Vouchers from late December bear nearly denuded nodes and dehisced fruits.

Distribution : *Clitoria macrophylla* is distributed in southeast Asia (Map. 1) from Myanmar to Thailand, south to Vietnam (Cochinchina), although the majority of vouchered collections are from Thailand. Only a few Thailandese collections give habitat date and elevations. Thailandese members are found on mountain slopes at altitudes of 100-900 m in open evergreen and dry, deciduous, dipterocarp forests (or jungles) on gravel to sandy soil.

KEY TO THE VARIETIES

1a. Leaf pubescence on lower surface with scattered, appressed trichomes well spaced and scarcely overlapping; leaflets typically ovate to oblong-ovate, often 1.5-2.5 times longer than wide; suffrutescent herb, somewhat erect with climbing apex, stem internodes 7-20 cm long, upper internodes twining slightly; petioles somewhat elongated, 5-9 cm long; calyx teeth 9-13 mm long, mature fruit glabrate or bearing scattered remnants of uncinate trichomes (Myanmar, Vietnam) ... 10A. var. *macrophylla*

1b. Leaf pubescence on lower surface sericeous, moderate to dense, trichomes close, often overlapping; leaflets shape typically elongated, oblong, or lanceolate, elliptic-oblong,

oblong-lanceolate, to oblanceolate-oblong, often 2-4 times longer than wide; subshrub, erect, stem internodes short, 4-10 cm long, weakly to arcuate-flexuous; petioles 1-6.5 cm long; calyx teeth 12-15 mm long; fruit uncinate-pubescent :

2a. Stipules 5-9 mm long, 2-4 wide; leaves 3-foliolate only leaflets to 6 cm wide; stipels 3-9 mm (Thailand) ... 10B. var. *sericea*

2b. Stipules (9-) 12 - 18 mm long, 4 - 5 mm wide; leaves 3- and 1-foliolate, 1-foliolate leaflets 6-8 cm wide; stipels of 1-foliolate leaves 10-16 mm (Thailand) ... 10C. var. *stipulacea*

10A. var. **macrophylla** (Map-1)

Clitoria macrophylla Wall., Cat. no. 5345. 1831-1832. *nom. nud.* Lectotype : Burma. Pegu : Mount Prome, *Wallich Hb.* 5345 (K-hb. Bentham!). Isolectotype : BM!. *Clitoria acuminata* Grah. ex Wall., Cat. no. 5346. 1831-32; *nom. nud.; Clitoria grahamii ('grahami')* Steud., Nom. Bot. ed. 2. 1:86. 1840; *nom. nud; Clitoria grahamii ('grahami')* Steud. ex Benth. in Miq., Pl. Jungh. 2:232. 1852; *p.p. min.* Lectotype : Burma. Tavoy. *Wallich Hb.* 5346 (K-hb. Bentham!). Isolectotype : (BM!).

Suffrutescent herb with erect to lax stems, apex trailing to climbing, weakly twining. Stem internodes weakly twining in upper portion of stem, typically 7-20 cm long. Leaves 3-foliolate; leaflets ovate, elliptic-ovate, or occasionally lanceolate-elliptic, primary veins of 9-12 (-15) pairs, lower surface sparsely pubescent, trichomes subappressed, scattered; ratio of leaflet lenght/width is 1.5- 2.5 : 1. Stipules 5-9 mm long, (2-) 3-4 mm wide. Petioles 4-10 cm. Calyx lobes 9-14 mm long. Legume pubescence microuncinate as juvenile, becoming glabrate with scattered, remnants of microuncinate trichomes.

The typical variety is collected infrequently from Myanmar and Vietnam (Cochinchina), to 1000m. Several collections of John W. Helfer collected in 1836-1838 were distributed under the label "India : in Bengalia circa Calcutta." These include :

India orient., *Helfer s.n.* (W); Bengali circa Calcutta, *Helfer* 95 (A, BM, E, F-mixed, G, GH, US, NY, PR, S), 179 (PR), 206 (PR) and *s.n.* (PR).

Predeep notes that Helfer collected plants primarily from Tenasserim (Myanmar), and later from the Andaman Islands where he was killed by hostile aboriginals. Herbarium and field studies by Predeep failed to locate any other evidence of this species occurring in India. Therefore, the Indian specimens are suspect, possibly an error by someone in cataloguing Helfer's collection. We regard the species as currently absent from India.

MYANMAR (BURMA) : Bithoko Range, *Brandis* 178 (K) and 1308 (K); Martaban, *Parish* 11 (K). Pegu : Prome or Paong pong, *Wallich* 5345B (K); Dist. Insein, *Khant* 574 (A). Sagaing : Maukkadaow, Upper Chindwin, *Lace* 4242 (E); Maubin, *Kuntze* 6206 (NY). Tennasserim : Tenasserim, *Helfer* 1727 (GH, K) and 1837 (K); Tavoy, *Wallich* 5346H (BM). VIETNAM. Cochinchina : ad China chiang, *Pierre s.n.* (E, K); Iles de Pulo Condor, *Harmand* 876 (A, BM).

10B. var. **sericea** Fantz, Novon 3 (4) : 354. 1993. Holotype : Thailand. Central : Hua Wai, Nakawn Sawan, 28 Aug 1931, *Put* 4085 (K!) Isotype : BM! Paratypes : Thailand. Kanburi, 3 Aug 1928, *Put* 1850 (BM!K!) Map. 1

Subshrub to suffrutescent herb, erect. Stem internodes weakly to arcuate-flexuous, 4-10 cm long. Leaves 3-foliolate, leaflets elongated, oblong or lanceolate, elliptic-oblong, oblong-lanceolate, oblanceolate-oblong, ratio of length width is 2-4.1, primary veins of (10-) 13-17 pairs, lower surface sericeous, moderate to dense, trichomes falcate, erect, closely packed and overlapping. Stipules 5-9 mm long, 3-4 mm wide. Petioles typically 2-6 cm long. Calyx lobes 11-15 mm. Legume uncinate-pubescent.

This variety is the one most commonly collected and is recognized easily by its sericeous pubescence on the lower surface of leaflets and shortened stipules and stipels. It is endemic to central and northern Thailand.

THAILAND : Central : Kohn Din near Sriracha, *Collins* 1441 (K, US); Khwae Noi River Basin Exp., Ku-Jae, *ca* 150 km NW of Kanburi, *Kostermans* 1275 (A, US); Thung Kra Mang, 16°15' N-101°30' E, *Larsen et al.* 31577 (E); Khao Phra Bat, N of Chanthaburi, 15°52' N-102°10' E, *Larsen et al.* 32103 (E); Sai Yok, Kanburi, *Marcan* 2419 (K); Hin Dat, Kanburi, *Put* 59 (BM) and 88 (BM, K); Bartapan, *Put* 1341 (BM, K); Sai Yok, Kanburi, *Put* 1850 (BM, K); Hua Wai, Nakawn Sawan, *Put* 4080 (BM, K); North : Chiengmai, plain W of Taron, Alyran Ameraid, *Garrett* 181 (BM, E, K); Chiengmai, Doi Sutep, 500-600 m *Sorensen et al.* 4500 (A). Northeast : Chaiyaphum Nong Bua Dong, 15°10' N-101°30' E, *Larsen et al.* 31892 (E).

10C. var. **stipulacea** Fantz, Novon 3 (4):355. 1993. Holotype : Thailand [North] : Lampoon, Me Lee, 366 m, 7 Aug 1915, *Winit* 360 (E!). Isotype : K. Paratypes : Thailand [North] : Doi Pha Dam between Hang Dang and Bo Luang, 18°17' N, 98°30'E, 600 m, 5 Jul 1968, *Larsen et al.* 2123 (E!K!). Map 1

Subshrub to suffrutescent herb with stems scrambling. Leaves trifoliolate and unifoliolate, 1.5-3 times longer than wide, 5-16.5 cm long, 3-6.5 cm wide, elliptic-oblong to oblong-lanceolate, primary lateral veins of 12-16 pairs, sericeous beneath. Stipules (9-) 12-18 mm long, 4-5 mm broad, stipels 7-16 mm long. Petioles 2-5 cm long on trifoliate leaves, 4-9 cm long on unifoliate leaves; rachis 2-4 cm long. Calyx lobes 12-15 mm long. Legume uncinate-pubescent. Thail and.

This variety is distinguished quickly by the prescence of unifoliolate leaves and the elongated, conspicuous stipules and stipels. It is collected infrequently from late May to early July. Endemic to the North province of Thailand, collected from the "papeh" and deciduous dipterocarp jungle / forests.

THAILAND (SIAM). North : Tang Salaeng Luang Nat. Park, *ca* 80 km E of Phitsanulok, *Murata et al.* T-10158 (MO).

REPORTED SPECIES EXCLUDED FROM SOUTHEAST ASIA

1. *Clitoria arborescens* R. Brown, in Ait. Hort. Kew, ed 2.4:302. 1814. Lectotype : Cult. from Trinidad, 1804, *James Vere s.n.* (BM!).

Bhaumik and Das (1983) reported this species as a new record from India. Fantz and Predeep (1992) noted that this report is based upon a misidentification. This species is native to northern South America, distributed from French Guiana to eastern Venezuela, and does not occur in India as reported.

2. *Clitoria heterophylla* Lam., Encycl. 2:51.1786; *Ternatea heterophylla* (Lam.) Kuntze, Rev. Gen. Pl. 1:210. 1891. Holotype : Indes orientalis, *M. Sonnerat s.n.* (P-LA).

This species is recognized easily by the small blue flowers and two distinct leaf types with minute leaflets (0.5-4 cm long × 0.1-1.1 cm wide). This species is endemic to the islands of Madagascar and Mauritius, cultivated infrequently elsewhere in the 1800's. Vouchered in our area only from cultivation in the Royal Botanic Garden of Calcutta around 1815. Label data is poor, often lacking the collector's name. Lacking recent evidence, this species is excluded from the present flora.

Known vouchers include: INDIA, West Bengal : Hortus Bot. Calcuttensis, *Anonymous s.n.* (CAL 124830); *l.c.*, 6 Sept, *Anonymous s.n.* (CAL 124831); *l.c.*, *Anonymous* 842 (DD); *l.c.*, Jun 1815, *Wallich* 767 (BM).

3. *Clitoria vaupellii* in Graham, Cat. Pl. Bombay. 47, no. 353. 1839. Type : Unknown, no collection cited.

Fantz and Predeep (1992) concluded that this name reported from India is ambiguous or dubious, invalid, and thus illegitimate.

4. *Clitoria virginianum* L., Sp. Pl. 1:753. 1753.=*Centrosema virginianum* (L.) Benth., Ann. Wein. Mus. 2:210. 1837.

This species was reported from India by Subramanian (1961), a misidentification corrected by Fantz and Predeep (1992) as *Centrosema pubescens* Benth.

Table 1. Reported medicinal uses of Clitoria ternatea L. summarized from Fantz (1991).

Medicinal use	Plant part
ANIMAL INFECTIONS	
Scorpion stings	Roots
Snake bites	Roots
Tapeworms	Seeds
(Antihelminthic)	
(Vermifuge)	
BODY ACHES	
Earache	Leaf juice
Headache	Leaf juice
(Hemicrania)	
FLUID ACCUMULATION	
Abdominal viscera	Roots
	Seeds
Anasarca	Roots
Ascites	Roots
Biliousness	Roots
Demulcent	Root bark
Diuretic	Roots
	Seeds
GASTROINTESTINAL	
Antidysentery	Flowers
Aperient	Roots
Cathartic	Roots
	Unknown
Laxative	Roots
	Root bark
	Seeds
Purgative	Roots
Ulcers	Leaf infusion
INFLAMMATIONS	
Cystitis	Seeds
Eczema	Leaf juice
Eye	Flower juice
Impetigo	Leaf juice
Prurigo	Leaf juice
Skin eruptions	Leaf infusion
POISONS	
Antidotic	Seeds
PULMONARY SYSTEM	
Antitubercular	Unknown
Bronchitis-	
Phlegm removal	Roots
Hectic fevers	Leaves
Refrigerant	Seeds
SWOLLEN BODY AREAS	
Glands	Leaf juice
Joints	Leaf poultice
UROGENITAL SYSTEM	
Antiperiodic	Roots
	Leaves
Conception	Unknown
Emmenagogue	Flower infusion
	Roots
	Root infusion
Gonorrhea	Leaf juice
	Root bark
VOMITIVE	
Emetic	Leaves
	Roots
Vomitive	Roots

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