

# THE GENUS BAUHINIA IN THAILAND

by

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## ABSTRACT

A revision of the genus *Bauhinia* for Thailand shows that the genus has 35 species in this country. 6 new combinations have been established: *B. bidentata* subsp. *bicornuta* K. & S. Larsen, *B. glabrifolia* subsp. *sericea* K. & S. Larsen, *B. glauca* subsp. *tenuiflora* K. & S. Larsen, *B. harmsiana* var. *media* K. & S. Larsen, *B. pottsii* var. *decipiens* K. & S. Larsen, *B. scandens* var. *horsfieldii* K. & S. Larsen.

The following species have been found new to Thailand, *B. bidentata*, *B. glabrifolia*, *B. penicilliloba* and *B. ridleyi*, [i.e. not published in Craib, Fl. Siam. En. 1 (1928)].

A survey of the distributional types of *Bauhinia* in Thailand is given.

## 1. INTRODUCTION

During the last two years the authors have worked with the genus *Bauhinia* from various points of view. To throw new light on the division of the large genus, distributed all over the tropics, and comprising about 500 species, an extensive study of the pollen morphology with the use of scanning electron microscopy has been commenced. As a basis for these studies a thorough revision of many groups has been necessary. The authors have so far centred their investigations on tropical Asia. In this region a revision of the Malaysian species was published by de Wit (1956). This revision mainly deals with the species from the evergreen rainforest. The flora in Monsoon Asia with its dry savannah regions harbours quite different groups of *Bauhinia*, while again Southern China is a separate plant geographic region with its own members of the genus.

Thailand, situated on the crossroads between the Malaysian, the Chinese and the Himalayan flora-provinces, has an extremely rich flora, which is also reflected by the present genus represented by 35 species.

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The pollen studies (unpublished) have already given us a new tool in hand to subdivide the taxon, but further studies are still necessary. The present paper is, however, also a precursor of a treatment of the Caesalpiaceae for "Flora of Thailand". Furthermore we hope to encourage Thai botanists to intensify the collecting of *Bauhinia* particularly in the border provinces in order to give us as complete a picture as possible of the genus in Thailand.

During these studies hundreds of specimens from all over Mainland Asia have been investigated. Material from the following herbaria have been sent to us on loan.

A	(Arnold Arboretum, U.S.A.)
AAU	(Botanical Institute, University of Aarhus)
ABD	(Dept. of Botany, University of Aberdeen)
BK*	(Dept. of Agriculture, Botanical Section, Bangkok)
BKF*	(Royal Forest Department, Bangkok)
BM*	(British Museum, Natural History, London)
C*	(Botanical Museum, Copenhagen)
E	(Royal Botanic Garden, Edinburgh)
GB	(Inst. of Syst. Botany, University of Göteborg)
H*	(Botanical Museum, Helsinki)
K*	(Royal Botanic Gardens, Kew)
L	(Rijksherbarium, Leiden)
M	(Botanische Staatssammlung, München)
P*	(Museum National d'Hist. Nat., Lab. Phanérogamie, Paris)
S*	(Naturhistoriska Riksmuseet, Stockholm)
SING	(Botanic Gardens, Singapore)
TI	(Botanical Institut, Tokyo)
US	(U.S. Nat. Mus.)

The herbaria marked with an asterisk have been visited within the last 2 years for these studies. We wish to express our gratitude to the directors of all these institutions. Furthermore the studies have been supported by the Danish State Research Council. We are greatly indebted to the DANIDA (Danish International Development Agency) for supporting an expedition to Thailand in 1972, during which most members of the genus were studied in nature. For help during the



expedition we want to thank Dr. Tem Smitinand and Mr. Thawatchai Santisuk, both of Bangkok. We also wish to thank Professor, Dr. R.C. Bakhuizen van den Brink for his criticism during the preparing of the manuscript.

## 2. ENUMERATION OF THE SPECIES

### *BAUHINIA*

Linn., Sp. Pl. 374. 1753; Taubert in Nat. Pflanzenfam. 3, 3: 147. 1891, de Wit, Reinwardtia 3: 381. 1956; Hutchinson, Gen. Fl. Pl. 1: 242. 1964.

Trees, shrubs and tendrilled lianas often with flattened stems ("monkey-ladders"). Leaves simple, entire, bilobed or divided in 2 free leaflets. Midrib often bristly between the lobes; 2 dark alveoles at base of lamina. Stipules often caducous. Inflorescence various, terminal or axillary. Receptacle (calyx-tube) short or long; calyx 5-merous splitting in free lobes, cup-shaped or spathaceous. Petals 5  $\pm$  equal. Stamens 10, 5, 3, 2, 1 or 0 (flowers dioecious). Ovary shorter or longer stipitate or (rarely) sessile; ovules 2 -  $\infty$ . Fruit dehiscent (rarely indehiscent), woody-valved, or thin-valved, sometimes septate. Seeds  $\pm$  orbicular, flat.

The genus *Bauhinia* in the present sense comprises *Casparia* Kunth, *Caspariopsis* Br. & Rose, *Lasiobema* Miq., *Lysiphyllum* de Wit, *Pauletia* Cav., *Phanera* Lour. and *Piliostigma* Hochst. (here only mentioned groups occurring in Thailand). We have thus adapted the broadest concept of the genus as Hutchinson did (l.c.) we cannot agree with authors such as de Wit (l.c.) etc., who have split *Bauhinia* into more than 25 genera. It is true that it is a eurypalynous taxon; but should we follow palynology we will end with twice the number of genera. Gross morphology, however, varied this may seem to one who is not familiar with the group, gives in itself no support for a generic division. The authors are working on a new subgeneric division based on scanning electron microscopy of pollen; this will be published in another connection.

## Key to the species

1. Trees and shrubs without tendrils . . . . . 2
1. Climbing or straggling, tendrilled shrubs . . . . . 14
2. Fertile stamens 1 . . . . . *B. monandra*
2. Fertile stamens 3-10 (or 0) . . . . . 3
3. Fertile stamens 10 or 0 (dioecious) . . . . . 4
3. Fertile stamens 3 or 5. . . . . 12
4. Mature buds large, more than 15 mm . . . . . 5
4. Mature buds small, less than 10 mm. . . . . 7
5. Buds pointed, with 5 free, subulate tips ("spider legs"),  
flowers white. . . . . 6
5. Buds pointed, without 5 free, subulate tips, flowers yellow . .  
. . . . . *B. tomentosa*
6. Buds glabrous or nearly so; pods with sharp raised parallel rims  
along the suture; leaf lobes with acute apex . . *B. acuminata*
6. Buds densely wooly pubescent; pods without raised rims, apex  
curved; leaf lobes rounded, . . . . . *B. hirsuta*
7. Inflorescence short, densely flowered, raceme or panicle . . . 8
7. Inflorescence lax, elongated raceme . . . . . 10
8. Inflorescence raceme . . . . . *B. brachycarpa*
8. Inflorescence panicle . . . . . 9
9. Leaves large, membranous (more than 15 × 16 cm), pod small,  
thin-valved, narrow, less than 15 mm broad, with straight sides  
. . . . . *B. prainiana*
9. Leaves smaller chartaceous (less than 9 × 9 cm), pod larger,  
woody-valved, broadest towards apex, more than 20 mm . .  
. . . . . *B. saccocalyx*
10. Buds club-shaped, pedicel long, 7 mm or more . *B. malabarica*
10. Buds pointed, pedicel short, less than 5 mm . . . . . 11
11. Mature buds glabrous apex straight, pods dehiscent, thin-valved  
5-7 cm × 0.8-1.0 cm . . . . . *B. viridescens*
11. Mature buds hairy with curved apex, pods inhehiscent, 15-25  
cm × 1-2 cm . . . . . *B. racemosa*
12. Fertile stamens 5 . . . . . *B. variegata*
12. Fertile stamens 3 . . . . . 13
13. Buds winged towards tip, receptacle 7-12 mm long; pods  
glabrous . . . . . *B. purpurea*



13. Buds entirely wingless, receptacle 30-45 mm long; pods pubescent . . . . . *B. pottsii*
- a. Flowers red, ovary velvety . . . . . b
- a. Flowers white-yellowish . . . . . c
- b. Upper surface of leaves glabrous or nearly so . . . . .  
. . . . . var. *elongata*
- b. Upper surface of leaves velvety to touch. . . var. *pottsii*
- c. Leaves glabrous or nearly so on both sides, ovary hirsute  
. . . . . var. *decipiens*
- c. Upper surface of leaves velvety to touch, ovary strigose .  
. . . . . var. *subsessilis*
14. Leaves entire . . . . . 15
14. Leaves more or less divided. . . . . 18
15. Flowers large, red more than 25 mm long. . . *B. strychnifolia*
15. Flowers small less than 10 mm long. . . . . 16
16. Buds ovoid with acute tips . . . . . *B. curtisii*
16. Buds sphaerical . . . . . 17
17. Pedicel less than 8 mm long, calyx cup-shaped, no swollen disc . . . . . *B. tubicalyx*
17. Pedicel more than 10 mm long, calyx-lobes reflexed, disc swollen  
. . . . . *B. concreta*
18. Perfect stamens 10, leaves consisting of 2 free leaflets . . . 19
18. Perfect stamens 2 or 3, leaves less divided, rarely consisting of  
2 free leaflets . . . . . 20
19. Flowers large, more than 5 cm long; pods straight . . *B. winitii*
19. Flowers smaller, less than 2 cm long; pods curved . . *B. binata*
20. Fertile stamens 2 . . . . *B. bassacensis* subsp. *bassacensis*
20. Fertile stamens 3 . . . . . 21
21. Inflorescence compound, large, composed of narrow c. 10 mm  
broad racemes with numerous small, white-yellowish flowers  
. . . . . 22
21. Inflorescence simple or if compound, composed of more than  
30 mm broad racemes, corymbs or subumbels . . . . . 23
22. Buds globose, calyx with 5 reflexed tips, ovary glabrous (stipe  
sometimes hairy) . . . . . *B. scandens* var. *horsfieldii*.
22. Buds fusiform—narrow ovoid; calyx 2-3 split . . *B. harmsiana*  
Ovary hairily along suture, disc swollen, hairy . . . . .  
. . . . . var. *harmsiana*  
Ovary glabrous, no swollen disc . . . . . var. *media*

23. Pedicels short, less than 10 mm . . . . . 24
23. Pedicels longer, more than 20 mm . . . . . 25
24. Flower buds large 20 mm (incl. receptacle), stigma large, peltate; receptacle c. 10 mm long, indumentum reddish-brown . . . . . *B. ridleyi*
24. Flower buds small 8 mm, stigma small, not peltate, receptacle not elongate, indumentum silvery . . . . . *B. pulla*
25. Inflorescence elongate, racemose . . . . . 26
25. Inflorescence corymbose or subumbellate . . . . . 28
26. Leaves consisting of 2 free leaflets . . . . . *B. yunnanensis*
26. Leaves bilobed . . . . . 27
27. Inflorescence greyish hairy, buds ovoid with acute tips . . . . . *B. curtisii*
27. Inflorescence densely hairy, bright rusty red, buds fusiform with free subulate tips ("spider legs") . . . . . *B. penicilliloba*
28. Anthers opening by central pores . . . . . *B. bidentata* subsp. *bicornuta*
28. Anthers opening by slits lengthwise . . . . . 29
29. Bracteoles large, 15-20 mm long, 10 mm broad . . . . . *B. involuclata*
29. Bracteoles much smaller . . . . . 30
30. Disc with a tubular outgrowth. . . . . *B. bracteata*
30. Disc without outgrowth . . . . . 31
31. Buds fusiform, petals spathulate, greenish . . . . . *B. similis*
31. Buds globose or ovoid, petals not spathulate, white, orange or red . . . . . 32
32. Ovary glabrous, receptacle up to 5 mm . . . . . 33
32. Ovary hairy, receptacle more than 7 mm . . . . . 34
33. Leaves reddish hirsute; pod narrow less than 2 cm broad . . . . . *B. lakhonensis*
33. Leaves nearly glabrous, pod more than 3 cm broad . . . . . *B. glauca*  
 Receptacle long, more than 25 mm . . . . . subsp. *tenuiflora*  
 Receptacle short, less than 15 mm . . . . . subsp. *glauca*
34. Ovary hairy along suture only, buds greyish silky hairy . . . . . *B. glabrifolia* subsp. *sericea*
34. Ovary densely hairy, buds reddish or brownish pilose . . . . . 35
35. Flowers white-yellowish, buds ovoid 5-8 mm long. . . . . *B. ornata*
35. Flowers orange-red, buds globose less than 4 mm diam . . . . . *B. integrifolia* subsp. *integrifolia*



1. *Bauhinia acuminata* Linn., Sp. Pl. : 375. 1753. — *B. candida* Aiton, Hort. Kew. 2 : 49. 1789. — *B. tomentosa* Naves in Blanco, Fl. Filip., ed. 3. Pl. III. 1877-1883 (non Linn.).

*Distribution* : Probably indigenous to Java, Borneo, the lesser Sunda Islands and the Philippines. Cultivated all over South East Asia (type from Ceylon).

*Occurrence in Thailand* : Found cultivated all over the country. It seems to thrive particularly well in the drier areas where it is sometimes found naturalized in the open dipterocarp forests.

2. *Bauhinia bassacensis* Pierre ex Gagnep., Not. Syst. 2 : 168. 1912. — *B. viridiflora* Backer, Bull. Jard. Bot. Buitenz. 3, 2 : 323. 1920. — *B. sanitwongsei* Craib, Kew Bull. 1924 : 94, incl. var. *glauca*. — *B. detergens* Craib, Kew Bull. 1927 : 388. — *B. sulphurea* C.E.F. Fischer, Kew Bull. 1927 : 85 sensu Craib, Fl. Siam. En. 1 : 530. 1928. — *Phanera bassacensis* (Pierre ex Gagnep.) de Wit, Reinwardtia 3 : 472. 1956.

var. *bassacensis*

*Distribution* : From Central Thailand and Laos (type) to the northern part of Malaysia (Kedah, Kelantan).

*Occurrence in Thailand* : A polymorphous species which has caused the description of a number of taxa. It is, however, not possible to maintain e.g. *B. detergens* and *B. sanitwongsei* as we find a clinal variation in characters such as size and shape of the leaves and the density of the indumentum of leaves, pedicels and buds; furthermore the size of the bracts varies considerably.

We have studied the holotype of *B. sulphurea* Fischer from S. Burma. It is closely related to *B. bassacensis* and some of the Thai specimens are by Craib (l.c.) referred to as *B. sulphurea*; we cannot agree in this even if the westernmost collection comes close to *B. sulphurea* in indumentum (cf. also de Wit, l.c.). We think that future investigation of more Burmese material may lead to the reduction of *B. sulphurea* to a variety of *B. bassacensis*.

It is a common climber in the southern part of the country and thus acts a vicariant for *B. bracteata*, which has northern distribution in Thailand.

3. *Bauhinia bidentata* Jack., Mal. Misc. 2:76. 1822. —*B. emarginata* Jack, l.c. 75. 1822 non Mill. —*B. cornifolia* Baker in Hook. fil., Fl. Br. Ind. 2:278. 1878. —*B. scortechinii* Prain, J. Asiat. Soc. Beng. 66 (2): 188. 1897. —*B. kingii* Prain, l.c.: 189. 1897. —*B. monticola* Ridl., J. Asiat. Soc. Str. Br. 75:28. 1917. —*B. brevifolia* Ridl., Fl. Mal. Pen. 5:306. 1925. —*B. gracilipes* Merr., Pap. Michigan Acad. Sci. 19:157. 1934. —*Phanera bidentata* (Jack.) Benth. in Pl. Jungh. 263. 1852 p.p. —*P. bicornuta* Miq., Fl. Ind. Bat., Suppl. Sumatra 286. 1860.

subsp. *bicornuta* (Miq.) K. & S. Larsen, *comb. nov.* Basionym: *Phanera bicornuta* Miq., l.c. —*P. bidentata* (Jack.) Benth. subsp. *bicornuta* (Miq.) de Wit, Reinwardtia 3:499. 1956. —*B. gracilipes* Merr., l.c. —*B. emarginata* Jack., l.c.

*Distribution*: Malay Peninsula to Sumatra (type).

*Occurrence in Thailand*: only collected once in the southernmost province: Naratiwat (Waeng).

A variable species of which several subspecific taxa have been described. Subsp. *bicornuta*, is the one having the widest distribution.

4. *Bauhinia binata* Blanco, Fl. Filip. 331. 1837. —*B. pinnata* Walp., Linnaea 16:53. 1842. —*B. diphylla* Zoll., Nat. Geneesk. Arch. Neerl. Ind. 3:70. 1846. —*B. hookeri* var. *puberula* Benth., Fl. Austr. 2:296. 1864. —*B. blancoi* (Benth.) Baker in Hook. fil., Fl. Br. Ind. 2:278. 1878.—*Lysiphyllum binatum* (Blanco) de Wit, Reinwardtia 3:432. 1956.—*Phanera blancoi* Benth. in Pl. Jungh. 264. 1852. —*P. complicata* Miq., Fl. Ind. bat. 1:70. 1855.

*Distribution*: From Thailand and Indo-China through Indonesia, the Philippines (neotype) to Australia.

*Occurrence in Thailand*: Only collected in the Chon Buri areas (Koh Khram, Sriracha, Anghin). In this small area which is its northern limit, restricted to sandy soil near the sea shore; growing in scrub.

5. *Bauhinia brachycarpa* Wall. ex Benth. in Pl. Jungh. 261. 1852; Wall. Cat. No. 5786. —*B. enigmatica* Prain, Journ. Asiat. Soc. Beng. 66 (2):495. 1897.



*Distribution* : Burma (type) to Thailand.

*Occurrence in Thailand* : Only collected at high altitude on Doi Chiang Dao in N. Thailand near the Burmese frontier.

It belongs to a group of dioecious species also comprising the South Chinese *B. faberi* Oliv. (Syn. : *B. densiflora* Franchet) and the Indo-Chinese *B. saccocalyx* Pierre.

6. *Bauhinia bracteata* (Grah. ex Benth.) Baker in Hook. fl., Fl. Br. Ind. 2:282. 1878, incl. var. *marcanii* Craib, Kew Bull. 1924:12. —*B. bracteata* Grah. ex Wall. Cat. No. 5802. —*Phanera bracteata* Benth., Pl. Jungh. 264. 1852. —*B. unguiculata* Baker, l.c. 277. —*B. harmandiana* Pierre ex Gagnep., Not. Syst. 2:172. 1912. —*B. helferi* Craib, Kew Bull. 1924:92

*Distribution* : Burma (type), Thailand, Laos, Vietnam, Cambodia.

*Occurrence in Thailand* : It is the commonest *Bauhinia* in the Northern and Central part of the country; but not found on the peninsula.

It is a polymorphous species showing variation in leaf size and in the size of the bracts. Particularly in the dry savannas of Central Thailand, e.g. around Tak an ecotype with relatively large bracts is found. We have collected a large number of specimens all over its distribution area and found continuous variation in those characters. We are not able to maintain Craib's *B. helferi*. In this connection it should be mentioned that Helfer's Tenasserim plant 1893 mentioned by Craib, Fl. Siam. En. 1:522. 1928, does not belong here but to *B. similis* as it lacks the tubular outgrowths from the disc, a character not found in any other Thai *Bauhinia*, than *B. bracteata*.

7. *Bauhinia concreta* Craib, Kew Bull. 1928:63.

*Distribution* : Endemic to Thailand only known from the type collection: Surat (Ban Kop Kaep). It is related to *B. curtisii* Prain. Fruits are unknown; a collection with pods from Phangnga: Haniff & Nur 4005 may belong here but more material is necessary to elucidate the nature of this taxon.

8. *Bauhinia curtisii* Prain, Journ. Asiat. Soc. Beng. 66 (2):195. 1897. —*B. calcicola* Craib, Kew Bull. 1927:387. —*Lasiobema curtisii* (Prain) de Wit, Reinwardtia 3:424. 1956.

*Distribution*: Mainly Thailand and adjacent provinces of Malaysia (type from Langkawi).

*Occurrence in Thailand*: Probably found all over the country, particularly along margin of clearings in evergreen forests.

The indumentum varies from greyish to brownish.

9. *Bauhinia glabrifolia* (Benth.) Baker in Hook. fil., Fl. Br. Ind. 2: 281. 1878. — *Phanera glabrifolia* Benth. in Pl. Jungh. 263. 1852.

subsp. *sericea* (Lace) K. & S. Larsen comb. nov.; Basionym: *B. sericea* Lace, Kew Bull. 1915: 400. — *B. prabangensis* Gagnep., Not. Syst. 2: 279. 1912.

*Distribution*: Burma (type), Thailand, Laos.

*Occurrence in Thailand*: Only once collected in the Kanchanaburi province (Sangkhla).

We cannot agree with de Wit (l.c.) that *B. piperifolia* Roxb. and *B. havilandii* Merr. are conspecific with *B. glabrifolia*.

10. *Bauhinia glauca* (Wall. ex Benth.) Benth., Fl. Hongk. 99. 1861. — *Phanera glauca* Wall. ex Benth. in Pl. Jungh. 265. 1852. — *B. tenuiflora* Watt. ex C.B. Clarke, J. Linn. Soc. Lond. (Bot.) 25: 8. 1889. — *B. viridiflora* Bl. ex Miq., Fl. Ind. bat. 1(1): 68. 1855. — *B. polysperma* Pierre ex Gagnep., Not. Syst. 2: 177. 1912. — *B. hupehana* Craib in Sargent, Pl. Wils. 2: 89. 1914. — *B. caterviiflora* Chen, J. Arn. Arb. 19: 129. 1938. — *P. tenuiflora* (Watt ex C.B. Clarke) de Wit, Reinwardtia 3: 490. 1956.

a. subsp. *glauca*

*Distribution*: From India (Khasya), Burma (type), China (Yunnan) throughout the Indo-Chinese peninsula to Indonesia.

*Occurrence in Thailand*: The typical subsp. seems in Thailand to have a southern distribution, mainly on the peninsula.

b. subsp. *tenuiflora* (Watt ex C.B. Clarke) K. & S. Larsen comb. nov.; Basionym: *B. tenuiflora* Watt ex C.B. Clarke, l.c. — *B. polysperma* Pierre ex Gagnep., l.c. — *B. caterviiflora* Chen, l.c. — *Phanera tenuiflora* (Watt ex C.B. Clarke) de Wit, l.c.



*Distribution*: Burma (Manipur, type) N. & Central Thailand, Laos.

*Occurrence in Thailand*: Widely distributed in the northern and central parts of the country up to high altitudes. In the Chanthaburi-area intermediate forms between the two subspecies seem to occur. *B. hupehana* Craib from Hupeh, Hunan and Seczuan also belongs here and may be another taxon of subspecific rank; it is closest to subsp. *tenuiflora* but a study of more Chinese material would be necessary before taking a final decision.

11. *Bauhinia harmsiana* Hoss., Fedde Rep. Nov. Sp. 4: 290. 1907. —*B. media* Craib, Kew Bull. 1927: 389.

var. *harmsiana*

*Distribution*: Endemic to Thailand where it is found from the Northern and Central parts down to Sam Roi Yot at Prachuap Khiri Khan. It is a relative of *B. scandens* but certainly a distinct species.

var. *media* (Craib) K. & S. Larsen *comb. nov.*; Basionym: *B. media* Craib, l.c.

*Distribution*: Endemic to Thailand. Only known from the type locality.

We cannot maintain this as a distinct species, but find that it is reasonable to keep it as a variety on account of its larger flowers, and slightly longer receptacle, petioles and pedicels.

12. *Bauhinia hirsuta* Weinm., Syll. Pl. Nov. ratisb. 2: 9. 1826. —*B. mollissima* Wall. sensu Ridl., Fl. Mal. Pen. 1. 626. 1922 p p. —*B. acuminata* Linn. var. *hirsuta* Craib, Fl. Siam. En. 1: 516. 1928.

*Distribution*: From Yunnan throughout the Indo-Chinese peninsula to Java (type).

*Occurrence in Thailand*: Scattered all over the country. In the drier central areas a small-leaved race is found; it is certainly not more than a local ecotype.

It is a distinct species related to *B. acuminata*.

13. *Bauhinia integrifolia* Roxb., Hort Beng. 90. 1814 nom. nud; Fl. Ind. Carey ed., 2: 331. 1832. —*B. holosericea* Ridl., J. Asiat. Soc. Str. Br. 75:

182. 1917. —*B. flammifera* Ridl., J. Asiat. Soc. Str. Br. 82: 182. 1920.  
—*Phanera integrifolia* (Roxb.) Benth. in Pl. Jungh. 263: 1852.

subsp. *integrifolia*

*Distribution*: Malay Peninsula (type from Penang).

*Occurrence in Thailand*: Common on the peninsula with northern limit at the Isthmus of Kra.

*Bauhinia pierrei* Gagnep. mentioned by de Wit (l.c.) as synonym of *B. integrifolia* is certainly a distinct species occurring Northeast of Thailand (not found in Thailand as said by de Wit).

14. *Bauhinia involuclata* Kurz, J. Asiat. Soc. Beng, 42: 72. 1873, incl. var. *jaeckelii* K. Larsen, Nat. Hist. Bull. Siam. Soc. 22: 271. 1968. —*Phanera involuclata* (Kurz) de Wit, Reinwardtia 3: 471. 1956.

*Distribution*. Along the Tenasserin Range from Burma (type) to Thailand.

*Occurrence in Thailand*: On limestone hills from the Kanchanaburi province to Prachuap Khiri Khan (Sam Roi Yot).

The var. *jaeckelii* K. Larsen cannot be maintained. After a closer study of the whole genus in nature, it has been found that stunted specimens from areas which are annually affected by surface fire remain shrub-like forming new branches without tendrils.

15. *Bauhinia lakhonensis* Gagnep., Not. Syst. 2: 173. 1912. —*B. sepiis* Craib, Kew Bull. 1927: 390.

*Distribution*: Vietnam, Laos (type) and adjacent provinces of Thailand.

*Occurrence in Thailand*: Only found in the Northeastern provinces in dry savanna vegetation.

It is related to *B. corymbosa* Roxb.

16. *Bauhinia malabarica* Roxb., Hort. Beng. 31. 1814, nom. nud.; Fl. Ind. ed. Carey 321. 1832. —*B. acida* Reinw. ex Korth., Verk. Nat. Gesch. Bot. 86: 1841. —*B. tomentosa* Blanco, Fl. Filip. 330. 1837. —*B. castrata* Hassk., Flora 25 (Beibl.): 96. 1842. —*B. platyphylla* Zip. ex Miq., Fl. Ind. bat. 1: 73. 1855. —*B. rugulosa* Bl. ex Miq., l.c. —*Casparea castrata*



Hassk., Pl. jav. rar. 412. 1848. —*Piliostigma acidum* (Reinw. ex Korth.) Benth. in Pl. Jungh. 261. 1852. —*P. malabaricum* (Roxb.) Benth., l.c., incl. var. *acidum* (Korth.) de Wit, l.c.

*Distribution*: Bicentric. Northern hemisphere: from India (type) through Burma, Thailand, Laos, Cambodia and Vietnam to the Philippines; Southern hemisphere: in Indonesia from Java to Timor.

*Occurrence in Thailand*: From the Northern part of the country down to a line from Kanchanaburi to Trat.

Two varieties are sometimes distinguished var. *malabarica* and var. *acida*. They are mainly separated by the hairiness of the lower surface of the leaves. There is, however, in the Thai material a continuous variation from glabrous to densely hairy leaf-undersides; thus the material from the dry deciduous forest in the Central and Northern plains are densely hairy, but a clinal variation is found in the material, for which reason we do not think it is reasonable to make a taxonomic separation. The pod is often described as indehiscent but in some herbarium sheets it seems to be dehiscent.

It is a characteristic species of the open dry deciduous dipterocarp forests on lateritic soil at low altitudes.

17. *Bauhinia monandra* Kurz, J. Asiat. Soc. Beng. 42 (2): 73. 1873. —*B. richardiana* Voigt, Hort. suburb. Calcutta 225. 1845 (non DC.). —*B. kappleri* Sagot, Ann. Sci. nat. (Bot.) 4, 13: 317. 1882. —*B. krugii* Urb., Ber. deutsch. bot. Ges. 3: 83. 1885. —*Caspariopsis monandra* (Kurz) Br. & Rose in N. Am. Fl. 23: 217. 1930.

*Distribution*: Origin unknown (type from Burma). Cultivated throughout the tropics.

18. *Bauhinia ornata* Kurz, J. Asiat. Soc. Beng. 42 (2): 72. 1873. —*B. kerrii* Gagnep., Not. Syst. 2: 173. 1912, incl. var. *grandiflora* Craib, Kew Bull. 1924: 93. —*B. subumbellata* Pierre ex Gagnep., Not. Syst. 2: 180. 1912.

*Distribution*: Burma (type), Thailand, Laos, Tonkin.

*Occurrence in Thailand*: A northern species found in mountain forests down to Phrae, Nan and Chaiyaphum.

It is a polymorphous species related to the Indian *B. vahlii* Wight & Arn. We have excluded the Hainan specimens quoted by Chen,

Lingn. Sc. J. **18**: 481. 1939 as these may prove to represent a separate taxon. *B. eberhardtii* Gagnep. described from Tonkin may on the other hand be conspecific with *B. ornata*; so far, however, we have not seen sufficient material to be able to take a final decision.

19. *Bauhinia penicilliloba* Pierre ex Gagnep., Not. Syst. **2**: 177. 1912, incl. var. *harmandiana* Gagnep. in Fl. gén. I.—C. **2**: 142. 1913.

*Distribution*: Eastern Thailand and adjacent Laos (type) and Cambodia.

*Occurrence in Thailand*: Only found in the Northeastern provinces down to Chaiyaphum and Ubon Ratchathani.

It is a characteristic species of the poorest and driest dipterocarp forests and open thorny savannas where it often occurs as a low stunted shrub on account of the annual surface fires. We see no reason to maintain the var. *harmandiana*.

20. *Bauhinia pottsii* G. Don, Gen. Syst. 462. 1832. —*B. elongata* Korth., Verh. nat. Gesch. Bot. **89**, pl. 24. 1841. —*B. mollissima* Wall., Cat. No. 5782. —*B. subsessilis* Craib, Kew Bull. 1927: 392. —*B. decipiens* Craib, Kew Bull. 1927: 388. —*Phanera elongata* Benth. in Pl. Jungh. 262. 1852, —*P. speciosa* Blume ex Miq., Fl. Ind. bat. **1**: 61. 1855.

a. var. *pottsii*

*Distribution*: From Southern Burma throughout the Malay Peninsula (type).

*Occurrence in Thailand*: Only known from the peninsula: Takua Pa (Ao Luek), Waeng.

b. var. *elongata* (Korth.) de Wit, Reinwardtia **3**: 404. 1956. —*B. elongata* Korth., l.c. —*Phanera speciosa* Bl. ex Miq., l.c.

*Distribution*: From Southern Thailand throughout the Malay Peninsula, Sumatra, Java, Borneo (type) to the Sunda Islands.

*Occurrence in Thailand*: Also a peninsular variety from Phuket (?), Trang, Songkhla and Terutao (?).

c. var. *subsessilis* (Craib) de Wit, l.c. —*B. subsessilis* Craib, l.c.

*Distribution*: Southeastern and Peninsular Thailand to Perlis. Type from Koh Chang.



*Occurrence in Thailand*: Chanhaburi and Trat provinces and on the islands in the Koh Chang archipelago. On the peninsula from Chumphon and Surat Thani.

d. var. *decipiens* (Craib) K. & S. Larsen, *comb. nov.*; Basionym: *B. decipiens* Craib, Kew Bull. 1927: 388.

*Distribution*: Endemic to the Trat province in Thailand (type from Bo Rai).

This species including its 4 varieties is the only Indo-Chinese species which has tetrad pollen, a character which it shares with the closely related Indian *B. phoenicea* Heyne. Among 250 *Bauhinia* species studied by the second author these 2 are unique in this character.

All 4 varieties belong to the evergreen forests where they become large lianas. In pioneer vegetation it often occurs as a low shrub.

21. *Bauhinia prainiana* Craib, Kew Bull. 1924: 93 — *B. polycarpa* Wall. ex. Benth. var. *kurzii* Prain, J. Asiat. Soc. Beng. 66 (2): 495. 1897.

*Distribution*: Burma (type) to N. Thailand.

*Occurrence in Thailand*: Only once collected near Tak. It shows some resemblance to *B. viridescens*.

22. *Bauhinia pulla* Craib, Kew Bull. 1927: 390.

*Distribution*: Endemic to Northern, Central and Southeastern Thailand, southwards to Prachuap Khiri Khan (Sam Roi Yot, Huey Yang and Nong Khae). It is common in the margin of forests and along waysides.

We have noticed a wide and continuous variation of hairiness in the vegetative parts from totally glabrous leaves to leaves pubescent on the lower surface, even in a mature state. This last feature is normal for plants from the driest areas, a tendency noticed in several species; we regard it as an eco-type and do not treat it taxonomically. A parallel variation is observed with regard to the hairiness of the twigs.

23. *Bauhinia purpurea* Linn., Sp. Pl. 375. 1753. — *B. coromandeliana* DC., Prod. 2: 515. 1825. — *B. triandra* Roxb., Fl. Ind. Carey ed. 2: 320. 1832. — *B. castrata* Blanco, Fl. Filip. 331. 1837. — *Phanera purpurea* Benth. in Pl. Jungh. 1: 262. 1852.

*Distribution*: Cultivated throughout the tropics (Neotype from Philippines); originating from S.E. Asia.

Some authors have described varieties based on shape and colour of the petals; we regard these as normal features in old cultivated species and do not think they need taxonomic attention.

24. *Bauhinia racemosa* Lamk., Encycl. Méth. 1 : 390. 1783. —*B. spicata* Koenig Wall. Cat. No. 5789. —*B. parviflora* Vahl, Symb. Bot. 3 : 55. 1794. —*Piliostigma racemosa* Benth. in Pl. Jungh. 262. 1852.

*Distribution*: From Northeast India (type) through Burma and Yunnan to Thailand. Also cultivated.

*Occurrence in Thailand*: From the northern provinces (Nakhon Sawan, Lamphun and Lampang) eastwards to Chaiyaphum.

It is restricted to the driest lowland dipterocarp forests.

25. *Bauhinia ridleyi* Prain, J. Asiat. Soc. Beng. 66 (2) : 185 : 1897. —*Phanera dasycarpa* Miq. var. *ridleyi* (Prain) de Wit, Reinwardtia 3 : 450. 1956.

*Distribution*: An endemism from northern Malaysia (Penang (type), Perak, Kelantan and Kedah).

*Occurrence in Thailand*: Only once collected very near the Malaysian frontier (Waeng).

26. *Bauhinia saccocalyx* Pierre, Fl. For. Cochinch. tab. 400, fig. B. 1899.

*Distribution*: Thailand, Laos (type).

*Occurrence in Thailand*: Common in the driest central areas from a line Kanchanaburi-Lampang eastwards to the Korat plateau and Laos. In open dipterocarp forest it often occurs as a characteristic-species. It has an upper limit of about 500 m up in the mountain. It seems to have an ecology different from *B. malabarica* as they have never by us been found growing together. Where one dominates the other is missing. Further soil studies are necessary to solve this problem.

27. *Bauhinia scandens* Linn., Sp. Pl. 344. 1753 (non Roxb., nec Blanco). —*B. anguina* Roxb., Hort. Beng. 31. 1814 nom. nud. —*B. debilis* Hassk., Tijdschr. Nat. Gesch. Phys. 10 : 149. 1843. —*Phanera debilis* (Hassk.) Miq.,



Fl. Ind. bat. 1 (1) : 69. 1855. —*P. scandens* (Linn.) Rafin., Sylv. Tell. 122. 1838. —*P. bifoliata* Miq., l.c. —*Lasiobema anguinum* (Roxb.) Korth. ex Miq., Fl. Ind. bat. 1 (1) : 71. 1855.

var. *horsfieldii* (Watt ex Prain) K. & S. Larsen, *comb. nov.*; Basionym : *Bauhinia anguina* var. *horsfieldii* Watt ex Prain, J. Asiat. Soc. Beng. 66 (2) : 194. 1897. —*Lasiobema horsfieldii* Miq., Fl. Ind. bat. 1 (1) : 71. 1855. —*B. horsfieldii* (Miq.) Macbr., Contrib. Gray Herb. 2, No. 59 : 23. 1919.

*Distribution* : Bicentric. Northern hemisphere : Thailand, Vietnam, Cambodia, Laos; southern hemisphere : Java (type).

*Occurrence in Thailand* : The northern limit is south of the dry central plateau from Kanchanaburi, Ayuthaya, Saraburi and Nakhon Ratchasima down to Phangnga in the peninsula. It is a giant climber mainly restricted to the dry evergreen forests often forming "monkey-ladders"; sometimes also occurring in mixed deciduous forests.

28. *Bauhinia similis* Craib, Kew Bull. 1927 : 391. —*Phanera similis* (Craib) de Wit, Reinwardtia 3 : 471. 1956.

*Distribution* : Southern Burma, Thailand (type) to Cambodia.

*Occurrence in Thailand* : Scattered from the northern provinces (Phrae, Loei) southwards to Kanchanaburi and Saraburi. It is found in dry deciduous forests at low altitude, predominantly on limestone.

We have chosen *Kerr 10007* as the holotype (ABD), *Marcan 1860* is a syntype with a somewhat larger receptacle.

29. *Bauhinia strychnifolia* Craib, Kew Bull. 1924 : 95, incl. var. *pubescens* Craib, l.c.

*Distribution* : Endemic to Thailand. It is locally abundant in the northern dry areas from Chiang Mai and Lampang to Tak, Kamphaeng Phet and Nakhon Sawan. In many localities it burns down every year during the dry season's surface fires and becomes a prostrate shrub; in more sheltered environment it may become a fairly tall climber. There seems no reason to maintain var. *pubescens* Craib.

30. *Bauhinia tomentosa* Linn., Sp. Pl. 375. 1753. —*B. pubescens* DC., Mem. 13. Leg. 483. 1825.

*Distribution.* Cultivated throughout the tropics; originating from S.E. Asia (neotype: Bogor, cult.).

31. *Bauhinia tubicalyx* Craib, Kew Bull. 1928: 64.

*Distribution:* Endemic to Thailand. A very local endemism found on limestone outcrops in evergreen forests from Krabi (Ao Luek) on the west side of the peninsula and near Surat Thani on the east side.

32. *Bauhinia variegata* Linn., Sp. Pl. 375. 1753. —*B. candida* Ait., Hort. Kew. 2:49. 1789. —*Phanera variegata* (Linn.) Benth. in Pl. Jungh. 2:262. 1852.

*Distribution:* Cultivated throughout the tropics; probably a native of China (type India).

33. *Bauhinia viridescens* Desv., Ann. Sc. Nat. 9:425. 1826. —*B. timorana* Decaisne, Nouv. Ann. Mus. Paris 3:466. 1834. —*B. tenuis* Spanoghe, Linnaea 15:202. 1841, in syn. —*B. timorensis* Decaisne ex Baker in Hook. fil., Fl. Br. Ind. 2:276. 1878. —*B. polycarpa* Wall. ex Benth. in Pl. Jungh. 261. 1852.

*Distribution:* Bicentric. Northern hemisphere: Burma, Thailand, Laos, Vietnam, Cambodia; southern hemisphere: Timor (type) and Wetar.

*Occurrence in Thailand:* Frequent all over except on the peninsula from where it has not yet been collected.

It is a species growing in bamboo thickets and among shrubs in the dipterocarp and teak forests. Most records are from limestone areas but there are also collections from sandstone areas.

34. *Bauhinia winitii* Craib, Kew Bull., 1924: 95.

*Distribution:* Endemic to Thailand. It is only found in dry savannas and in thorny scrub between Kanchanaburi and Saraburi provinces. It seems to be restricted to limestone.



35. *Bauhinia yunnanensis* Franchet, Pl. Delav. 190. 1890. —*B. diptera* Coll. & Hemsl., J. Linn. Soc. 28: 52. 1890, nom. nud.; Prain, J. Asiat. Soc. Beng. 66 (2): 501. 1897 (non Bl. ex Miq.). —*B. collettii* Prain, l.c. in nota.

*Distribution*: From Yunnan (type) and Szechuan to Burma and N. Thailand.

*Occurrence in Thailand*: Only found near Chiang Mai and Lamphun.

Flower size varies to some extent; thus the Thai specimens and particularly some Yunnan collections have considerably larger flowers than the type specimen.

### 3. DISTRIBUTIONAL TYPES

Of the 35 *Bauhinia* species occurring in Thailand 30 are indigenous, 5 are cultivated. Below we have divided the species according to their distributional type.

#### 1. Cultivated species:

*B. acuminata*, *B. monandra*, *B. purpurea*, *B. tomentosa* and *B. variegata*.

#### 2. Widespread Malaysian—Indo-Chinese species:

*B. hirsuta*.

#### 3. Northern species:

*B. brachycarpa*, *B. bracteata*, *B. glabrifolia*, *B. lakhonensis*, *B. ornata*, *B. prainiana*, *B. racemosa*, *B. similis*, *B. yunnanensis*, *B. glauca* subsp. *tenuiflora*.

Some of these species are restricted to the extreme North, others are widespread as far south as the central plain; but they all belong to the deciduous monsoon forests.

#### 4. Southern species:

*B. bidentata* subsp. *bicornuta*\*, *B. binata*, *B. glauca* subsp. *glauca*\*, *B. integrifolia* subsp. *integrifolia*, *B. pottsii* (4 varieties), *B. ridleyi*\*.

Some of these taxa marked with an asterisk are strictly peninsular, others also occur in the evergreen forests of the Chanthaburi area where similar environmental conditions are found.

**4. Endemic species :****a. Widespread endemisms.***B. harmsiana.***b. Central endemisms (some also occurring in adjacent areas of Burma (B), Laos (L) and Cambodia (C). *B. involucellata* (B), *B. penicilliloba* (C, L), *B. pulla*, *B. saccocalyx* (L), *B. similis*, *B. strychnifolia*, *B. winitii* (B, C).****c. Southern endemisms.***B. concreta*, *B. tubicalyx*.**5. Bicentric species :**

Occurring in the moonsoon area of the Indo-Chinese peninsula and under corresponding climatic conditions in Indonesia, e.g. on Java.

*B. malabarica*, *B. scandens* var. *horsfieldii* and *B. viridescens*.



## Index to names

An asterisk indicates new combinations. Synonyms are in *italics*.

<i>Bauhinia acida</i>	12	<i>gracilipes</i>	8
<i>acuminata</i>	4, 7, 11, 19	<i>harmandiana</i>	9
<i>acuminata</i> var. <i>hirsuta</i>	11	<i>harmsiana</i>	5, 11, 19
<i>anguina</i>	16	<i>harmsiana</i> var. <i>harmsiana</i>	5, 11
<i>bassacensis</i>	5, 7	* <i>harmsiana</i> var. <i>media</i>	1, 5, 11
<i>bidentata</i>	1, 8	<i>havilandii</i>	10
* <i>bidentata</i> subsp. <i>bicornuta</i>		<i>helpferi</i>	9
	1, 6, 8, 19	<i>hirsuta</i>	4, 11, 19
<i>binata</i>	5, 8, 19	<i>holosericea</i>	11
<i>blancoi</i>	8	<i>hookeri</i> var. <i>puberula</i>	8
<i>brachycarpa</i>	4, 8, 19	<i>horsfieldii</i>	17
<i>bracteata</i>	6, 7, 9, 19, 9	<i>hupehana</i>	10, 11
<i>bracteata</i> var. <i>marcanii</i>	9	<i>integrifolia</i>	6, 11, 12, 19
<i>brevifolia</i>	8	<i>involutellata</i>	6, 12, 19
<i>calcicola</i>	9	<i>involutellata</i> var. <i>jaeckelii</i>	12
<i>candida</i>	7, 18	<i>kappleri</i>	13
<i>castrata</i> Blanco	15	<i>kerrii</i>	13
<i>castrata</i> Hassk.	12	<i>kerrii</i> var. <i>grandiflora</i>	13
<i>caterviflora</i>	10	<i>kingii</i>	8
<i>collettii</i>	18	<i>krugii</i>	13
<i>concreta</i>	5, 9, 19	<i>lakhonensis</i>	6, 12, 19
<i>cornifolia</i>	8	<i>malabarica</i>	4, 12, 16, 19
<i>coromandeliana</i>	15	<i>media</i>	11
<i>corymbosa</i>	12	<i>mollissima</i> Ridl.	11
<i>curtisii</i>	5, 6, 9	<i>mollissima</i> Wall.	14
<i>debilis</i>	16	<i>monandra</i>	4, 13, 19
<i>decepiens</i>	14, 15	<i>monticola</i>	8
<i>densiflora</i>	9	<i>ornata</i>	6, 13, 14, 19
<i>detergens</i>	7	<i>parviflora</i>	16
<i>diphylla</i>	8	<i>penicilliloba</i>	1, 6, 14, 19
<i>diptera</i>	18	<i>penicilliloba</i> var. <i>harmandiana</i>	14
<i>eberhardtii</i>	14	<i>phoenicea</i>	15
<i>elongata</i>	14	<i>pierrei</i>	12
<i>emarginata</i> Jack	8	<i>pimata</i>	8
<i>enigmatica</i> Prain	8	<i>piperifolia</i>	10
<i>faberi</i>	9	<i>platyphylla</i>	12
<i>flammifera</i>	12	<i>polycarpa</i>	18
<i>glabrifolia</i>	1, 10, 19	<i>polycarpa</i> var. <i>kurzii</i>	15
* <i>glabrifolia</i> subsp. <i>sericea</i>	1, 6, 10	<i>polysperma</i>	10
<i>glauc</i>	6, 10	<i>pottsii</i>	5, 14, 19
<i>glauc</i> subsp. <i>glauc</i>	6, 10, 19	* var. <i>decepiens</i>	1, 5, 15
* <i>glauc</i> subsp. <i>tenuiflora</i>		,, <i>elongata</i>	5, 14
	1, 6, 10, 11, 19	,, <i>pottsii</i>	5, 14
		,, <i>subsessilis</i>	5, 14

## Bauhinia

<i>prabangensis</i>	10	<i>viridescens</i>	4, 15, 18, 19
<i>prainiana</i>	4, 15, 19	<i>viridiflora</i> Backer	7
<i>pubescens</i>	17	<i>viridiflora</i> Bl. ex Miq.	10
<i>pulla</i>	6, 15, 19	<i>winitii</i>	5, 18, 19
<i>purpurea</i>	4, 15, 19	<i>yunnanensis</i>	6, 18, 19
<i>racemosa</i>	4, 16, 19	<i>Casparea castrata</i>	12
<i>richardiana</i>	13	<i>Caspariopsis monandra</i>	13
<i>ridleyi</i>	1, 6, 16, 19	<i>Lasiobema anguinum</i>	17
<i>rugulosa</i>	12	<i>curtisii</i>	9
<i>saccocalyx</i>	4, 9, 16, 19	<i>horsfieldii</i>	17
<i>sanitwongsei</i>	7	<i>Lysiphylum binatum</i>	8
<i>scandens</i>	11, 16	<i>Phanera bassacensis</i>	7
* <i>scandens</i> var. <i>horsfieldii</i>	1, 5, 17, 19	<i>bicornuta</i>	8
<i>scortechinii</i>	8	<i>bidentata</i>	8
<i>serpis</i>	12	<i>bidentata</i> subsp. <i>bidentata</i>	8
<i>sericea</i>	10	<i>bifoliata</i>	17
<i>similis</i>	6, 17, 19	<i>blancoi</i>	8
<i>spicata</i>	16	<i>bracteata</i>	9
<i>strychnifolia</i>	5, 17, 19	<i>complicata</i>	8
<i>strychnifolia</i> var. <i>pubescens</i>	17	<i>dasycarpa</i> var. <i>ridleyi</i>	16
<i>subsessilis</i>	14	<i>debilis</i>	16
<i>subumbellata</i>	13	<i>elongata</i>	14
<i>sulphurea</i>	7	<i>glabrifolia</i>	10
<i>tenuiflora</i>	10	<i>glauca</i>	10
<i>tenuis</i>	18	<i>involutellata</i>	12
<i>timorana</i>	18	<i>integrifolia</i>	12
<i>timorensis</i>	18	<i>purpurea</i>	15
<i>tomentosa</i> Blanco	12	<i>scandens</i>	17
<i>tomentosa</i> Linn.	4, 17, 19	<i>similis</i>	17
<i>tomentosa</i> Naves	7	<i>speciosa</i>	14
<i>triandra</i>	15	<i>tenuiflora</i>	10
<i>tubicalyx</i>	5, 18, 19	<i>variegata</i>	18
<i>unguiculata</i>	9	<i>Piliostigma acidum</i>	13
<i>vahlII</i>	13	<i>malabaricum</i>	13
<i>variegata</i>	4, 18, 19	<i>malabaricum</i> var. <i>acidum</i>	13
		<i>racemosa</i>	16