## CHAPTER IV

## RESULTS

Preliminary taxonomic study of Argyreia Lour. in Thailand was carried out between May 2001 to February 2003. There were 27 species and one variety. Descriptions, key to species and illustrations were provided.


#### Abstract

ARGYREIA Lour. Fl. Coch. 134. 1790; C.B. Clarke in Fl. Br. Ind. 4: 184. 1885; Kurz., For. Fl. Burma 2: 211. 1877; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 272. 1915; Ridl., Fl. Malay Penins. 2: 448. 1923; Ooststr., Blumea 5: 352. 1943, 5: 686. 1945, 6: 337. 1947, 7: 171. 1952; Hoogland in Blumea 7: 179. 1952; Ooststr. in Fl. Mal. s. 1.1 (4): 494. 1953; Backer \& Bakh.f., Fl. Jaya 2: 497. 1965; D.F. Austin \& Ghaz. in Fl. W. Pakistan 126:3. 1976; Gandhi in Fl. Hassan District. 464. 1978; D.F. Austin in Fl. Ceylon 1: 292. 1980; M.S. Khan, Fl. Bangladesh 30: 4. 1985; R.C. Fang \& Staples in Fl. China 16: 313. 1995; Grierson \& D.G. Long in Fl. Bhutan 2 (2): 838. 1999. —Lettsomia Roxb., Fl. Ind. ed.; Kurz, For. Fl. Burma 2: 216. 1877; C.B. Clarke in Fl. Br. Ind. 4: 191. 1885; Ridl., Fl. Malay Penins. 2: 449. 1923.


Mostly are woody climber, rarely scandent or shrubs, stem terete, angular or furrowed, hairy or glabrescent. Leaves simple, alternate, subchartaceous, chartaceous or subcoriaceous, apex, retuse, obtuse, acute, acuminate, cuspidate, mucronulate or mucronate; base obtuse, cordate, round, cuneate, attenuate or truncate, margin entire rarely undulate and slightly recurved; upper surface glabrous, glabrescent or densely hair, lower surface densely hair rarely glabrescent; lateral nerve beneath prominent someone slightly raise or grooved, secondary vein distinct or indistinct; petiole long rarely short or none, stipule absent. Inflorescences axillary or terminal, cymose, few to many - flowered, loose or compact to capitate. Bracts minute or large, hairy ouside, glabrous inside, caducous or persistent. Sepals 5, linear, lanceolate, elliptic, ovate, obovate, orbicular, triangular or oblong variable in shape and size, mostly entire rarely undulate or decurved, mostly hairy outside glabrous inside rarely glabrous on both side sometimes much enlarged in fruit. Corolla regular, fleshy or delicate papyraceous, campanulate, funnelform or tubular, flowers large, medium sized or small, radial symmetry, purple, red, pink or white; limb nearly entire or very
shortly lobed or deeply lobed, midpetaline bands mostly hairy outside and glabrous inside sometimes corolla glabrous. Stamens 5, not equal, inserted on the corolla tube, included or exserted; filaments filiform, often dilated and hairy at the base rarely glabrous; pollen globular, spinulose. Disk annular or cupular, entire or shallowly 5 lobed. Ovary 2 - or 4 - celled, 4 - ovuled, glabrous; style 1, simple, filliform, included or exserted; stigma biglobular. Fruit globose or subglobose; fleshy, leathery, or mealy berry, purplish, red, orange, or yellowish. Seeds 4 or less, strong and glabrous.

## Key to species

1. Corolla lobe entire or shallowly lobe, stamens and styles included.
2. Corolla glabrous rarely glabrescent.
3. Sepals glabrous or sparsely pilose.
4. Sepals elliptic-ovate, lanceolate, foliar bracts ovate to cordate.

## 2. A. breviscapa

4. Sepals ovate, broadly obovate to orbicular, bracts elliptic-oblong, elliptic-lanceolate or lanceolate.
5. Leaves blade cordate to orbicular, sepals ovate, lateral nerves 7-9 pairs.

## 5. A. collinsae

5. Leaves blade ovate or ovate-lanceolate, sepals broadly obovate to orbicular, lateral nerves, 14-16 pairs.
6. A. sp. 1
7. Sepals densely hairs outside, glabrous inside.
8. Stems with whitish pubescent, leaves blade cordate, ovate or ovatelanceolate.
9. A. kerrii
10. Stems with brown sparsely pilose, leaves blade elliptic, oblong-lanceolate or oblong-elliptic.
11. A. cf. laotica
12. Corolla densely hairs at midpetaline bands.
13. The corolla inside with long hairs at base.
14. A. capitiformis
15. The corolla inside glabrous at base.
16. Bracts persistent.
17. Leaves blade ovate, broadly ovate, cordate, to orbicular, base slightly cordate to deeply cordate, truncate or obtuse.
18. Stems with brown or fulvous hairs.
19. Internode $13.0-18.0 \mathrm{~cm}$ long, sepals unequal.
20. A. ionantha
21. Internode $4.0-5.5 \mathrm{~cm}$ long, sepals subequal.
22. A. versicolor
23. Stems with whitish or greyish hairs.
24. Bracts oblong or oblanceolate, $12-20$ by $2-3 \mathrm{~mm}$.
25. A. roxburghii
26. Bracts ovate, elliptic or ovate-elliptic, 2.5-5.0 by $1.2-1.8 \mathrm{~cm}$.
27. Inflorescence axillary, subcapitate cyme, ovary 2 -celled.
28. A. wallichii
29. Inflorescence axillary, lax cyme, ovary 4-celled.
30. A. nervosa
31. Leaves blade oblong-ovate, oblong-lanceolate, elliptic, oblong or obovate, base round or obtuse.
32. Sepals oblong-ovate, leaves blade oblong-ovate or oblonglanceolate, internode $8.0-8.5 \mathrm{~cm}$ long, lateral nerves 6-7 pairs
33. A. calcicola
34. Sepals elliptic or obovate, leaves blade elliptic, oblong or obovate, internode $1.0-3.0 \mathrm{~cm}$ long, lateral nerves 8-10 pairs.
35. A. mekongensis
36. Bracts caducous.
37. Leaves blade cordate nearly circular
38. A. maymyo
39. Leaves blade obovate ovate, ovate-lanceolate, lanceolate, elliptic, elliptic-oblong, oblong oblong-elliptic or linear.
40. Both side of leaves blade hairy.
41. Sepals linear-lanceolate, decurved, filaments glabrous at base.
42. A. adpressa
43. Sepals ovate, broadly ovate, elliptic to ellipticoblong, entire, filaments hairy at base.
44. Leaves blade lanceolate or linear.
45. A. stenophylla
46. Leaves blade elliptic, ovate-lanceolate or obovate.
47. A. obtecta
48. Upper surface of leaves glabrous or hairy on vein, lower surface hairy.
49. Sepals oblong or lanceolate, $14-16 \mathrm{~mm}$ long.

## 10. A. lanceolata

19. Sepals ovate-triangular, broadly ovate, elliptic, broadly elliptic, elliptic-oblong or ovate to round, less than 12 mm long.
20. Margin of sepals undulate.
21. A. splendens
22. Margin of sepals entire.
23. Peduncles 3-9 cm long, leaves subchartaceous. 7. A. henryi
24. Peduncles $1-2 \mathrm{~cm}$ long, leaves chartaceous or subcoriaceous.
25. Outer sepals ovate-triangular, ovary 2-celled, disk annular.
26. A. sp. 2
27. Outer sepals broadly elliptic, ovary 4-celled, disk cupular. 14. A. mollis
28. Corolla distinct 5-lobed, stamens and styles exserted.
29. Inflorescence axillary, capitate cyme.
30. A. osyrensis
31. Inflorescence axillary, lax cyme.
32. Leaves blade lanceolate, corolla narrow tubular-campanulate.
33. A. thorelii
34. Leaves blade ovate, broadly ovate to suborbicular, corolla funnelform.
35. Leaves broadly ovate to suborbicular, subcoriaceous, flowers white.
36. A. fulvocymosa var. fulvocymosa
37. Leaves ovate, chartaceous, flowers pale purple to
pinkish red.
38. Lateral nerves 6-9 pairs, filaments glabrous at base.
39. A. roseopurpurea
40. Lateral nerves $11-12$ pairs, filaments hairy at base.
41. A. sp. 3

Table 2. Species, Floristic Regions, Altitude Distribution and Flowering periods of Argyreia Lour. found in Thailand.

| SPECIES | FLORISTIC REGIONS |  |  |  |  |  |  | ALTITUDE <br> DISTRIBUTION | FLOWERING PERIODS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | N | NE | E | SW | C | SE | P |  |  |
| 1. A. adpressa (Choisy) Boerl. |  |  |  |  |  |  | * | 150-965 m | Jul. - Dec. |
| 2. A. breviscapa (Kerr) Ooststr. | * | * | * | * | * | * |  | 280-850 m | Jul. - Nev. |
| 3. A. calcicola (Kerr) Ooststr. |  | * |  | * | * |  |  | 100 m | Jun. |
| 4. A. capitiformis (Poir.) Ooststr. | * | * | * | * | * | * | * | $50-1,600 \mathrm{~m}$ | Jul. - Feb. |
| 5. A. collinsae (Craib) B. Na Songkhla \& P. Traiperm | * |  | * | * | * | * |  | 20-700 m | Sep.- Nov. |
| 6. A. fulvocymosa C. Y. Wu var. fulvocymosa | * | * |  |  | * |  |  | $725-1,650 \mathrm{~m}$ | Jul. - Dec. |
| 7. A. henryi (Craib) Craib | * |  |  | $=$ |  |  |  | 400-1,950 m | Sep.- Feb. |
| 8. A. ionantha (Kerr) C. Khunwasi \& P. Traiperm | * |  |  |  |  |  |  | 975-1,685 m | Sep. - Jan. |
| 9. A. kerrii Craib | * |  |  |  | - |  |  | $300-1,000 \mathrm{~m}$ | Aug. - Nev. |
| 10. A. lanceolata Choisy | * | * | * |  | - | * |  | $300-1,280 \mathrm{~m}$ | Jun. - Nov. |
| 11. Argyreia cf. laotica Gagnep. |  |  | * |  | $\checkmark$ |  |  | 300 m | Sep. - Nov. |
| 12. A. maymyo (W. W. Smith) Raizada | * |  |  | * |  |  |  | 1000-1,500 m | Nov. - Jan. |
| 13. A. mekongensis Gagnep. et Courchet | * | * |  |  |  | * |  | 50 m | Jun. - Sep. |
| 14. A. mollis (Burm. f.) Choisy | * | * | 3 |  |  |  |  | $0-1,200 \mathrm{~m}$ | Sep. - Mar. |
| 15. A. nervosa (Burm. f. ) Boj. |  |  |  |  | Cul | ivat |  |  | Apr. - Sep. |
| 16. A. obtecta C. B. Clarke | * | * | * | * | * | * | * | 300-1,200 m | Aug. - Jan. |
| 17. A. osyrensis (Roth) Choisy | * | * | * | * | * | * | * | $200-800 \mathrm{~m}$ | Oct. - Mar. |
| 18. A. roseopurpurea (Kerr) Ooststr. จชาลงกร | 1.2 | 1 | 。 | 8 | ธ |  | * | 100-700 m | Jan. |
| 19. A. roxburghii Choisy | * |  |  |  |  | * |  | 400 m | Jul. - Dec. |
| 20. A. splendens (Hornem.) Sweet | * | * |  |  |  |  |  | 200-1,500 m | Sep. - Feb. |
| 21. A. stenophylla (Kerr) Staples \& P. Traiperm | * |  |  | * |  |  |  | 700 m | Nov. |
| 22. A. thorelii Gagnep. |  |  | * |  |  |  |  | 250 m | Jul. - Nov. |
| 23. A. versicolor (Kerr) Staples \& P. Traiperm |  | * | * |  |  | * |  | 100 m | Oct. - Dec. |
| 24. A. wallichii Choisy | * |  |  | * |  |  |  | $420-1,450 \mathrm{~m}$ | Oct. - Nov. |
| 25. Argyreia sp. 1 |  |  |  | * |  |  |  | 650 m | Aug. - Nov. |
| 26. Argyreia sp. 2 | * |  |  |  |  |  |  | $1,250 \mathrm{~m}$ | Aug. - Sep. |
| 27. Argyreia sp. 3 | * |  |  |  |  |  |  | $1,250 \mathrm{~m}$ | Sep. - Dec. |

N: NORTHERN, NE: NORTH-ESTERN, E: EASTERN, SW: SOUTH-WESTERN, C: CENTRAL, SE: SOUTH-EASTERN, PEN: PENINSULAR.

1. Argyreia adpressa (Choisy) Boerl., Handl. Fl. Ned. Ind. 2: 513. 1899; Ooststr., Blumea 5: 367. 1943; Hoogland in Blumea 7: 182. 1952. -Convolvulus adpressus Wall. \{Cat. no 1424, nom. nud.\} 1828. -Moorcroftia adpressa Choisy, Mém. Soc. Phys. Genève 6: 431. 1833. —Lettsomia adpressa Miq., Fl. Ind. Bat. 2: 591. 1857; C.B. Clarke in Fl. Br. Ind. 4: 196. 1883; Ooststr. in Fl. Mal. 1(4): 501. 1953; Kerr in Fl. Siam. En. 3(2): 27. 1954. -Fig. 2., Plate 1. a-b.

Woody climber, stems terete, young parts brown pilose to hirsute, later glabrescent and dark brown, internode $2-4 \mathrm{~cm}$. Leaves ovate, elliptic or elliptic oblong, $8.0-12.0$ by $3.5-7.0 \mathrm{~cm}$, apex acute or obtuse, base obtuse or slightly cordate, margin entire or rarely undulate, chartaceous; densely brown setulose or stigose on both sides or upper surface more sparsely strigillose; lateral nerves 4 - 6 pairs on each side of midrib, parallel, straight but curved at the margin, prominent beneath, petiole $2-4 \mathrm{~cm}$ long. Inflorescences axillary, lax cyme, 5-to 7 - flowered. Peduncles $2.0-5.5 \mathrm{~cm}$, hairy like the young parts. Pedicels $6-8 \mathrm{~mm}$, hirsute. Bracts linear - lanceolate, acute or obtuse, ca. 1 cm , hirsute outside, caducous. Sepals unequal decurved, 3 outer sepals linear - lanceolate, acute $11-12 \mathrm{~cm}$ long, hirsute outside, glabrescent inside; 2 inner sepals shorter, ca. 1 cm , lanceolate, gradually attenuate towards the apex. Corolla delicate papyraceous, funnelform to campanulate, $3.0-3.5 \mathrm{~cm}$ long, white with reddish purple inside corolla tube; limb entire to shallowly lobe; midpetaline bands with long patent hairs outside, the corolla inside glabrous between their base. Stamens and style included; filaments glabrous. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2 - celled. Fruit subglobose, $8-10 \mathrm{~mm}$ in diameter, black or brownish black, 2 seed. Seeds 6-7 mm long, black.

Thailand.- PENINSULAR : Phuket, Nakhon Si Thammarat, Trang, Songkhla, Pattani.

Distribution.- India, Malaysia, Sumatra (type, Penang) (Kerr, 1954 and van Ooststroom, 1953).

Ecology.- In thickets and thin forests. Altitude from 150 to 965 m . Flowering in July - December.

Vernacular.-
Specimens examined.- P. Traiperm 32 (BCU); P. Traiperm 38 (BCU); A.F.G. Kerr 7429 (BK); J.F. Maxwell 84-116 (BKF, PSU), 86-6 (BKF); K.

Iwatsuki et al. T-8527 (BKF); M Tagawa et al. T-4639 (BKF); R.C. Bakhuizen s.n. (BKF); Sanan 975 (BKF).



Figure 2. Argyreia adpressa (Choisy) Boerl.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
2. Argyreia breviscapa (Kerr) Ooststr., Blumea 7: 178. 1952. -Lettsomia breviscapa Kerr in Kew Bull. 1941: 13. 1941; Kerr in Fl. Siam. En. 3(2): 29. 1954. -Fig. 3., Plate 1. c-d.

Twiner, stems terete with brown adpressed pubescent, internode $4-14 \mathrm{~cm}$ long. Leaves ovate, elliptic or oblong-elliptic, $10.0-16.0$ by $2.5-5.5 \mathrm{~cm}$; apex acute to acuminate, base slightly cordate, acute or round, margin indistinctly undulate; chartaceous; densely white hair on both sides, lateral nerves 7-14 pairs on each side of midrib, prominent beneath, petiole $10-30 \mathrm{~mm}$, slender, pubescent. Inflorescences axillary, subcapitate cyme, 2-to 9-flowered. Peduncles 4-15 mm long, with brown pubescent. Pedicels $5-8 \mathrm{~mm}$ long, sparsely hairs. Outer bracts foliar, ovate to cordate, apex acuminate, base truncate or cordate, reddish pink, sometime with red veins more prominent on outer surface, $2.0-2.8$ by $4.0-4.5 \mathrm{~cm}$, inner bracts ovate, smaller than bracts, all of bracts pubescent. Sepals subequal, elliptic - ovate, lanceolate $0.6-0.8$ by $1.8-2.2 \mathrm{~cm}$, apex acute, base round or truncate, glabrous to sparsely appressed pilose. Corolla delicate papyraceous, campanulate, ca. 5 cm long, white, limb entire or shallowly lobe, glabrous,. Stamens and style included, base dilated with strigose hairs. Disk cupular, shallowly 5-lobed. Ovary glabrous, near to 25 mm in height, 2-celled, style 22 mm long. Fruit subglobose, $10-12 \mathrm{~mm}$ in diameter, black or brownish black, 2 seed. Seeds 6-6.5 mm long, black.

Thailand.- NORTHERN : Nakhon Sawan; NORTH-EASTERN : Loei, Sakon Nakhon, Nakhon Phanom; EASTERN : Chaiyaphum; SOUTH-WESTERN : Phetchaburi; CENTRAL : Nakhon Nayok; SOUTH-EASTERN : Sa Kaeo.

Distribution.- Thailand (type!).
Ecology.- At edge of scrub and deciduous forest. Altitude from 280 to 850 m . Flowering in July - November.

Vernacular.- Thao fa ra ngap (เถาฟ้าระงับ : Nakhon Sawan).
Specimens examined.- P. Traiperm 3 (BCU); P. Traiperm 19 (BCU); P. Traiperm 24 (BCU); S. Chantana-orapin 2 (BCU); Kasin 447 (BK); P. Sangkhachand 228 (BK); Pradit 397 (BK); Put 4045 (BK); G. Murata et al. T-50547 (BKF); S. Suddee 123 (BKF); S. Suddee 143 (BKF).


Figure 3. Argyreia breviscapa (Kerr) Ooststr.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section); g. fruit; h. seed.
3. Argyreia calcicola (Kerr) Ooststr. in Blumea, 7: 178. 1952. - Lettsomia calcicola Kerr in Kew Bull.1941:14. 1941; Kerr in Fl. Siam. En. 3 (2): 29. 1954. -Fig. 4., Plate 1. e-f.

Plant twiner, stem terete, densely brown appressed tomentose, internode ca. $8.0-8.5 \mathrm{~cm}$ long. Leaves oblong - ovate or oblong - lanceolate, $4.0-4.5$ by 1.5 1.7 cm , apex acute or obtuse, base round; margin entire, chartaceous; upper surface moderately brown hirsute, lower surface densely brown tomentose, lateral nerves 6 7 pairs on each side of midrib, lightly prominent beneath, petiole $8-10 \mathrm{~mm}$ long, brown pubescent. Inflorescense axillary, subcapitate, several flowered. Peduncles short $2-3 \mathrm{~mm}$ long. with brown appressed hairs. Pedicels short and hairy. Bracts ovate, apex acute, $1.5-2.3$ by $0.9-1.7 \mathrm{~cm}$, outside brown pubescent, inside glabrous, persistent. Sepals subequal, oblong-ovate, apex acute to acuminate, entire, outside brown appressed hairs, inside glabrous. Corolla subcampanulate, ca. 3.5 cm long, white, limb shallowly 5 -lobed, midpetaline band brown hirsute. Stamens and style include; filaments dilated and pilose at base. Ovary glabrous. Fruit not seen.

Thailand.- NORTH-EASTERN: Phetchabun; SOUTH-WESTERN : Kanchanaburi, Ratchaburi; CENTRAL: Lopburi.

Distribution.- Thailand (type!).
Ecology.- In open deciduous forest on rocky limestone hill. Altitude ca. 100 m . Flowering in June.

## Vernacular.-

Specimens examined.- Adisai Chantananuruk 780 (BK); A.F.G. Kerr 19658 (BK) Isotype; G. Staples 319 (BKF); G. Staples \& Th. Wathaniyakun 313 (BKF); T. Smitinand s.n. (BKF).


Figure 4. Argyreia calcicola (Kerr) Ooststr.: a. branch; b. inflorescence; c. variation of leaves: Drawn from type specimen: Kerr 19658.
4. Argyreia capitiformis (Poir.) Ooststr. in Fl. Mal. 1(6): 941. 1972; M.S. Khan, Fl. Bangladesh 30: 6. 1985; R.C. Fang \& Staples in Fl. China 16: 317. 1995; Grierson \& D.G. Long in Fl. Bhutan 2 (2): 843. 1999. -Convolvulus capitiformis Poir. in Lamk, Encycl. Suppl. 3: 469. 1814. -Convolvulus capitatus Vahl, Symb. Bot. 3: 28. 1794. —Lettsomia strigosa Roxb., Fl. Ind. ed. Carey \& Wall. 2: 80. 1824. —Ipomoea trichotosa Bl. Bijdr. 717. 1825. - Argyreia capitata (Vahl) Choisy, Mém. Soc. Phys. Genève 6: 423. 1833; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 277. 1915; Ooststr. in Blumea 5: 184. 1952, in Fl. Mal. 1 (4): 502. 1953; Backer \& Bakh.f., Fl. Java 2: 498. 1965. —Lettsomia capitata Miq., Fl. Ind. Bat. 2: 591. 1857; Kerr in Fl. Siam. En. 3 (2): 30. 1954. -Lettsomia pequensis C.B. Clarke in Hook.f., Fl. Ind. 4: 193. 1883. —Rivea capitata Hallier f., Med. Rijksherb. Leiden 1: 26. 1911. -Lettsomia capitiformis (Poir.) Kerr in Fl. Siam. En. 3 (2):30. 1954. -Fig. 5-6., Plate 2.

Large twiner, stems with white milky juice and spreading patently brown or fulvous hirsute, sometime appressed - pilose with softly hairs, internode 8-14 cm. Leaves broadly ovate, ovate - lanceolate, cordate to orbicular 9-18 by 6-12 cm, acuminate to long acuminate, base deeply cordate; margin entire, chartaceous, densely fulvous patent hairs or appressed hairs on both side; lateral nerves $15-18$ pairs on each side of midrib, prominent beneath; petiole $4-9 \mathrm{~cm}$ long, mostly patently hirsute, occasionally tomentulose hairs. Inflorescences axillary cymes, capitate to lax cyme, several flowers. Peduncles $5-20 \mathrm{~cm}$ long, brown or fulvous hirsute, sometime appressed hirsute. Pedicels short ca. 2-3 mm or absent, hairy. Outer bracts ovate, inner bracts oblong - lanceolate, $18-22 \mathrm{~mm}$ long, acute or obtuse at the apex, densely brown hirsute outside, glabrous inside, persistent or caducous. Sepals subequal, entire, densely fulvous hirsute outside, glabrous inside, 3 outer sepals ovate - oblong, 13 - 17 cm long, 2 inner sepals elliptic or elliptic - oblong, $10-14 \mathrm{~mm}$ long. Corolla delicate papyraceous, funnelform, $4.0-5.5 \mathrm{~cm}$ long, reddish pink inside, whitish outside, limb entire or shallowly lobed, fulvous hirsute at midpetaline bands outside, the corolla inside with long hairs at bases. Stamens and style included; filaments dilated and hairy at base. Disk annular, nearly entire. Ovary glabrous, 2 celled. Fruit globose, 8 mm in diameter, reddish or brownish, 4 - seeded. Seeds $5-6$ mm long, greyish, glabrous.

Thailand.- NORTHERN : Mae Hong Son, Chiang Mai, Chiang Rai, Lampang, Phrae, Tak, Phitsanulok, Nakhon Sawan; NORTH-EASTERN : Loei, Sakon Nakhon, Khon Kaen; EASTERN : Chaiyaphum, Nakhon Ratchasima, Yasothon, Ubon Ratchathani; SOUTH-WESTERN : Kanchanaburi, Prachuap Khiri Khan; CENTRAL : Saraburi, Nakhon Pathom, Nakhon Nayok; SOUTH-EASTERN : Prachin Buri, Chon Buri, Chanthaburi, Trat; PEninsular : Surat Thani, Phangnga, Krabi, Trang, Songkhla, Yala.

Distribution.- India, Ceylon, Bangladesh, Bhutan, Burma, China, Laos, Cambodia, Vietnam, Malaysia, Sumatra, Java. (van Ooststroom, 1953 and Fang \& Staples, 1995)

Ecology.- In open forest, thickets, secondary forest, edges of forests, along roadsides. Altitude from sea level upto $1,600 \mathrm{~m}$. Flowering in July - February.

Vernacular.- Fon saen ha (ฝนแสนห่า: Chanthaburi), Chingcho luang (จิงจ้อหลวง : Prachuap Khiri Khan), Dulan (ดูลาน: Yala), Yan khon (ย่านขน : Songkhla), En khon (เอ็นขน : Surat Thani).

Used.- The leaves are used externally for treating trauma.(Fang \& Staples, 1995)

Specimens examined.- P. Traiperm 10 ( BCU ); P. Traiperm 11 (BCU); P. Traiperm 12 (BCU); P. Traiperm 18 (BCU); P. Traiperm 19 (BCU); P. Traiperm 23 (BCU); P. Traiperm 50 (BCU); A.F.G. Kerr 4859 (BK); A.F.G. Kerr 10101 (BK); A.F.G. Kerr 11267 (BK); A.F.G. Kerr 13567 (BK); A.F.G. Kerr 16790 (BK); A.F.G. Kerr 20644 (BK); C. Cheremsirivathana 252 (BK); J.F. Maxwell 71642 (BK); J.F. Maxwell 73-505 (BK); J.F. Maxwell 75-151 (BK); M.C. Lakshnakara 490 (BK); Pradit 510 (BK), 652 (BK); P. Sangkhachand 74 (BK); P. Sangkhachand 74635 (BK); Put 1370 (BK); Put 2153 (BK); Put 3669 (BK); S. Sutheesorn 43 (BK); S. Sutheesorn 394 (BK); S. Sutheesorn 2842 (BK); Sanit 4 (BK); Umpai 286 (BK); A. Mauric 21 (BKF); Adithep 78 (BKF); A.F.G. Kerr 4859 (BKF); C.F. van Beusekom et al. 3692 (BKF); Chitr 126 (BKF); C.P. 3155 (BKF); G. Murata et al. T-42995 (BKF); G. Murata et al. 43090 (BKF); G. Murata et al. 51109 (BKF); G. Staples \& C. Promdej 235 (BKF); G. Staples \& C. Promdej 259 (BKF); G. Staples \& C. Promdej 265 (BKF); G. Staples \& S. Khao - iam \& T. 420 (BKF); G. Staples \& Th. Wathaniyakun 276 (BKF); G. Staples \& Th. Wongprasert 153 (BKF); G. Staples \& Th. Wongprasert 155 (BKF); G. Staples \& Th. Wongprasert 159 (BKF); G. Staples \&

Th. Wongprasert 220 (BKF); G. Staples \& Th. Wongprasert 227 (BKF); G. Staples \& Th. Wongprasert 270 (BKF); G. Staples \& Th. Wongprasert 354 (BKF); G. Staples \& Th. Wongprasert 369 (BKF); G. Staples \& Th. Wongprasert 389 (BKF); H. Koyama et al. T-30815 (BKF); H. Koyama et al. T-48948 (BKF); Hamilton \& Congdon 87 (BKF); J.F. Maxwell 84-510 (BKF); J.F. Maxwell 88-1208 (BKF); J.F. Maxwell 941201 (BKF); J.F. Maxwell 97-1454 (BKF); L.E. Garcia 421 (BKF); P. Suvarnakoses 221 (BKF); P.P. \& T. Ch. 441 (BKF);R. Geesink et al. 7719 (BKF); S. Phusomsaeng 2 (BKF); T. Shimizu et al. T-19169 (BKF); Th. Santisuk et al. s.n. (BKF); Th. Wongprasert s.n. (BKF); Th. Wongprasert \& H. Lachomphu 408 (BKF); J.F. Maxwell 93-1517 (CMU); J.F. Maxwell 94-221 (CMU); J.F. Maxwell 94-84 (CMU); J.F. Maxwell 96-1507 (CMU); J.F. Maxwell 97-1453 (CMU); M. Panatkool 444 (CMU); Kulchalee Thongisan 28 (CMU); P. Sirirugsa 750 (PSU); Thidarat Noiraksar 33 (PSU); BGO. Staff 18 (QSBG); S. Sasrirat 182 (QSBG); W. Pongamornkul 609 (QSBG).

This species is vary in degree of inflorescence and bracts, so in this thesis can be divided into 3 form.

Form 1. Inflorescence capitate cyme, bracts persistent. Fig. 5a.
Form 2. Inflorescence lax cyme, bracts persistent. Fig. 6a.
Form 3. Inflorescence lax cyme, bracts caducous. Fig. 6b.


Figure 5. Argyreia capitiformis (Poir.) Ooststr.: a. branch; b. bracts; c. sepals; d. opened corolla with stamens; e. pistil; f. ovary (x-section).


Figure 6. Argyreia capitiformis (Poir.) Ooststr.: variation of inflorescence; a. inflorescence form $2 ; b$. inflorescence form 3.
5. Argyreia collinsae (Craib) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.). Rivea collinsae Craib in Kew Bull. 1916: 266. 1916. —Lettsomia collinsae (Craib) Kerr in Kew Bull. 1941: 15. 1941; in Fl. Siam. En. 3 (2): 31. 1954. -Fig. 7., Plate 3. a-c.

Large woody climber with brown hairs; young stems herbaceous, whitish green or whitish yellow pubescent, internode $8-14 \mathrm{~cm}$. Leaves cordate to orbicular $5.0-8.5$ by $4.0-6.0 \mathrm{~cm}$; apex-acute, base cordate, margin entire or slightly undulated, subchartaceous, upper surface and lower surface with appressed hair; lateral nerves 7-9 pairs on each side of midrib, prominent beneath; petiole 25-35 mm, hirsute. Inflorescences axillary, lax cyme, 3-to 5 - flowered. Peduncles 15-20 mm long, appressed pilose. Pedicels $5-15 \mathrm{~mm}$ long, slightly pubescent. Bracts elliptic-oblong, acute, $20-25$ by $6-7 \mathrm{~mm}$; reddish green, margin undulate-entire, slightly pilose, caducous. Sepals subequal in length, entire, glabrous and enlarge in fruit, 2 outer sepals ovate, apex truncate, 3 outer sepals slightly larger and longer than outer. Corolla fleshy campanulate, 2.5-4.5 cm long, white, limb entire or shallowly lobed, pinkish purple, midpetaline bands purple, glabrous. Stamens and style included, base dilated with whitish hairs. Disk cupular, nearly entire. Ovary sunken in disk, glabrous, 2 - celled. Fruit ca. 13 mm in diameter, dark red, 4 - seeds. Seeds 11 -12 mm long, dark brown, glabrous.

Thailand.- NORTHERN : Nakhon Sawan; EASTERN : Nakhon Ratchasima; SOUTH-WESTERN : Kanchanaburi, Ratchaburi, Phetchaburi, Prachuap Khiri Khan; CENTRAL : Krung Thep Maha Nakhon (Bangkok); south-EASTERN : Prachin Buri, Chonburi.

Distribution.- Thailand.
Ecology.- In open sandy scrub, rocky limestone. Altitude from sea level upto 700 m . Flowering in September - November.

Vernacular.- Ching cho (จิงโจ้ : Bangkok), Ching chaw (จิงจ้อ : Nakhon Sawan), Dawk krasawp (ดอกกระสอบ : Prachuap Khiri Khan).

Specimens examined.- $P$. Traiperm 5 (BCU); P. Traiperm 13 (BCU); P. Traiperm 49 (CMU); C. Khunwasi 21 (BCU); C. Khunwasi 31 (BCU); C.

Khunwasi 32 (BCU); A.F.G. Kerr 2149 (BK); Mrs. D.J. Collins 53 (BK); H.M. Burkill s.n. (BKF); Winit 405 (BKF).



Figure 7. Argyreia collinsae (Craib) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.).: a. branch; b. bract; c. sepals; d. stamen; e. pistil.
6. Argyreia fulvocymosa C.Y. Wu var. fulvocymosa in Rep. Stud. Pl. Trop. Subtrop. Yunnan 1: 135. 1965; R.C. Fang \& Staples in Fl. China 16: 321. 1995. Fig. 8., Plate 3. d-f.

Large climber, with dense yellowish tomentose, woody at the base, stems, terete, younger branches brownish green, internode $5-18 \mathrm{~cm}$ or more. Leaves broadly ovate to suborbicular, $12-15$ by $8-12 \mathrm{~cm}$ long or more, apex acute with mucronate, rarely retuse; base shallowly cordate sometime round; margin entire; subcoriaceous; upper surface slightly yellowish tomentose, lower surface densely whitish yellow pubescent; lateral nerves 10 - 14 pairs on each side of midrib, prominent beneath, on upper surface, furrowed, petiole $3-12 \mathrm{~cm}$ long, terete, densely yellowish pubescent. Inflorescences axillary, lax cymes, up to 40 - flowered. Peduncles $1.5-8.0 \mathrm{~cm}$ long, terete, yellowish tomentose. Pedicels short, ca. 8 mm , angular. Bracts ovate, apex acute, base round, ca. 5 mm long, densely yellowish tomentose, caducous. Sepals unequal, entire, 2 outer sepals ovate larger than inner ones, $6.0-7.0$ by $4.0-$ 5.5 mm , apex round, base round, densely pubescent; 3 inner sepals ovate with yellow to brown tomentum. Corolla delicate papyraceous, funnelform ca. 2 cm long, white, limb deeply 5 - lobed, midpetaline bands densely yellowish hirsute, the corolla inside glabrous at base. Stamens and style exserted. Filaments slightly dilated and pilose at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2-celled. Fruit subglobose 4 - 5 mm in diameter blackish brown, 4 seeds. Seeds 2-3 mm long black, glabrous.

Thailand.- NORTHERNK: Tak, Nhitsanulok; NORTH-EASTERN : Phetchabun, Loei; CENTRAL : Nakhon Nayok.

Distribution.- China: Yunnan.(Fang \& Staples, 1995)
Ecology.- In deciduous forest, along roadside. Altitude from 725 to 1,650 m . Flowering in July - December.

Vernacular.-
Specimens examined.- P. Traiperm 26 (BCU); Herb Tr. 1134 (BCU); J.F. Maxwell 01-390 (BCU); Umpai (BK); H. Takahashi \& MN. Tamura T63458 (BKF); T. Shimizu et al. T-11676 (BKF); T. Shimizu et al. 11320 (BKF); T. Shimizu et al. 11321 (BKF).


Figure 8. Argyreia fulvocymosa C.Y. Wu var. fulvocymosa: a. branch; b. young flower; c. bract; d. sepal; e. opened corolla with stamens; f. stamen; g. pistil; h. ovary (l-section); i ovary (x-section).
7. Argyreia henryi (Craib) Craib in Kew Bull. 1914: 9. 1914; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 284. 1915; R.C. Fang \& Staples in Fl. China 16: 316. 1995. Ipomoea henryi Craib in Kew Bull. 1911: 423. 1911. —Lettsomia henryi (Craib) Kerr in Fl. Siam. En. 3 (2): 32. 1954. -Fig. 9., Plate 4. a-c.

Shurbs scandent, woody, stems angular, moderately minute setose, internode 3 - 15 cm . Leaves ovate-lanceolate, $14-20$ by 6-7 cm, apex acute to obtuse, base round to shallowly cordate; margin entire; subchartaceous; upper surface glabrous or slightly setose on midrib, lower surface densely brown appressed setose, lateral nerves 8 - 10 pairs on each side of midrib, on the lower surface prominent; petiole 2 6 cm long, sparsely appressed hispid. Inflorescences axillary, lax cymes. Peduncles 3 - 9 cm long, angular, moderately minute setose. Pedicels short, 5-10 mm long, moderately minute setose. Bracts caducous. Sepals subequal, entire, outside appressed hirsute, inside a sparsely hirsute, 2 outer sepals ovate - triangular $4-7$ by 4 mm, apex obtuse, 3 inner sepals broadly ovate, apex round. Corolla delicate papyraceous, funnelform, $3.5-5.0 \mathrm{~cm}$ long, pink with purple throat, outside white, limb shallowly 5 - lobed, midpetaline bands densely yellowish hirsute, the corolla inside glabrous at base. Stamens and style included; filaments villous at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2-celled. Fruit 8-9 mm in diameter, globose., dark red, 4-seeded. Seeds 5-6 mm long, dark brown, glabrous.

Thailand.- NORTHERN : Mae Hong Son, Chiang Mai, Chiang Rai, Nan, Lamphun, Lampang.

Distribution.-Yunnan. (Fang \& Staples, 1995)
Ecolog y.- On tree in open forest in valleys, thickets, forest margins. Altitude from 400 to $1,950 \mathrm{~m}$. Flowering in September - February.

Vernacular.- Khruea phu (เครือพู: General).
Specimens examined.- P. Traiperm 49 (BCU); Herb. Trip. 317 (BCU); A.F.G. Kerr 1489 (BK); A.F.G. Kerr 2773 (BK); P. Sangkhachand 183 (BK); Y. Paisooksantiwatana y369-80 (BK,CMU); C.F. van Beusekom et al. 2529 (BKF); Garrett 1038 (BKF); G. Staples, S. Khao - iam \&T. 422 (BKF); H. Koyama T-39198 (BKF); H. Koyama T-39891 (BKF); H. Koyama T-62190 (BKF); H. Koyama \& C. Phengklai T-40029 (BKF); H. Koyama et al. T-32292 (BKF); H. Koyama T-32348
(BKF); H. Koyama T-32359 (BKF); J.F. Maxwell 01-101 (BKF); J.F. Maxwell 871371 (BKF); J.F. Maxwell 88-101 (BKF); J.F. Maxwell 95- 638 (BKF); J.F. Maxwell 96-1378 (BKF, CMU); J.F. Maxwell 97-1556 (BKF, CMU); M. Tagawa et al. T10498 (BKF); P. Palee 426 (BKF); T. Santisuk 8610 (BKF); T. Shimizu et al. T19202 (BKF); T. Shimizu et al. T-19278 (BKF); T. Shimizu et al. 19284 (BKF); T. Shimizu et al. 19375 (BKF); T. Shimizu et al. 20638 (BKF); W.N. 306 (BKF); J.F. Maxwell 01-81 (CMU); J.F. Maxwell 93-10 (CMU); J.F. Maxwell 93-90 (CMU); J.F. Maxwell 93-1386 (CMU); J.F. Maxwell 93-1566 (CMU); J.F. Maxwell 97-1208 (CMU); P. Palee 97-1208 (CMU); BGO. Staff 1964 (QSBG); BGO. Staff 5004 (QSBG); BGO. Staff 4-8-10-97 (QSBG); W. Nanakorn et al. 092 (QSBG); W. Nanakorn et al. 9704 (QSBG).



Figure 9. Argyreia henryi (Craib) Craib: a. branch; b. sepals; c. stamen; d. pistil; e. ovary (x-section); f. fruit.
8. Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.). Lettsomia ionantha Kerr in Kew Bull. 1941: 15. 1941; Kerr in Fl. Siam. En. 3 (2): 32. 1954. - Fig. 10., Plate 4. d-f.

Large twiner, stems terete, woody at base, younger parts densely brownish or fulvous pubescent, internode 13 - 18 cm long. Leaves cordate or broadly ovate, 9.0 13.5 by $8.5-14.0 \mathrm{~cm}$, acute to acuminate at the apex, deeply cordate at the base; margin entire; subchartaceous; silky setulose on the upper surface and densely fulvous pubescent on the lower surface; lateral nerves $7-9$ pairs on each side of midrib, prominent beneath; petiole $4-10 \mathrm{~cm}$ long, densely brown tomentose. Inflorescences axillary, subcapitate cymes, several flowers. Peduncles $1-2 \mathrm{~cm}$ long, densely brown tomentose. Pedicels $2-4 \mathrm{~mm}$ long, densely brown tomentose. Bracts oblonglanceolate or ovate - lanceolate, $15-25 \mathrm{~mm}$ long, apex acute or obtuse, slightly fulvous setose, persistent. Sepals unequal, entire, ovate - ellipic or elliptic - oblong, 6 -7 mm long, hairy outside, glabrous inside, 3 outer sepals, acuminate, fulvous hirsute, 2 inner sepals, acuminate, slightly fulvous hirsute. Corolla delicate papyraceous, campanulate, $4.5-5.0 \mathrm{~cm}$ long, whitish purple to pale purple outside, reddish pink in the throat of corolla tube, limb shallowly lobed, golden brown patently hirsute at midpetaline bands, the corolla inside glabrous at base. Stamens and style included; filaments hairy at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2 - celled. Fruit 5-6 mm in diameter, dark red, 4 -seeds. Seeds ca. 4 mm long, dark brown, glabrous.

Thailand.- NORTHERN : Mae Hong Son, Chiang Mai, Chiang Rai, Lamphun, Lampang, Phitsanulok, Nakhon Sawan.

Distribution.- Thailand (type!).
Ecology.- In open place, along roadside, climbing on small tree. Altitude from 975 to $1,685 \mathrm{~m}$. Flowering in September - January.

## Vernacular.-

Specimens examined.- P. Traiperm 27 (BCU); P. Traiperm 35 (BCU); Herb. Trip. 318 (BCU); J.F. Maxwell 88-79 (BKF); J.F. Maxwell 93-1315 (BKF, CMU); J.F. Maxwell 94-165 (BKF, CMU); J.F. Maxwell 96-1239 (BKF); J.F. Maxwell 96-1619 (BKF, CMU); J.F. Maxwell 97-1282 (BKF, CMU); H.B. G. Garrett 738 (BKF) Isotype; M. Tagawa et al. T-9495 (BKF); S.T. et al. 46 (BKF); T. Shimizu
et al. (BKF); J.F. Maxwell 01-652 (CMU); Martin van de Bult 123 (CMU); BGO. Staff 2384 (QSBG); BGO. Staff 2431 (QSBG); BGO. Staff 2478 (QSBG); W. Nanakorn et al. 2466 (QSBG); W. Nanakorn et al. 4760 (QSBG); W. Pongamornkul 330 (QSBG).



Figure 10. Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.): a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
9. Argyreia kerrii Craib in Kew Bull. 1911: 422. 1911; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 281. 1915; Craib in Contr. Fl. Siam. 55: 139. 1921. — Lettsomia kerrii (Craib) in Fl. Siam. En. 3 (2): 33. 1954. -Fig. 11., Plate 5 a-b.

Twiner or creeping, stems terete, young parts densely whitish pubescent, internode 8-12 cm. Leaves cordate, ovate or ovate - lanceolate, $8.0-15.0$ by $4.5-$ 10.0 cm , apex acute or shortly acuminate, base cordate; margin entire; chartaceous; upper surface cover with rigid hairs, lower surface densely whitish pubescents, lateral nerves 9-11 pairs on each side of midrib, prominent beneath; petiole $1.5-7.0 \mathrm{~cm}$ long, tomentose. Inflorescences axillary, lax cyme, several flowers. Peduncles 8 - 30 mm long, tomentose. Pedicels 3 - 15 mm long, tomentose. Bracts ovate - lanceolate, undulate, apex acuminate, $20-38 \mathrm{~mm}$ long, outside densely white tomentose, inside sparsely pubescents, persistent. Sepals subequal, ovate - oblong, apex obtuse, entire, 10-12 mm by 6-7 mm, glabrous inside, 2 outer sepals densely whitish pubescents, 3 inner sepals moderately pubescents. Corolla fleshy, campanulate, ca. 5 cm long, 2.5 -3.0 cm in diameter, dark purple; limb shallowly 5 - lobed, glabrous. Stamens and style included; filaments dilated and shortly pilose at base. Disk cupular, shallowly 5lobed. Ovary glabrous, 2 - celled. Fruit $8-9 \mathrm{~mm}$ in diameter, globose, young fruit bright light green, 4 - seeds. Seeds ca. 6 mm long, dark brown, glabrous.

Thailand.- NORTHERN: Chiang Mai, Lamphun, Lampang.
Distribution.-Thailand
Ecology.- In deciduous forest, on sandy soil in sunny place, climbing on the small tree. Altitude from 300 to $1,000 \mathrm{~m}$. Flowering in August - November.

Vernacular.- Khruea phu muang (เครือพูม่วง : Lamphun).
Specimens examined.- P. Traiperm 51 (BCU); P. Traiperm 53 (BCU); B. Na Songkhla 304 (CMU); Winit 1229 (BK); Winit 1907 (BK); P. Pooma 837 (BKF); T. Smitinand 7567 (BKF); Th. Sorensen et al. 4579 (BKF); Th. Wongprasert s.n. (BKF); Arom Phuakam 64 (CMU); J.F. Maxwell 00-431 (CMU); J.F. Maxwell 01-593 (CMU); J.F. Maxwell 96-1209 (CMU); J.F. Maxwell 96-1326 (CMU); P. Palee 380 (CMU); Phooritut Leeswut 322 (CMU); Prasuat Kongpanitkul 3 (CMU); Suthira Srapratet 49 (CMU); J.F. Maxwell 93-1078 (PSU); BGO. Staff

1545 (QSBG); BGO. Staff 5072 (QSBG); BGO. Staff 9688 (QSBG); Serm 114 (QSBG); W. Boonchai 6 (QSBG); W. Pongamornkul 346 (QSBG).



Figure 11. Argyreia kerrii Craib: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary ( x -section).
10. Argyreia lanceolata Choisy, Convolv. Or. :39. 1834; C.B. Clarke in Fl. Br. Ind. 4: 186. 1883; Brandis, Ind. Trees: 485. 1906; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 276. 1915. - Lettsomia lanceolata (Choisy) Craib in Fl. Siam. En. 3 (2): 33. 1954. — Fig. 12., Plate 5. c-d.

Twiner, stems slender, ca. 3 mm in diameter, sparsely appressed silvery hairs, internode 2-9 cm. Leaves lanceolate or elliptic-oblong, 6-17 by 2-7 cm, apex acute rarely acute to acuminate, base cuneate or obtuse; margin entire; chartaceous; upper surface glabrous, lower surface densely appressed argenteus hairs, lateral nerves 4-5 pairs on each side of midrib, prominent beneath; petiole $5-20 \mathrm{~mm}$ long, slender, slightly silky hairs. Inflorescences axillary, lax cymes, 2-7-flowered. Peduncles 2-5 mm long, terete, whitish pilose. Pedicels slender, 6-10 mm long. Bracts lanceolate, apex acuminate, up to 1.2 cm long, outside densely silky hairs, inside glabrous, caducous. Sepals unequal, oblong or lanceolate, entire, outside densely whitish or silvery tomentose, inside glabrous, 3 outer sepals $14-16$ by $4-5$ $\mathrm{mm}, 2$ inner sepals broadly, apex acuminate. Corolla delicate papyraceous, tubularcampanulate, $5-6 \mathrm{~cm}$ long, purple, tubular whitish purple, limb entire to slightly lobed, glabrous midpetaline bands densely whitish tomentose outside, inside glabrous, the corolla inside glabrous at base. Stamens and style included, filaments dilated and hairy at base. Disk annular, shallowly 5-lobed. Ovary glabrous, articulate near base, 2-celled. Fruit ca. $7-8 \mathrm{~mm}$ in diameter, subglobose. Seeds $3-4.5 \mathrm{~mm}$ long, glabrous.

Thailand.- NORTHERN : Chiang Mai, Lampang, Phitsanulok; NORTHEASTERN : Phetchabun, Loei, Sakon Nakhon, Kalasin, Khon Kaen; EASTERN : Nakhon Ratchasima, Buri Ram, Ubon Ratchatani; SOUTH-EASTERN : Chonburi.

Distribution.- India, Burma (type), Laos. (Kerr, 1954).
Ecology.- In dry deciduous forest, climbing on small shurbs and sandy soil or tall grasses. Altitude from 300 to $1,280 \mathrm{~m}$. Flowering in June - November.

Vernacular.- Thao kradueng chang (เถากระดึงช้าง: Nakhon Ratchasima)
Specimensexamined.- $P$. Traiperm 1 (BCU); P. Traiperm 8 (BCU); P. Traiperm 47 (BCU); Herb. Tr. 667 (18/5) (BCU); P. Sangkhachand 2068 (BK); Put 4260 (BK); S. Sutheesorn and P. Sangkhachand 3452 (BK); S. Sutheesorn and P.

Sangkhachand 3353 (BK); FTP 660 (BKF); G. Murata et al. T-37442 (BKF); H. Takahashi T-63211 (BKF); J.F. Maxwell 94-1071 (BKF); S. Suddee 8 (BKF); T. Smitinand 2007 (BKF); J.F. Maxwell 94-1071 (CMU); BGO. Staff 1619 (QSBG), S. Indhamusika 71 (QSBG); W. Nanakorn et al. 1656 (QSBG).



Figure 12. Argyreia lanceolata Choisy: a. branch; b. bracts; c. sepals; d. sepals and bracts; e. opened corolla with stamens; f. pistil; g. ovary (l-section); h. ovary (x-section).
11. Argyreia cf. laotica Gagnep. in Lec. Not. Syst. 3: 134. 1915; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 276. 1915. Fig. 13., Plate 5. e-f.

Plant twinner, stems terete, with brown sparsely pilose, internode ca. $2-8 \mathrm{~cm}$. Leave elliptic, oblong-lanceolate or oblong-elliptic, $6.0-11.0$ by $1.5-3.0 \mathrm{~cm}$, apex acute or slightly acuminate, base obtuse, attenuate; margin entire; chartaceous; appressed pilose hairs on both surface, lateral nerves $7-9$ pairs on each side of midrib, indistinct but main vein prominent beneath, petiole $5-8 \mathrm{~mm}$ long, terete, slightly appressed hirsute. Inflorescences axillary, subcapitate cymes, 2-9flowered. Peduncles 4-9 mm long, brown hirsute. Pedicels 3-9 mm long slightly pilose. Bracts elliptic - oblong, apex acute, base round, $1.5-2 \mathrm{~cm}$ long, yellowish brown pilose, persistent. Sepals unequal, lanceolate, ovate or oblong, apex acute, base round, entire, glabrous inside, 2 outer sepals $25-28$ by $5-6 \mathrm{~mm}$, densely patent golden brown hirsute, 3 inner sepals smaller, densely brown hirsute on the middle, margin glabrous. Corolla fleshy, campanulate, $5-6 \mathrm{~cm}$ long, white, limb shallowly lobed, outside glabrous or glabrescent, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Disk annular, margin entire. Ovary glabrous, 2-celled. Fruit subglobose, ca. 8 mm in diameter, brown, glabrous, 4 seeded. Seeds ca. 6 mm long, brownish yellow, glabrous.

Thailand.- EASTERN: Ubon Ratchatani.
Distribution.- Laos. (Gagnep. et Courchet, 1915)
Ecology.- In dry dipterocarp forest, climbing on shrub and small tree. Altitude from ca. 300 m . Flowering in August - September.

Vernacular.-
Specimens examined.- P. Traiperm 17 (BCU); P. Traiperm 29 (BCU).


Figure 13. Argyreia cf. laotica Gagnep.: a. branch; b. bract; c. sepals; d. opened corolla with stamens; e. stamen; f. pistil; g. ovary (x-section).
12. Argyreia maymyo (W.W. Smith) Raizada, Indian Forester 93: 754. 1967. -Lettsomia maymyo W.W. Smith, Rec. Bot. Surv. India 6: 38. 1914; Kerr in Fl. Siam. En. 3 (2): 34. 1954. -Fig. 14., Plate 6. a-b.

Climbers, stems herbaceous, woody at the base, terete, rarely whitish pilose or glabrescent, younger branches brownish green, internode $4-12 \mathrm{~cm}$. Leaves cordate nearly circular, $8-18$ by $8-14 \mathrm{~cm}$, apex acute or slightly acuminate sometime retuse or obtuse, base shallowly cordate; margin entire or slightly undulate; chartaceous; upper surface sparsely strigose on nerves, lower surface sparsely hirsute or glabrescent, lateral nerves $8-12$ pairs on each side of midrib, prominent beneath, petiole $3.5-15.0 \mathrm{~cm}$ long, appressed pilose. Inflorescences axillary, lax cymes, 9 20 - flowered. Peduncles $2-22 \mathrm{~cm}$ long, terete, whitish pilose. Pedicels short, 0.5 2.0 cm long, angular. Bracts linear, ea. 1 cm , slightly pilose, caducous. Sepals unqual, entire, 2 outer sepals ovate -oblong, 6.0 by $3.5-4.0 \mathrm{~mm}$, densely strigose; 2 inner sepals broadly ovate, densely appressed pilose on the middle, glabrous on margin, apex obtuse or acute. Corolla delicate papyraceous, funnelform $3.5-4.5 \mathrm{~cm}$ long, outside whitish purple, inside purple, limb entire to shallowly lobed, midpetaline bands densely whitish sericeous - pilose, the corolla inside glabrous at base. Stamens and style included; filamens dilated and hairy at base. Disk annular, margin entire. Ovary glabrous, articulate near base, 2 celled. Fruit $8-9 \mathrm{~mm}$ in diameter, dark red or brownish red, 4 - seeds. Seeds ca. 7 mm long, glabrous.

Thailand.- NORTHERN : Chiang Mai, Chiang Rai; SOUTH-WESTERN : Phetchaburi, Prachuap Khiri Khan.

Distribution.- Burma (type), Yunnan. (Kerr, 1954 and Fang \& Staples, 1995).

Ecology.- On bushes at edges of evergreen forest. Altitude from 1,000 to $1,500 \mathrm{~m}$. Flowering in November - January.

## Vernacular.-

Specimens examined.- P. Traiperm 14 (CMU); P. Traiperm 25 (CMU); A.F.G. Kerr 3324 (BK); J. Sadakorn 441 (BK); P. Sangkhachand 1158 (BK); Put 4260 (BK); Y. Paisooksantlvatana, J. Sadakorn and P. Penchitra y2237-88 (BK).


Figure 14. Argyreia maymyo (W.W. Smith) Raizada: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
13. Argyreia mekongensis Gagnep. et Courchet in Lec. Not. Syst. 3: 134. 1915;

Gagnep. et Courchet in Fl. Gén. I.-C. 4: 282. 1915. -Fig. 15., Plate 6. c-d.

Woody climber, up to 4 m , stem terete, densely yellowish brown appressed hairs, internode ca. $1-3 \mathrm{~cm}$ long. Leaves elliptic, oblong or obovate, $5.0-9.0$ by 2.5 -4.5 cm ; apex obtuse or acute, base obtuse; margin entire; chartaceous; upper surface densely brown tomentose; lower surface moderately golden brown hirsute; lateral nerves $8-10$ pairs on each side of midrib, prominent beneath, secondary vein indistinct, petiole $7-10 \mathrm{~mm}$ long, densely brown pilose. Inflorescences axillary cymes, subcapitate, 5-7 flowered. Peduncle $15-20 \mathrm{~mm}$ long, terete, appressed brown hairs. Pedicels $5-7 \mathrm{~mm}$ long, appressed brown hairs. Bracts elliptic, apex acute to acuminate, $12-20$ by $6-9 \mathrm{~mm}$, outside densely greyish brown tomentose, glabrous inside, persistent. Sepals subequal, entire, fulvous brown tomentulose outside, glabrous inside, 3 outer sepals elliptic, obtuse, 2 inner sepals obovate, round, tomentulose on the middle, glabrous on margin. Corolla funelform, $3.5-4.0 \mathrm{~cm}$ long, white, limb shallowly lobed; midpetaline bands with brown appressed pilose, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Ovary glabrous. Fruit not seen.

Thailand.- NORTHERN : Nakhon Sawan; NORTH-EASTERN : Udon Thani, Sakon Nakhon, Nakhon Phanom; SOUTH-EASTERN : Prachin Buri.

Distribution.- Loas (type), Vietnam. (Kerr, 1954).
Ecology.- In open deciduous forest. Altitude ca. 50 m . Flowering in June - September.

Vernacular.- Phung mu (พุงหมู : Sakhon Nakhon).
Specimens examined.- A.F.G. Kerr 19609 (BK, BKF); M.C. Lakshnakara 1022 (BK); Pradit 431 (BK); Put 3096 (BK).


Figure 15. Argyreia mekongensis Gagnep. et Courchet: a. branch; b. bracts; c. sepals; d. sepals and bract; e. variation of leaves.
14. Argyreia mollis (Burm. f.) Choisy, Mém. Soc. Phys. Genève 6: 421. 1833;Ridl., Fl. Malay. Penins. 449. 1923; Ooststr. in Blumea 5: 357. 1943; in Fl. Mal. 1 (4): 496. 1953; Backer \& Bakh.f., Fl. Java 2: 497. 1965; R.C. Fang \& Staples in Fl. China 16: 315. 1995. -Convolvulus mollis Burm. f., Fl. Ind. 44. 1768. - A. argentata Miq., Fl. Ind. Bat. 2: 588. 1857. - A. championi Benth. Prain in Nov. Ind. Add. Sp. Ind. Pl. 89. 1905. -Fig. 16., Plate 6. e-f.

Twiner, densely appressed silvery hairs or greyish white pilose, internode 4 15 cm . Leaves elliptic, oblong, oblong - elliptic, ovate - lanceolate rarely lanceolate, 9 - 17 by 3-7 cm; apex acute, base obtuse or acute, margin entire, chartaceous; upper surface glabrous; lower surface densely silyery white or pale fulvous hairs; lateral nerves 9-11 pairs on each side of midrib, prominent beneath; petiole $1.5-3.5 \mathrm{~cm}$, appressed-pilose. Inflorescences axillary, lax cymes, 3-to 4 - flowered. Peduncles $1.0-1.3 \mathrm{~cm}$ long, densely greyish white pilose. Pedicels $8-10 \mathrm{~mm}$ long, densely white greyish pilose. Bracts oyate, apex acute, outside densely appressed sericeous hairs, glabrous inside, caducous. Sepals unequal, entire, densely hairs outside, glabrous inside, 2 outer sepals subequal, broadly elliptic, apex round, $8-10$ by $5-7$ mm , densely appressed fulvous hairs, 3 inner sepals elliptic, $7-8 \mathrm{~mm}$, sparsely fulvous hairs. Corolla delicate papyraceous, funnelform, $4.5-5 \mathrm{~cm}$ long, purple or whitish pink outside, reddish pink inside; limb shallowly lobed; midpetaline bands with long appressed whitish hairs, the corolla inside glabrous at base. Stamens and style included; filaments dilated and slightly pilose at base. Disk cupular, shallowly 5lobed. Ovary glabrous, 4 - celled. Fruit not seen.

Thailand.- NORTHERN : Chiang Mai, Phayao, Lamphun, Lampang; NORTH-EASTERN : Phetchabun.

Distribution.- Burma, China, Malaysia, Sumatra, Java (van Ooststroom, 1953).

Ecology.- Altitude from 600 to $1,625 \mathrm{~m}$. Flowering in September - March.
Vernacular.- Khruea phu ngoen (เครือพูเงิน: Prachin Buri), Yan Tan (ย่าน ตาน: Songkhla).

Used.- All of parts used as eye drops for antiphlogistic. (ก่องกานดา, 2528)

Specimens examined.- P. Traiperm 39 (BCU); P. Traiperm 52 (BCU); B. Na Songkhla 572 (BCU); C.F. van Beusekom et al. 2308 (BKF); C. Phengklai \& T. Smitinand 6059 (BKF); G. Staples \& S. Khao-iam \& T. 421 (BKF); H.B.G. Garrett 713 (BKF); J.F. Maxwell 87-1185 (BKF); J.F. Maxwell 93-1312 (BKF, CMU); J.F. Maxwell 95-704 (BKF); J.F. Maxwell 97-1209 (BKF, CMU); J.F. Maxwell 97-1485 (BKF, CMU); J.K. Jackson 6194 (BKF); Kai Larsen \& Bartel Hansen 5132 (BKF); K. Bunchuai 1196 (BKF); K. Chayamarit \& C. Phatacharoen 709 (BKF); Khantchai 309 (BKF); Khantchai 728 (BKF); M. Tagawa et al. T-10497 (BKF); O. Petrmitr 156 (BKF); Plernchit 194 (BKF); Plernchit 3051 (BKF); P. Puudjaa 510 (BKF); Pradit 400 (BKF); P.S. 1528 (BKF); R. Pooma 650 (BKF); Sawradet 220 (BKF); TDBS 5132 (BKF); T. Smitinand 4933 (BKF); Vidal 5280 (BKF); Winit 810 (BKF); Winit 1499 (BKF); Arom Phuakam 92-713 (CMU); J.F. Maxwell 01-82 (CMU); J.F. Maxwell 92-582 (CMU); J.F. Maxwell 95-784 (CMU); J.F. Maxwell 97-267 (CMU); J.F. Maxwell 97-1149 (CMU); J.F. Maxwell 98-1247 (CMU); J.F. Maxwell 98-1248 (CMU); Kulchalee Thongisan 29 (CMU); M. Hara and M. Kanzaki B416 (CMU); M. Hara and Y. Okada D 736 (CMU); O. Petrmitr 156 (CMU); O. Petrmitr 274 (CMU); O. Petrmitr 350 (CMU); Raweewan Palee 6 (CMU); Wachiraporn Ponpanich 256 (CMU); BGO. Staff 2422 (QSBG); BGO. Staff 2428 (QSBG); BGO. Staff 4585 (QSBG); BGO. Staff 7944 (QSBG); W. Boonchai 23 (QSBG); W. Saemyarm 138 (QSBG).


Figure 16. Argyreia mollis (Burm. f.) Choisy: a. branch; b. sepals; c. stamen; d. pistil; e. ovary ( x -section).
15. Argyreia nervosa (Burm. f.) Boj., Hort. Maurit. 224: 1837; Ooststr. Blumea 5: 364. 1943; Hoogland in Blumea 7: 181. 1952; Ooststr. in Fl. Mal. 1 (4): 499. 1953; Kerr in Fl. Siam. En. 3 (2): 24. 1954; Backer \& Bakh.f., Fl. Java 2: 497. 1965; D.F. Austin \& Ghaz. in Fl. W. Pakistan 126: 4. 1976; D.F. Austin in Fl. Ceylon 1: 297. 1980; M.S. Khan, Fl. Bangladesh 30: 8. 1985. -Convolvulus nervosus Burm. f. in Fl. Ind. 20: 48. 1768. —Ipomoea speciosa (L. f.) Pres., Syn. Pl. 1: 183. 1805. Lettsomia nervosa (Burm. f.) Roxb., Fl. Ind. ed. Carey \& Wall. 2: 78. 1824. Argyreia speciosa (L. f.) Sweet, Hort. Br. 289. 1827; Trimen, Handb., Fl. Ceylon 3: 207. 1895; C.B. Clarke in Fl. Assam. 3: 342. 1939. -Rivea nervosa (Burm. f.) Hall. F., Bull. Herb. Boissier 5: 381. 1897. -Fig. 17., Plate 7. a-b.

Large climber, up to 10 m high, with milky juice, stems herbaceous toward the tips, woody at the base, robust, terete, densely minutely tomentose, whitish or greyish, younger branches densely white pubescent, internode $4-25 \mathrm{~cm}$ or more. Leaves cordate 10-30 by 8-25 cm long or more, apex acute to acuminate, shortly cuspidate, base deeply cordate; margin entire, chartaceous, upper surface glabrous, lower surface densely fulvous to greyish or whitish sericeo-tomentose, shining; lateral nerves 9 - 18 pairs on each side of midrib, prominent beneath, minor nerves many, parallel between the primary lateral ones, petiole up to 20 cm long, shorter than or as long as the blade, tomentose. Inflorescences axillary, lax cymes. Peduncles terete, 20 cm or more long, tomentose. Pedicels 1 cm or more, angular. Bracts larger than the sepals, varies in size and shape, ovate or elliptic, long acuminate, softly pilose outside, glabrous inside, $2.5-5 \mathrm{~cm}$ long, persistent. Sepals subequal, entire, $1.5-2.5$ by $1.1-1.3 \mathrm{~cm}$, densely fulvous tomentose outside, glabrous inside, 2 outer sepals broadly elliptic, acute, acuminate or obtuse, 3 inner sepals ovate to broadly ovate, densely fulvous on the middle, inside glabrous. Corolla fleshy, funnel-campanulate $5.5-6.5 \mathrm{~cm}$ long, pinkish-purple with darker throat, limb shallowly lobed, tube mostly densely sericeolanate on the outside, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 4 - celled. Fruit ca. $1.5-2.0$ cm, globose, apiculate, yellowish-brown. Seeds brownish, ca. 8 mm long, glabrous.

Thailand.- Cultivated as ornamental plants, often run wild.

Distribution.- Originally in British India, from Assam and Bengal to Belgaum and Mysore, cultivated in other tropical countries; occasionally escaped from culture. (Van Ooststroom, 1943).

Ecology.- Altitude from sea level upto 350 m . Flowering in April September.

Vernacular.- Bai rabat (ใบระบาด), Phak rabat (ผักระบาด: Central), Mueang mon (เมืองมอน : Bangkok).

Used. - The leaves are used by native practitioners in the preparation of emollient poultices, and also in cutaneous complains, being applied externally to the parts affected. The upper side of leaves is used by the natives to act as a discutient, the under or white side as a maturant. (Drury, C.H., 1873)

Specimensexamined.- P. Traiperm 30 (BCU); Umpai 150 (BK); T. Smitinand 4 (BKF); J.F. Maxwell 01-299 (CMU).


Figure 17. Argyreia nervosa (Burm. f.) Boj.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. fruit; g. seed.
16. Argyreia obtecta C.B. Clarke in Fl. Br. Ind. 4: 186. 1883; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 275. 1915; Kerr in Fl. Siam. En. 3 (2): 24. 1954. —Fig. 18., Plate 7. c-d.

Large climber covered with whitish hairs; young parts densely appressedpilose with whitish or pale fulvous hairs, internode $2.5-6.0 \mathrm{~cm}$. Leaves elliptic or ovate - lanceolate or obovate, 4-15 by $2-7 \mathrm{~cm}$; apex acute, shortly acuminate, obtuse and mucronulate, base round, obtuse, acute, margin entire, chartaceous, upper surface slightly appressed hairs; lower surface densely covered with whitish brown hairs; lateral nerves 6-12 pairs on each side of midrib, prominent beneath, curved towards the margin; petiole 7-30 mm, appressed - pilose. Inflorescences cymes lax, several flowered. Peduncles $15-20 \mathrm{~mm}$ long, hairy. Pedicels 5-12 mm long, angular, hairy. Bracts obovate, tomentose, caducous. Sepals unequal, entire, densely whitish brown pubescent outside, glabrous inside, in fruit enlarged, becoming red or purplish inside, 3 outer sepals broadly ovate, obtuse or subacute, $8-12 \mathrm{~mm}$ long; 2 inner sepals elliptic to elliptic-oblong, obtuse to slightly emarginate. Corolla delicate papyraceous, campanulate, 5-6 cm long, pale purple or pink with whitish tube; limb shallowly lobed; midpetaline bands with long appressed hairs, the corolla inside glabrous at base. Stamens and style, included; filaments indistintly dilated and pilose at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 4 - celled. Fruit subglobose, 8-10 mm in diameter, red or orange red, 4-or less-seeded. Seeds 4-5 mm long, black.

Thailand.- NORTHERN : Phitsanulok; NORTH-EASTERN : Phetchabun, Udon Thani, Sakon Nakhon; EASTERN : Nakhon Ratchasima, Buri Ram, Surin, Ubon Ratchathani; SOUTH-WESTERN : Prachuap Khiri Khan; CENTRAL : Phra Nakhon Si Ayutthaya, Saraburi, Nakhon Nayok; SOUTH-EASTERN : Sa Kaeo, Prachin Buri, Chachoengsao, Chon Buri, Rayong, Chanthaburi, Trat; PENINSULAR : Chumphon, Ranong, Surat Thani, Phangnga, Phuket, Krabi, Trang, Songkhla.

Distribution.- India, Laos, Cambodia and Vietnam. (Gagnep. \& Courchet, 1915)

Ecology.- Altitude from sea level upto $1,200 \mathrm{~m}$. Flowering in August January.

## Vernacular.-

Specimens examined.- P. Traiperm 9 (BCU); P. Traiperm 21 (BCU); P. Traiperm 37 (BCU); P. Traiperm 44 (BCU); Ch. Kunwasi 2 (BCU); A.F.G. Kerr 19825 (BK); A.F.G. Kerr 9097 (BK); J.F. Maxwell 72-44 (BK); J.F. Maxwell 74-22 (BK); J.F. Maxwell 74-949 (BK); J.F. Maxwell 75-1140 (BK); Kasem 620 (BK); Mrs. Collins 2037 (BK); Mrs. Collins 989 (BK); Pradit 662 (BK); P. Sangkhachand 634 (BK); Put 1324 (BK); Put 2412 (BK); Put 2478 (BK); Put 4372 (BK); S. Sutheesorn 116 (BK); Umpai 285 (BK); Umpai 620 (BK); Umpai 550 (BK); 303 (BKF); A. Boonkongchart 20 (BKF); A. Muaric 20 (BKF); C. Phengkhlai 552 (BKF); C. Phengkhlai et al. 3276 (BKF); C.F. van Beusekom \& C. Charoenpol 1698 (BKF); Chitr 43 (BKF); De 170 (BKF); G. Murata et al. T-51943 (BKF); G. Murata et al. 52544 (BKF); G. Murata et al. 52602 (BKF); G. Staples \& C. Promdej 226 (BKF); G. Staples \& C. Promdej 248 (BKF); G. Staples \& C. Promdej 262 (BKF); G. Staples \& C. Promdej 263 (BKF); G. Staples \& Th. Wongprasert 143 (BKF); G. Staples \& Th. Wongprasert 147 (BKF); G. Staples \& Th. Wongprasert 150 (BKF); G. Staples \& Th. Wongprasert 167 (BKF); G. Staples \& Th. Wongprasert 174 (BKF); G. Staples \& Th. Wongprasert 336 (BKF); G. Staples \& Th. Wongprasert 338 (BKF); G. Staples \& Th. Wongprasert 349 (BKF); G. Staples \& Th. Wongprasert 404 (BKF); G. Staples \& W. Ueachirakan 179 (BKF); G. Staples \& W. Ueachirakan 196 (BKF); G. Staples \& W. Ueachirakan 201 (BKF); H.Koyama T-30868 (BKF); Hamilton \& Congdon 89 (BKF); J.F. Maxwell 84-427 (BKF, CMU); J.F. Maxwell 84-508 (BKF); Martin Greijmans 203 (BKF); P. Sirirugsa 994 (BKF); Plernchit 473 (BKF); T. Smitinand 3524 (BKF); T. Smitinand \& H. Sleumer et al. 1134 (BKF); T. Shimizu et al. T-13165 (BKF); T. Shimizu et al. T-28308 (BKF); Th. Wongprasert 012-36 (BKF); Th. Wongprasert 9912-03 (BKF); Th. Wongprasert 9912-10 (BKF); S. Watthana and T. Riyapun 970 (QSBG).


Figure 18. Argyreia obtecta C.B. Clarke: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. ovary (x-section); g. fruit; h. seed.
17. Argyreia osyrensis (Roth) Choisy in DC. Prod. 9: 334. 1845; Ooststr. in Blumea 7: 177. 1952; Ooststr. in Fl. Mal. 1 (4): 508. 1953. —Ipomoea osyrensis Roth, Nov. Pl. Spec. 117. 1821. -Lettsomia aggregata Roxb., Hort. Beng. 13. 1814; Kerr in Fl. Siam. En. 3(2): 28. 1954. - A. aggregata (Roxb.) Choisy in Mém. Soc. Phy. Genève 5: 427. 1833. -L. aggregata Roxb. var. osyrensis C.B. Clarke in Hook. f. Fl. Br. Ind. 4: 192. 1883; Kerr in Fl. Siam. En. 3(2): 28. 1954. -A. aggregata var. osyrensis Clarke in Fl. Gén. I.-C. 4: 280. 1915. -A. osyrensis (Roth) Choisy var. osyrensis ju hua bai he teng in Fl. China. 16: 319. 1995. - A. brachypoda (Kerr) Ooststr., syn. nov. Blumea 7: 178. 1952. -L. brachypoda Kerr in Kew Bull. 1941: 13. 1941. -Fig. 19., Plate 7. e-f.

Stems twining or creeping, terete, woody except young part, densely white or greyish tomentose internode $5-11 \mathrm{~cm}$. Leaves cordate to orbicular, 4-14 by 4-12 cm , apex obtuse and mucronate or round, base cordate, margin entire, subcoriaceous, upper surface sparsely tomentose, darker; lower surface densely whitish tomentose, lateral nerves $9-10$ pairs on each side of midrib, prominent beneath; petiole $2-8$ cm long, tomentose, grooved. Inflorescences axillary, densely capitate cyme. Peduncles $2-5 \mathrm{~cm}$ long, densely tomentose, grooved. Pedicels very short or none, densely tomentose. Bracts mostly obovate, slightly truncate, $10-12 \mathrm{~mm}$ long and broad, outside densely whitish pubescent, inside glabrous, persistent. Sepals unequal, entire, tomentose outside and glabrous inside, 2 outer sepals oblong-obovate, obtuse, $8-10 \mathrm{~mm}$ long, 3 inner sepals oblong, acute or obtuse, $6-8 \mathrm{~mm}$ long. Corolla fleshy, funnelform, $12-14 \mathrm{~mm}$ long, pink or purple, deeply 5 - lobed, lobes narrowly ovate emarginate, tube ca. 8 mm long, lobes densely whitish pubescent outside, the corolla inside glabrous at base. Stamens and style exserted; filaments dilated and hairy at base. Disk cupular, nearly entire. Ovary glabrous, 2 - celled. Fruit globose, 6 - 10 mm in diameter, shiny red, subtended and partially surrounded or at least supported by the enlarged sepals which are red, 4 - seeded. Seeds $6-7 \mathrm{~mm}$ long, grey, glabrous.

Thailand.- NORTHERN : Mae Hong Son, Chiang Mai, Chiang Rai, Phayao, Lamphun, Lampang, Tak; NORTH-EASTERN : Phetchabun, Sakon Nakhon, Kalasin; EASTERN : Nakhon Ratchasima, Surin, Ubon Ratchathani; SOUTH-WESTERN : Kanchanaburi, Ratchaburi, Phetchaburi, Prachuap Khiri Khan; CENTRAL : Nakhon

Pathom, Nakhon Nayok; SOUTH-EASTERN : Prachin Buri, Chon Buri; PENINSULAR : Chumphon.

Distribution.- India, Ceylon, Bangladesh, Burma, Yunnan, Laos, Malaysia, Indonesia. (Fang \& Staples, 1995).

Ecology.- In dry open place, climbing on small tree. Altitude from 300 to $1,200 \mathrm{~m}$. Flowering in October - March.

Vernacular.- Hun (หุน: Genaral), Thao ma kwang (เถาหมากวาง : Surat Thani).

Specimens examined.- P. Traiperm 6 (BCU); P. Traiperm 15 (BCU); P. Traiperm 22 (BCU); Herb. Trip 306 (12/4) (BCU); Herb. Trip 789 (22/17) (BCU); Adisai 206 (BK); A.F.G. Kerr 13497 (BK); A.F.G. Kerr 4643 (BK); Dr. Narong Joungsamanjat 716 (BK); J.F. Maxwell 76-703 (BK); M.C. Lakshnakara 1528 (BK); Pernjit 412 (BK); Pradit 511 (BK); Put 248 (BK); Put 660 (BK); Put 2029 (BK); S. Sutheesorn 447 (BK); S. Sutheesorn 2712 (BK); S. Sutheesorn 3495 (BK); Winit 1530 (BK); Winit 652 (BK); C.F. van Beusekom et al. 3047 (BKF); C.F. van Beusekom et al. 4018 (BKF); C.F. van Beusekom \& T. Santisuk s.n. (BKF); C. Niyomtham 4901 (BKF); C. Niyomtham 5576 (BKF); C. Phengklai \& T. Smitinand 6170 (BKF); G. Murata et al. T-37605 (BKF); G. Murata et al. T-41815 (BKF); G. Murata et al. T-49806 (BKF); G. Murata et al. T-50039 (BKF); G. Murata et al. T50397 (BKF); G. Murata et al. T-50419 (BKF); G. Murata et al. T-50593 (BKF); G. Staples \& Th. Wanthaniyakul 271 (BKF); G. Staples \& Th. Wanthaniyakul 283 (BKF); G. staples \& Th. Wongprasert 301 (BKF); G. staples \& Th. Wongprasert 334 (BKF); G. staples \& Th. Wongprasert 341 (BKF); G. staples \& Th. Wongprasert 344 (BKF); G. staples \& Th. Wongprasert 353 (BKF); G. staples \& Th. Wongprasert 383 (BKF); G. staples \& Th. Wongprasert 384 (BKF); G. staples \& Th. Wongprasert 400 (BKF); H. Koyama T-39682 (BKF); J.F. Maxwell 01-97 (BKF); J.F. Maxwell 88-407 (BKF); J.F. Maxwell 95-1269 (BKF, CMU); J.F. Maxwell 96-123 (BKF, CMU); J.F. Maxwell 96-1682 (BKF, CMU); J.F. Maxwell 97-120 (BKF, CMU); J.F. Maxwell 971454 (BKF, CMU); O. Petrmitr 234 (BKF); P. Charoenchai 751 (BKF); Plernchit 180 (BKF); R. Geesink et al. 7945 (BKF); T. Smitinand 4361 (BKF); T. Smitinand 4899 (BKF), T. Smitinand s.n. (BKF); T. Smitinand \& H. Sleumer et al. 1112 (BKF); Winit 652 (BKF); Winit 1530 (BKF); J.F. Maxwell 00-442 (CMU); J.F. Maxwell 0197 (CMU); J.F. Maxwell 93-1432 (CMU); J.F. Maxwell 94-353 (CMU); N. Morci

V100 (CMU); O. Petrmitr 234 (CMU); P. Charoenchai s.n. (CMU); BGO. Staff 1678 (QSBG); BGO. Staff 5492 (QSBG); W. Nanakorn et al. 5425 (QSBG); W. Pongamornkul 572 (QSBG).



Figure 19. Argyreia osyrensis (Roth) Choisy: a. branch; b. inflorescence; c. flower (sideview); d. flower (top view); e. bract; f. sepals; g. opened corolla with stamens; h. ovary ( x -section); i. fruit.
18. Argyreia roseopurpurea (Kerr) Ooststr., Blumea 7: 178. 1952. -Lettsomia roseopurpurea Kerr in Kew Bull. 1941:15. 1941; in Fl. Siam. En. 3 (2): 34. 1954. -Fig. 20., Plate 8. a-b.

Woody climber, branches subterete or slightly angular, moderately fulvous hirsute internode ca. $7-8 \mathrm{~cm}$ long. Leaves ovate, $9.0-11.0$ by $5.5-6.5 \mathrm{~cm}$, apex acute to shortly acuminate, slightly truncate or cordate at base, margin entire, chartaceous, upper surface occasionally brown hirsute, lower surface glabrescent; lateral nerves $6-9$ pairs on each side of midrib, prominent beneath; petiole 2.5-3.0 cm long, fulvous hirsute. Inflorescense axillary, lax cyme, several flowers. Peduncles $3-9 \mathrm{~cm}$ long, fulvous hirsute. Pedicels ca. 4 mm long. Bracts ovate, ca. 2 mm long, caducous. Sepals entire, densely fulvous hirsute outside, glabrous inside, 4.0 by 3.5 mm , outer sepals broadly lanceolate, apex obtuse, inner sepals broadly ovate, on the middle hirsute, margin glabrous. Corolla funnelform, limb short 5 - lobed, ca. 2.5 cm long, tube purple, limb pinkish red, long fulvous hirsute on midpetaline bands, the corolla inside glabrous at base. Stamens and style included; filament dilated and glabrous at base. Disk shallowly 5-lobed. Ovary glabrous. Fruit not seen.

Thailand.- PENINSULAR: Chumphon, Surat Thani.
Distribution.- Thailand (type!).
Ecology.- Woody climber in evergreen forest. Altitude from 100 to 700 m . Flowering in January.

## Vernacular.-

Specimensexamined.- A.F.G. Kerr 11531 (BK) Isotype.


ChuLALONGKORN UNIVERSITY

Figure 20. Argyreia roseopurpurea (Kerr) Ooststr.: branch: Drawn from type specimen: Kerr 11531.
19. Argyreia roxburghii Choisy in Mém. Soc. Phy. Genève 6: 419. 1833; C.B. Clarke in Fl. Br. Ind. 4: 185. 1883; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 284. 1915; Craib in Contr. Fl. Siam 55: 139. 1923; C.B. Clarke in Fl. Assam. 3: 343. 1939; Ooststr., Blumea 5: 383. 1943; H. Hara \& T. Yamaz. in Fl. E. Himalaya 263. 1966; M.S. Khan, Fl. Bangladesh 30: 8. 1985; Grierson \& D.G. Long in Fl. Bhutan 2 (2): 841. 1999. - A. roxburghii Choisy var. siamica Craib, var. nov. in Kew Bull. 1911: 423. 1911. - A. roxburghii Craib var. siamica Craib in Fl. Siam En. 3 (2): 26. 1954. —Fig. 21., Plate 8. c-d.

Large climber, up to 4 m high or more, stems terete, densely whitish tomentose, internode 4-15 cm. Leaves cordate to nearly orbicular, 7-18 by 5-14 cm , apex obtsely acute, base slightly cordate to deeply cordate; margin entire, chartaceous, moderately villous on the upper surface and densely whitish grey villous on the lower surface; lateral nerves $9-11$ pairs on each side of midrib, prominent beneath; petiole 3-10 cm long, densely grey villous. Inflorescences axillary, lax cymes, up to 5 - flowered. Peduncles 5-22 cm long, grey pubescent. Pedicels 6 10 mm long. Bracts oblong or oblanceolate 12-20 by $2-3 \mathrm{~mm}$ long, apex acute to acuminate, densely whitish pubescent on both side, persistent. Sepals unequal, entire, 2 outer sepals, lanceolate or oblong-lanceolate, ca. 15 mm long, apex acute, densely grey villous outside, sparsely villous inside, 3 inner sepals ovate, 7-8 mm long, apex acuminate, sparsely whitish villous on the middle, glabrous inside. Corolla delicate papyraceous, funnel to campanulate, $5.0-6.5 \mathrm{~cm}$ long, purplish - pink with darker throat, sparsely villous on midpetaline bands, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Ovary glabrous, 4 celled. Fruit not seen.

Thailand.- NORTHERN: Chiang Mai, Lampang, Tak.
Distribution.- Eastern India (type), Nepal, Bhutan, Bangladesh, Burma (Khan, 1985).

Ecology.- In dry deciduous forest. Altitude ca. 400 m . Flowering in July December.

Vernacular.- Tan fak (ตานฟัก : Chiang Mai).
Specimensexamined.- Herb Trip 496 (30/1) (BCU); Noi Mao s.n. (BK); T. Boonkird s.n. (BK); C.P. 3170 (BKF); M. Tagawa et al. T- 8556 (BKF); BGO. Staff 7608 (QSBG).


## .11 - $1101 a^{1-m}$



Figure 21. Argyreia roxburghii Choisy: a. branch; b. bracts; c. sepals.
20. Argyreia splendens (Hornem.) Sweet, Hort. Brit. ed. 1: 289. 1826; R.C. Fang \& Staples in Fl. China 16: 318. 1995. -Convolvulus splendens Hornem., Hort. Bot. Hafn. Suppl. 123. 1819. -Lettsomia splendens Roxb. In Fl. Ind. Ed. Carey et Wall. 2: 75. 1824. -A. splendens (Roxb.) Sweet in Fl. Br. Ind. 4: 186. 1883; C.B. Clarke in Fl. Assam. 3: 343. 1939; Kerr in Fl. Siam En. 3 (2): 26. 1954; D.F. Austin in Fl. Ceylon 1: 300. 1980; M.S. Khan, Fl. Bangladesh 30: 9. 1985. -Fig. 22., Plate 8. e-f.

Twiner; stems herbaceous toward the tips, woody at the base, dense silky hairs internode 4-12 cm. Leaves ovate, elliptic, elliptic-oblong, 7-14 by 4-8 cm; apex obtuse or acuminate, sometime slightly retuse, base rounded to obtuse, margin entire, subchartaceous, upper surface glabrous; lower surface densely pubescent with silverywhite to slightly brownish-white appressed trichomes; lateral nerves 10-14 pairs on each side of midrib, prominent beneath, petiole $14-25 \mathrm{~mm}$, appressed-pubescent. Infolrescences axillary, subcapitate cymes, 2 -(or more) flowered. Peduncles 5-25 mm long, appressed pubescent. Pedicels $3-8 \mathrm{~mm}$ long, angular trichome. Bracts elliptic-oblong, $3.5-4.0 \mathrm{~mm}$, acuminate, tomentose, caducous. Sepals subequal, undulate, 2 outer equal, ovate to rounded, acute, $8-10 \mathrm{~mm}$ long; inner sepals ellipticoblong, acuminate; all sepals densely whitish to yellowish- white tomentose. Corolla delicate papyraceous, funnel-campanulate, $2.5-3.2 \mathrm{~cm}$ long pink or pale violet; limb shallowly lobed; midpetaline with tomentose hairs, the corolla inside glabrous at base. Stamens and style much shorter than corolla, included; filaments pilose at the base. Disk annular, shallowly 5-lobed. Ovary glabrous, 2 -celled. Fruit not seen.

Thailand.- NORTHERN : Chiang Mai, Lampang, Phrae; NORTH-EASTERN : Phetchabun, Loei, Khon Kaen.

Distribution.- India, Ceylon, Bangladesh, Burma, Yunnan. (Fang \& Staples, 1995)

Ecology.- In evergreen forest, dry deciduous forest, sending out erect and long trailing shoots. Altitude from 200 to $1,500 \mathrm{~m}$. Flowering in September February.

Vernacular.- Khruea khao luang (เครือเขาหลวง), Ba nam pa (บ่าน้ำป่า), Si cho (สีจ้อ : Chiang Mai), Khruea ta pla (เครือตาปลา : Si Sa Ket), Mun ruesi (มันฤาษี : Lampang), Han phi pai (ฮ้านผีป้าย: Chanthaburi).

Notes.- The epithet splendens has often been attributed to Roxburgh, either in Hor. Bengal. 13. 1824 (a nomen nudum), or in Fl. Ind. 2: 75. 1824. Hornemann's publication predates by five years the first publication of a description for Lettsomia splendens, so the epithet must be based on Hornemann's Convolvulus splendens. (cited in Fang \& Staples, 1995)

Specimens examined.- P. Traiperm 20 (BCU); P. Traiperm 36 (BCU); C. Cherursirvathana 1034 (BK); J. Sadakorn 606 (BK); J.F. Maxwell 73-628 (BK); M.C. Lakshnakara 1457 (BK); Mrs. Collins s.n. (BK); Put 4409 (BK); T. Boonkird 28 (BK), 48 (BK); Vacharapong 389 (BK); Y. Paisooksantivatana y195486 (BK); G. Staples et al. 410 (BKF); G. Staples \& Th. Wongprasert 381 (BKF); G. Staples \& Th. Wongprasert 401 (BKF); M. Tagawa et al. T-10501 (BKF); Plernchit 297 (BKF); Plernchit 297 (BKF); T. Smitinand s.n. (BKF); W. Boonchai 23 (BKF); BGO. Staff 9756 (QSBG); W. Pongamornkul 351 (QSBG).


Figure 22. Argyreia splendens (Hornem.) Sweet: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. and g. variation of leaves.
21. Argyreia stenophylla (Kerr) Staples \& P. Traiperm, comb. nov. (ined.). Lettsomia stenophylla Kerr in Kew Bull.1941:16. 1941; Kerr in Fl. Siam. En. 3 (2): 34. 1954. -Fig. 23., Plate 9. a-b.

Stems creeping, with tuberous root, slightly brownish strigose or glabrescent, internode ca. 6-7 cm long. Leaves lanceolate or linear $7.0-9.0$ by $1.0-1.5 \mathrm{~cm}$, apex obtuse with short mucronate, base round or acute, margin entire, chartaceous, upper surface brownish strigose, lower surface densely greyish pubescent, lateral nerves 5-6 pairs on each side of midrib, slightly raised; petiole 5-10 mm long, slender with greyish hirsute. Inflorescence axillary, usually 1 - flowered rarely several flowered. Peduncles ca. 3 mm long. Pedicels 4-5 mm long, slender, brown pubescent. Bracts 2, ovate $4-6$ by 2 mm , caducous. Sepals subequal, ovate, apex acute, entire, 8 by 3 mm , in fruit enlarged, brown appressed strigose outside and glabrous inside. Corolla campanulate - funnelform, $3.5-4.0 \mathrm{~cm}$ long, purple, tube whitish, limb entire or shallowly lobed, patent brown hair at midpetaline bands. Stamens and style included, triangular dilated and hairy at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2 - celled. Fruit globose, 7 mm in diameter.

Thailand.- NORTHERN: Chiang Mai; SOUTH-WESTERN : Prachuap Khiri Khan.

Distribution.- Thailand (type!).
Ecology.- Trailing on ground in open grassy forest. Altitude ca. 700 m . Flowering November.

Vernacular.-
Specimensexamined.- A.F.G. Kerr 6490 (BK) Isotype; Adisai 966 (BK).


Chulalongkorn University

Figure 23. Argyreia stenophylla (Kerr) Staples \& P. Traiperm, comb. nov. (ined.).: branch: Drawn from type specimen: Kerr 6490.
22. Argyreia thorelii Gagnep. in H. Lec. Not. Syst. 3: 135. 1915; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 279. 1915. -Fig. 24., Plate 9. c-d.

Woody climber, upto $2-4 \mathrm{~m}$, stems terete, sparely brownish yellow hirsute, internode $2.5-9.0 \mathrm{~cm}$ long. Leaves lanceolate, $4.0-10.0$ by $1.0-2.5 \mathrm{~cm}$; apex acute with short mucronate, base obtuse; margin entire, chartaceous, slightly brownish setose on both side, lateral nerves $7-9$ pairs on each side of midrib, prominent beneath; petiole 2-4 mm, brownish yellow hirsute. Inflorescences axillary, lax cymes, several flowers. Peduncles $2-5 \mathrm{~mm}$ long, densely stigose. Pedicels $3-4 \mathrm{~mm}$ long, densely strigose. Bracts linear - lanceolate or oblong - lanceolate, apex acute, 8 - 12 mm long, densely yellow hirsute outside, glabrous inside, persistent. Sepals unequal, apex acute, entire, $15-23 \mathrm{~mm}$ long, densely yellow setose outside, glabrous inside, 2 outer sepals lanceolate, 3 inner sepals, linear - lanceolate. Corolla fleshy, narrowly tubular-campanulate, $4.0-4.5 \mathrm{~cm}$ long, white, limb of corolla distinctly 5 lobed to 5 - parted, oblong - lanceolate, ca. 2 cm , apex mucronate, sparsely brown hirsute outside, the corolla inside glabrous at base. Stamens and style exserted; filaments dilated and hairy at base. Disk annular, nearly entire. Ovary glabrous, 2 celled. Fruit not seen.

Thailand.- EASTERN: Si Sa Ket, Ubon Ratchathani.
Distribution.- Laos.
Ecology.- In mixed deciduous forest, climbing on small tree. Altitude from 420 to 650 m . Flowering in July - November.

Vernacular.-
Specimens examined.- $P$. Traiperm $2(\mathrm{BCU}) ; \quad$. Traiperm 43 (BCU); J.F. Maxwell 76-539 (BK).


Figure 24. Argyreia thorelii Gagnep.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
23. Argyreia versicolor (Kerr) Staples \& P. Traiperm, comb. nov. (ined.). —Lettsomia versicolor Kerr in Kew Bull.1941:17. 1941; Kerr in Fl. Siam. En. 3 (2): 34. 1954. -Fig. 25., Plate 9. e-f.

Woody climber, stems terete, brown tomentose, internode ca. $4.0-5.5 \mathrm{~cm}$ long. Leaves cordate or broadly ovate, $5.5-8.0$ by $3.5-5.0 \mathrm{~cm}$; apex rather acute to acuminate, base cordate; margin entire; chartaceous; upper surface moderately stigose, lower surface densely appressed setose; lateral nerves $8-9$ pairs on each side of midrib, prominent beneath, petiole $8-10 \mathrm{~mm}$ long, brown pubescent. Inflorescence axillary, subcapitate cymes, several flowered. Peduncles $1.2-2.0 \mathrm{~cm}$ long, pubescent. Pedicels ca. $5-8 \mathrm{~mm}$ long, brown tomentose. Bracts elliptic, ovate or ovate-lanceolate, apex acute to acuminate, $2.3-2.5 \mathrm{~cm}$ long, brown pubescent outside and glabrous inside, inner bracts narrower and shorter than outer ones, persistent. Sepals supequal, elliptic, apex round, entire, $10-12$ by $8-9 \mathrm{~mm}$, sparsely hirsute outside and glabrous inside. Corolla campanulate, 5 cm long, white, limb shallowly lobed with purple spotted, outer midpetaline sparsely hirsute, corolla inside glabrous. Stamens and style included; filament dilated and hairy at base. Ovary glabrous. Fruit not seen.

Thailand.- NORTH-EASTERN: Kalasin; EASTERN : Chaiyaphum; SOUTHEASTERN : Prachin Buri.

Distribution.- Thailand (type!).
Ecology.- Climbing on bushes in scrub. Altitude ca. 100 m . Flowering in October - December.

Vernacular.-
Specimens examined.- A.F.G. Kerr 9786 (BK) Isotype; Sakol Suthisorn 638 (BK).


Figure 25. Argyreia versicolor (Kerr) Staples \& P. Traiperm, comb. nov. (ined.).: branch: Drawn from type specimen: Kerr 9786.
24. Argyreia wallichii Choisy in Mém. Soc. Phys. Genève 6: 422. 1833; C.B. Clarke in Fl. Br. Ind. 4: 187. 1883; Gagnep. et Courchet in Fl. Gén. I.-C. 4: 284. 1915; Craib in Contr. Fl. Siam 140. 1921; Kerr in Fl. Siam. En. 3 (2): 26. 1954; R.C. Fang \& Staples in Fl. China 16: 316. 1995; Grierson \& D.G. Long in Fl. Bhutan. 2 (2): 841. 1999. -Fig. 26., Plate 10. a-b.

Large woody climber, stems terete, densely whitish pubescent to tomentose, internode $1.5-7.0 \mathrm{~cm}$ long, Leaves ovate, broadly ovate to orbicular $11.0-17.0$ by $7.5-16.0 \mathrm{~cm}$, apex acute or obtuse, base slightly cordate, truncate or obtuse; margin entire; subcoriaceous; upper surface dark green, glabrous and shallowly rugose, lower surface densely whitish tomentose, lateral nerves 13-14 pairs on each side of midrib, prominent beneath; petiole $7-12 \mathrm{~cm}$, greyish tomentose. Inflorescences axillary, subcapitate cymes. Peduncles $6-8 \mathrm{~mm}$ long, densely greyish pubescent. Pedicels very short or none, densely greyish pubescent. Bracts ovate - elliptic, $2.5-4.0$ by 1.2 - 1.8 cm , apex acute, densely whitish villous or pubescent outside and glabrous inside, persistent. Sepals unequal, entire, white tomentose outside, glabrous inside, 2 outer sepals, elliptic, $10-12 \mathrm{~mm}$ long, 3 inner sepals narrower lanceolate, ca. 9 mm long. Corolla funnelform, $4-5 \mathrm{~cm}$; white or pale purple, limb entire or shallowly lobed, midpetaline bands sparsely whitish villous, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Ovary glabrous, 2 celled. Fruits not seen.

Thailand.- NORTHERN : Chiang Mai, Chiang Rai, Lamphun, Kamphaeng Phet; SOUTH-WESTERN : Uthai Thani.

Distribution.- India, Bhutan, Burma, China: Guizhou, Sichuan.
Ecology.- Growing on rock in sandy soil, mixed deciduous forest. Altitude from 420 to $1,450 \mathrm{~m}$. Flowering in October - November.

## Vernacular.-

Specimens examined.- A.F.G. Kerr 6383 (BK); P. Sangkhachand 79 (BK); S. Sutheesorn \& P. Sangkhachand 3099 (BK); C. Phengkhlai et al. 3896 (BKF); K. Iwatsuki et al. T- 11049 (BKF); Winit 1230 (BKF); W. Nanakorn et al. 5217 (QSBG).


Figure 26. Argyreia wallichii Choisy: a. branch; b. bracts; c. sepals.
25. Argyreia sp.1. -Fig. 27., Plate 10. c-e.

Woody climber, stems terete, densely brown pubescent to hirsute, internode 1 - 11 cm long. Leaves ovate or ovate - lanceolate, 10-24 by 4-10 cm, apex acute to acuminate at the, base obtuse or slightly cordate rarely truncate, margin entire; chartaceous; upper surface densely brown hirsute; lower surface densely brown pilose, lateral nerves $14-16$ pairs on each side of midrib, prominent beneath, petiole $1.5-5.0 \mathrm{~cm}$ long, grooved, densely brown pubescent. Inflorescences axillary, lax cyme, several flowers. Peduncles $2.0-3.5 \mathrm{~cm}$ long, terete, densely brown strigose. Pedicels 5-10 mm long, densely brown strigose. Bracts lanceolate, elliptic lanceolate, $15-25$ by $5-8 \mathrm{~mm}$, apex acute to acuminate, densely brown pubescent outside and glabrous inside persistent. Sepals subequal, entire, glabrous on both side, broadly obovate to orbicular, $15-17$ by $11-13 \mathrm{~mm}$ long. Corolla fleshy, campanulate, completely glabrous, $6-7 \mathrm{~cm}$ long and 3.2-3.5 in diameter, dark purple or white in corolla tube and reddish pink in corolla lobed; limb entire to shallowly lobed. Stamens and style included; filaments dilated and hairy at base. Disk cupular, shallowly 5-lobed. Ovary glabrous, 2 - celled. Fruits not seen.

Thailand.- SOUTH-WESTERN: Phetchaburi (Kang Kha Chan).
Distribution.- Thailand.
Ecology.- In dry evergreen forest, climbing on small tree. Altitude ca. 650 m. Flowering in August - November.

## Vernacular.-

Specimensexamined.- $P$. Traiperm 31 (BCU)


Figure 27. Argyreia sp. 1.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
26. Argyreia sp.2. -Fig. 28., Plate 10. f-g.

Woody climber, stems grooved, glabrescent, young branches moderately greenish brown tomentose, internode $2-8 \mathrm{~cm}$ long. Leaves ovate or ovate lanceolate, $10.0-16.5$ by $4.0-6.0 \mathrm{~cm}$, apex acute, base obtuse rarely shallowly cordate, margin entire, subcoriaceous, upper surface glabrous, yellowish green, lower surface densely with silvery white or pale fulvous hairs; lateral nerves 12 - 14 pairs on each side of midrib, prominent beneath; petiole $2.0-3.5 \mathrm{~cm}$ long, furrowed, slightly appressed pilose. Inflorescences axillary, lax cyme, 6-8 flowered. Peduncles $1.5-2.0 \mathrm{~cm}$ long, densely fulvous pubescent. Pedicels $6-8 \mathrm{~mm}$ long, densely fulvous pubescent. Bracts oblong - elliptic, apex acute, $4.0-4.5 \mathrm{~mm}$ long, densely silky tomentulose outside, glabrous inside, caducous. Sepals unequal, entire, densely yellowish brown pubescent outside and glabrous inside, 2 outer sepals subequal, ovate-triangular, ca. 10 mm long, apex acute, 3 inner sepals elliptic, $6-7$ mm long, apex acute. Corolla fleshy, campanulate, $3.5-4.0 \mathrm{~cm}$ long, whitish purple outside and reddish pink inside, limb entire to shallowly lobed, whitish pilose at midpetaline bands, the corolla inside glabrous at base. Stamens and style included; filaments dilated and hairy at base. Disk annular, shallowly 5-lobed. Ovary glabrous, 2 - celled. Fruit not seen.

Thailand.- NORTHERN: Phitsanulok (Phu In Rong Khla).
Distribution.- Thailand.
Ecology.- In deciduous forest, climbing on tree. Altitude ca. $1,250 \mathrm{~m}$. Flowering in September - December.

## Vernacular.-

Specimens examined.- P. Traiperm 34 (BCU); G. Staples \& Th. Wongprasert 388 (BKF); G. Staples \& Th. Wongprasert 395 (BKF).


Figure 28. Argyreia sp. 2.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).
27. Argyreia sp.3. -Fig. 29., Plate 10. h-i.

Stems twining, woody at base, densely greyish brown pubescent, branches subterete, furrowed, internode $2.5-10.0 \mathrm{~cm}$ long. Leaves ovate, $13.0-18.0$ by $7.0-$ 9.5 cm , apex acute to short acuminate, base round, obtuse to slightly cordate, margin entire, chartaceous; upper surface glabrous on lamina except brown appressed pilose on vein, lower surface densely appressed brownish grey pubescent; lateral nerves 11 12 pairs on each side of midrib, prominent beneath, petiole $6-8 \mathrm{~cm}$ long, terete, densely brown pubescent. Inflorescences axillary, lax cyme, 12-18-flowers. Peduncles $4.5-6.5 \mathrm{~cm}$ long, densely brown pubescent. Pedicels $7-13 \mathrm{~mm}$ long, densely brown pubescent. Bracts ovate, $2-3 \mathrm{~mm}$ long, hairy outside and glabrous inside, caducous. Sepals subequal, entire, densely brown pubescent outside and glabrous inside, 3 outer sepals elliptic or ovate, apex acute, $8.0-8.5 \mathrm{~mm}$ long, 2 inner sepals elliptic, apex obtuse, 6-7 mm. Corolla delicate papyraceous, funnelform, 3.0 -3.5 mm long, pale purple, reddish pink in corolla throat, limb distinct 5 - triangular lobe, $7-10 \mathrm{~mm}$, patenly fulvous hirsute at midpetaline bands, the corolla inside glabrous at base. Stamens and style exserted; filaments hairy and slightly dilated at base. Disk cupular, nearly entire. Ovary glabrous, 2 - celled. Fruit not seen.

Thailand.- NORTHERN: Phitsanulok (Phu In Rong Khla).
Distribution.- Thailand.
Ecology.- In open place, climbing on small tree. Altitude ca. $1,250 \mathrm{~m}$. Flowering in September - November.

Vernacular.-
Specimensexamined.- P. Traiperm 33 (BCU).


Figure 29. Argyreia sp. 3.: a. branch; b. sepals; c. stamen; d. pistil; e. ovary (x-section).


Plate 1. Argyreia adpressa (Choisy) Boerl.: a. flowering branch; b. inflorescence, Argyreia breviscapa (Kerr) Ooststr.: c. fruit; d. flowering branch, Argyreia calcicola (Kerr) Ooststr.: e-f. branch; g. inflorescence.


Plate 2. Argyreia capitiformis (Poir.) Ooststr.: a. flower; b. habitat; c. flowering branch; d. inflorescence form 2 ; e. flowering branch; f. inflorescence form 3 and g. inflorescence form 1 .


Plate 3. Argyreia collinsae (Craib) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.): a. branch; b. flower; c. fruit; Argyreia fulvocymosa C.Y. Wu var. fulvocymosa: d. flower; e. habitat; f. inflorescence.


Plate 4. Argyreia henryi (Craib) Craib: a. habitat; b. inflorescence; c. fruits, Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.): d. habitat; e. fruits; f. inflorescence.


Plate 5. Argyreia kerrii Craib: a. habitat; b. fruit, Argyreia lanceolata Choisy: c. branch; d. flower and habitat, Argyreia cf. laotica Gagnep.: e. flowers; f. fruits.


Plate 6. Argyreia maymyo (W.W. Smith) Raizada: a. fruit; b. flowers, Argyreia mekongensis Gagnep. et Courchet: c. branch; d. inflorescence, Argyreia mollis (Burm. f.) Choisy : e. inflorescence; f. habitat.


Plate 7. Argyreia nervosa (Burm. f.) Boj.: a. habitat; b. inflorescence, Argyreia obtecta C.B. Clarke: c. fruit; d. flower, Argyreia osyrensis (Roth) Choisy: e. habitat; f. fruit.


Plate 8. Argyreia roseopurpurea (Kerr) Ooststr.: a. branch; b. inflorescence, Argyreia roxburghii Choisy: c. branch; d. inflorescence, Argyreia splendens (Hornem.) Sweet: e. flowering branch; f. inflorescence.


Plate 9. Argyreia stenophylla (Kerr) Staples \& P. Traiperm, comb. nov. (ined.): a. branch; b. inflorescence, Argyreia thorelii Gagnep.: c. habitat; d. flower, Argyreia versicolor (Kerr) Staples \& P. Traiperm, comb. nov. (ined.): e. branch; f. inflorescence.


Plate 10. Argyreia wallichii Choisy: a. branch; b. inflorescence, Argyreia sp. 1.: c. habit; d. inflorescence; e. flower, Argyreia sp. 2.: f. flower; g. inflorescence, Argyreia sp. 3. : h. habitat; i. inflorescence.


Figure 30. Distribution of Argyreia adpressa (Choisy) Boerl. ( $\star$ ); Argyreia breviscapa (Kerr) Ooststr. (■); Argyreia. calcicola (Kerr) Ooststr. (•); Argyreia capitiformis (Poir.) Ooststr. ( $\leqslant$ ) and Argyreia henryi Craib (Craib) ( $)_{\text {) }}$ ).


Figure 31. Distribution of Argyreia collinsae (Craid) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.) ( $\star$ ); Argyreia fulvocymosa C.Y. Wu var. fulvocymosa (■); Argyreia kerrii Craib (•); Argyreia lanceolata Choisy ( $\bullet$ ) and Argyreia cf. laotica Gagnep.( ).


Figure 32. Distribution of Argyreia maymyo (W.W. Smith) Raizada ( $\star$ ); Argyreia mekongensis Gagnep. et Courchet (■); Argyreia mollis (Burm. f.) Choisy (•); Argyreia obtecta C.B. Clarke ( $\leqslant$ ) and Argyreia roxburghii Choisy ( $\boldsymbol{*}$ ).


Figure 33. Distribution of Argyreia osyrensis (Roth) Choisy ( $\star$ ); Argyreia roseopurpurea (Kerr) Ooststr. (■); Argyreia splendens (Hornem.) Sweet (•); Argyreia stenophylla (Kerr) Staples \& P. Traiperm, comb. nov. (ined.) ( $\leqslant$ ) and Argyreia thorelii Gagnep. (*).


Figure 34. Distribution of Argyreia versicolor (Kerr) Staples \& P. Traiperm, comb. nov. (ined.) ( $\star$ ); Argyreia wallichii Choisy (■); Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.) (•); Argyreia sp. 1. (*); Argyreia sp. 2. (*) and Argyreia sp. 3. (*).


Figure 35. Floristic Regions of Thailand.

## FLORISTIC REFIONS AND PROVINCES OF THAILAND

## I. $N$ (NORTHERN)

1. Mae Hong Son
2. Chiang Mai
3. Chiang Rai
4. Phayao
5. Nan
6. Lamphun
7. Lampang
8. Phrae
9. Uttaradit
10. Tak
11. Sukhothai
12. Phitsanulok
13. Kamphaeng Phet
14. Phichit
15. Nakhon Sawan
II. NE (NORTH-EASTERN)
16. Phetchabun
17. Loei
18. Nong Bua Lam Phu
19. Udon Thani
20. Nong Khai
21. Sakon Nakhon
22. Nakhon Phanom
23. Mukdahan
24. Kalasin
25. Maha Sarakham
26. Khon Kaen
III. $E$ (EASTERN)
27. Chaiyaphum
28. Nakhon Ratchasima
29. Buri Ram
30. Surin
31. Roi Et
32. Yasothon
33. Amnat Charoen
34. Si Sa Ket
35. Ubon Ratchathani
IV. SW (SOUTH-WESTERN)
36. Uthai Thani
37. Kanchanaburi
38. Ratchaburi
39. Phetchaburi
40. Prachuap Khiri Khan
V. C (CENTRAL)
41. Chai Nat
42. Sing Buri
43. Lop Buri
44. Suphan Buri
45. Ang Thong
46. Phra Nakhon Si Ayutthaya
47. Saraburi
48. Nakhon Pathom
49. Pathum Thani
50. Nakhon Nayok
51. Nonthaburi
52. Krung Thep Maha Nakhon (Bangkok)
53. Samut Prakan
54. Samut Songkhram
55. Samut Sakhon
VI. $S E$ (SOUTH-EASTERN)
56. Sa Kaeo
57. Prachin Buri
58. Chachoengsao
59. Chon Buri
60. Rayong
61. Chanthaburi
62. Trat
VII. PEN (PENINSULAR)
63. Chumphon
64. Ranong
65. Surat Thani
66. Phangnga
67. Phuket
68. Krabi
69. Nakhon Si Thammarat
70. Phatthalung
71. Trang
72. Satun
73. Songkhla
74. Pattani
75. Yala
76. Narathiwat

## Palynological result

Pollen morphology of 21 species and one variety of Argyreia has been additionally investigated by using light microscope and scanning electron microscope (SEM). According to the present study, it seems that Argyreia is stenopalynous genus.

Pollen grains of Argyreia are monad, spheroidal to subspheroidal, large to very large size 83-118 microns in diameter, radial symmetry, apolar, polypantoporate. Pori are circular to semicircular, somewhat elliptic, margin distinct, irregular, diameter of pore 5-11 microns. Tectum is semi-tectate. Ornamentation is echinate, spines 7-22 micron in height, conical or bottle shape, apex pointed or blunt, base inflated. Interspinal area more or less microreticulate, with small granules on muri, lumina irregular. (Plate 11. - Plate 25.)

Among those species studied, pollen grains of A. thorelii Gagnep. have spines with rather distinct trunctate apex. This character is quite different from the tapering pointed apex of other species, and make pollen grains of A. thorelii Gagnep. look different from the rest of the genus. All measurement of pollen grains of each species is shown in table 3 .

| Species | Symmetry | Polar | Pores | Size | Shape | Ornamentation | Specimen examine |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. A. adpressa | radial | apolar | polyporate | 93-111 $\mu \mathrm{m}$ | spheroidal | echinate | P. Traiperm 32, 38 (BCU) |
| 2. A. capititormis | radial | apolar | polyporate | $95-112 \mu \mathrm{~m}$ | spheroidal | echinate | P. Traiperm 10, 11, 12 (BCU) |
| 3. A. collinsae | radial | apolar | polyporate | $97-113 \mu \mathrm{~m}$ | spheroidal to sub spheroidal | echinate | P. Traiperm 5, 13 (BCU) |
| 4. A. fulvocymosa | radial | apolar | polyporate | $95-105 \mu \mathrm{~m}$ | spheroidal | echinate | P. Traiperm 26 (BCU) |
| 5. A. henryi | radial | apolar | polyporate | $99-113 \mu \mathrm{~m}$ | spheroidal to sub spheroidal | echinate | P. Traiperm 49 (BCU) |
| 6. A. ionantha | radial | apolar | polyporate | 93-106 $\mu \mathrm{m}$ | spheroidal | echinate | P. Traiperm 27, 35 (BCU) |
| 7. A. kerrii | radial | apolar | polyporate | 98-108 $\mu \mathrm{m}$ | - spheroidal | echinate | P. Traiperm 51, 53 (BCU) |
| 9. Argyreia cf. | radial | apolar | polyporate | $95-112 \mu \mathrm{~m}$ | spheroidal | echinate | P. Traiperm 1, 8, 47 (BCU) |
| laotica | radial | apolar | polyporate | 100-113 $\mu \mathrm{m}$ | spheroidal to slightly sub spheroidal | echinate | P. Traiperm 17, 29 (BCU) |
| 10. A. maymyo | radial | apolar | polyporate | $97-108 \mu \mathrm{~m}$ | spheroidal to slightly sub spheroidal | echinate | P. Traiperm 14, 25 (BCU) |
| 11. A. mollis | radial | apolar | polyporate | 97-114 $\mu \mathrm{m}$ | spheroidal to slightly sub spheroidal | echinate | P. Traiperm 39, 52 (BCU) |
| 12. A. nervosa | radial | apolar | polyporate | $104-114 \mu \mathrm{~m}$ | spheroidal | echinate | P. Traiperm 30 (BCU) |
| 13. A. obtecta | radial | apolar | polyporate | 104-118 $\mu \mathrm{m}$ | spheroidal to sub spheroidal | echinate | P. Traiperm 9, 21, 37, 44 (BCU) |
| 15. A. osyrensis | radial | apolar | polyporate | $96-106 \mu \mathrm{~m}$ | spheroidal to slightly sub spheroidal | echinate | P. Traiperm 6, 15, 22 (BCU) |
| 16. A. splendens | radial | apola | polyporate | $100-107 \mu \mathrm{~m}$ | Sta spheroidal | echinate | Herb. Trip 496 (30/1) (BCU) |
| 17. A. thorelii | radial | apolar | polyporate | 83-105 $\mu \mathrm{m}$ | spheroidal | echinate | P. Traiperm 20, 36 (BCU) |
| 18. A. wallichii | radial | apolar | polyporate | 96-111 $\mu \mathrm{m}$ | spheroidal to sub spheroidal | echinate | P. Traiperm 2, 43 (BCU) |
| 19. Argyreia sp. 1 | radial | apolar | polyporate | $95-115 \mu \mathrm{~m}$ | spheroidal | echinate | W. Nanakorn et.al 5217 (QSBG) |
| 20. Argyreia sp. 2 | radial | apolar | polyporate | $84-101 \mu \mathrm{~m}$ | spheroidal to sub spheroidal | echinate | P. Traiperm 34 (BCU) |
| 21. Argyreia sp 3 | radial | apolar | polyporate | 98-110 $\mu \mathrm{m}$ | spheroidal | echinate | P. Traiperm 33 (BCU) |

## Chulalongkorn University

Table 3. Palynological characters of twenty one species and one variety in Argyreia Lour. in Thailand.


Plate 11. LM micrographs: A. Argyreia adpressa (Choisy) Boerl., B. Argyreia capitiformis (Poir.) Ooststr., C. Argyreia collinsae (Craib) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.), D. Argyreia fulvocymosa C.Y. Wu var. fulvocymosa, E. Argyreia henryi (Craib) Craib and F. Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.).


Plate 13. LM micrographs: A. Argyreia obtecta C.B. Clarke, B. Argyreia osyrensis (Roth) Choisy, C. Argyreia roxburghii Choisy, D. Argyreia splendens (Hornem.) Sweet, E. Argyreia thorelii Gagnep. and F. Argyreia wallichii Choisy.


Plate 14. LM micrographs: A. Argyreia sp.1., B. Argyreia sp. 2. and C. Argyreia sp. 3.


Plate 15. SEM micrographs: A-C. Argyreia adpressa (Choisy) Boerl. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia capitiformis (Poir.) Ooststr. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 16. SEM micrographs: A-C. Argyreia collinsae (Craib) B. Na Songkhla \& P. Traiperm, comb. nov. (ined.) (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia fulvocymosa C.Y. Wu var. fulvocymosa (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 17. SEM micrographs: A-C. Argyreia henryi (Craib) Craib (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia ionantha (Kerr) C. Khunwasi \& P. Traiperm, comb. nov. (ined.) (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 18. SEM micrographs: A-C. Argyreia kerrii Craib (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia lanceolata Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 19. SEM micrographs: A-C. Argyreia cf. laotica Gagnep. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia maymyo (W.W. Smith) Raizada (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 20. SEM micrographs: A-C. Argyreia mollis (Burm. f.) Choisy (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia nervosa (Burm. f.) Boj. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 21. SEM micrographs: A-C. Argyreia obtecta C.B. Clarke (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia osyrensis (Roth) Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 22. SEM micrographs: A-C. Argyreia roxburghii Choisy (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia splendens (Hornem.) Sweet (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 23. SEM micrographs: A-C. Argyreia thorelii Gagnep. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia wallichii Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 24. SEM micrographs: A-C. Argyreia sp. 1. (A) Pollen grain.(B) Detail of ornamentation. (C) Detail of apertural area. D-F. Argyreia sp. 2. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.


Plate 25. SEM micrographs: A-C. Argyreia sp. 3. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area.

