TAXONOMIC STUDY IN *Argyreia* Lour. (CONVOLVULACEAE) IN THAILAND

Miss Paweena Traiperm

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Botany
Department of Botany
Faculty of Science
Chulalongkorn University
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การศึกษาอนุกรมวิธานของพืชสกุล *Argyreia* Lour. (Convolvulaceae) ในประเทศไทย

นางสาวปวีณา ไตรเพิ่ม

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาพฤกษศาสตร์ ภาควิชาพฤกษศาสตร์
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By	Miss Paweena Traiperm
Field of study	Botany
Thesis Advisor	Chumpol Khunwasi, Ph.D.
Thesis Co-advisor	Associate Professor Busban Na Songkhla

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ปวีณา ไตรเพิ่ม : การศึกษาอนุกรมวิธานของพืชสกุล *Argyreia* Lour. (Convolvulaceae) ในประเทศไทย. (TAXONOMIC STUDY IN *Argyreia* Lour. (CONVOLVULACEAE) IN THAILAND) อ. ที่ปรึกษา : ดร. ชุมพล คุณวาสี, อ.ที่ปรึกษาร่วม : รศ. บุศบรรณ ณ สงขลา, 144 หน้า. ISBN 974-17-3060-8.

การศึกษาอนุกรมวิธานของพืชสกุล *Argyreia* Lour. (Convolvulaceae) ในประเทศไทย ระหว่างเดือนพฤษภาคม พ.ศ. 2544 ถึงเดือนกุมภาพันธ์ พ.ศ. 2546 จากตัวอย่างพืชที่ได้สำรวจและเก็บใหม่พร้อมทั้งตัวอย่างพันธุ์ไม้แห้งที่เก็บรักษาไว้ในพิพิธภัณฑ์พืช 7 แห่งในประเทศไทย ได้แก่ พิพิธภัณฑ์พืชศาสตราจารย์กสิน สุวตะพันธุ์ (BCU), พิพิธภัณฑ์พืชกรุงเทพ (BK), พิพิธภัณฑ์พืช หอพรรณไม้ กรมป่าไม้ (BKF), พิพิธภัณฑ์พืช ภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่ (CMU), พิพิธภัณฑ์พืช ภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น (KKU), พิพิธภัณฑ์พืชภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตหาดใหญ่ (PSU) และพิพิธภัณฑ์พืชสวนพฤกษศาสตร์สมเด็จพระนางเจ้าสิริกิติ์ (QSBG) พบพืชสกุลนี้ในประเทศไทย 27 ชนิด 1 พันธุ์ ได้บรรยายลักษณะพืชอย่างละเอียด สร้างรูปวิธานจำแนกชนิด วาดภาพลายเส้น และถ่ายภาพ การศึกษาครั้งนี้พบพืชถิ่นเดียว จำนวน 8 ชนิด คาดว่าเป็นพืชที่พบครั้งแรกในประเทศไทย จำนวน 2 ชนิด คือ *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa* และ *Argyreia thorelii* Gagnep. ไม่สามารถระบุชนิดได้ 3 ชนิด การศึกษาละอองเรณูของพืชสกุลนี้ จำนวน 21 ชนิด และ 1 พันธุ์ ด้วยกล้องจุลทรรศน์แบบใช้แสง และกล้องจุลทรรศน์อิเล็กตรอนแบบส่องกราด พบว่าเรณูมีลักษณะเป็นเม็ดเดี่ยว สมมาตรแบบรัศมี มีขั้วแบบ apolar มีช่องเปิดแบบ polypantoporate รูปร่างแบบ spheroidal ขนาดของเรณู 83-118 ไมโครเมตร มีลวดลายของผนังชั้นนอกแบบ echinate ซึ่งลักษณะสัณฐานวิทยาของเรณูไม่สามารถนำมาใช้จำแนกในระดับชนิดได้ พร้อมนี้ได้แสดงภาพของเรณูจากกล้องจุลทรรศน์ และกล้องจุลทรรศ์อิเล็กตรอนแบบส่องกราด

ภาควิชา.....พฤกษศาสตร์..... ลายมือชื่อนิสิต.....ปวีณา ไตรเพิ่ม.....

สาขาวิชา.....พฤกษศาสตร์..... ลายมือชื่ออาจารย์ที่ปรึกษา.....

ปีการศึกษา 2545 ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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PAWEENA TRAIPERM: TAXONOMIC STUDY IN *Argyreia* Lour. (CONVOLVULACEAE) IN THAILAND THESIS ADVISOR : CHUMPOL CHUNWASI, Ph.D., THESIS COADVISOR : ASSOC. PROF. BUSBAN NA SONGKHLA, 144 pp. ISBN 974-17-3060-8.

Taxonomic study of *Argyreia* Lour. in Thailand was carried out between May 2001 to February 2003, have been studied from the new collecting of fresh materials as well as from herbarium specimens deposited at the seven herbaria in Thailand, namely Professor Kasin Suvatabhandhu Herbarium (BCU), Bangkok Herbarium (BK), The Forest Herbarium (BKF), The Herbarium, Department of Biology Faculty of Science Chiang Mai University (CMU), The Herbarium, Department of Biology Faculty of Science Khon Kaen University (KKU), The Herbarium, Department of Biology Faculty of Science Prince of Songkhla University (PSU) and Queen Sirikit Botanic Garden Herbarium (QSBG). There were found 27 species and one variety. Descriptions, key to species, illustrations and photographs were prepared. Eight species are endemic to Thailand, two are new record species from Thailand, viz. *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa* and *Argyreia thorelii* Gagnep., and 3 new species are expected. Pollen morphology of 21 species and one variety were also studied by light microscope and scanning electron microscope. The pollen is monad, radial symmetry, apolar. Aperture is polypantoporate. The shape of pollen grains is spheroidal. The pollen grain size is 83-118 microns. The exine is echinate. The palynological data do not provide good taxonomic investigation for species identification. As well as the photographs from light microscope and scanning electron microscope of pollens also have been added.

Department.....Botany..... Student's signature Paweena Traiperm

Field of study.....Botany..... Advisor's signature Chumpol Chunwasi

Academic year 2002 Co-advisor's signature Busban Na Songkhla

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CHAPTER I

INTRODUCTION

Thailand is a tropical country situating with in floristic regions of Southeast Asia. Thailand consists of many types of forests such as tropical rain forest, dry tropical forest, hill evergreen forest, mixed deciduous forest, and dry dipterocarp forest. Nowadays there are serious forest crisis for example lose of forest area due to human activity, leading to threatening plants species to extinction.

Argyreia Lour. is one of the large and showy flowering plants in Thailand. However, the taxonomic data on Thai *Argyreia* is rather scanty and is found scattered in various taxonomic literatures done by oversea taxonomists. In order to complete the taxonomic study of the family Convolvulaceae, this research project should be carried out, which in term the benefit to the Flora of Thailand project and also provide basic data for plant genetic resources for this family.

Morphological character is an important evidence that always use in plant taxonomic study since it is a conventional and less complicate method. Recently, micro structure data such as palynological data is used in plant taxonomy. Pollen morphology can be used to verify, confirm and complete macro morphological study, and can also be used for phylogenetic investigation among plants group.

Palynology, the study of pollen and spore, was developed as a result of SEM. SEM has revolutionize the study of surface of pollen grains in depth. The availability of countless pollen samples from herbarium and rapid techniques for preparation allows a palynological survey in a just period of time.

So, characters provided by pollen grains including pollen wall structure, polarity, symmetry, shape, and grain size are useful in taxonomic study. For example pollen morphology had been used in determining patterns of species relationships in *Vernonia* (Keeley and Jones, 1977 cited in Jones and Luchsinger, 1987). Accordingly, in this research palynology characters will be investigated as well in addition to morphological characters.

Aims of this Thesis

- To collect plant specimens, study morphology and diversity of *Argyreia* Lour. (Convolvulaceae) in Thailand for identify, classify, construct key to species and to study distribution in Thailand.

- To study pollen morphology: to present pollen descriptions.

CHAPTER II

LITERATURES REVIEW

Taxonomic Background

Argyreia is one of the largest genera of Convolvulaceae. It contains about 90 species and distributes in the tropical continental Asia, Malaysia and Australia (Austin, 1980). Most of them are woody twiners with large showy flowers or inflorescences. Parts of plants usually covered with various types of indumentum, especially on the outside of midpetaline bands. Fruits are indehiscent, fleshy, leathery or berry with orange, red or purplish to yellowish color. (van Ooststroom, 1943,1953; Austin, 1980)

The genus *Argyreia* which was firstly described by Joao de Louriero in 1790, in his Flora Cochinchinensis, contained 3 species, i.e. *A. obtusifolia* Lour., *A. acuta* Lour. and *A. arborea* Lour. He described his new genus as having 5-partite corolla with oblong reflexed segments, a capitate emarginate stigma and a subglobular, 4-celled berry. The first two species doubtless belong to the family Convolvulaceae, as representatives of well-defined genus. However, the last one, *A. arborea* Lour., was later transferred to the Boraginaceae by Hallier in 1898 as a synonym of *Cordia myxa* L. (van Ooststroom, 1943)

In 1824, William Roxburgh established the new genus *Lettsomia*, in the first edition of Flora Indica vol. II, which was very similar to *Argyreia* Lour., except its 2-locular ovary. He subdivided the *Lettsomia* into two groups according to the corolla form, i.e. campanulate group and infundibuliform (or rather hypocrateriform) group. From his description, it is clear that all species with campanulate corolla has a biglobular stigma, but infundibuliform group has a linear stigma (van Ooststroom, 1943)

In 1833, it was Jacques Denis Choisy, in Mém. Soc. Phys. Genève vol. VI, who treated the genus *Lettsomia* Roxb. as a synonym of the genus *Argyreia* Lour. He transferred all *Lettsomia* species with campanulate corolla and biglobular stigma to

the *Argyreia*. He also untied all species with infundibuliform corolla and linear stigma into the new genus *Rivea* Choisy. Among these *Rivea tiliaefolia* Desr. was afterward chagned to the genus *Stictocardia* by Hallier under the name *Stictocardia tiliaefolia* (Desr.) Hallier f. (van Ooststroom, 1943)

Choisy (1845) divided the Convolvulaceae into 4 tribes, i.e. Cuscuteae, Dichondreae, Convolvuleae and Argyreieae. The first tribe contains only one parasitic genus, *Cuscuta*. The second one is differ from the others by its deeply 2-lobed ovary and contains only two genera, *Dichondra* and *Falkia*. The third one includes all species having dehiscent capsules. The last one comprises of indehiscing fruits. He put the *Argyreia* in the last tribe and still mentioned *Lettsomia* p.p. as a synonym. Eventhough Choisy's opinion was followed by a number of authors, but some taxonomists still keep these two genera separate, however with some hesitation. Ridley (1923) separated *Lettsomia* from *Argyreia* in his publication, The Flora of the Malay Peninsula vol. II, but still mentioned that the *Lettsomia* is very near to *Argyreia* and may pass into it.

Van Ooststroom (1943) gave the conclusion that the differences in the number of cells of the ovary appears to be of little value and the species which previously classifed in *Lettsomia* have so many characters in common with those of *Argyreia*. The separation of these two genera would be a very unnatural one.

In 1893 Hallier, in Bot. Jahrb. vol. 16, was the first one who used pollen morphology as an important character in the classification of Convolvuloideae. (Ferguson, Verdcourt and Poole, 1977). He used the presence of spines on the exine to separate the genera of Convolvulaceae into two groups, namely Echinoconiae which pollen grains have spines and Psiloconiae which pollen grains have no spines (Erdtman, 1971). The Hallier's system was later adopted by van Ooststroom (1953). He subdivided the family into two subfamilies, the Cuscutoideae and the Convovuloideae. The last subfamily was then further divided into two tribes, the Convolvuleae (or Psiloconiae group of Hallier f.) and the Impomoeae (or Echinoconiae group of Hallier f.).The *Argyreia* was classified in the tribe *Ipomoeae* with its very closely related genus *Ipomoea*. (van Ooststroom, 1953)

Taxonomic study of *Argyreia* in nearby countries

The taxonomic data of *Argyreia* (and *Lettsomia* p.p.), was published in many Floras by various taxonomists. On the westward asian countries of Thailand, the presence of *Argyreia* was reported in Flora Indica (Roxburgh, 1824), Flora of British Burma (Kurz, 1877), Flora of British India (Clarke, 1885), Flora of Presidendy of Madras (Gamble, 1915), Flora of Assam (C.B. Clarke, 1939), Flora of Eastern Himalaya (Hara and Yamazaki, 1966), Flora Indica or descriptions of Indian Plants (Roxburgh, 1975), Flora of Hassan District (India) (Gandhi, 1978), Flora of West Pakistan (Austin and Ghazanfar, 1979), Flora of Ceylon (Austin, 1980), Flora of Bangladesh (Khan, 1985), Forest Plants of Eastern India (Chaudhuri, 1993), and Flora of Bhutan (Grierson and Long, 1999).

The occurrence of *Argyreia* in Laos, Cambodia and Vietnam was only found only in Flora Génerale de L' Indochine (Gagnepain & Courchet, 1915). Fang and Staples (1995) nearly completely reported the *Argyreia* found in China in Flora of China vol. 16.

On the southern regions to Thailand, *Argyreia* was reported in Malay Peninsula (Ridley, 1923), Malesiana (van Ooststroom, 1943, 1945, 1950, 1952, 1953 and Hoogland 1952). So afterwards in 1953 Van Ooststroom & Hoogland were published Flora Malesiana and reported 46 species of *Argyreia* and finally in 1965 Backer & Bakhuizen reported 3 species of *Argyreia* in Indonesia, in Flora of Java.

Taxonomic study of *Argyreia* in Thailand

The first taxonomic publications about *Argyreia* in Thailand was done by William Grant Craib. He primarily reported 4 species of *Argyreia* in 1911 (*A . obtusifolia* Lour., *A. roxburghii* Choisy var. *siamica*, *A. wallichii* Choisy) and added one more species in 1914 (*A. henryi* (Craib) Craib). A few years later, he mentioned about *Rivea collinsae* Craib found in Thailand, which was later changed to *Lettsomia* and *Argyreia*, respectively (Craib, 1911, 1914, 1916)

The data of Thai species of *Argyreia* was later extended by Arthur Francis G. Kerr. He studied and verified 7 new Thai species of *Argyreia*, but at that time, under the generic name *Lettsomia*, viz. *L. brachypoda* Kerr, *L. breviscapa* Kerr, *L. calcicola* Kerr, *L. ionantha* Kerr, *L. roseopurpurea* Kerr, *L. stenophylla* Kerr and *L. versicolor* Kerr and transferred *Rivea collinsae* to *Lettsomia*.(Kerr, 1941). In 1954, he finally reported 7 species of *Argyreia* and 21 species of *Lettsomia* found in Thailand (Kerr, 1954)

The occurrence of *Argyreia* in Thailand was also found scattered in various works of plant taxonomists who studied Thai Flora in particular regions, such as Doi Inthanon, Chiang Mai and Phu Kradung, Loei (Koyama, 1986), Pa Hin Ngam National Park, Chaiyaphum (สมราน สุดดี, 2538), Queen Sirikit Botanic Garden, Chiang Mai (วัชนะ บุญชัย, 2542). Phu Phan National Park, Sakon Nakhon, (ปวีณา ไตรเพิ่ม, 2542) Toan Nga Chang waterfall, Songkhla (พวงเพ็ญ ศิริรักษ์ และคณะ, 2542), Khao Wang Kamen, Kanchanaburi (วรรณชัย ชาแท่น, 2543) Chiang Dao Cave, Chiang Mai (จีรภากรานต์ ปาละหล้า, 2543), Doi Suthep-Pui National Park, Chiang Mai (Maxwell & Elliott, 2001).

Table 1. Comparison of *Argyreia* spp. found in different Floras

No.	Species \ Publications	Clarke 1885 British India	Gandhi, 1978 Hassan District	Austin, 1980 Ceylon	Khan, 1985 Bangladesh	Austin & Ghazanfar, 1979 West Pakistan	Kurz 1877 British Burma	Grierson & Long, 1999 Bhutan	Hara & Yamazaki, 1966 Eastern Himalaya	Fang & Staples, 1995 China	Gagnep. & Courchet, 1915 IndoChina	Ridley 1923 Malay Peninsula	Ooststroom & Hoogland, 1953 Malesiana	Ooststroom, 1965 Java
1	*A. acuta* Lour.									X	X			
2	*A. adpressa* (Choisy) Boerl.	X										X	X	
3	*A. aggregata* Choisy *	X					X				X			
4	*A. apoensis* (Elmer) Ooststr.												X	
5	*A. arborea* Lour.										X			
6	*A. argentea* (Roxb.) Choisy	X			X									
7	*A. atropurpurea* (Wall.) Raizada **	X						X	X					
8	*A. barbata* (Wall.) Raizada	X												
9	*A. barbigera* Choisy	X												
10	*A. barnesii* (Merr.) Ooststr.												X	
11	*A. bella* (C.B. Clarke) Raizada	X												
12	*A. bifrons* Ooststr.												X	
13	*A. baoshanensis* S.H. Huang									X				
14	*A. boholensis* (Merr.) Ooststr.												X	
15	*A. bracteata* Choisy	X												
16	*A. bracteosa* (C.B. Clarke) Raizada	X												
17	*A. capitata* (Vahl) Choisy ***						X				X		X	X
18	*A. capitiformis* (Poir.) Ooststr.				X			X		X				
19	*A. caudata* Ooststr.												X	
20	*A. celebeica* Ooststr.												X	
21	*A. cheliensis* C.Y. Wu									X				
22	*A. choisyana* Wight ex C.B. Clarke	X		X										
23	*A. cinerea* Ooststr.												X	
24	*A. congesta* Ooststr.												X	
25	*A. corneri* Hoogl.												X	
26	*A. crispa* Ooststr.												X	
27	*A. cucullata* Ooststr.												X	
28	*A. cuneata* (Willd.) Ker-Grawler	X	X		X									

Table 1. (Continued) Comparison of *Argyreia* spp. found in different Floras

No.	Species \ Publications	Clarke 1885 British India	Gandhi, 1978 Hassan District	Austin, 1980 Ceylon	Khan, 1985 Bangladesh	Austin & Ghazanfar, 1979 West Pakistan	Kurz 1877 British Burma	Grierson & Long, 1999 Bhutan	Hara & Yamazaki, 1966 Eastern Himalaya	Fang & Staples, 1995 China	Gagnep. & Courchet, 1915 IndoChina	Ridley 1923 Malay Peninsula	Ooststroom & Hoogland, 1953 Malesiana	Ooststroom, 1965 Java
29	*A. curtisii* (Prain) Prain ex Ooststr.											X		
30	*A. cymosa* Sweet	X												
31	*A. daltoni* C.B. Clarke	X												
32	*A. discolor* Ooststr.												X	
33	*A. elliptica* (Roth) Choisy	X	X	X										
34	*A. erinacea* Ooststr.												X	
35	*A. eriocephala* C.Y. Wu									X				
36	*A. formosana* Ishigami ex Yamazaki									X				
37	*A. fulgens* Choisy	X												
38	*A. fulvocymosa* C.Y. Wu									X				
39	*A. fulvovillosa* C.Y. Wu									X				
40	*A. glabra* Choisy												X	
41	*A. hancorniafolia* Gardner	X		X										
42	*A. henryi* (Craib) Craib									X	X			
43	*A. hirsuta* Arn.	X		X										
44	*A. hirsutissima* (C.B. Clarke) Raizada	X						X						
45	*A. hookeri* C.B. Clarke	X						X	X				X	
46	*A. imbricata* (Roth) Santapau & Patel		X											
47	*A. involucrata* C.B. Clarke	X									X			
48	*A. kerrii* Craib											X	X	
49	*A. kunstleri* (Prain) Prain ex Ooststr.										X			
50	*A. kurzii* Boerl.	X												
51	*A. lanceolata* Choisy	X									X			
52	*A. laotica* Gagnep.										X			
53	*A. leschenaultii* Choisy	X								X				
54	*A. lineariloba* C.Y. Wu												X	
55	*A. linggaensis* Ooststr.													
56	*A. lawii* C.B. Clarke	X												

Table 1. (Continued) Comparison of *Argyreia* spp. found in different Floras

No.	Species \ Publications	Clarke 1885 British India	Gandhi, 1978 Hassan District	Austin, 1980 Ceylon	Khan, 1985 Bangladesh	Austin & Ghazanfar, 1979 West Pakistan	Kurz 1877 British Burma	Grierson & Long, 1999 Bhutan	Hara & Yamazaki, 1966 Eastern Himalaya	Fang & Staples, 1995 China	Gagnep. & Courchet, 1915 IndoChina	Ridley 1923 Malay Peninsula	Ooststroom & Hoogland, 1953 Malesiana	Ooststroom, 1965 Java
57	*A. luzonensis* (Hallier f.) Ooststr.												X	
58	*A. maingayi* (C.B. Clarke) Hoogl.	X										X	X	
59	*A. malabarica* Arn. ex Choisy	X												
60	*A. marlipoensis* C.Y. Wu									X				
61	*A. mastersii* (Prain) Raizada									X				
62	*A. maymyo* (W.W) Raizada									X				
63	*A. mekongensis* Gagnep. & Courchet										X			
64	*A. micrantha* Ooststr.												X	
65	*A. mollis* (Burm. f.) Choisy									X		X	X	X
66	*A. monglaensis* C.Y. Wu & S.H. Huang									X				
67	*A. monosperma* C.Y. Wu									X				
68	*A. mysorensis* C.B. Clarke	X												
69	*A. nasirii* D.F. Austin					X								
70	*A. nellygherya* Choisy	X												
71	*A. nervosa* (Burm. f.) Boj.			X	X	X				X			X	X
72	*A. nitida* (Desr.) Choisy												X	
73	*A. nuda* Ooststr.												X	
74	*A. oblongifolia* Ooststr.												X	
75	*A. obtecta* C.B. Clarke	X									X			
76	*A. obtusifolia* Lour.										X	X		
77	*A. ooststroomii* Hoogl.												X	
78	*A. osyrensis* (Roth) Choisy			X						X			X	
79	*A. parviflora* (Ridl.) Choisy												X	
80	*A. paucinervia* Ooststr.												X	
81	*A. pedicellata* Ooststr.												X	
	A. penangiana (Choisy) Boerl. ****	X										X	X	
83	*A. pequensis* C.B. Clarke	X										X		
84	*A. philippinensis* (Merr.) Ooststr.												X	

Table 1. (Continued) Comparison of *Argyreia* spp. found in different Floras

No.	Species \ Publications	Clarke 1885 British India	Gandhi, 1978 Hassan District	Austin, 1980 Ceylon	Khan, 1985 Bangladesh	Austin & Ghazanfar, 1979 West Pakistan	Kurz 1877 British Burma	Grierson & Long, 1999 Bhutan	Hara & Yamazaki, 1966 Eastern Himalaya	Fang & Staples, 1995 China	Gagnep. & Courchet, 1915 IndoChina	Ridley 1923 Malay Peninsula	Ooststroom & Hoogland, 1953 Malesiana	Ooststroom, 1965 Java
85	*A. pierreana* Bois									X	X			
86	*A. pilosa* Wight & Arn.	X	X											
87	*A. pomacea* (Roxb.) Choisy	X	X	X										
88	*A. populifolia* Choisy	X		X										
89	*A. pseudorubicunda* Ooststr.												X	
90	*A. reinwardtiana* (BL.) Miq.												X	
91	*A. reticulata* (Prain) Hoogl.												X	
92	*A. ridleyi* (Prain) Prain ex Ooststr.											X	X	
93	*A. robinsonii* (Ridl.) Ooststr.												X	
94	*A. roxburghii* Choisy	X			X			X	X		X			
95	*A. rubens* (C.B. Clarke) Raizada	X												
96	*A. rubicunda* Choisy *****	X										X	X	
97	*A. samarensis* Ooststr.												X	
98	*A. scortechinii* (Prain) Hoogl.											X	X	
99	*A. sericea* Dalz. & Gibs.	X												
100	*A. setosa* (Roxb.) Choisy	X							X		X			
101	*A. sikkimensis* (C.B. Clarke) Ooststr.	X						X						
102	*A. sorsogonensis* (Elmer) Ooststr.												X	
103	*A. speciosa* Sweet	X												
104	*A. sphaerocephala* (Prain) Hoogl.											X	X	
105	*A. splendens* (Hornem.) Sweet ******	X		X	X					X				
106	*A. strigillosa* C.Y. Wu									X				
107	*A. strigosa* *******	X												
108	*A. sumbawana* Ooststr.												X	
109	*A. thomsoni* (C.B. Clarke) Babu	X						X						
110	*A. thorelii* Gagnep.										X			
111	*A. thwaitesii* (C.B. Clarke) D.F. Austin			X										
112	*A. tiliaefolia* Wight	X			X		X				X			

Table 1. (Continued) Comparison of *Argyreia* spp. found in different Floras

No.	Species \ Publications	Clarke 1885 British India	Gandhi, 1978 Hassan District	Austin, 1980 Ceylon	Khan, 1985 Bangladesh	Austin & Ghazanfar, 1979 West Pakistan	Kurz 1877 British Burma	Grierson & Long, 1999 Bhutan	Hara & Yamazaki, 1966 Eastern Himalaya	Fang & Staples, 1995 China	Gagnep. & Courchet, 1915 IndoChina	Ridley 1923 Malay Peninsula	Ooststroom & Hoogland, 1953 Malesiana	Ooststroom, 1965 Java
113	*A. velutina* C.Y. Wu									X				
114	*A. venusta* Choisy							X						
115	*A. wallichii* Choisy	X						X		X	X			
116	*A. walshae* Ooststr.												X	
117	*A. zeylanica* Gaertn.						X							
	Total	46	5	10	7	2	4	9	4	23	17	12	46	3

* *Argyreia aggregata* Choisy as a synonym of *Argyreia osyrensis* (Roth) Choisy

** *Lettsomia atropurpurea* C.B. Clarke in British India as a synonym of *Argyreia pierreana* Bois in Flora China

*** *Argyreia capitata* (Vahl) Choisy as a synonym of *Argyreia osyrensis* (Roth) Choisy

**** *Lettsomia penangiana* miq. in Flora British India & Malay Peninsula as a synonym of *Argyreia penangiana* (Choisy) Boerl.

***** *Lettsomia rubicunda* C.B. Clarke in Flora Hassan District & in Flora Malay Peninsula as a synonym of *Argyreia rubicunda* (C.B. Clarke) Raizada

****** *Argyreia splendens* (Roxb.) Sweet in Flora Ceylon & Flora Bangladesh as a synonym of *Argyreia splendens* (Hornem.) Sweet, cause of this name are not effective.

******* *Lettsomia strigosa* Roxb. in Flora British India as a synonym of *Argyreia capitata* (Vahl) Choisy in Flora Malesiana (Van Ooststroom, 1953)

According to the limited reference some species are not able to solved about author confusion.

CHAPTER III

MATERIAL AND METHOD

1. Materials

1.1 Specimen collecting equipments

- a plant press, 30 x 45 cm.
- sheets of newspaper
- corrugated cardboard
- hand pruner
- spade
- plastic bage
- field note
- hand lens
- camera
- films (colour print and transparency slide)
- altimeter
- tags

1.2 Herbarium specimen preparing equipments

- Deep freezer (-40 c)
- Hot air oven
- mounting paper, 30 x 42 cm.
- species covers, 30 x 42 cm.
- genus covers, 30 x 42 cm.
- latex mixed with synthetic glue in ratio 1 : 1
- label pad, about 10.5 x 13.5 cm
- needle and thread
- *sand bags*

1.3 Identification equipments

- dissecting microscope
- dissecting needles
- razor blades
- petri dishes
- Related taxonomic literatures

2. Method

2.1 Literatures review

- Reviewed literatures dealing with *Argyreia* emphasized and related genera which distributed in Thailand and neighbouring countries such as Malaysia, Indonesia, India, Burma and Indo-China in order to use as a guidance for further study and collection.

- The related literatures were searched from the libraries at the Professor Kasin Suvathabhandhu Herbarium, Department of Botany, Chulalongkorn University (BCU) and The Forest Herbarium, Royal Forest Department (BKF).

2.2 Exploration and collection

- Field collections and flowering period observations of *Argyreia* was made in many provinces of Thailand as many as possible.

- The herbarium specimens of *Argyreia* available in Professor Kasin Suvatabhandhu Herbarium (BCU), Bangkok Herbarium (BK), The Forest Herbarium (BKF), The Herbarium, Department of Biology Faculty of Science Chiang Mai University (CMU), The Herbarium, Department of Biology Faculty of Science Khon Kaen University (KKU), The Herbarium, Department of Biology Faculty of Science Prince of Songkhla University (PSU), and Queen Sirikit Botanic Garden Herbarium (QSBG) have been throughly studied.

- Three duplicated of plants specimens with flowers or fruits were collected. The filed notes on morphological characters of each specimens such as color, form and size of flowers; kind of fruit, ecological information, habit and some diagnostic characters of each species were noted.

3. Laboratory study

- The details of external and internal morphological characters of each specimens were studied in the laboratory. Plant specimens were identified using both keys and descriptions from taxonomic literatures. The full descriptions of each species and line drawings were made.

- The herbarium specimens were prepared and have been kept in the Kasin Suvatabhandhu Herbarium, Department of Botany, Chulalongkorn University (BCU) and The Forest Herbarium, Royal Forest Department (BKF)

- Dichotomous keys to species based on their significant characters were made.

- In addition, other information, including ecological data, distribution, vernacular name for each species, were prepared.

Materials for palynological study

1. **Materials for field work and sample collection**
   - 1.1 Paper envelops
   - 1.2 A plant press, size 30X46 cm
   - 1.3 A pair of hand pruners
   - 1.4 Plastic bags
   - 1.5 Hand-lens
   - 1.6 Camera
   - 1.7 Collector's number card
   - 1.8 Color slides film (Kodak 100)
   - 1.9 Color printed film (Kodak 100)
2. **Materials for pollen slide preparation and pollen morphological study**
   - 2.1 10 % Potassium hydroxide
   - 2.2 Glacial acetic acid
   - 2.3 Acetic acid anhydride
   - 2.4 Concentrated sulphuric acid
   - 2.5 70 %, 95 %, absolute ethyl alcohol
   - 2.6 Distilled water
   - 2.7 Benzene
   - 2.8 Acetone
   - 2.9 Silicone oil AK 2,000
   - 2.10 Paraffin
   - 2.11 Immersion oil
   - 2.12 Paper envelops
   - 2.13 Label stickers
   - 2.14 Sieving crucible
   - 2.15 Pyrex beaker 50 ml., 100 ml.
   - 2.16 Vials
   - 2.17 Hot plate
   - 2.18 Warm plate

2.19 Centrifuge and centrifuge tubes

2.20 Microscopic slides and cover glasses

2.21 Micrometer, scale 1:100 micron

Light Microscope (model Nikon AFX 35) at the Prefessor Kasin Suvatabhandhu Herbarium, Department of Botany, Faculty of Science, Chulalongkorn University

2.22 Scanning electron microscope (model JEOL:JSM-5410 LV) at Technological Research Equipment Center, Chulalongkorn University.

2.23 Black – white negative films (Kodak TMAX 100 for LM and Kodak VP 120 for SEM)

2.24 Pollen materials: fresh materials, herbarium specimens

Methods

1. Field work and sample collection

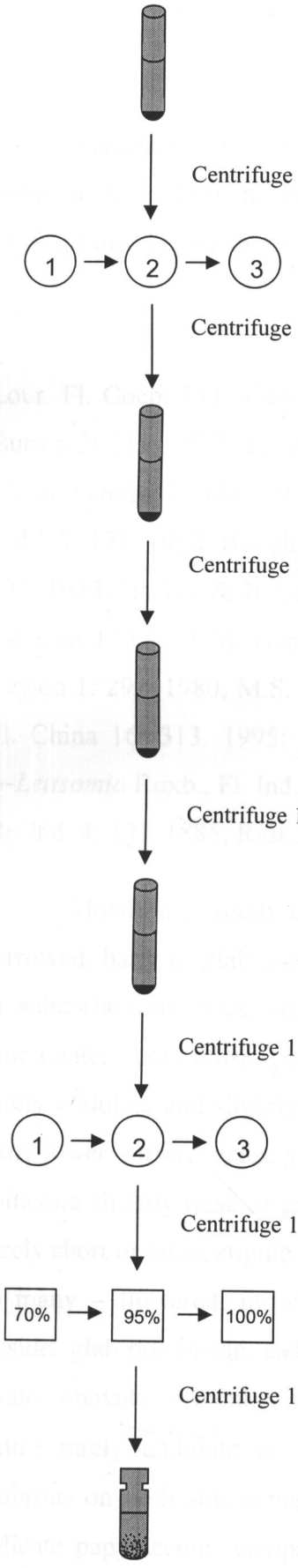
Field collection for herbarium specimens and pollen materials were made through many provinces in Thailand during May 2001 to January 2003. One to ten mature flowers of each species were kept and dried in paper envelopes. In addition, three duplications of plant specimens were collected.

2. Pollen slide preparation and pollen morphological study

Most of pollen samples were taken from fresh specimens were collected in the field. Some of them were obtained from the specimens deposited in BCU, BKF and CMU.

For LM, the pollen samples were treated by the acetolysis method (Fig.1) and preserved in silicone oil AK 2,000 (Andersen, 1960). The acetolysed pollen grains were mounted on microscopic slides and sealed with paraffin. Pollen morphological observations and photographs were made under a Nikon AFX 35. Permanent type slides of all samples are deposited at BCU.

For SEM, acetolysed pollen grains were dried and directly mounted on stubs with double-sides adhesive tape. The pollen grains were, then, coated with gold by using a Bazer-sputter coater for 5 minutes, and observed by SEM model JEOL JSM-5410 LV. SEM micrographs were taken with 1,000 to 15,000 magnification at kV.



1. Boiled pollen samples in 10% (KOH). (1 min.)
2. Washed with distilled water and centrifuge 1 min. (3 times).
3. Removed water by means of glacial acetic acid.
4. Removed of most organic matters with acetolysis mixture (conc. Sulphuric acid: Acetic anhydride; 1:9) and boiled 1 min. at 60-80 °C
5. Washed with glacial acetic acid
6. Washing with distilled water and centrifuge 1 min. (3 times).
7. Dehydrated by 70%, 95%, absolute ethyl alcohol.
8. Transferred acetolysed pollen grains from centrifuge tube to vial by means of benzene before preserved in silicone oil.

Figure 1. Acetolysis Method (Erdtman, 1960)

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.

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. Java 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. **25. A. sp.1**
      3. Sepals densely hairs outside, glabrous inside.
         6. Stems with whitish pubescent, leaves blade cordate, ovate or ovate-lanceolate. **9. A. kerrii**
         6. Stems with brown sparsely pilose, leaves blade elliptic, oblong-lanceolate or oblong-elliptic. **11. A. cf. laotica**
   2. Corolla densely hairs at midpetaline bands.
      7. The corolla inside with long hairs at base. **4. A. capitiformis**
      7. The corolla inside glabrous at base.
         8. Bracts persistent.
            9. Leaves blade ovate, broadly ovate, cordate, to orbicular, base slightly cordate to deeply cordate, truncate or obtuse.
               10. Stems with brown or fulvous hairs.

11. Internode 13.0 – 18.0 cm long, sepals unequal.

8. A. ionantha

11. Internode 4.0 – 5.5 cm long, sepals subequal.

23. A. versicolor

10. Stems with whitish or greyish hairs.

12. Bracts oblong or oblanceolate, 12-20 by 2-3 mm.

19. A. roxburghii

12. Bracts ovate, elliptic or ovate-elliptic, 2.5-5.0 by 1.2-1.8 cm.

13. Inflorescence axillary, subcapitate cyme, ovary 2-celled. **24. A. wallichii**

13. Inflorescence axillary, lax cyme, ovary 4-celled . **15. A. nervosa**

9. Leaves blade oblong-ovate, oblong-lanceolate, elliptic, oblong or obovate, base round or obtuse.

14. Sepals oblong-ovate, leaves blade oblong-ovate or oblong-lanceolate, internode 8.0 – 8.5 cm long, lateral nerves 6 - 7 pairs **3. A. calcicola**

14. Sepals elliptic or obovate, leaves blade elliptic, oblong or obovate, internode 1.0 – 3.0 cm long, lateral nerves 8 - 10 pairs. **13. A. mekongensis**

8. Bracts caducous.

15. Leaves blade cordate nearly circular **12. A. maymyo**

15. Leaves blade obovate ovate, ovate-lanceolate, lanceolate, elliptic, elliptic-oblong, oblong oblong-elliptic or linear.

16. Both side of leaves blade hairy.

17. Sepals linear-lanceolate, decurved, filaments glabrous at base. **1. A. adpressa**

17. Sepals ovate, broadly ovate, elliptic to elliptic-oblong, entire, filaments hairy at base.

18. Leaves blade lanceolate or linear. **21. A. stenophylla**

18. Leaves blade elliptic, ovate-lanceolate or obovate. **16. A. obtecta**

16. Upper surface of leaves glabrous or hairy on vein, lower surface hairy.
    19. Sepals oblong or lanceolate, 14-16 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. **20. A. splendens**
        20. Margin of sepals entire.
            21. Peduncles 3-9 cm long, leaves subchartaceous. **7. A. henryi**
            21. Peduncles 1-2 cm long, leaves chartaceous or subcoriaceous.
                22. Outer sepals ovate-triangular, ovary 2-celled, disk annular. **26. A. sp. 2**
                22. Outer sepals broadly elliptic, ovary 4-celled, disk cupular. **14. A. mollis**

1. Corolla distinct 5-lobed, stamens and styles exserted.
    23. Inflorescence axillary, capitate cyme. **17. A. osyrensis**
    23. Inflorescence axillary, lax cyme.
        24. Leaves blade lanceolate, corolla narrow tubular-campanulate. **22. A. thorelii**
        24. Leaves blade ovate, broadly ovate to suborbicular, corolla funnelform.
            25. Leaves broadly ovate to suborbicular, subcoriaceous, flowers white. **6. A. fulvocymosa var. fulvocymosa**
            25. Leaves ovate, chartaceous, flowers pale purple to pinkish red.
                26. Lateral nerves 6-9 pairs, filaments glabrous at base. **18. A. roseopurpurea**
                26. Lateral nerves 11-12 pairs, filaments hairy at base. **27. A. sp. 3**

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

SPECIES	FLORISTIC REGIONS							ALTITUDE 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 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 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 m	Aug. – Nev.
10. *A. lanceolata* Choisy	*	*	*			*		300 – 1,280 m	Jun. – Nov.
11. *Argyreia* cf. *laotica* Gagnep.			*					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	*	*						0 – 1,200 m	Sep. – Mar.
15. *A. nervosa* (Burm. f.) Boj.	Cultivated								Apr. – Sep.
16. *A. obtecta* C. B. Clarke	*	*	*	*	*	*	*	300 – 1,200 m	Aug. – Jan.
17. *A. osyrensis* (Roth) Choisy	*	*	*	*	*	*	*	200 – 800 m	Oct. – Mar.
18. *A. roseopurpurea* (Kerr) Ooststr.							*	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 m	Oct. – Nov.
25. *Argyreia* sp. 1				*				650 m	Aug. – Nov.
26. *Argyreia* sp. 2	*							1,250 m	Aug. – Sep.
27. *Argyreia* sp. 3	*							1,250 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 cm. ***Leaves*** ovate, elliptic or elliptic – oblong, 8.0 – 12.0 by 3.5 – 7.0 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 cm long. ***Inflorescences*** axillary, lax cyme, 5 – to 7 – flowered. ***Peduncles*** 2.0 – 5.5 cm, hairy like the young parts. ***Pedicels*** 6 – 8 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 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 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 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).

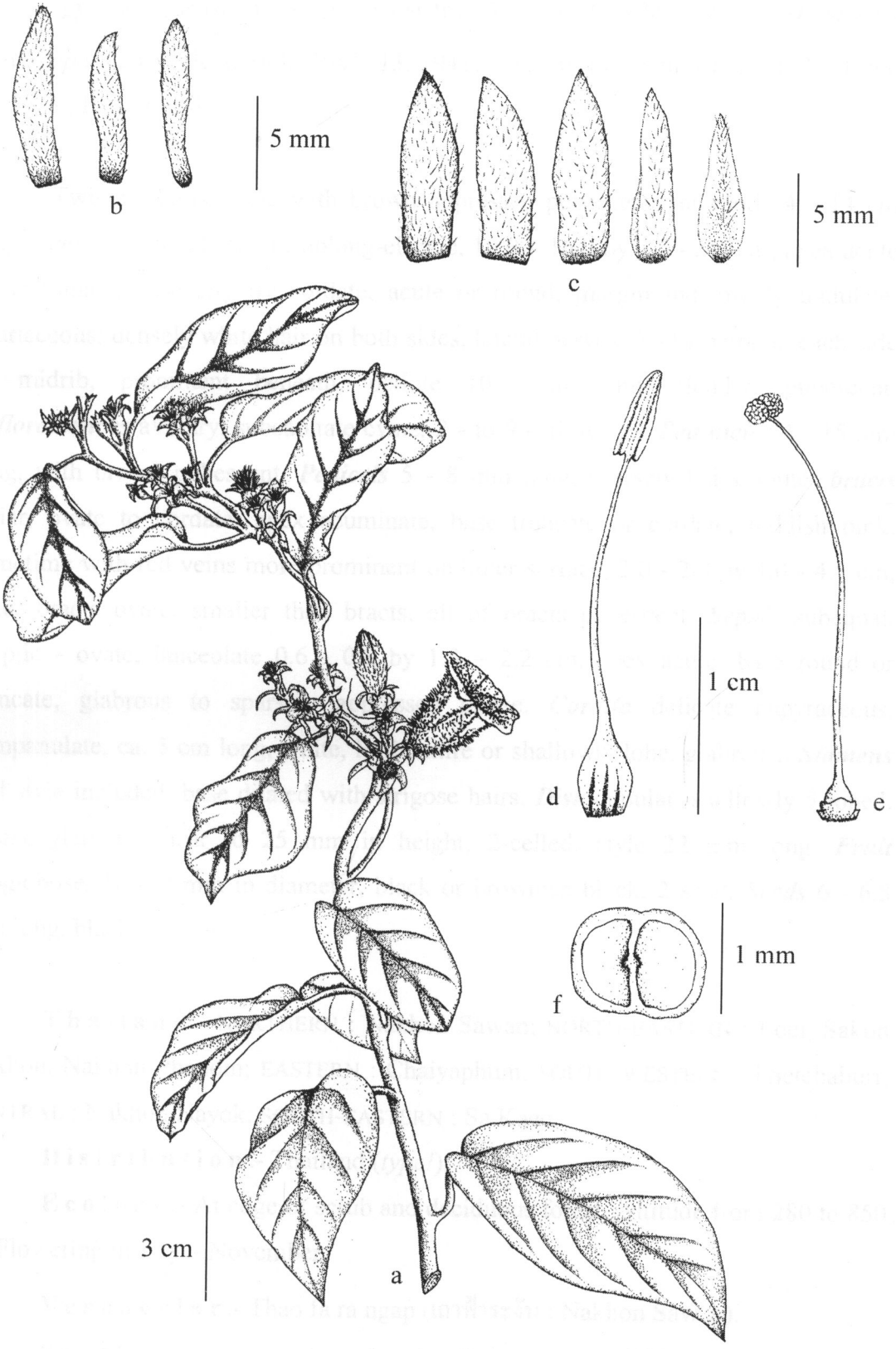


Figure 2. *Argyreia adpressa* (Choisy) Boerl.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 cm long. ***Leaves*** ovate, elliptic or oblong-elliptic, 10.0 – 16.0 by 2.5 - 5.5 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 mm, slender, pubescent. ***Inflorescences*** axillary, subcapitate cyme, 2 - to 9 – flowered. ***Peduncles*** 4 - 15 mm long, with brown pubescent. ***Pedicels*** 5 - 8 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 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 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 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).

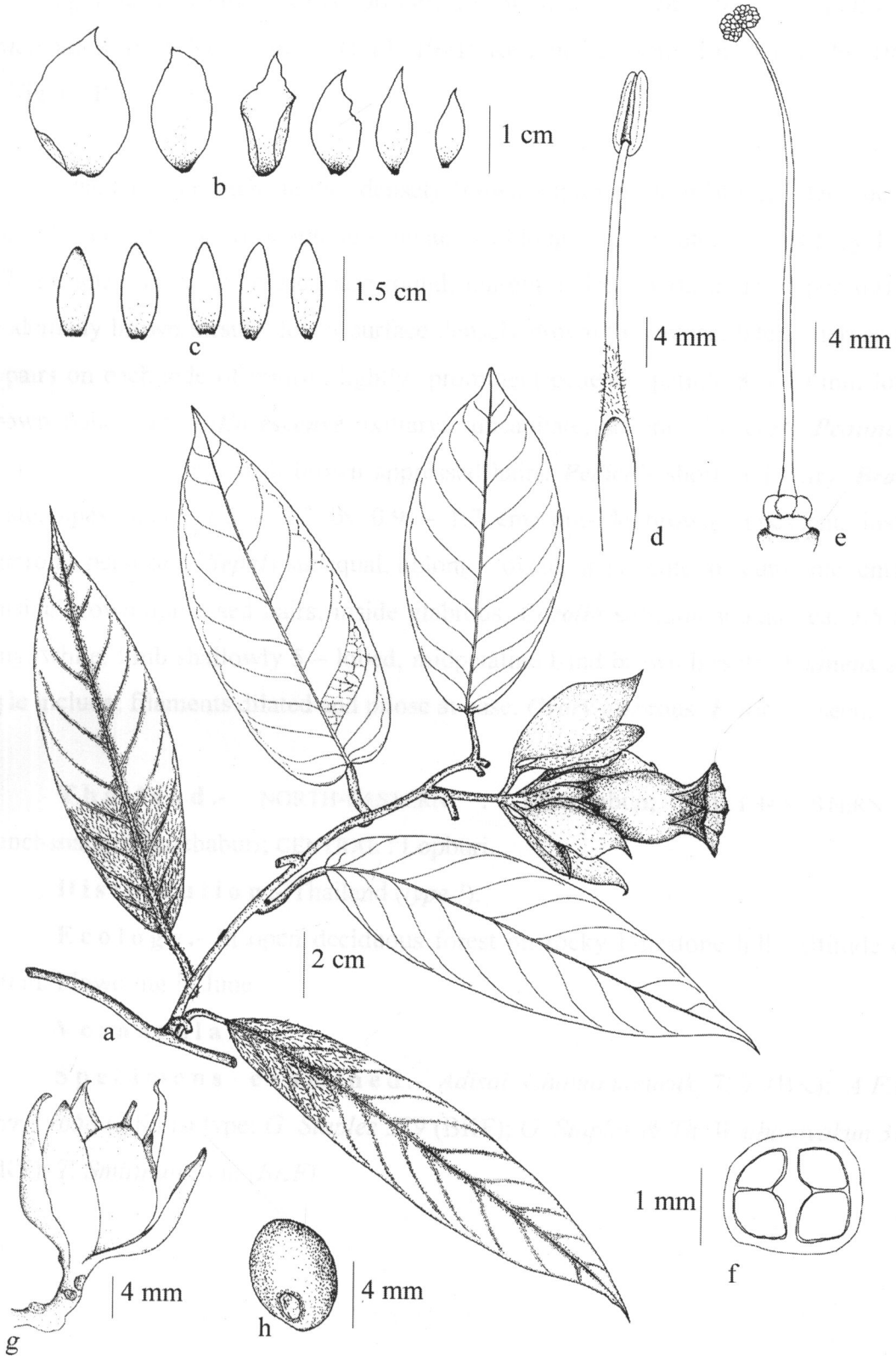


Figure 3. *Argyreia breviscapa* (Kerr) Ooststr.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section); g. fruit; h. seed.

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 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 mm long, brown pubescent. ***Inflorescense*** axillary, subcapitate, several flowered. ***Peduncles*** short 2 – 3 mm long. with brown appressed hairs. ***Pedicels*** short and hairy. ***Bracts*** ovate, apex acute, 1.5 – 2.3 by 0.9 – 1.7 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).*

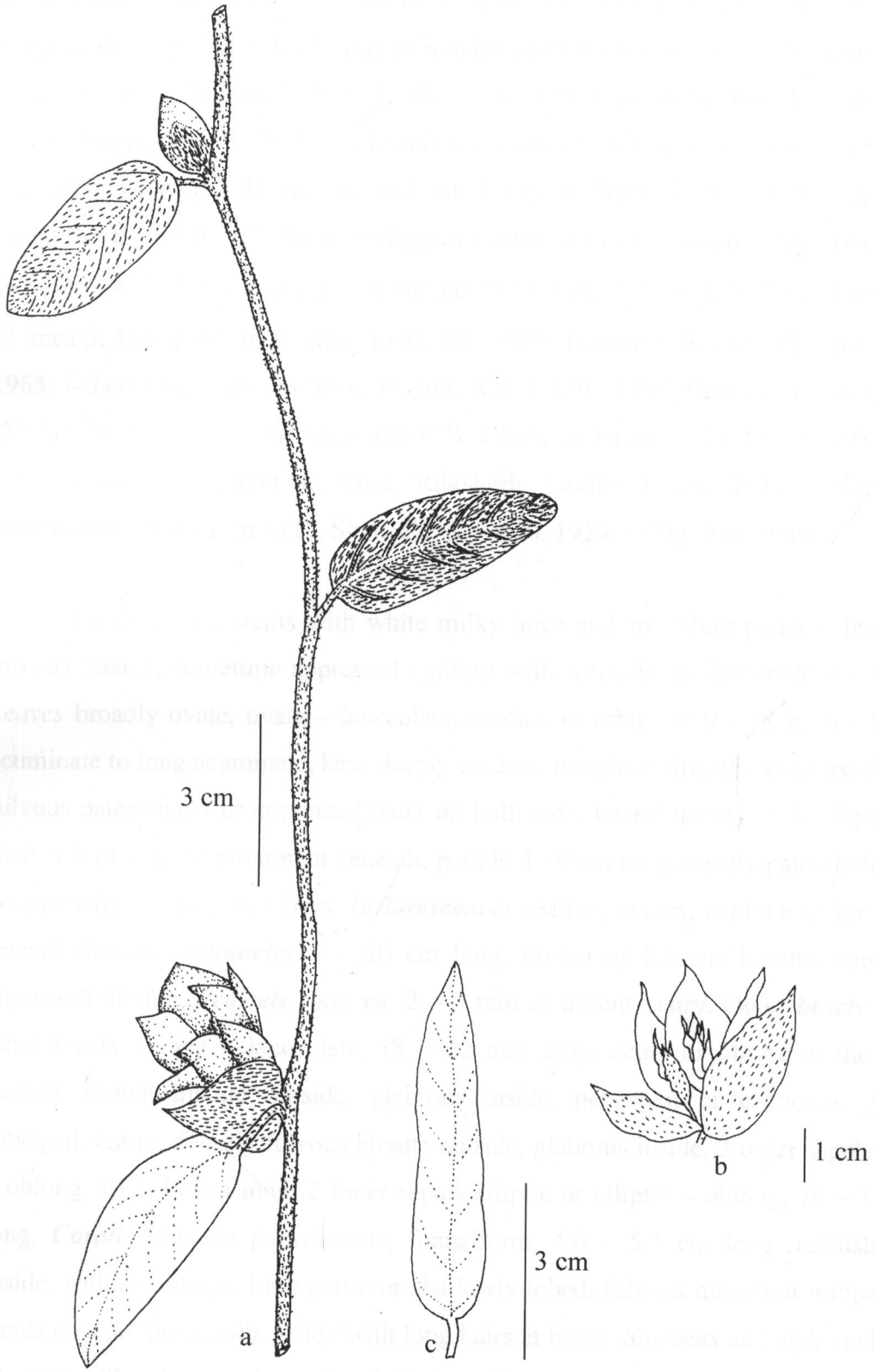


Figure 4. *Argyreia calcicola* (Kerr) Ooststr.: a. branch; b. inflorescence; c. variation of leaves: Drawn from type specimen: Kerr 19658.

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 cm long, mostly patently hirsute, occasionally tomentulose hairs. ***Inflorescences*** axillary cymes, capitate to lax cyme, several flowers. ***Peduncles*** 5 – 20 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 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 mm long. ***Corolla*** delicate papyraceous, funnelform, 4.0 – 5.5 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 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 (เอื็นขน : 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 71-642* (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 74 635* (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 94-1201* (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.

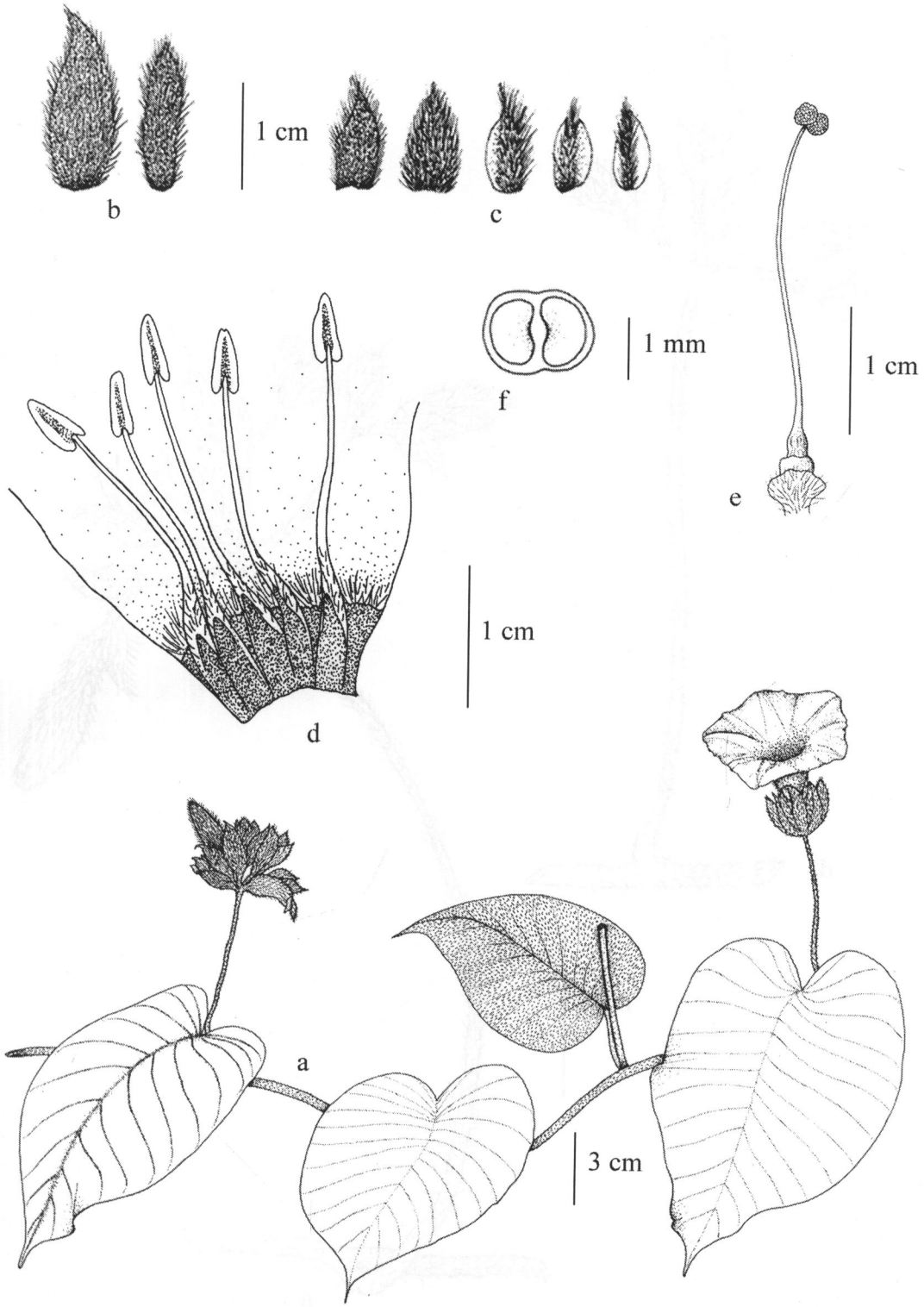


Figure 5. *Argyreia capitiformis* (Poir.) Ooststr.: a. branch; b. bracts; c. sepals; d. opened corolla with stamens; e. pistil; f. ovary (x-section).

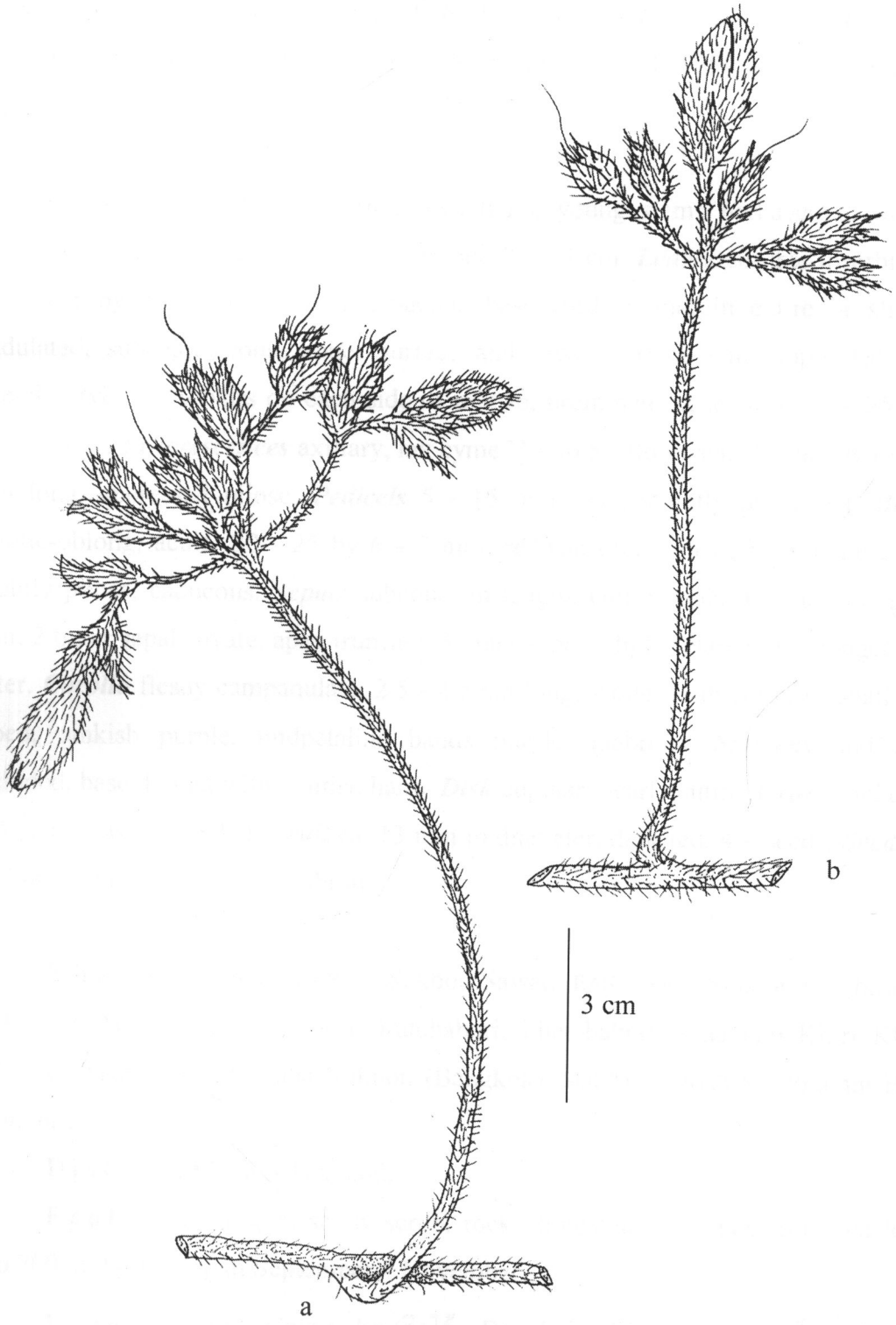


Figure 6. *Argyreia capitiformis* (Poir.) Ooststr.: variation of inflorescence; a. inflorescence form 2; b. inflorescence form 3.

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 cm. ***Leaves*** cordate to orbicular 5.0 - 8.5 by 4.0 – 6.0 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 mm long, slightly pubescent. ***Bracts*** elliptic-oblong, acute, 20 - 25 by 6 - 7 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).

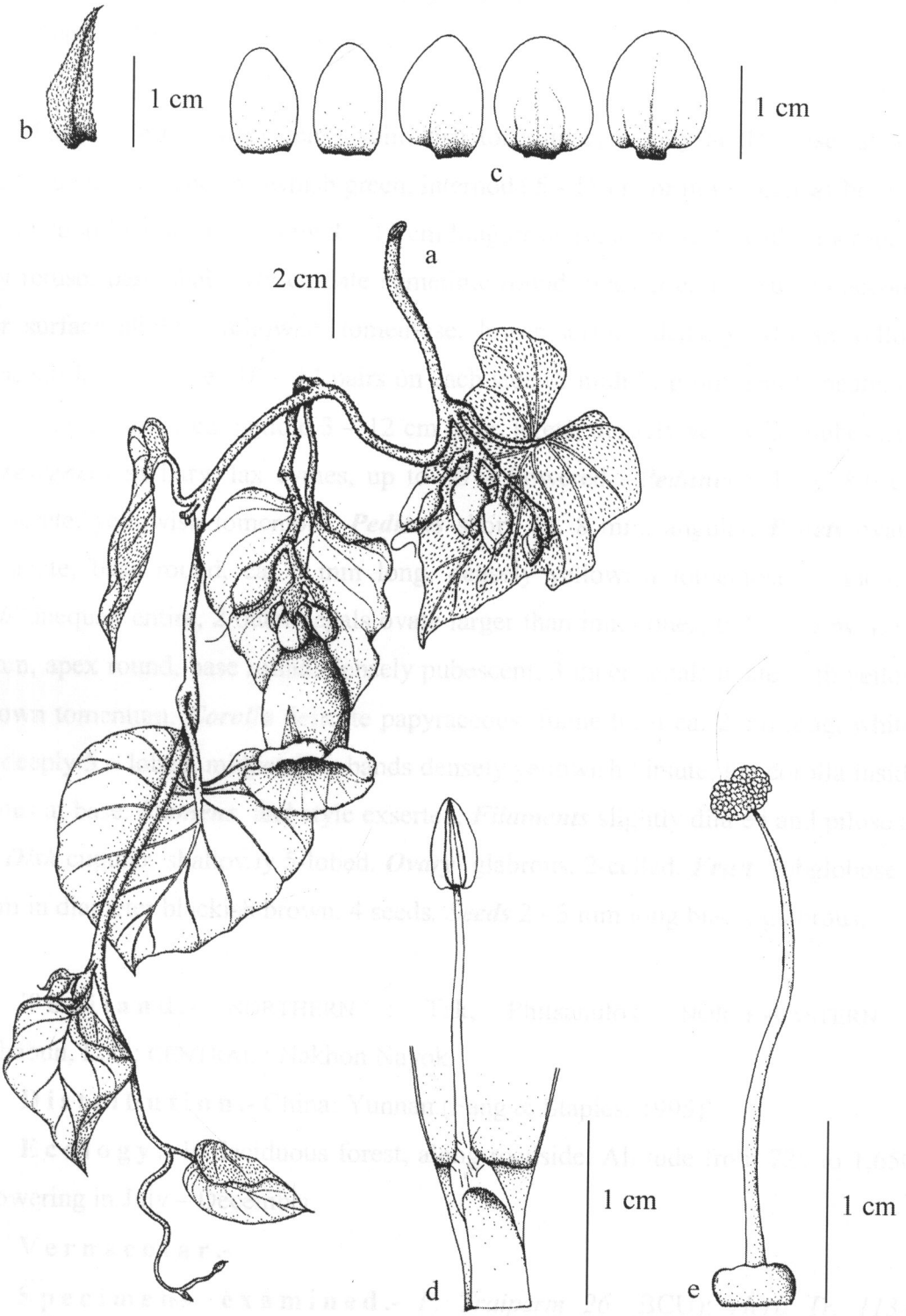


Figure 7. *Argyreia collinsae* (Craib) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.).: a. branch; b. bract; c. sepals; d. stamen; e. pistil.

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 cm or more. ***Leaves*** broadly ovate to suborbicular, 12 - 15 by 8 – 12 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 cm long, terete, densely yellowish pubescent. ***Inflorescences*** axillary, lax cymes, up to 40 – flowered. ***Peduncles*** 1.5 – 8.0 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.- NORTHERN : Tak, Phitsanulok; 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 T-63458* (BKF); *T. Shimizu et al. T-11676* (BKF); *T. Shimizu et al. 11320* (BKF); *T. Shimizu et al. 11321* (BKF).

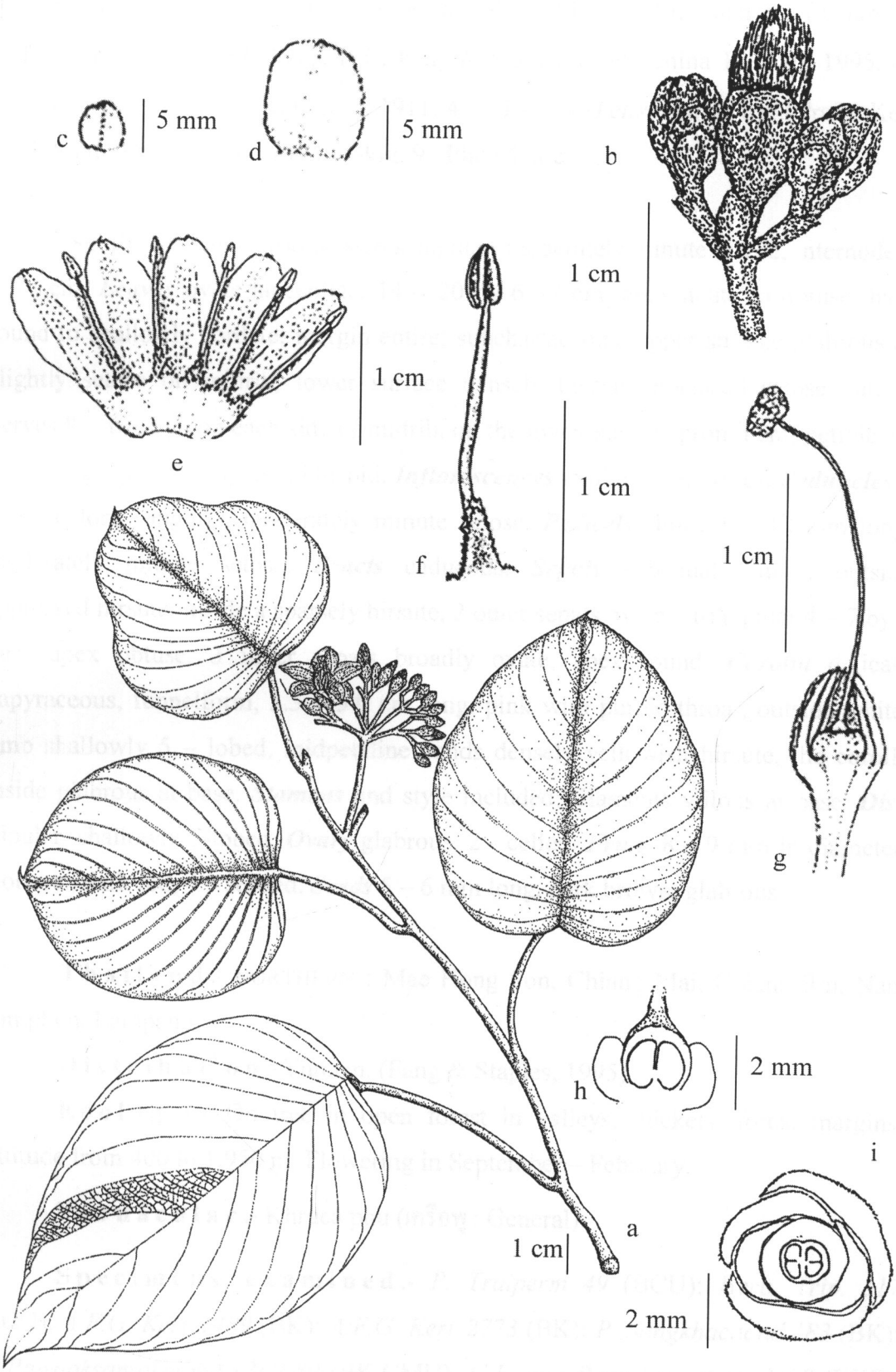


Figure 8. *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa*: a. branch; b. young flower; c. bract; d. sepal; e. opened corolla with stamens; f. stamen; g. pistil; h. ovary (l-section); i ovary (x-section).

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 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)

Ecology.- On tree in open forest in valleys, thickets, forest margins. Altitude from 400 to 1,950 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 87-1371* (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. T-10498* (BKF); *P. Palee 426* (BKF); *T. Santisuk 8610* (BKF); *T. Shimizu et al. T-19202* (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).

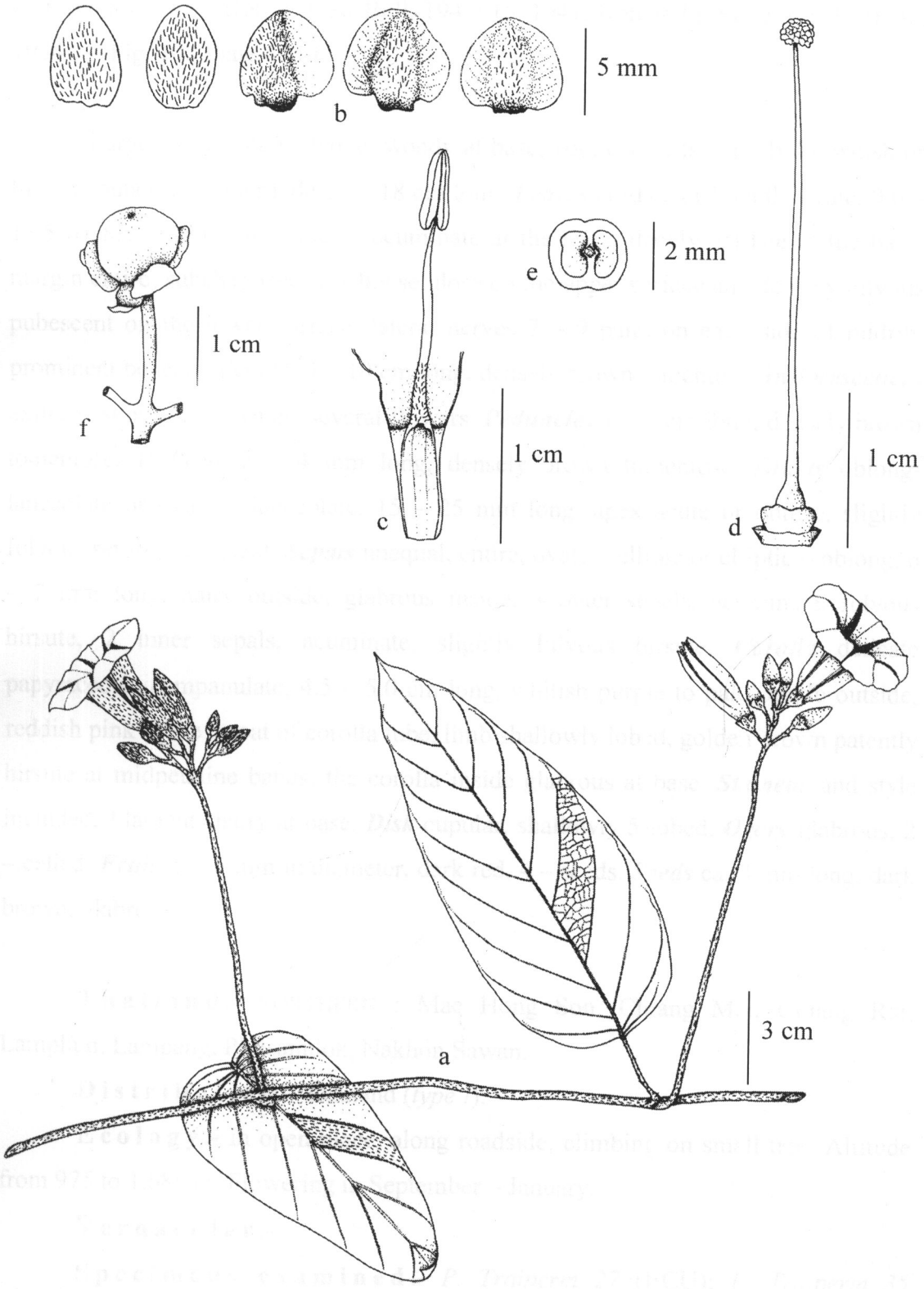


Figure 9. *Argyreia henryi* (Craib) Craib: a. branch; b. sepals; c. stamen; d. pistil; e. ovary (x-section); f. fruit.

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 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 cm long, densely brown tomentose. ***Inflorescences*** axillary, subcapitate cymes, several flowers. ***Peduncles*** 1 – 2 cm long, densely brown tomentose. ***Pedicels*** 2 – 4 mm long, densely brown tomentose. ***Bracts*** oblong-lanceolate or ovate – lanceolate, 15 – 25 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 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 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).

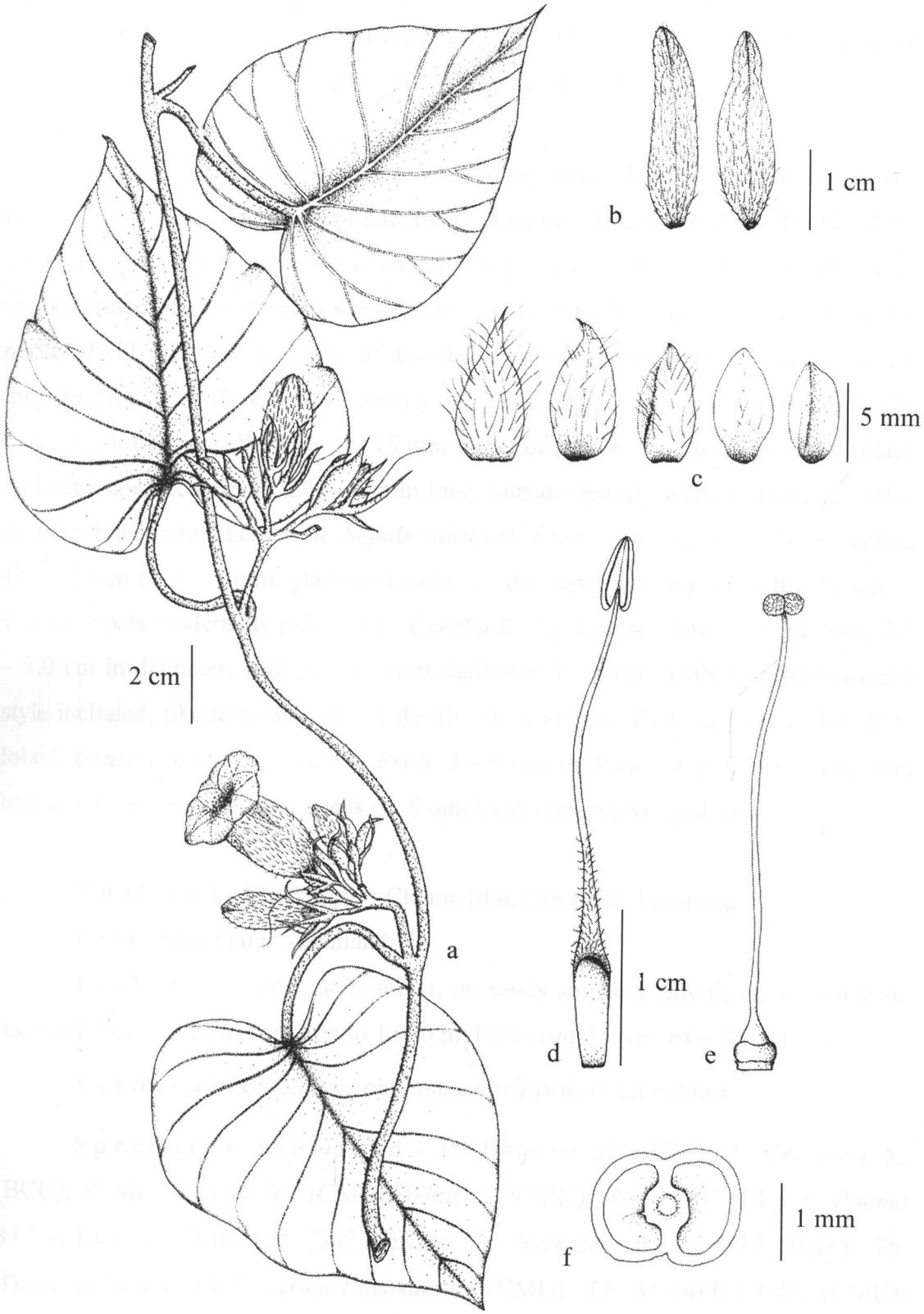


Figure 10. *Argyreia ionantha* (Kerr) C. Khunwasi & P. Traiperm, **comb. nov.** (ined.): a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 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 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 5-lobed. ***Ovary*** glabrous, 2 – celled. ***Fruit*** 8 - 9 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 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).

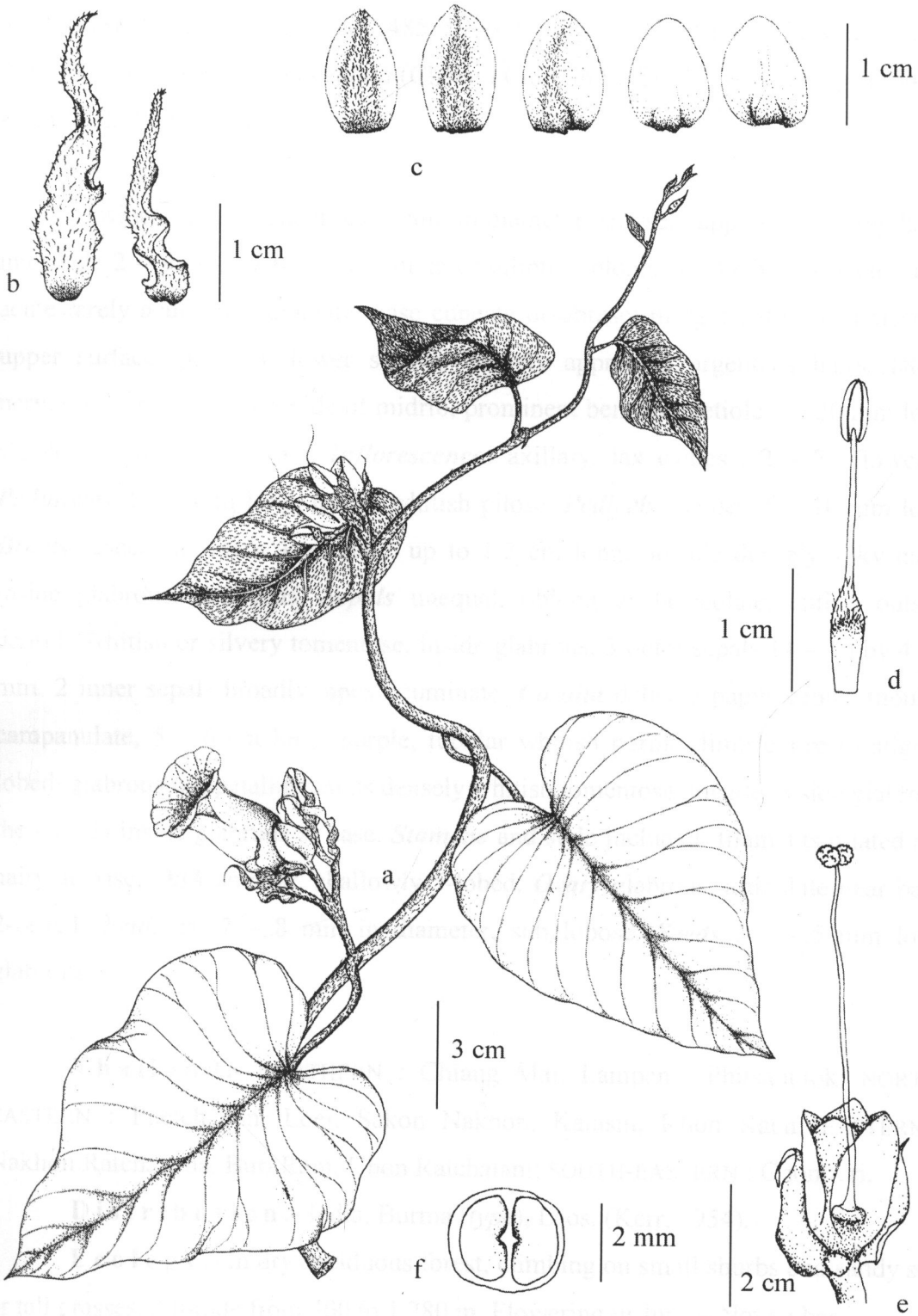


Figure 11. *Argyreia kerrii* Craib: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 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 mm, 2 inner sepals broadly, apex acuminate. ***Corolla*** delicate papyraceous, tubular-campanulate, 5 – 6 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 mm in diameter, subglobose. ***Seeds*** 3 – 4.5 mm long, glabrous.

Thailand.- NORTHERN : Chiang Mai, Lampang, Phitsanulok; NORTH-EASTERN : 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 m. Flowering in June – November.

Vernacular.- Thao kradueng chang (เถากระดึงช้าง : Nakhon Ratchasima)

Specimens examined.- *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).

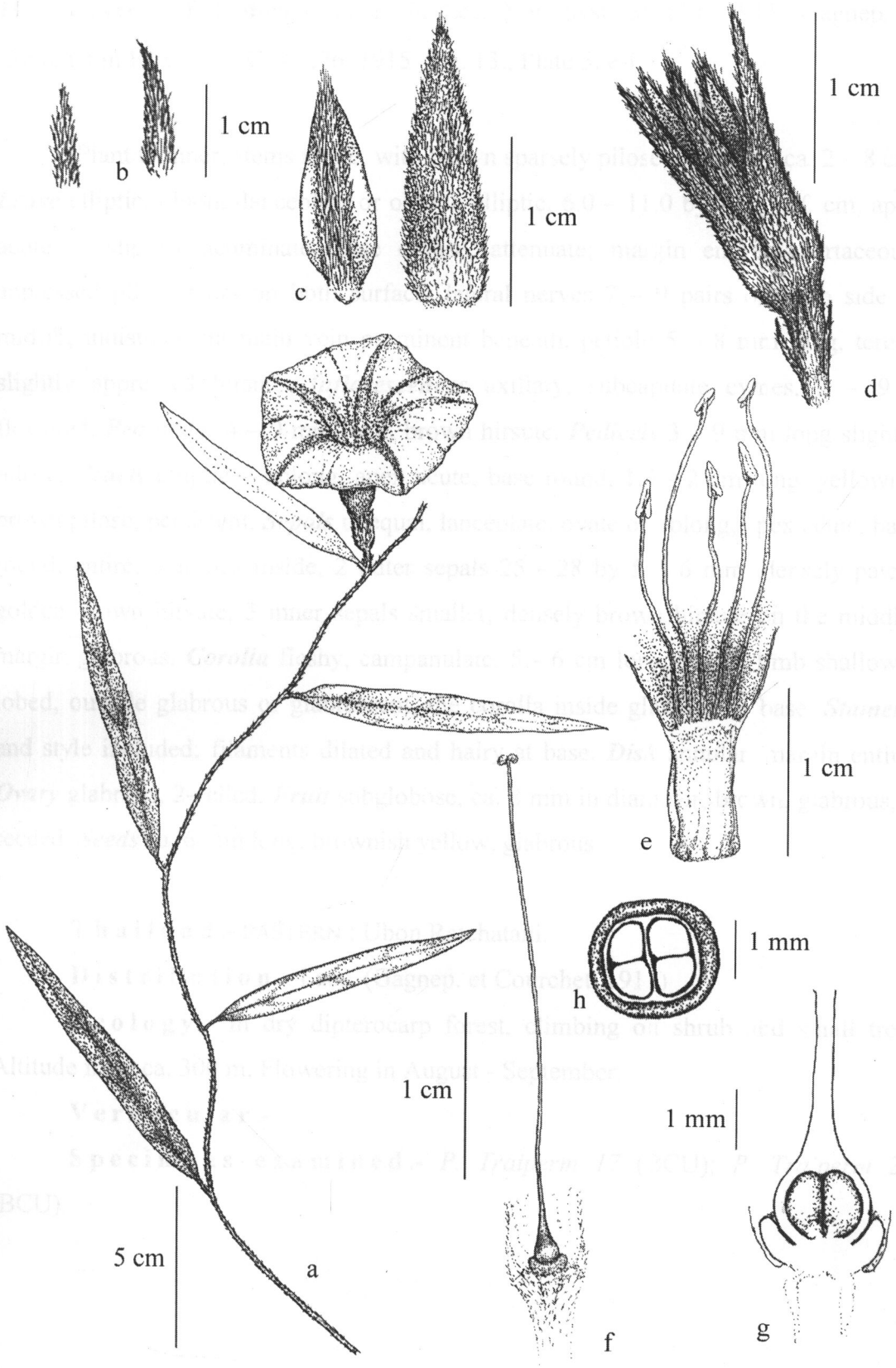


Figure 12. *Argyreia lanceolata* Choisy: a. branch; b. bracts; c. sepals; d. sepals and bracts; e. opened corolla with stamens; f. pistil; g. ovary (l-section); h. ovary (x-section).

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 cm. ***Leave*** elliptic, oblong-lanceolate or oblong-elliptic, 6.0 – 11.0 by 1.5 – 3.0 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 mm long, terete, slightly appressed hirsute. ***Inflorescences*** axillary, subcapitate cymes, 2 – 9 – flowered. ***Peduncles*** 4 – 9 mm long, brown hirsute. ***Pedicels*** 3 – 9 mm long slightly pilose. ***Bracts*** elliptic – oblong, apex acute, base round, 1.5 - 2 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 mm, densely patent golden brown hirsute, 3 inner sepals smaller, densely brown hirsute on the middle, margin glabrous. ***Corolla*** fleshy, campanulate, 5 - 6 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).

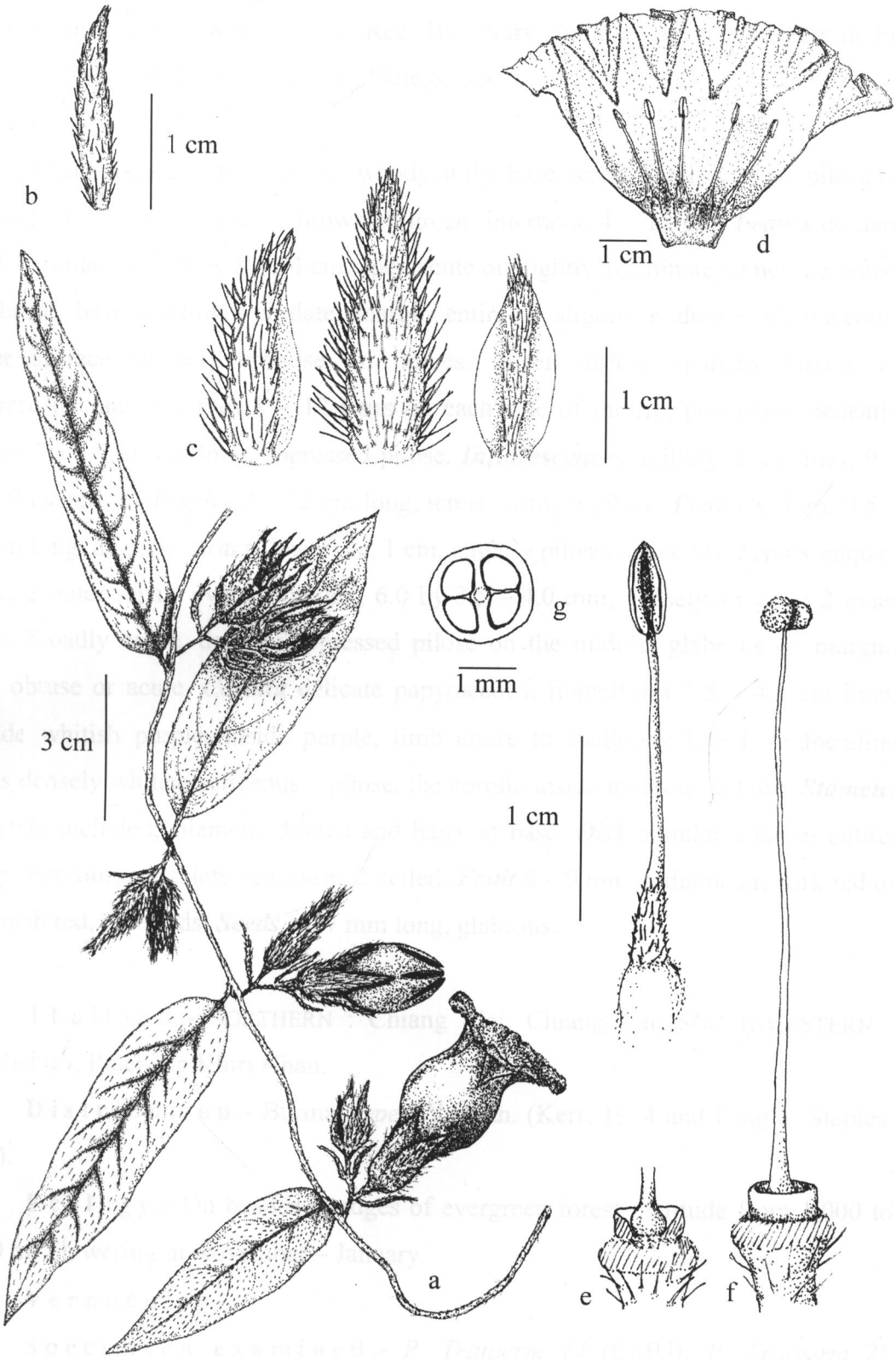


Figure 13. *Argyreia* cf. *laotica* Gagnep.: a. branch; b. bract; c. sepals; d. opened corolla with stamens; e. stamen; f. pistil; g. ovary (x-section).

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 cm. ***Leaves*** cordate nearly circular, 8 – 18 by 8 – 14 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 cm long, appressed pilose. ***Inflorescences*** axillary, lax cymes, 9 – 20 – flowered. ***Peduncles*** 2 – 22 cm long, terete, whitish pilose. ***Pedicels*** short, 0.5 – 2.0 cm long, angular. ***Bracts*** linear, ca. 1 cm, slightly pilose, caducous. ***Sepals*** unqual, entire, 2 outer sepals ovate – oblong, 6.0 by 3.5 – 4.0 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 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 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 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).

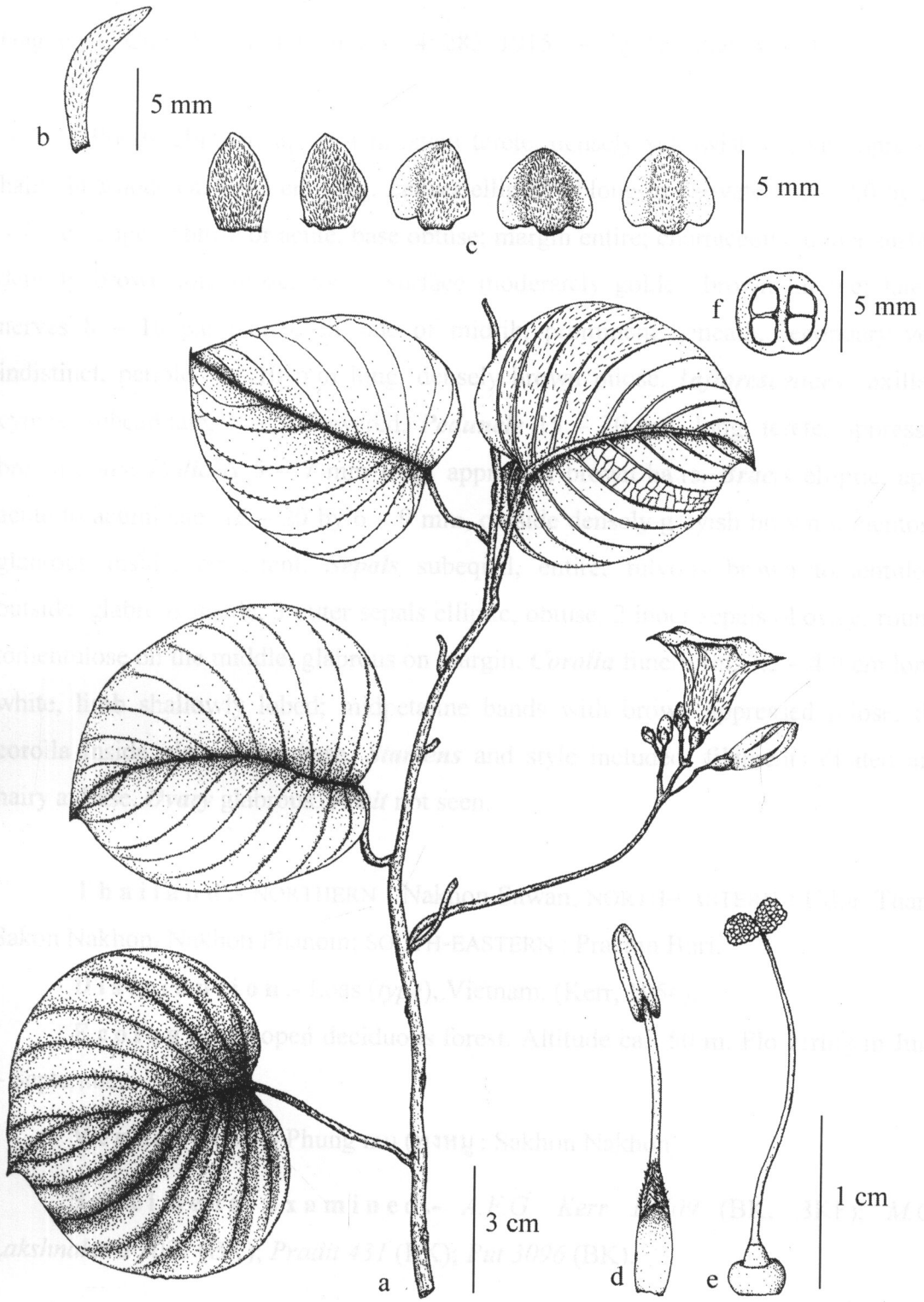


Figure 14. *Argyreia maymyo* (W.W. Smith) Raizada: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 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 mm long, densely brown pilose. ***Inflorescences*** axillary cymes, subcapitate, 5 – 7 flowered. ***Peduncle*** 15 – 20 mm long, terete, appressed brown hairs. ***Pedicels*** 5 – 7 mm long, appressed brown hairs. ***Bracts*** elliptic, apex acute to acuminate, 12 – 20 by 6 – 9 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 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).

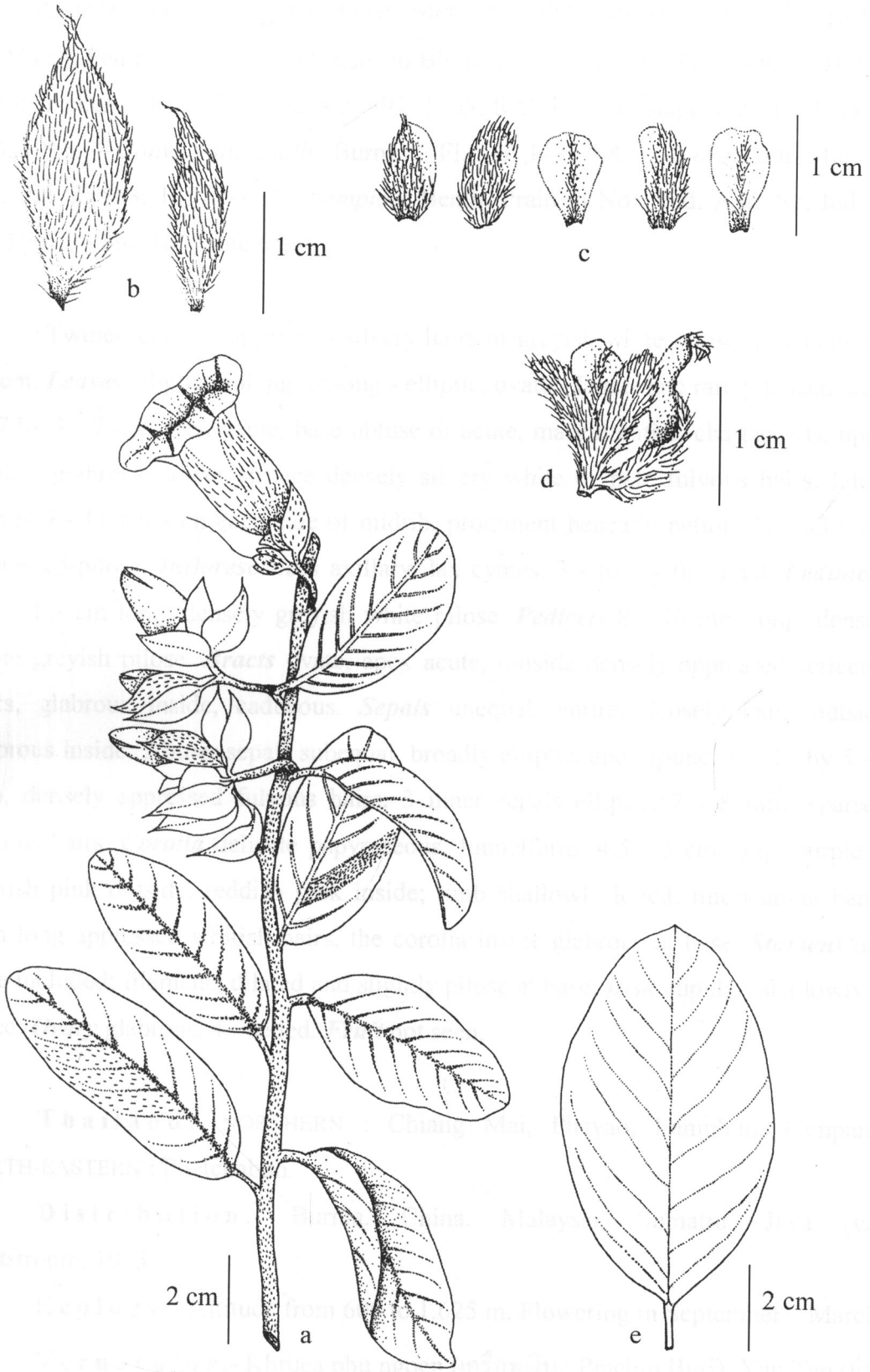


Figure 15. *Argyreia mekongensis* Gagnep. et Courchet: a. branch; b. bracts; c. sepals; d. sepals and bract; e. variation of leaves.

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 silvery white or pale fulvous hairs; lateral nerves 9 - 11 pairs on each side of midrib, prominent beneath; petiole 1.5 – 3.5 cm, appressed-pilose. ***Inflorescences*** axillary, lax cymes, 3 - to 4 - flowered. ***Peduncles*** 1.0 – 1.3 cm long, densely greyish white pilose. ***Pedicels*** 8 - 10 mm long, densely white greyish pilose. ***Bracts*** ovate, 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 mm, sparsely fulvous hairs. ***Corolla*** delicate papyraceous, funnelform, 4.5 - 5 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 5-lobed. ***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 m. Flowering in September – March.

Vernacular.- Khruea phu ngoen (เครือพูเงิน : Prachin Buri), Yan Tan (ย่านตาน : 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).

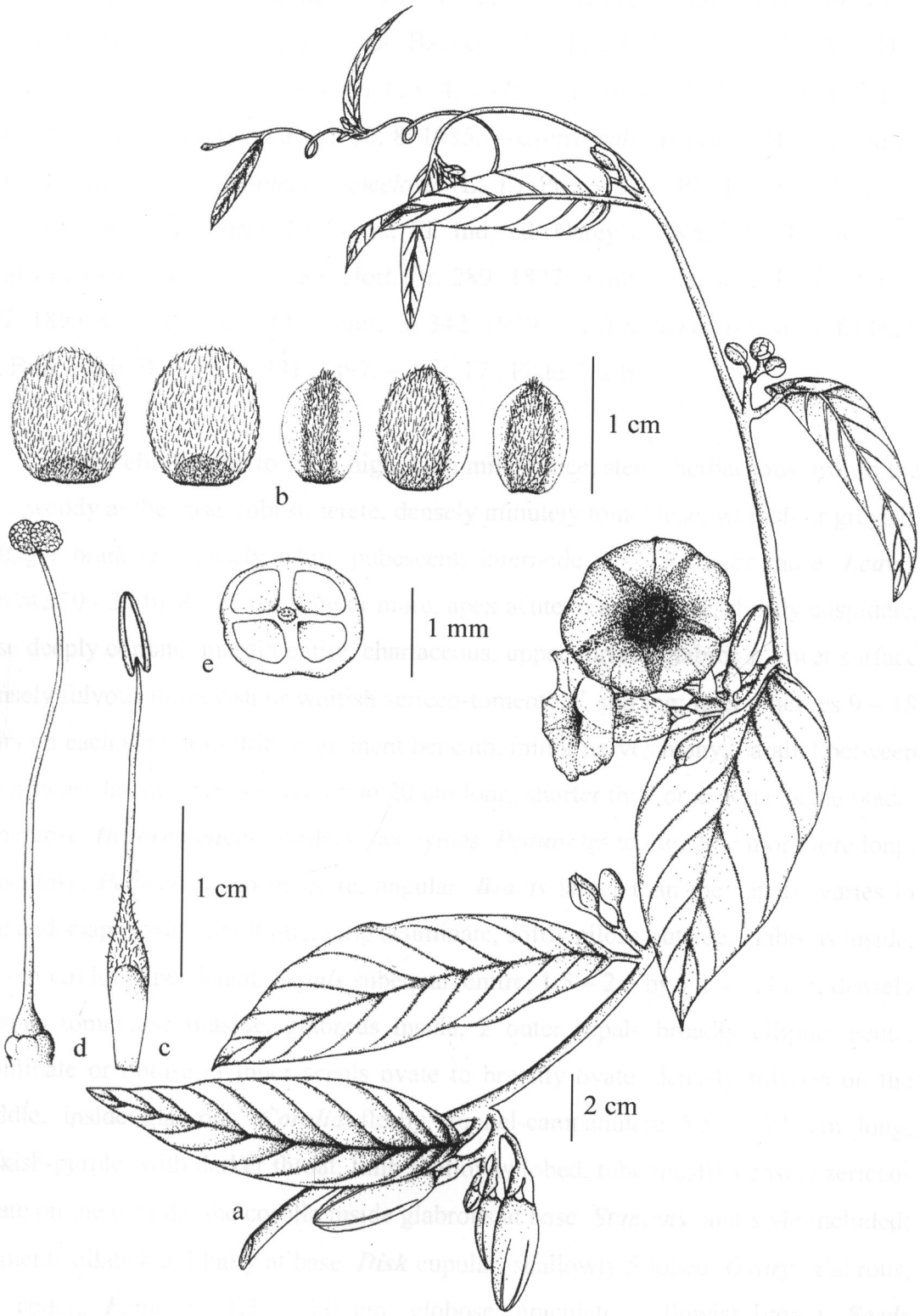


Figure 16. *Argyreia mollis* (Burm. f.) Choisy: a. branch; b. sepals; c. stamen; d. pistil; e. ovary (x-section).

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 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 cm long, persistent. ***Sepals*** subequal, entire, 1.5 – 2.5 by 1.1 – 1.3 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 cm long, pinkish-purple with darker throat, limb shallowly lobed, tube mostly densely sericeo-lanate 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.

T h a i l a n d .- 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)

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

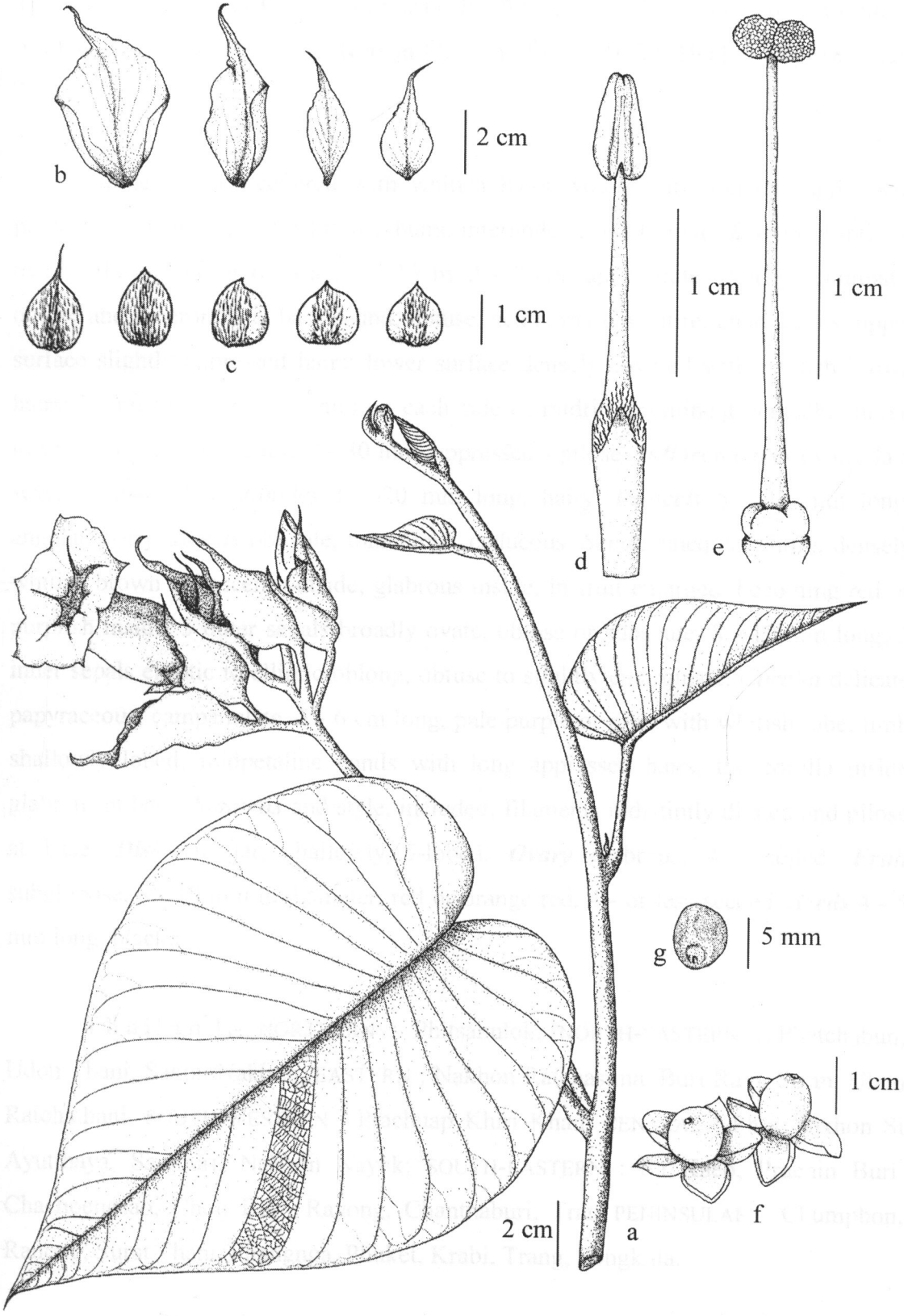


Figure 17. *Argyreia nervosa* (Burm. f.) Boj.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. fruit; g. seed.

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 appressed-pilose with whitish or pale fulvous hairs, internode 2.5 – 6.0 cm. ***Leaves*** elliptic or ovate – lanceolate or obovate, 4 - 15 by 2 - 7 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 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 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 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).

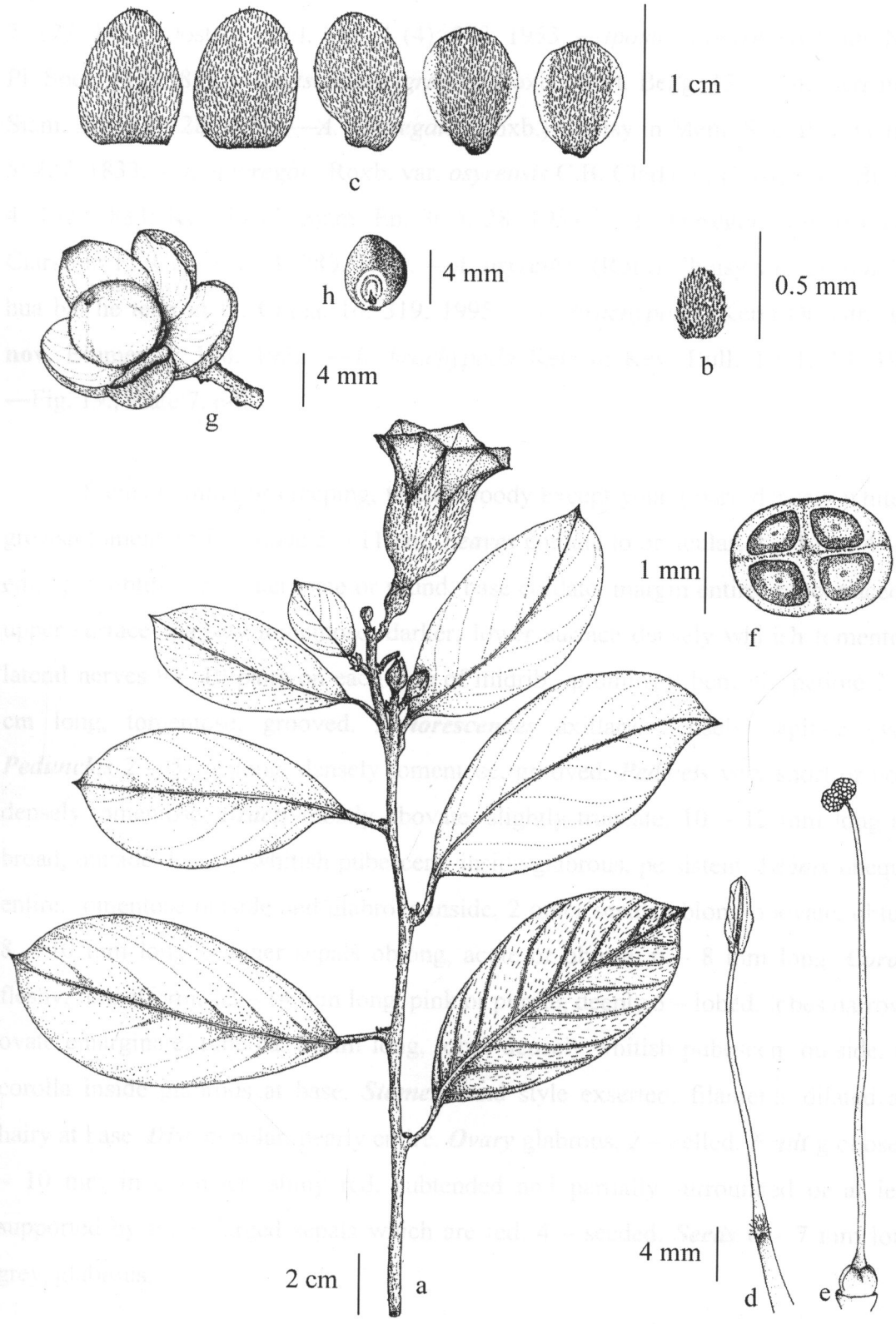


Figure 18. *Argyreia obtecta* C.B. Clarke: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. ovary (x-section); g. fruit; h. seed.

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 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 cm long, densely tomentose, grooved. ***Pedicels*** very short or none, densely tomentose. ***Bracts*** mostly obovate, slightly truncate, 10 – 12 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 mm long, 3 inner sepals oblong, acute or obtuse, 6 – 8 mm long. ***Corolla*** fleshy, funnelform, 12 – 14 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 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 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. T-50397* (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 97-1454* (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 01-97* (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).

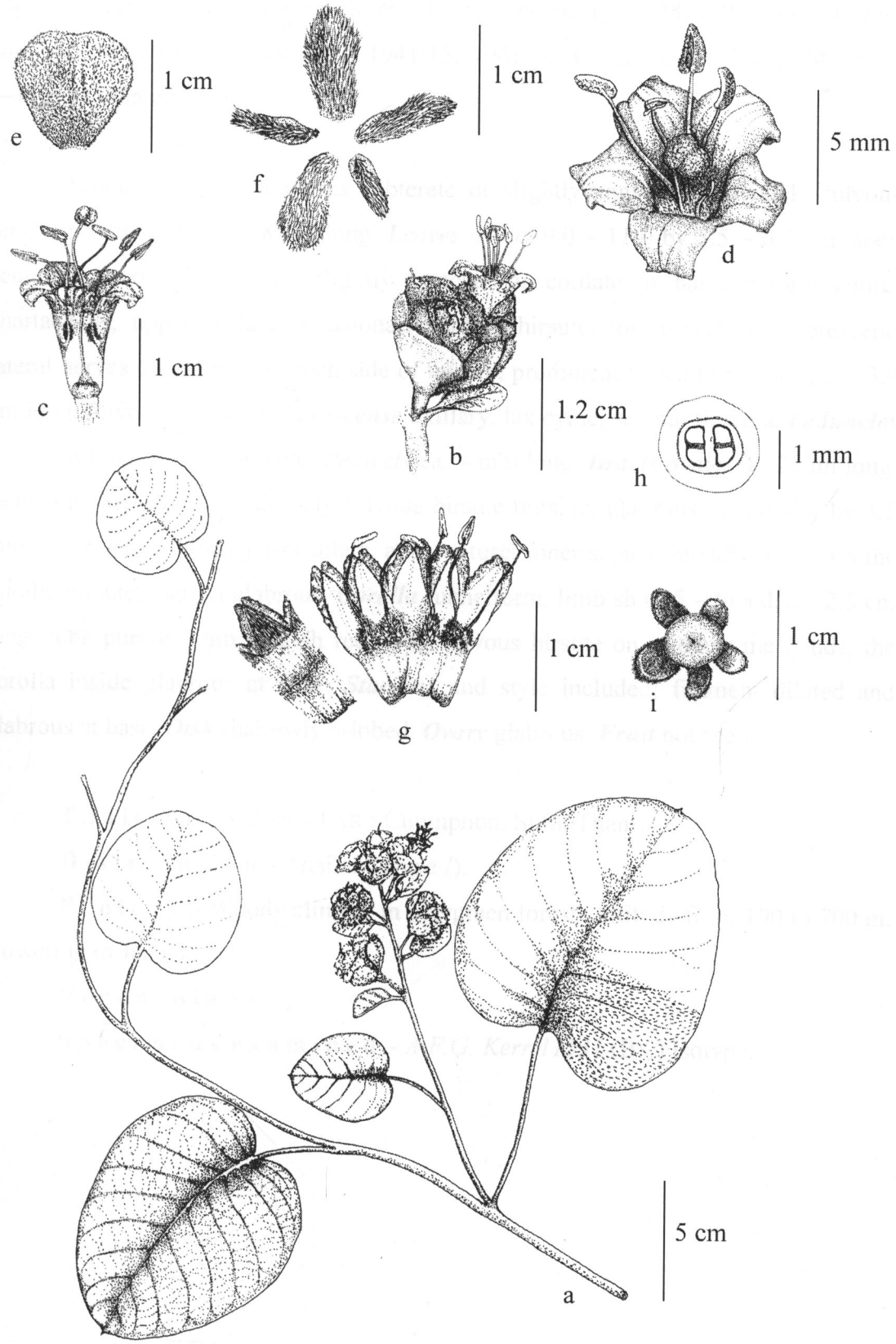


Figure 19. *Argyreia osyrensis* (Roth) Choisy: a. branch; b. inflorescence; c. flower (side-view); d. flower (top view); e. bract; f. sepals; g. opened corolla with stamens; h. ovary (x-section); i. fruit.

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 cm long. ***Leaves*** ovate, 9.0 – 11.0 by 5.5 – 6.5 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 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.-

Specimens examined.- *A.F.G. Kerr 11531* (BK) Isotype.

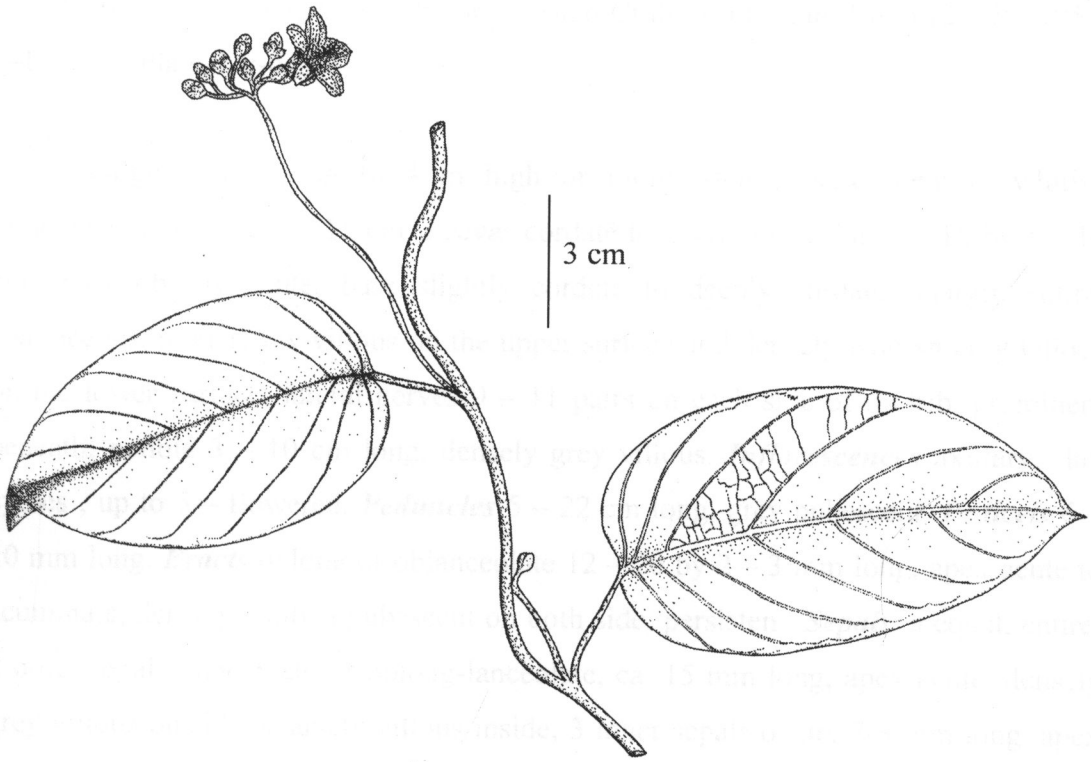


Figure 20. *Argyreia roseopurpurea* (Kerr) Ooststr.: branch: Drawn from type specimen: Kerr 11531.

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 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 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).

Specimens examined.- *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).

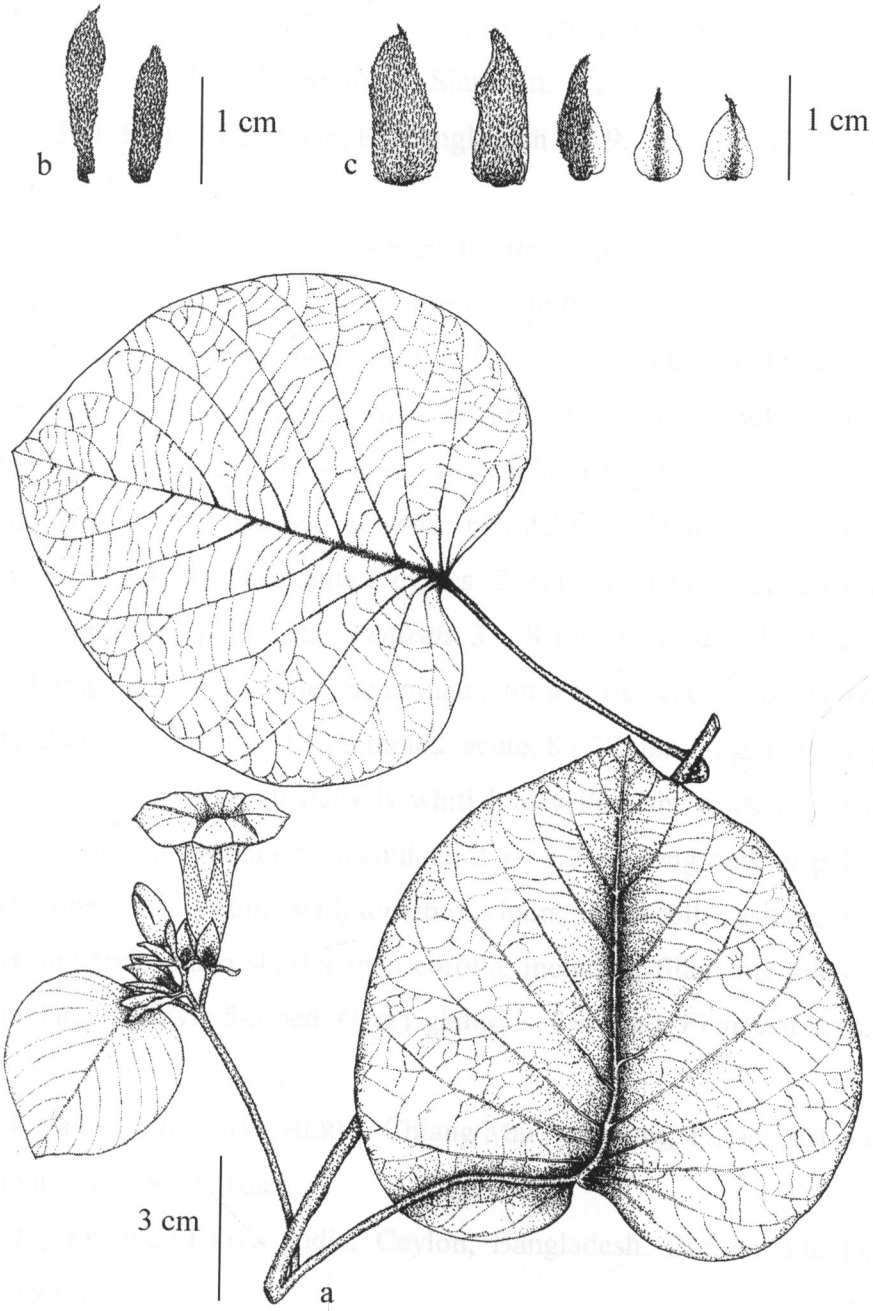


Figure 21. *Argyreia roxburghii* Choisy: a. branch; b. bracts; c. sepals.

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 silvery-white to slightly brownish-white appressed trichomes; lateral nerves 10 - 14 pairs on each side of midrib, prominent beneath; petiole 14 – 25 mm, appressed-pubescent. ***Infolrescences*** axillary, subcapitate cymes, 2 -(or more) flowered. ***Peduncles*** 5 - 25 mm long, appressed pubescent. ***Pedicels*** 3 - 8 mm long, angular trichome. ***Bracts*** elliptic-oblong, 3.5 – 4.0 mm, acuminate, tomentose, caducous. ***Sepals*** subequal, undulate, 2 outer equal, ovate to rounded, acute, 8 - 10 mm long; inner sepals elliptic-oblong, acuminate; all sepals densely whitish to yellowish- white tomentose. ***Corolla*** delicate papyraceous, funnel-campanulate, 2.5 - 3.2 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 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 y1954-86* (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).

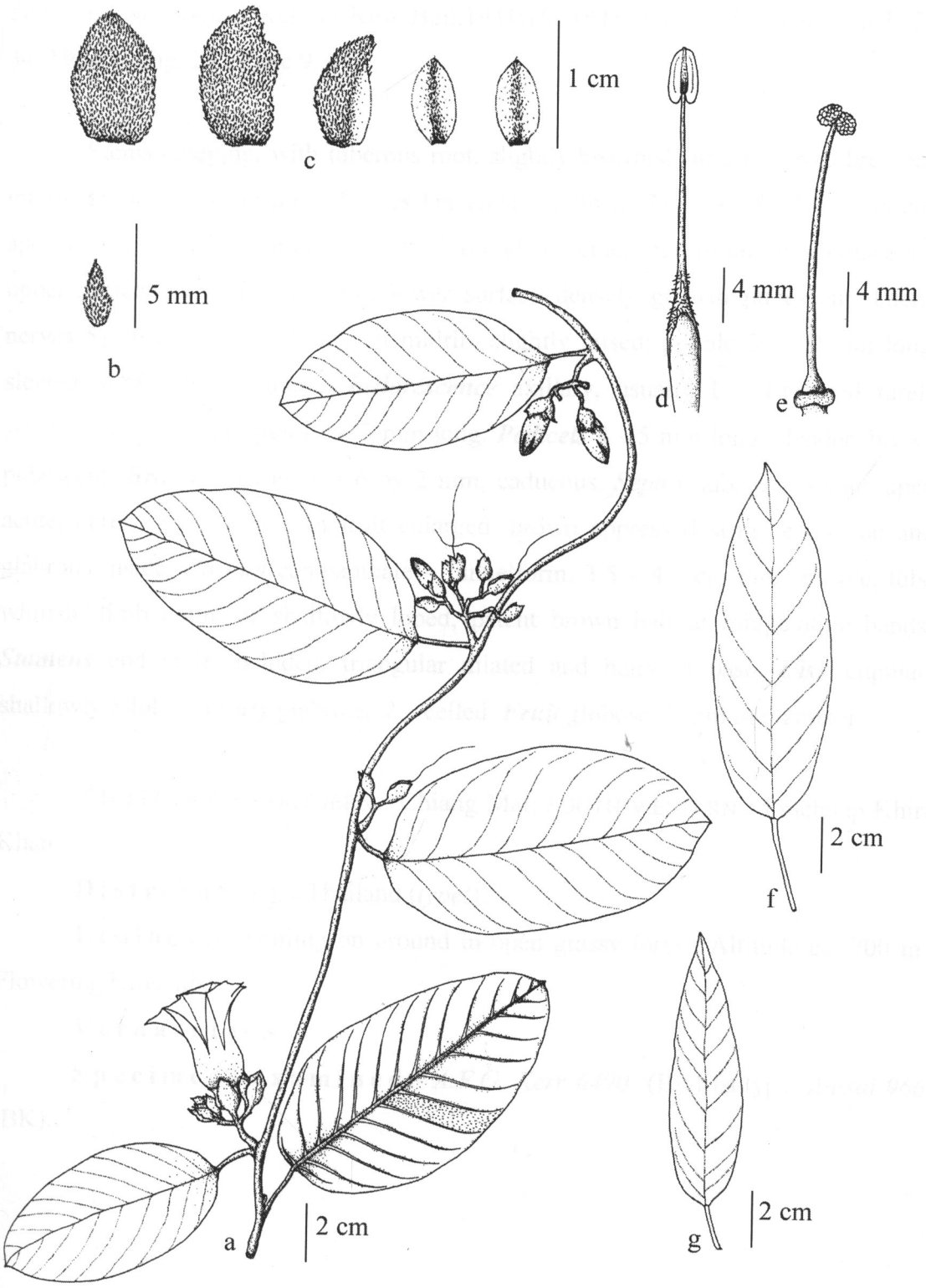


Figure 22. *Argyreia splendens* (Hornem.) Sweet: a. branch; b. bract; c. sepals; d. stamen; e. pistil; f. and g. variation of leaves.

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 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 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.-

Specimens examined.- *A.F.G. Kerr 6490* (BK) Isotype; *Adisai 966* (BK).

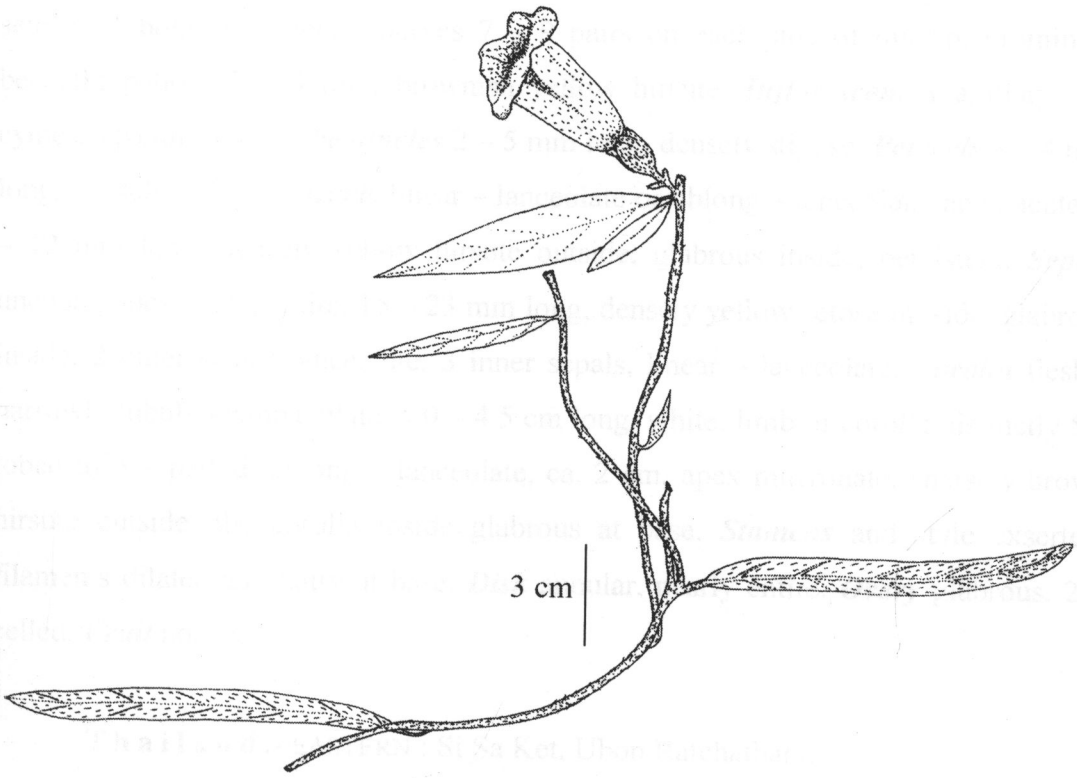


Figure 23. *Argyreia stenophylla* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.).: branch: Drawn from type specimen: Kerr 6490.

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 m, stems terete, sparely brownish yellow hirsute, internode 2.5 – 9.0 cm long. ***Leaves*** lanceolate, 4.0 – 10.0 by 1.0 – 2.5 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 mm long, densely stigose. ***Pedicels*** 3 – 4 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 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 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* (BCU); *P. Traiperm 43* (BCU); *J.F. Maxwell 76-539* (BK).

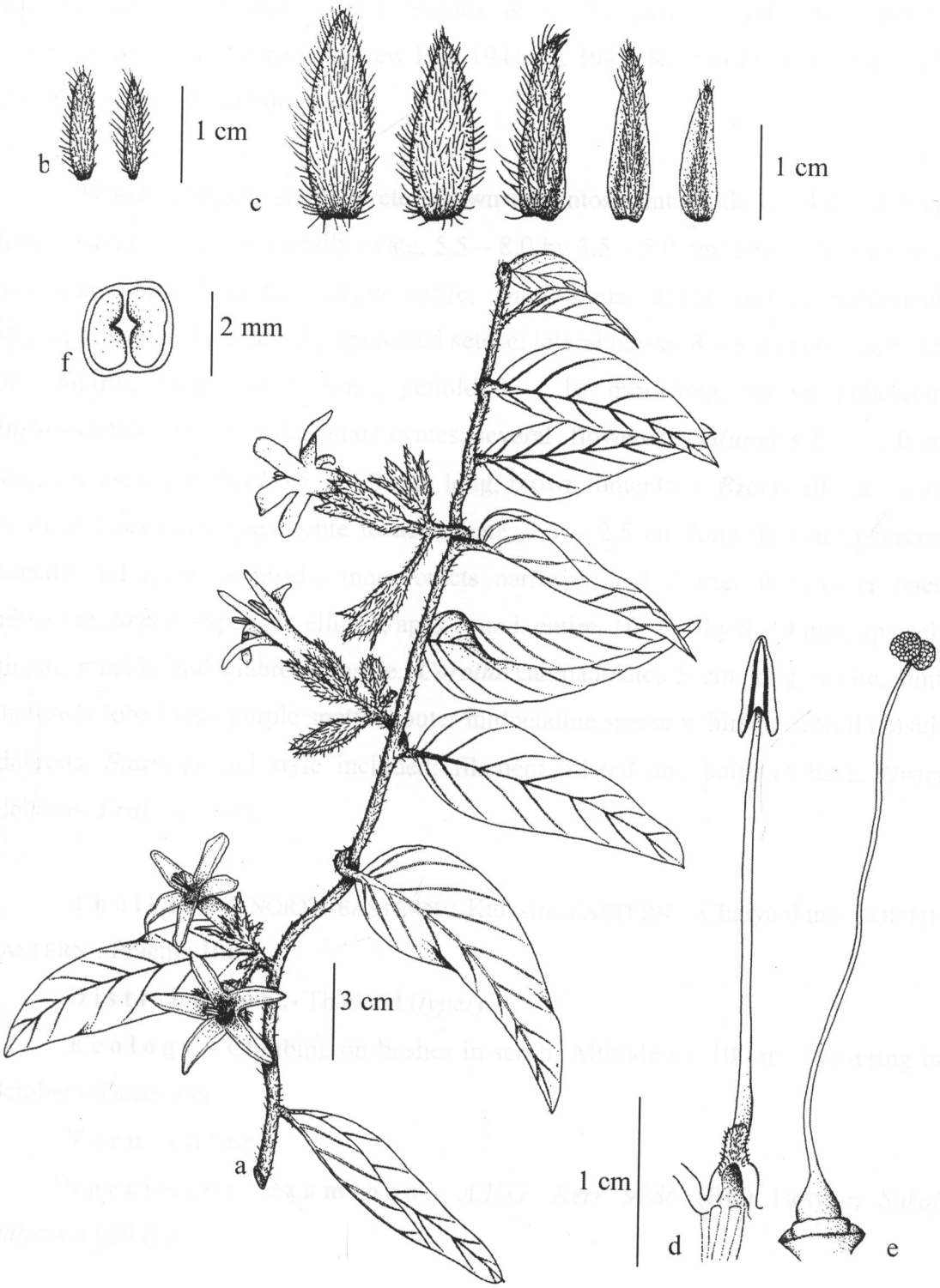


Figure 24. *Argyreia thorelii* Gagnep.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 cm long. ***Leaves*** cordate or broadly ovate, 5.5 – 8.0 by 3.5 – 5.0 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 mm long, brown pubescent. ***Inflorescence*** axillary, subcapitate cymes, several flowered. ***Peduncles*** 1.2 – 2.0 cm long, pubescent. ***Pedicels*** ca. 5 – 8 mm long, brown tomentose. ***Bracts*** elliptic, ovate or ovate-lanceolate, apex acute to acuminate, 2.3 – 2.5 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 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; SOUTH-EASTERN : 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).

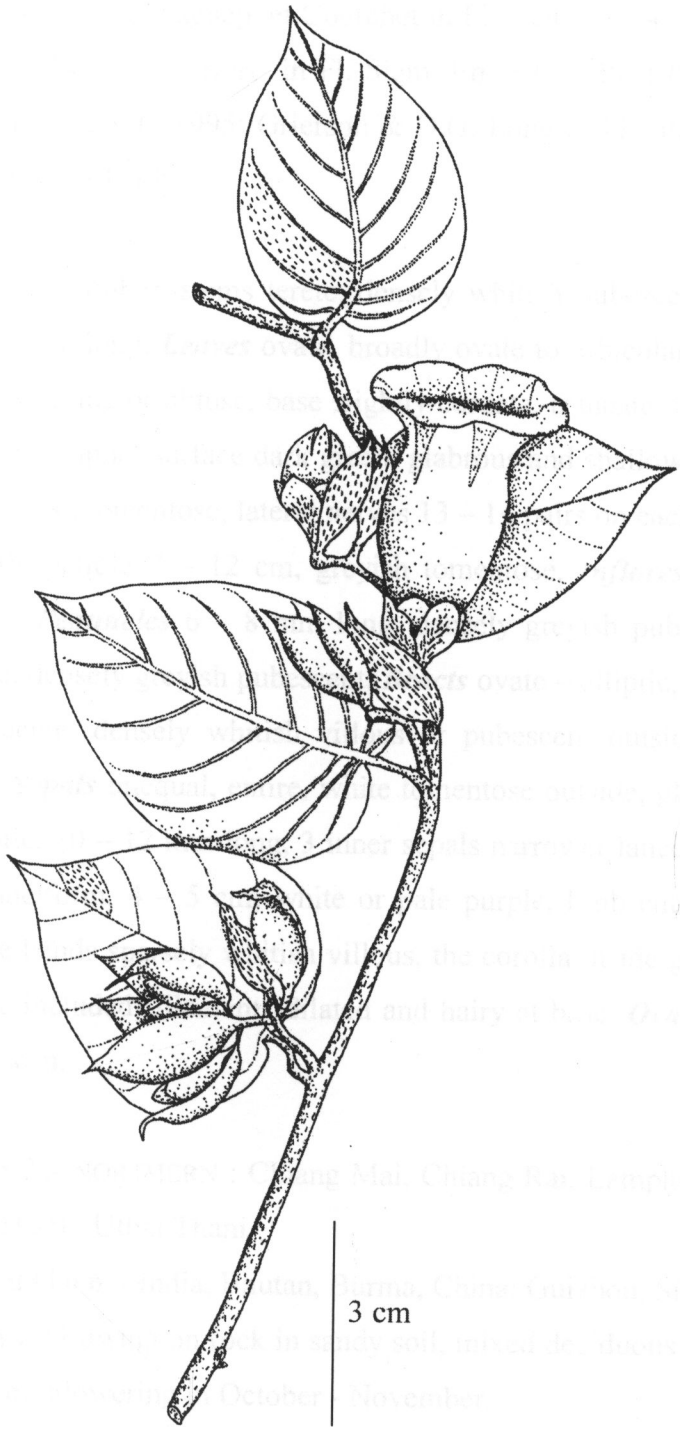


Figure 25. *Argyreia versicolor* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.).: branch: Drawn from type specimen: Kerr 9786.

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 cm long, ***Leaves*** ovate, broadly ovate to orbicular 11.0 – 17.0 by 7.5 – 16.0 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 cm, greyish tomentose. ***Inflorescences*** axillary, subcapitate cymes. ***Peduncles*** 6 – 8 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 mm long, 3 inner sepals narrower lanceolate, ca. 9 mm long. ***Corolla*** funnelform, 4 – 5 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 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).

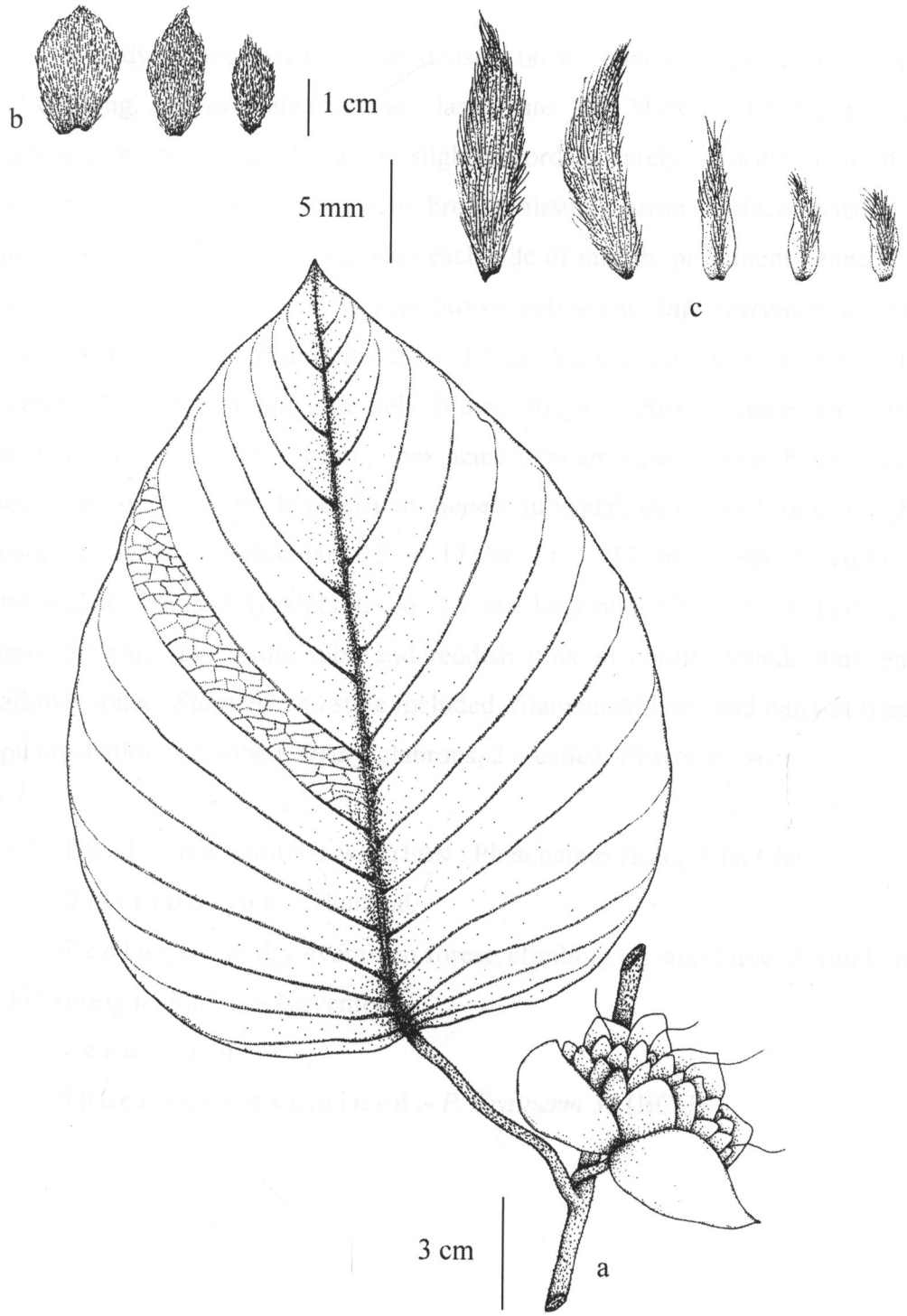


Figure 26. *Argyreia wallichii* Choisy: a. branch; b. bracts; c. sepals.

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 cm long, grooved, densely brown pubescent. ***Inflorescences*** axillary, lax cyme, several flowers. ***Peduncles*** 2.0 – 3.5 cm long, terete, densely brown strigose. ***Pedicels*** 5 – 10 mm long, densely brown strigose. ***Bracts*** lanceolate, elliptic – lanceolate, 15 – 25 by 5 – 8 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 mm long. ***Corolla*** fleshy, campanulate, completely glabrous, 6 – 7 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.-

Specimens examined.- *P. Traiperm 31* (BCU)

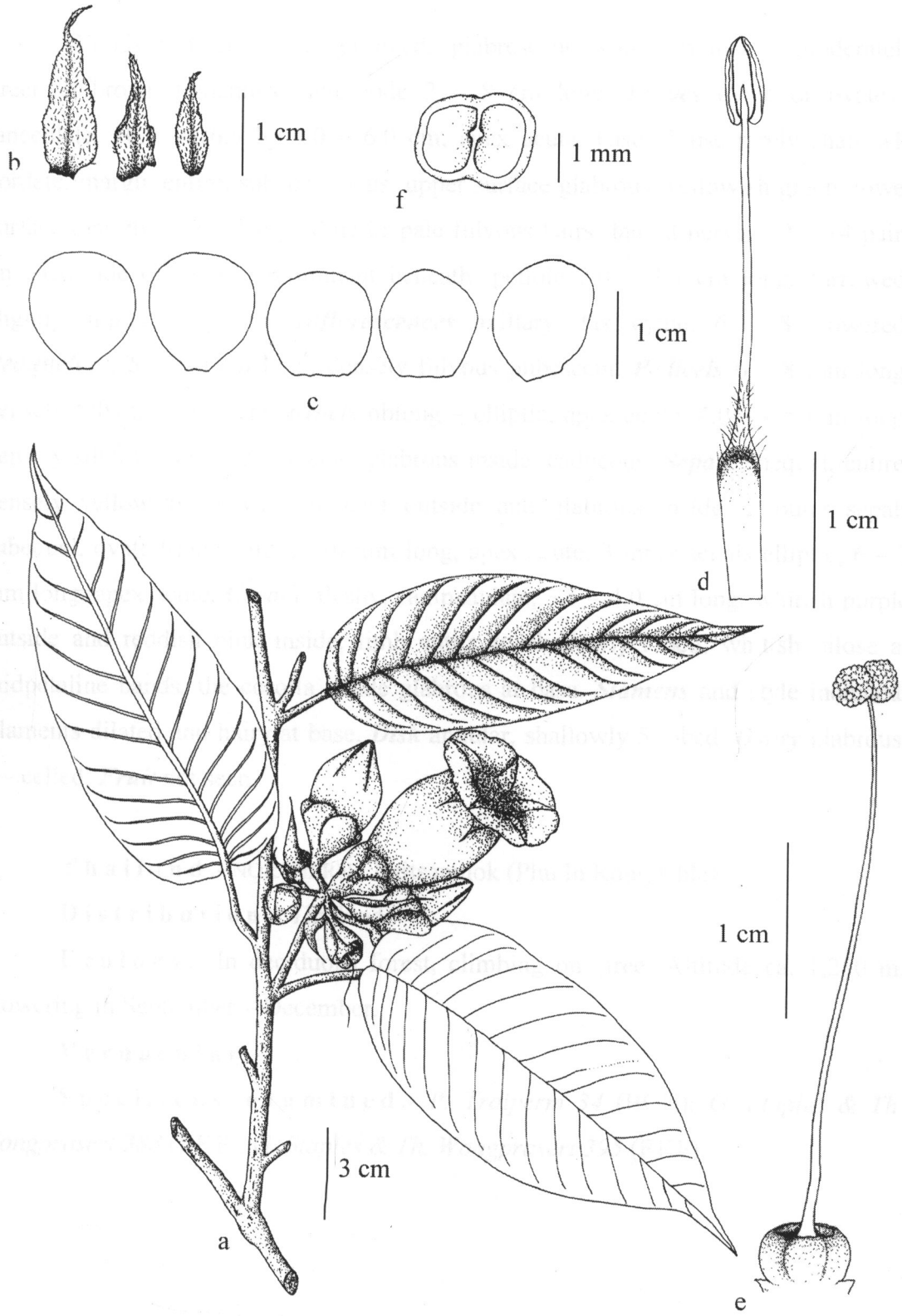


Figure 27. *Argyreia* sp. 1.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

26. Argyreia sp.2. —Fig. 28., Plate 10. f-g.

Woody climber, stems grooved, glabrescent, young branches moderately greenish brown tomentose, internode 2 – 8 cm long. ***Leaves*** ovate or ovate – lanceolate, 10.0 – 16.5 by 4.0 – 6.0 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 cm long, furrowed, slightly appressed pilose. ***Inflorescences*** axillary, lax cyme, 6 – 8 flowered. ***Peduncles*** 1.5 – 2.0 cm long, densely fulvous pubescent. ***Pedicels*** 6 – 8 mm long, densely fulvous pubescent. ***Bracts*** oblong – elliptic, apex acute, 4.0 – 4.5 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 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 m. Flowering in September – December.

Vernacular.-

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

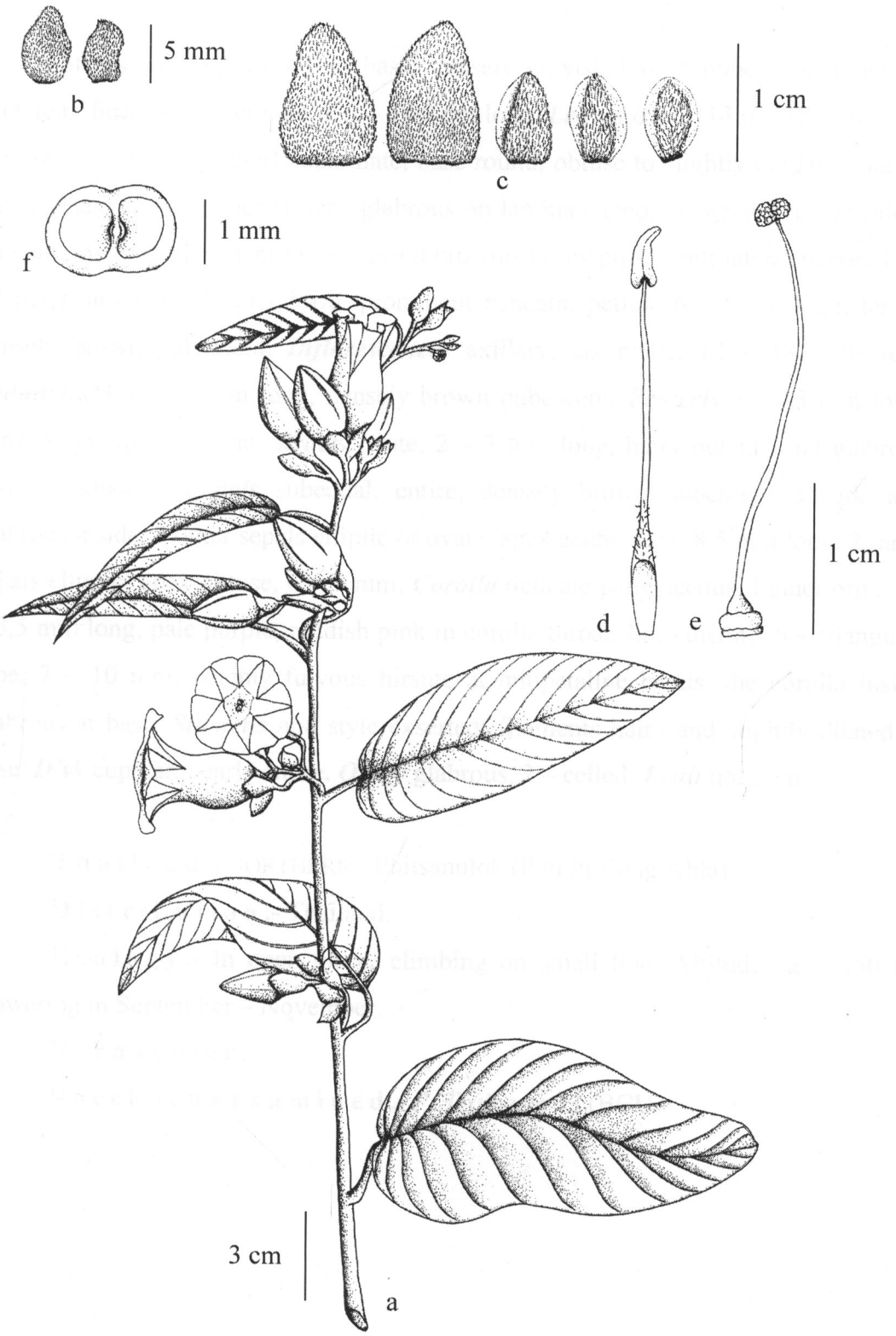


Figure 28. *Argyreia* sp. 2.: a. branch; b. bracts; c. sepals; d. stamen; e. pistil; f. ovary (x-section).

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 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 cm long, terete, densely brown pubescent. ***Inflorescences*** axillary, lax cyme, 12 – 18 – flowers. ***Peduncles*** 4.5 – 6.5 cm long, densely brown pubescent. ***Pedicels*** 7 – 13 mm long, densely brown pubescent. ***Bracts*** ovate, 2 – 3 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 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 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 m. Flowering in September – November.

Vernacular.-

Specimens examined.- *P. Traiperm 33* (BCU).

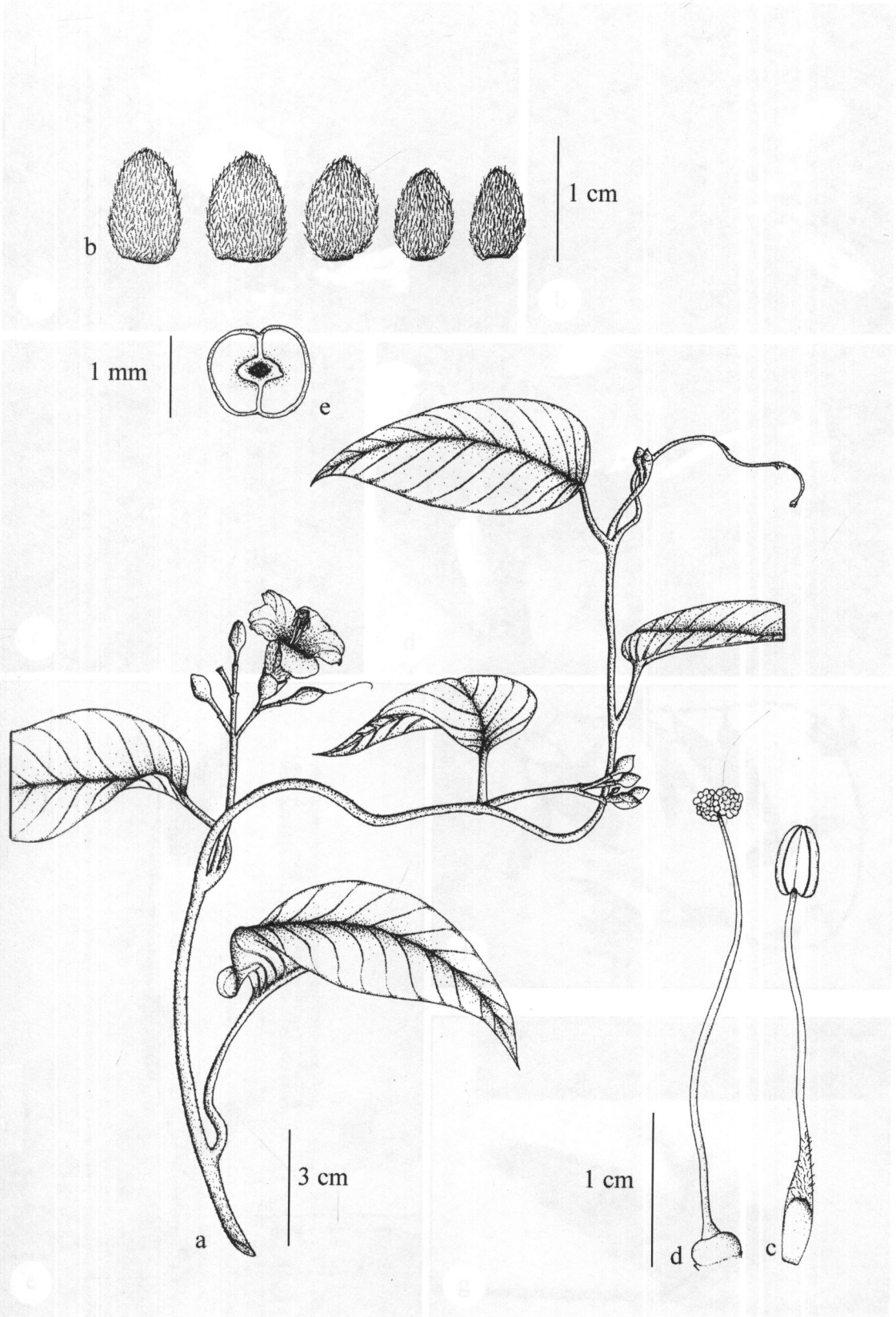


Figure 29. *Argyreia* sp. 3.: a. branch; b. sepals; c. stamen; d. pistil; e. ovary (x-section).

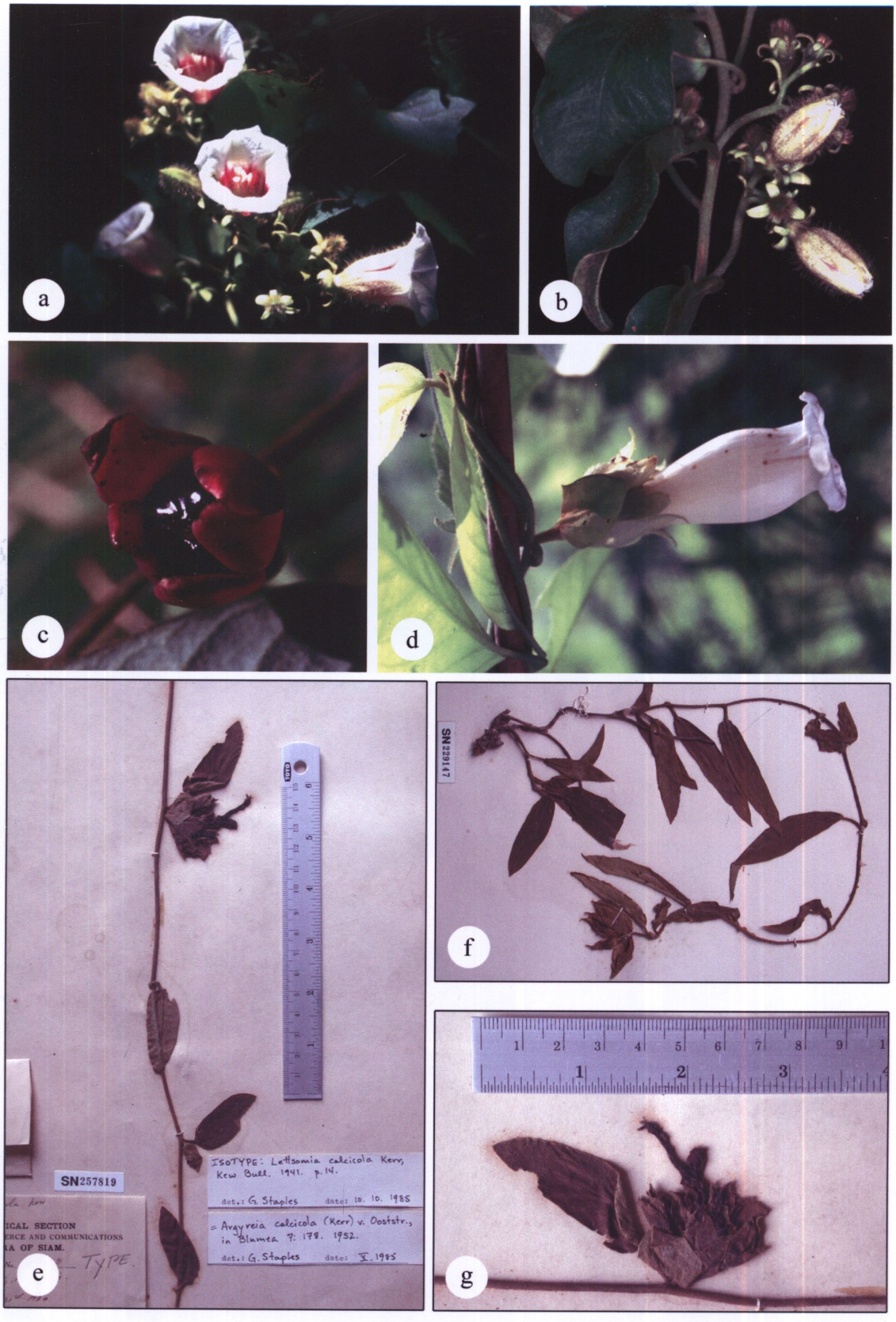


Plate 1. *Argyreia adpressa* (Choisy) Boerl.: a. flowering branch; b. inflorescence, *Argyreia breviscapa* (Kerr) Ooststr.: c. fruit; d. flowering branch, *Argyreia calcicola* (Kerr) Ooststr.: e-f. branch; g. inflorescence.

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.

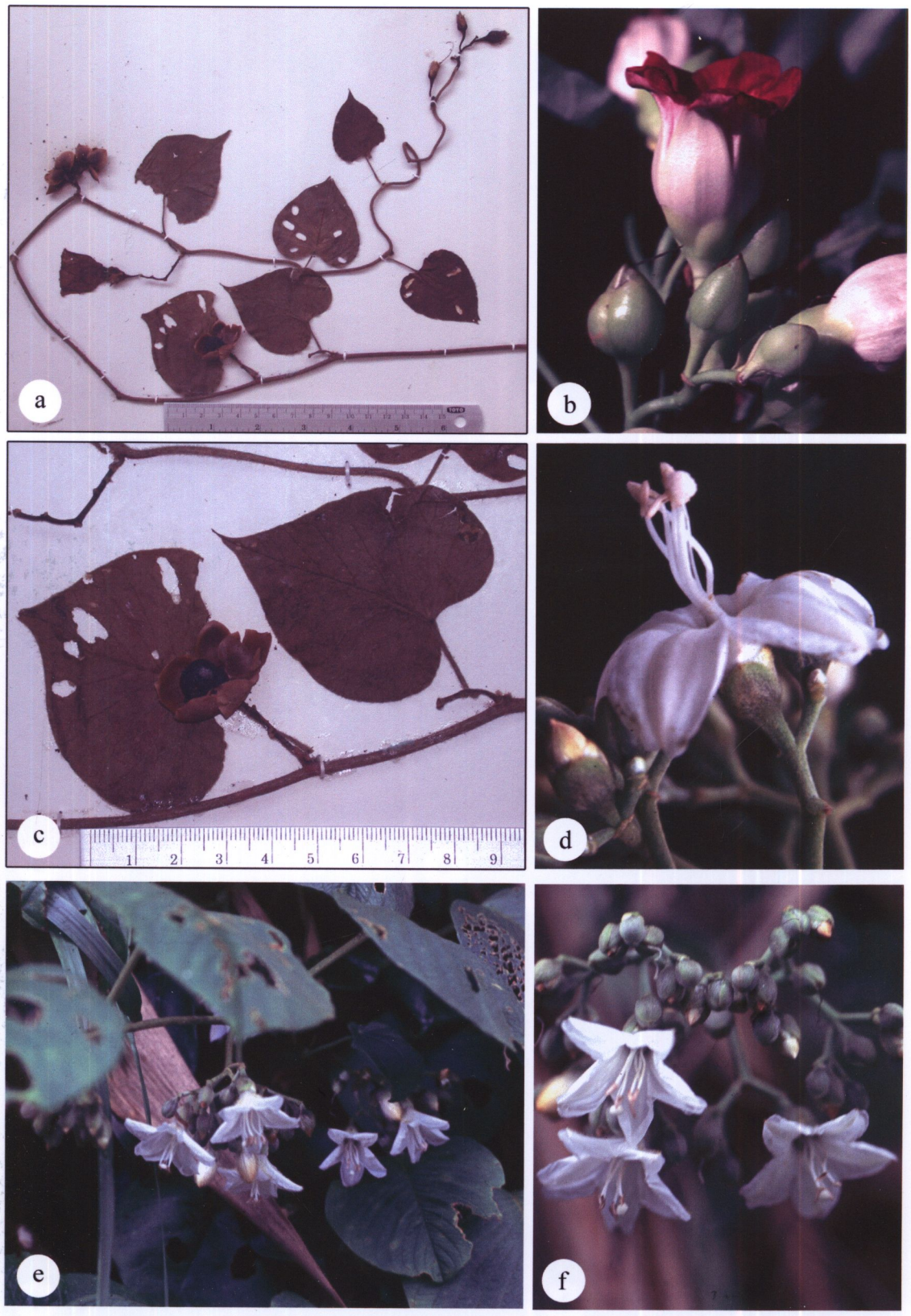


Plate 3. *Argyreia collinsae* (Craib) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.): a. branch; b. flower; c. fruit; *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa*: d. flower; e. habitat; f. inflorescence.

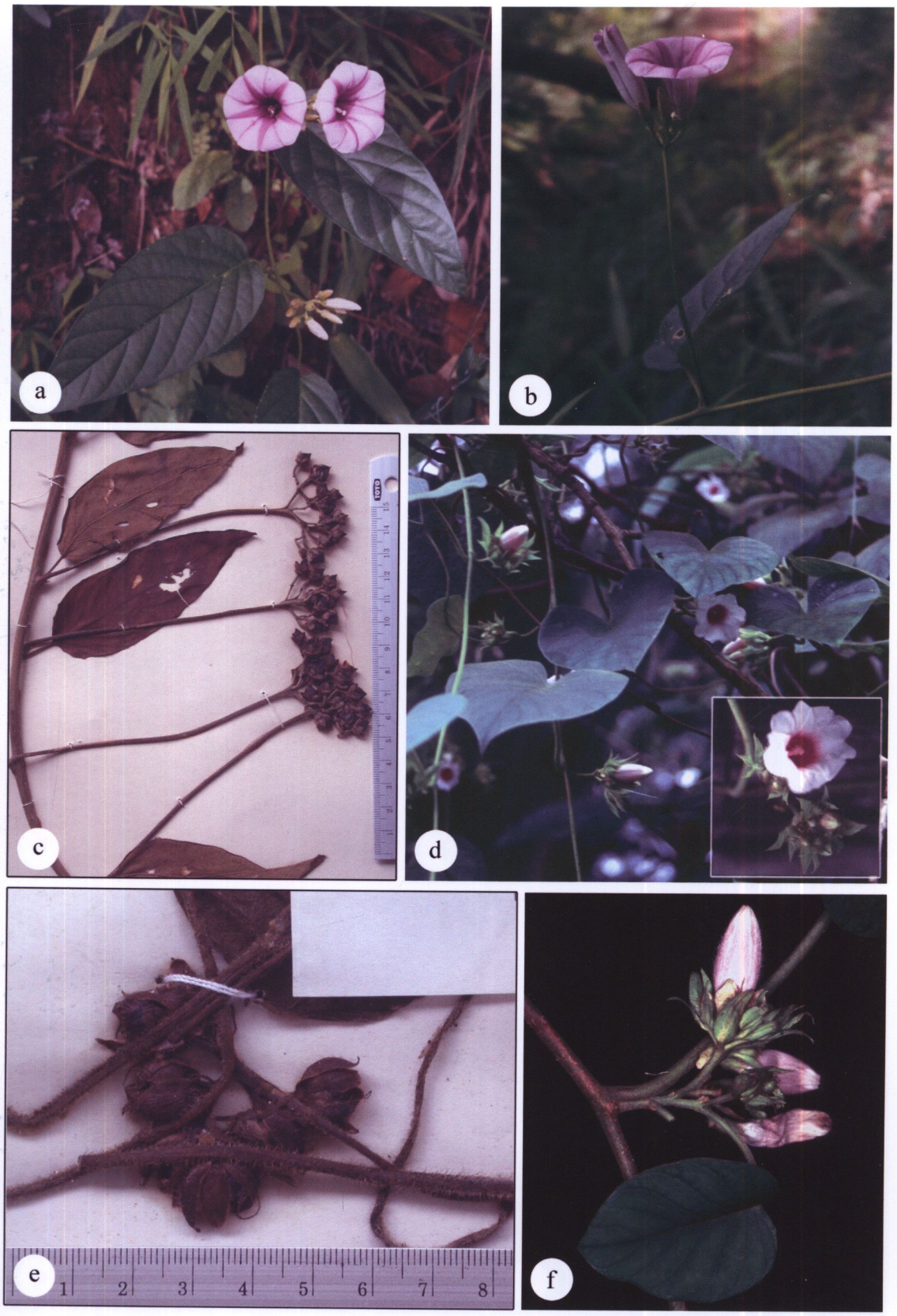


Plate 4. *Argyreia henryi* (Craib) Craib: a. habitat; b. inflorescence; c. fruits, *Argyreia ionantha* (Kerr) C. Khunwasi & P. Traiperm, **comb. nov.** (ined.): d. habitat; e. fruits; f. inflorescence.

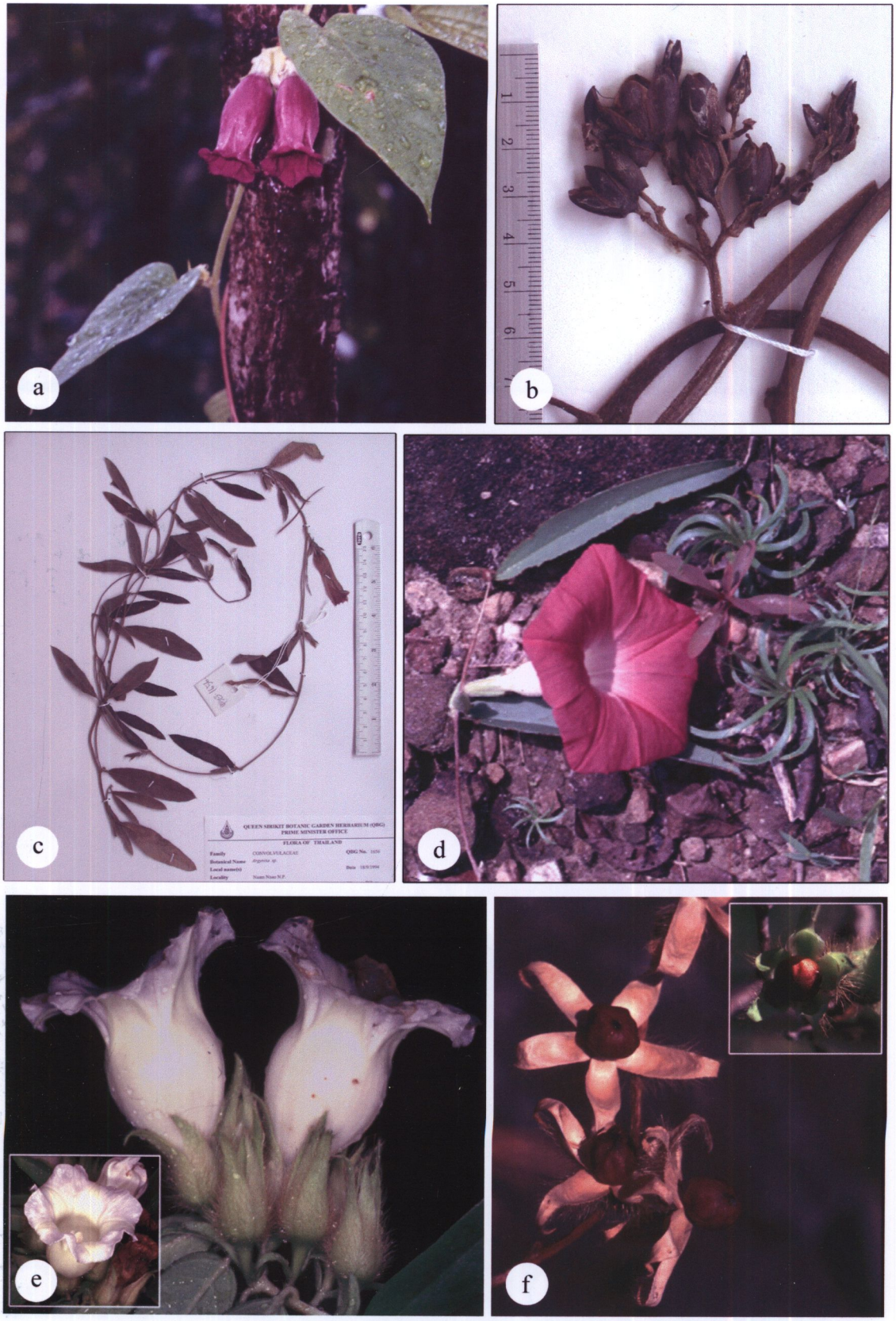


Plate 5. *Argyreia kerrii* Craib: a. habitat; b. fruit, *Argyreia lanceolata* Choisy: c. branch; d. flower and habitat, *Argyreia* cf. *laotica* Gagnep.: e. flowers; f. fruits.

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.

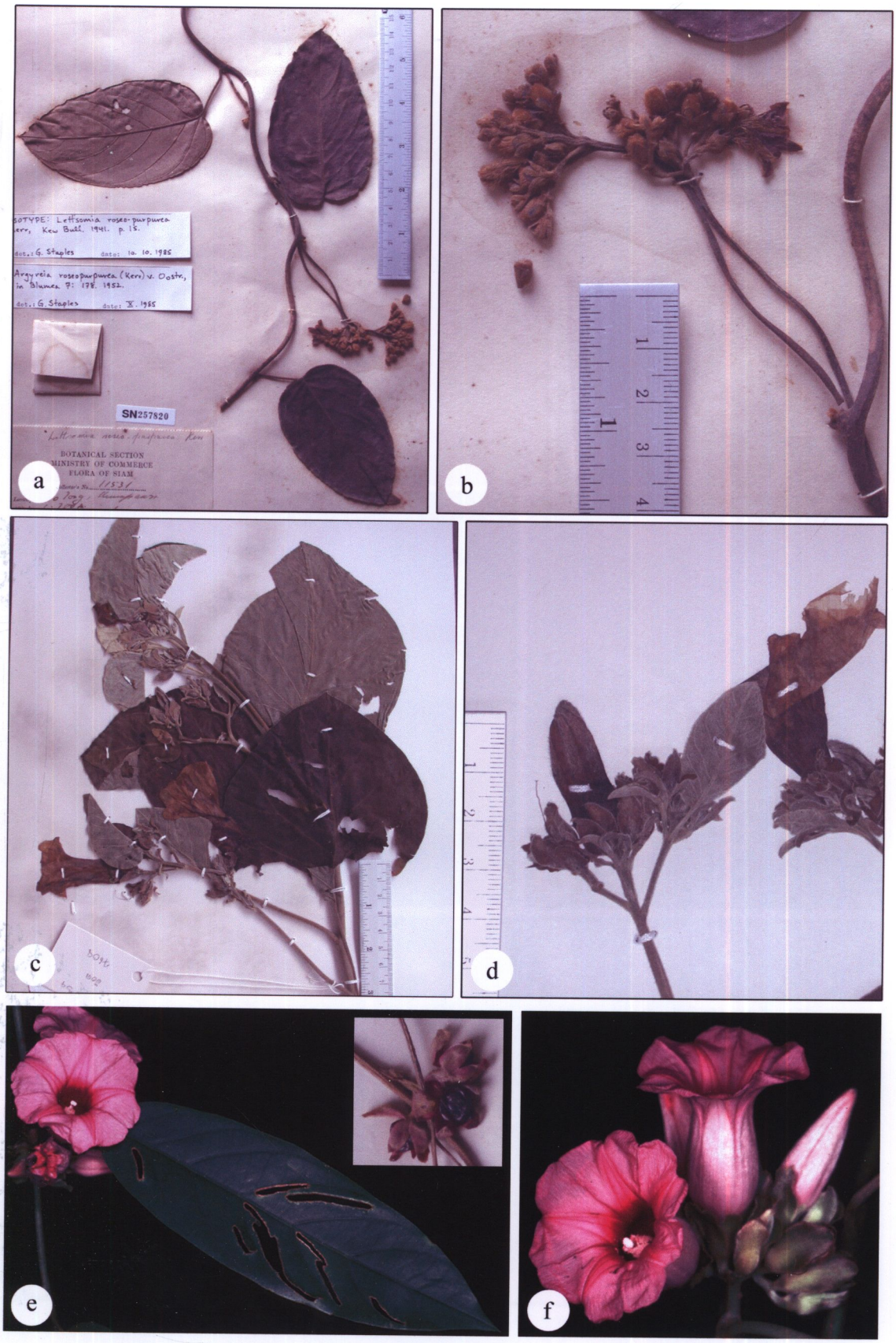


Plate 8. *Argyreia roseopurpurea* (Kerr) Ooststr.: a. branch; b. inflorescence, *Argyreia roxburghii* Choisy: c. branch; d. inflorescence, *Argyreia splendens* (Hornem.) Sweet: e. flowering branch; f. inflorescence.

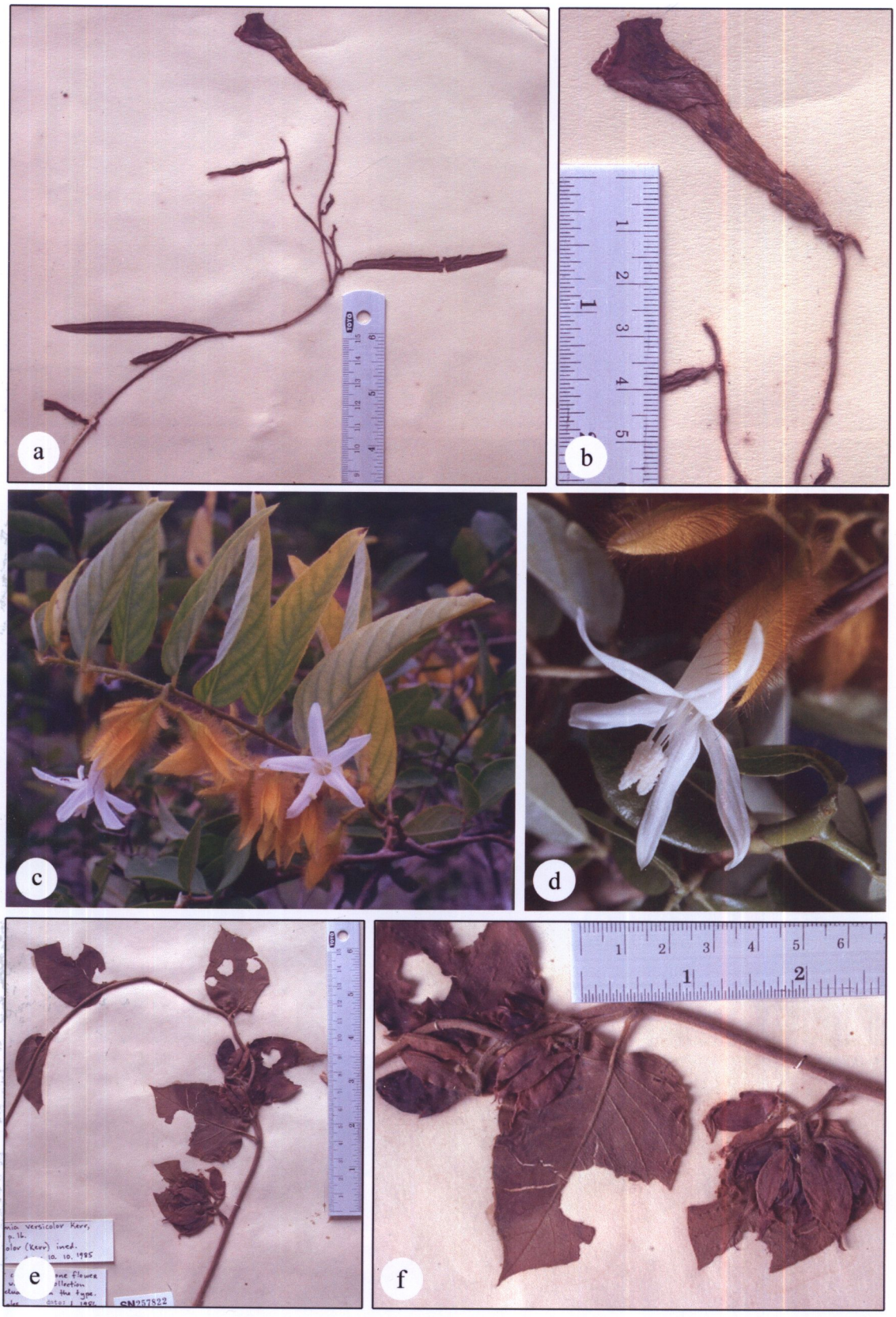


Plate 9. *Argyreia stenophylla* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.): a. branch; b. inflorescence, *Argyreia thorelii* Gagnep.: c. habitat; d. flower, *Argyreia versicolor* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.): e. branch; f. inflorescence.

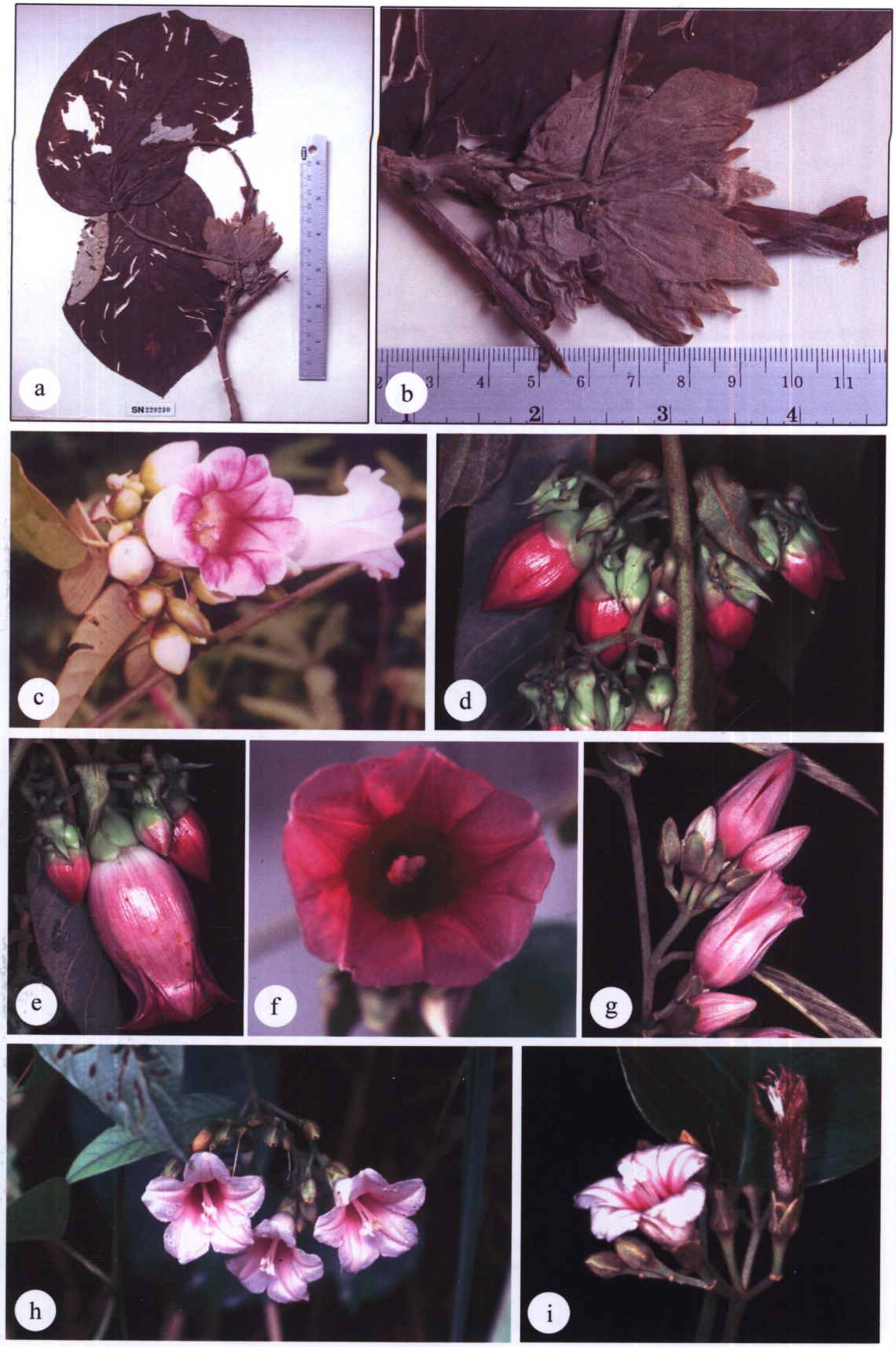


Plate 10. *Argyreia wallichii* Choisy: a. branch; b. inflorescence, *Argyreia* sp. 1.: c. habit; d. inflorescence; e. flower, *Argyreia* sp. 2.: f. flower; g. inflorescence, *Argyreia* sp. 3. : h. habitat; i. inflorescence.

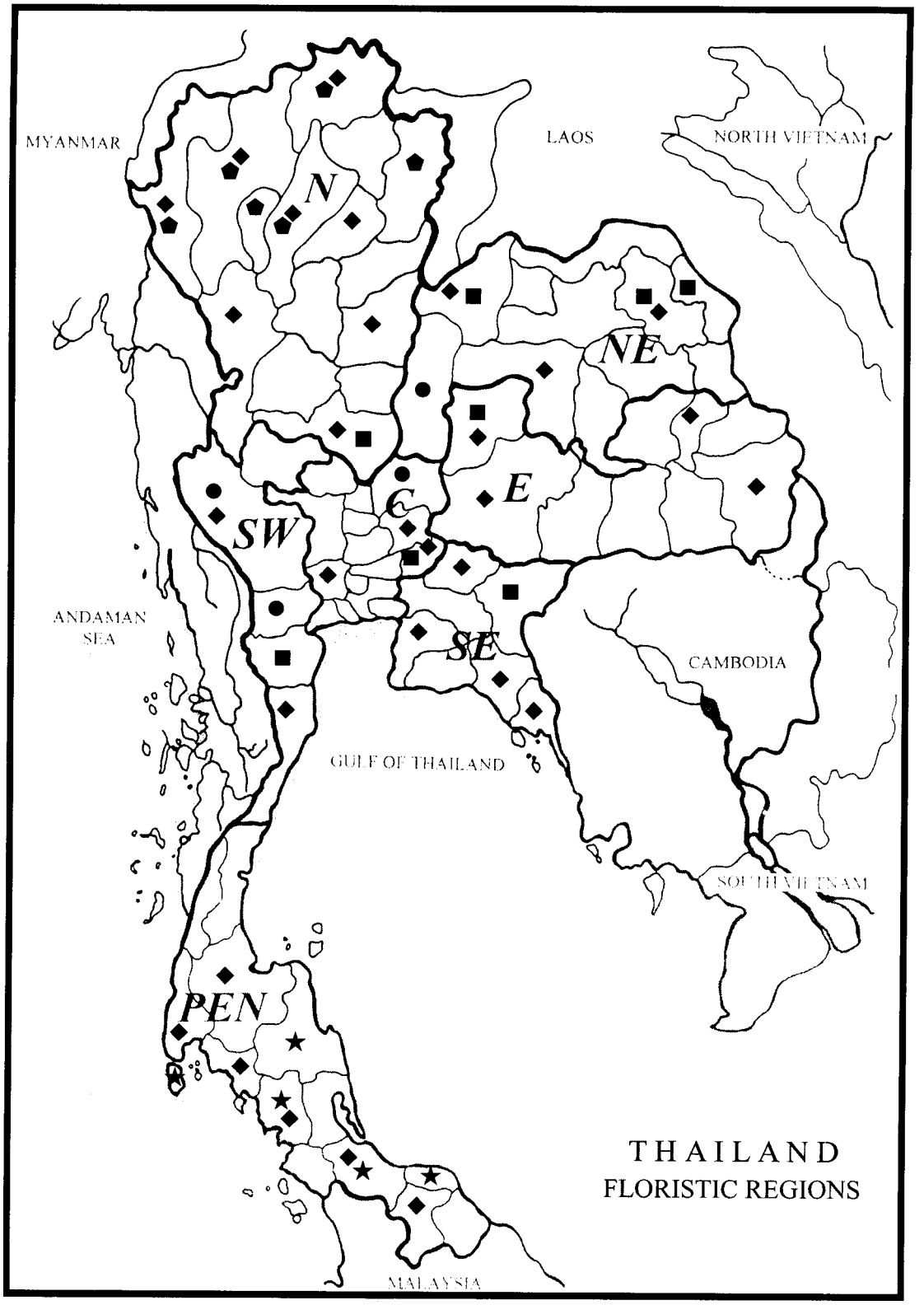


Figure 30. Distribution of *Argyreia adpressa* (Choisy) Boerl. (★); *Argyreia breviscapa* (Kerr) Ooststr. (■); *Argyreia. calcicola* (Kerr) Ooststr. (●); *Argyreia capitiformis* (Poir.) Ooststr. (◆) and *Argyreia henryi* Craib (Craib) (⬟).

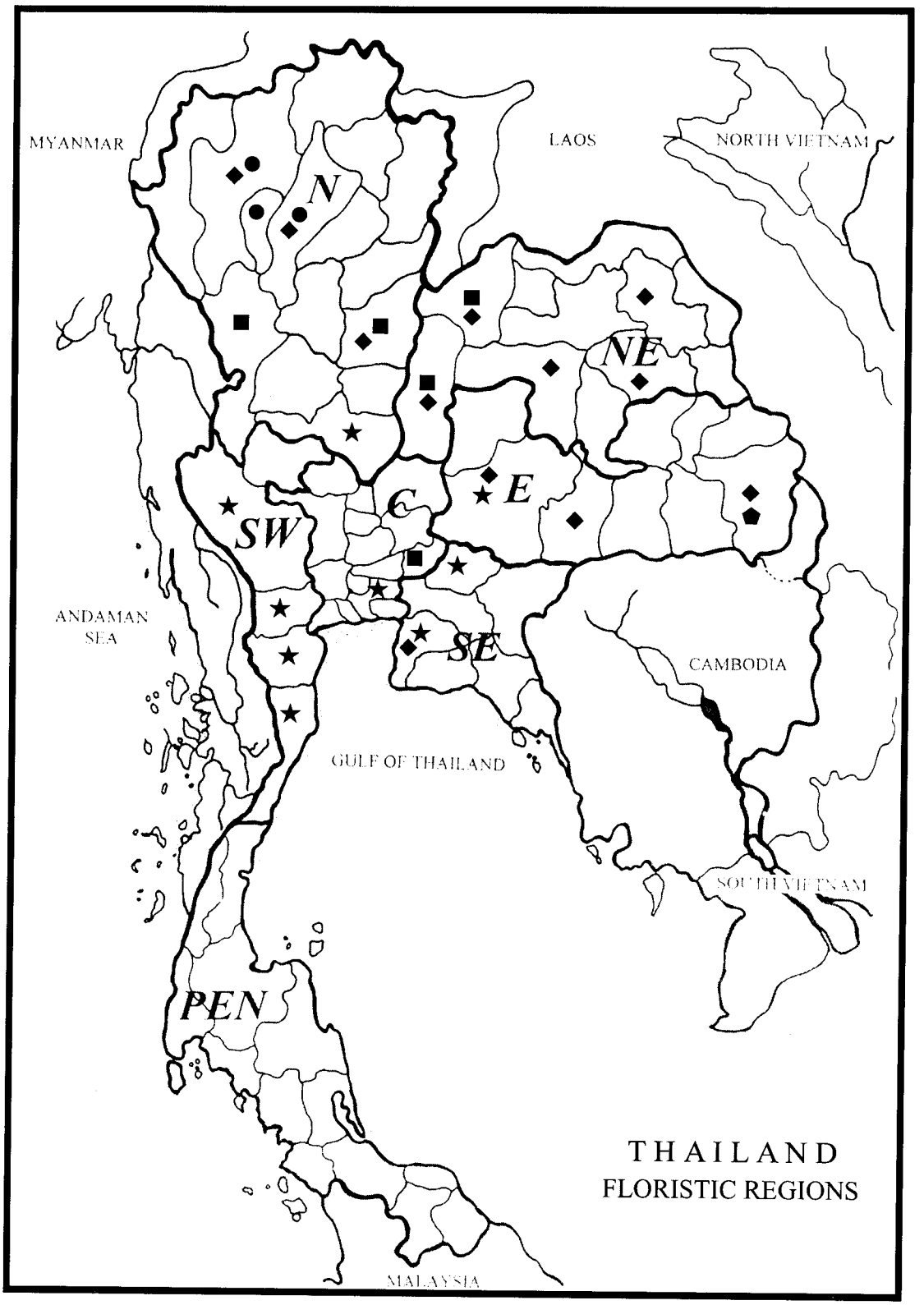


Figure 31. Distribution of *Argyreia collinsae* (Craid) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.) (★); *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa* (■); *Argyreia kerrii* Craib (●); *Argyreia lanceolata* Choisy (◆) and *Argyreia* cf. *laotica* Gagnep.(⬟).

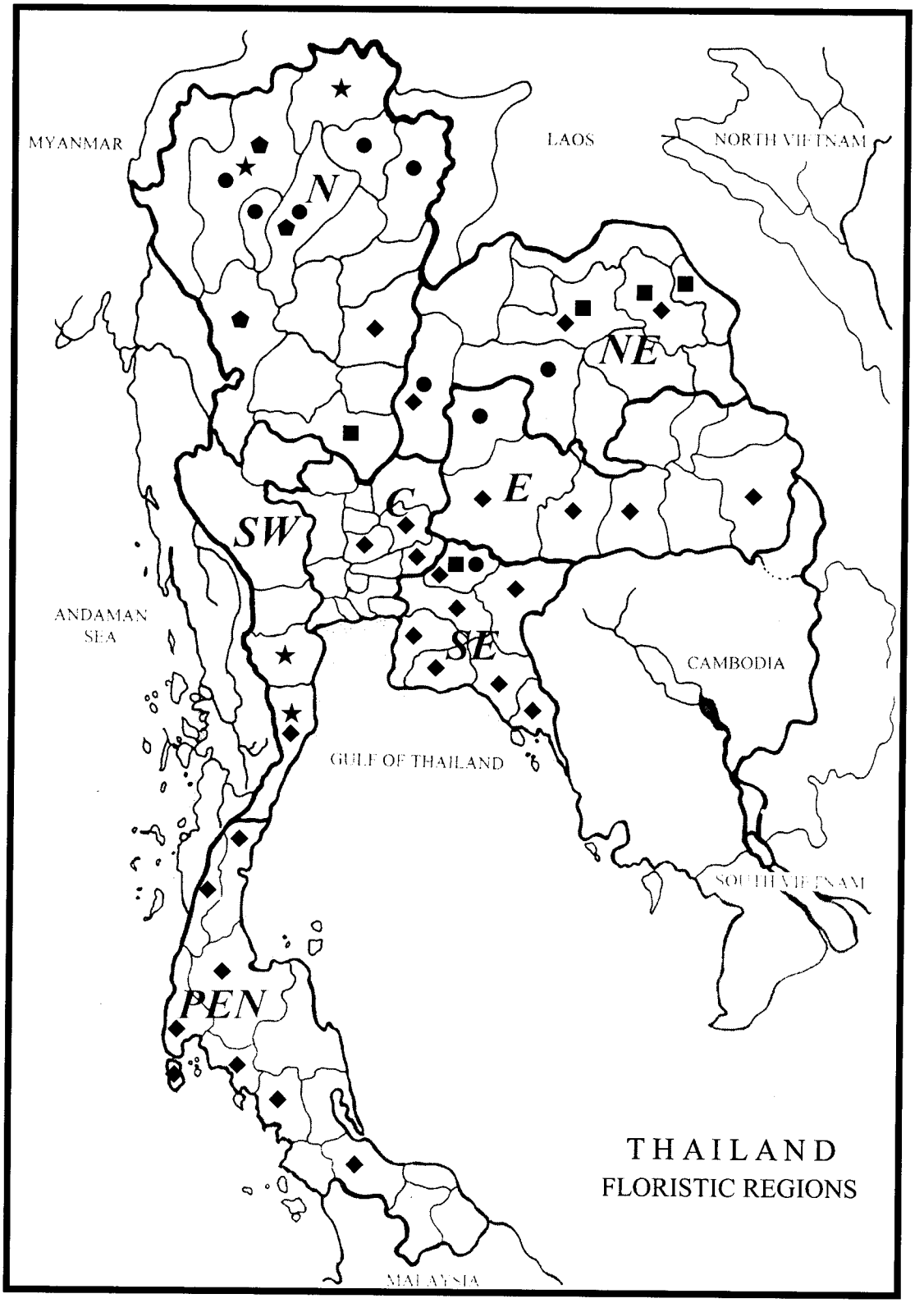


Figure 32. Distribution of *Argyreia maymyo* (W.W. Smith) Raizada (★); *Argyreia mekongensis* Gagnep. et Courchet (■); *Argyreia mollis* (Burm. f.) Choisy (●); *Argyreia obtecta* C.B. Clarke (◆) and *Argyreia roxburghii* Choisy (⬟).

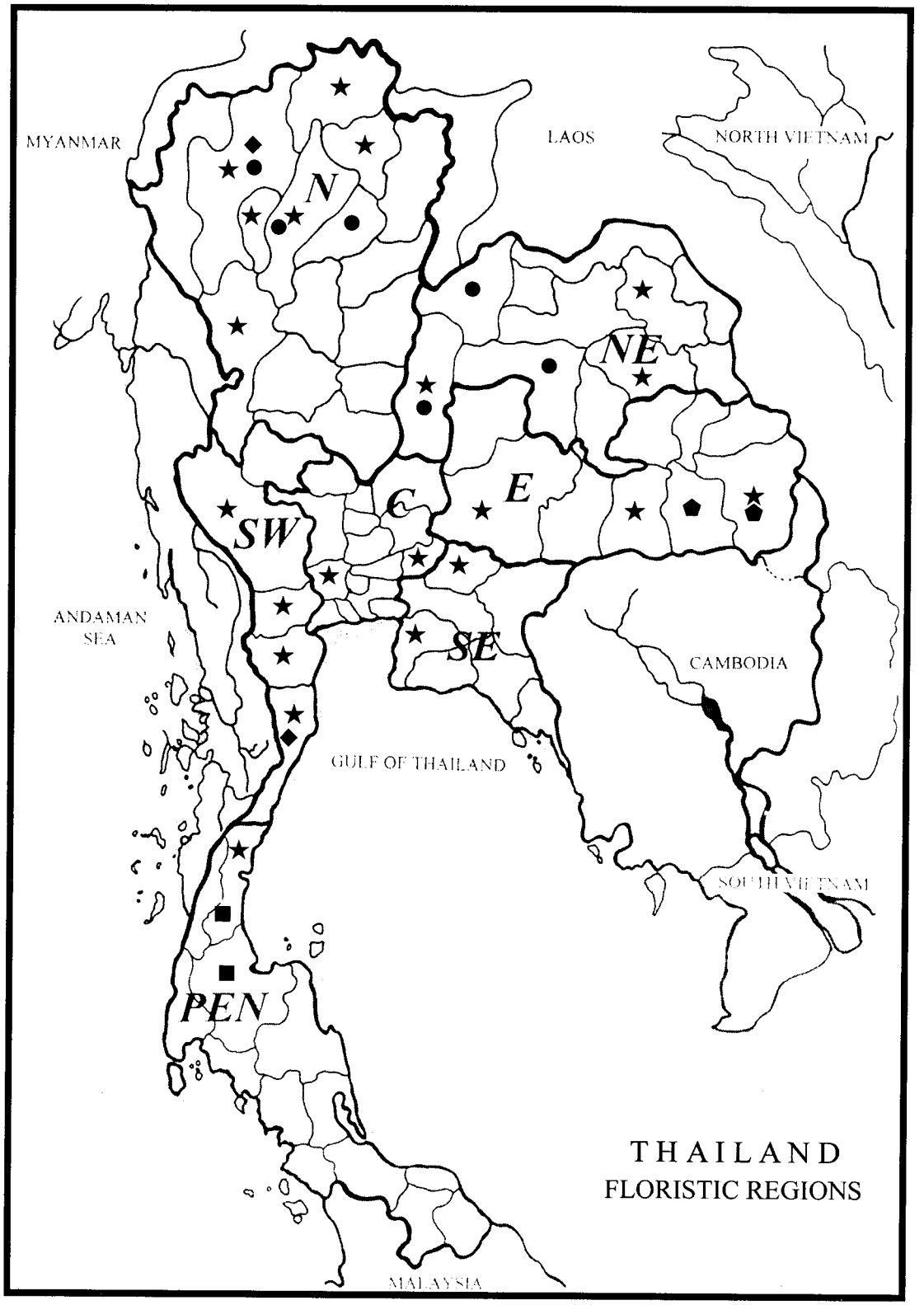


Figure 33. Distribution of *Argyreia osyrensis* (Roth) Choisy (★); *Argyreia roseopurpurea* (Kerr) Ooststr. (■); *Argyreia splendens* (Hornem.) Sweet (●); *Argyreia stenophylla* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.) (◆) and *Argyreia thorelii* Gagnep. (⬟).

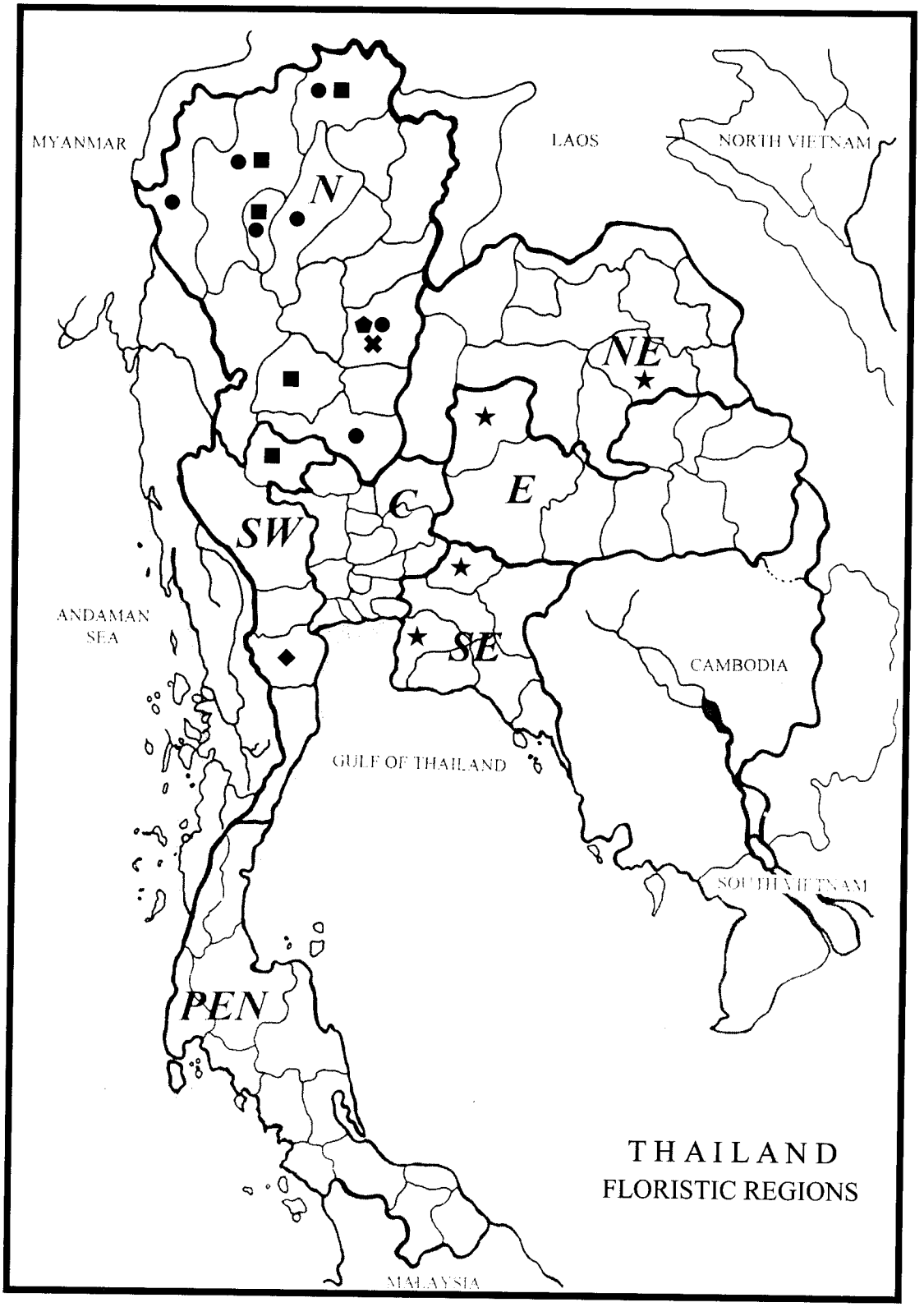


Figure 34. Distribution of *Argyreia versicolor* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.) (★); *Argyreia wallichii* Choisy (■); *Argyreia ionantha* (Kerr) C. Khunwasi & P. Traiperm, **comb. nov.** (ined.) (●); *Argyreia* sp. 1. (◆); *Argyreia* sp. 2. (⬟) and *Argyreia* sp. 3. (✖).

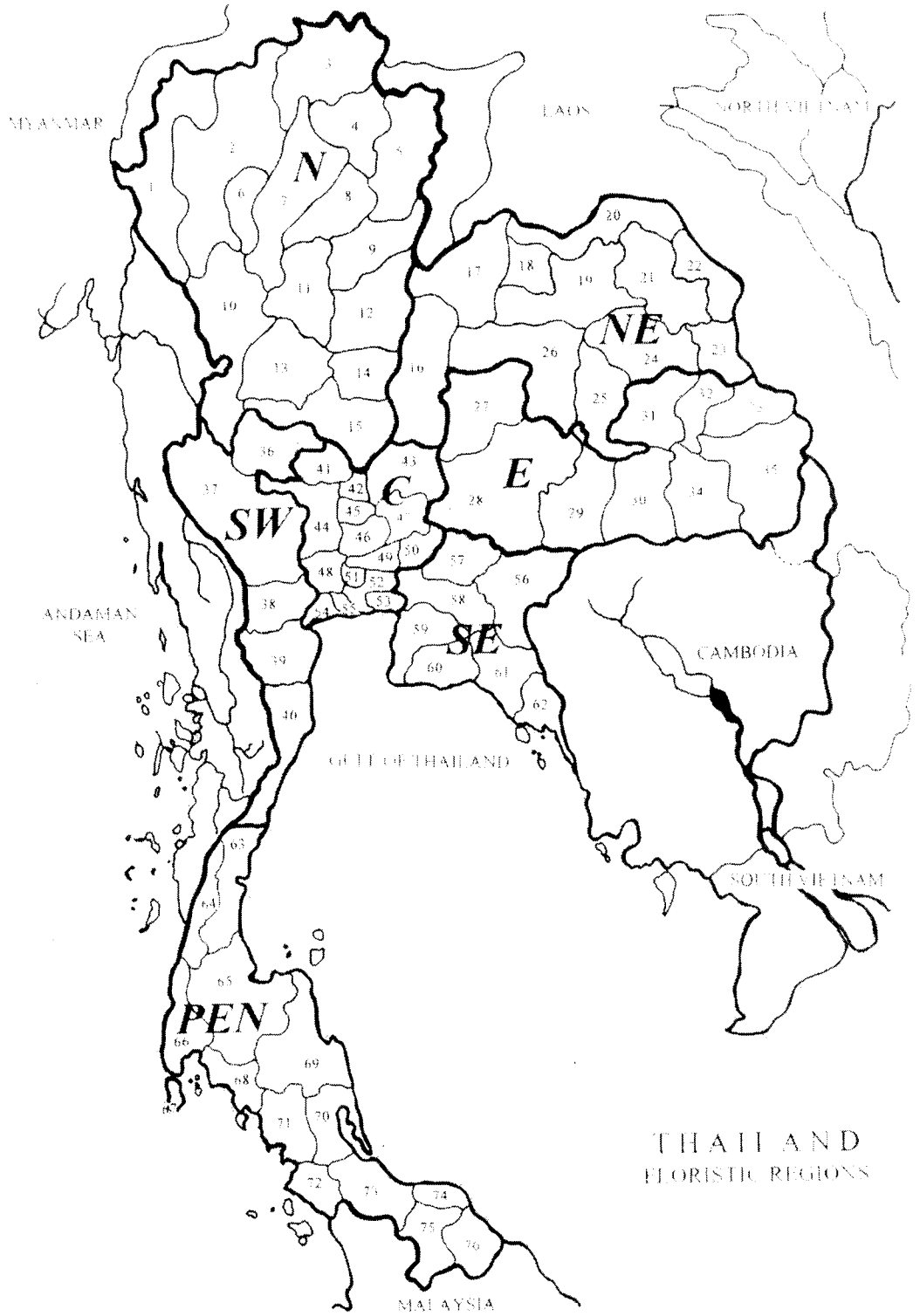


Figure 35. Floristic Regions of Thailand.

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. *SE* (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 μm	spheroidal	echinate	P. Traiperm 32, 38 (BCU)
2. *A. capititormis*	radial	apolar	polyporate	95-112 μm	spheroidal	echinate	P. Traiperm 10, 11, 12 (BCU)
3. *A. collinsae*	radial	apolar	polyporate	97-113 μm	spheroidal to sub spheroidal	echinate	P. Traiperm 5, 13 (BCU)
4. A. fulvocymosa	radial	apolar	polyporate	95-105 μm	spheroidal	echinate	P. Traiperm 26 (BCU)
5. *A. henryi*	radial	apolar	polyporate	99-113 μm	spheroidal to sub spheroidal	echinate	P. Traiperm 49 (BCU)
6. *A. ionantha*	radial	apolar	polyporate	93-106 μm	spheroidal	echinate	P. Traiperm 27, 35 (BCU)
7. *A. kerrii*	radial	apolar	polyporate	98-108 μm	spheroidal	echinate	P. Traiperm 51, 53 (BCU)
8. *A. lanceolata*	radial	apolar	polyporate	95-112 μm	spheroidal	echinate	P. Traiperm 1, 8, 47 (BCU)
9. *Argyreia* cf. *laotica*	radial	apolar	polyporate	100-113 μm	spheroidal to slightly sub spheroidal	echinate	P. Traiperm 17, 29 (BCU)
10. *A. maymyo*	radial	apolar	polyporate	97-108 μm	spheroidal to slightly sub spheroidal	echinate	P. Traiperm 14, 25 (BCU)
11. *A. mollis*	radial	apolar	polyporate	97-114 μm	spheroidal to slightly sub spheroidal	echinate	P. Traiperm 39, 52 (BCU)
12. *A. nervosa*	radial	apolar	polyporate	104-114 μm	spheroidal	echinate	P. Traiperm 30 (BCU)
13. *A. obtecta*	radial	apolar	polyporate	104-118 μm	spheroidal to sub spheroidal	echinate	P. Traiperm 9, 21, 37, 44 (BCU)
14. *A. osyrensis*	radial	apolar	polyporate	96-106 μm	spheroidal to slightly sub spheroidal	echinate	P. Traiperm 6, 15, 22 (BCU)
15. *A. roxburghii*	radial	apolar	polyporate	100-107 μm	spheroidal	echinate	Herb. Trip 496 (30/1) (BCU)
16. *A. splendens*	radial	apolar	polyporate	83-105 μm	spheroidal	echinate	P. Traiperm 20, 36 (BCU)
17. *A. thorelii*	radial	apolar	polyporate	102-115 μm	spheroidal to sub spheroidal	echinate	P. Traiperm 2, 43 (BCU)
18. *A. wallichii*	radial	apolar	polyporate	96-111 μm	spheroidal to slightly sub spheroidal	echinate	W. Nanakorn et.al 5217 (QSBG)
19. *Argyreia* sp. 1	radial	apolar	polyporate	95-115 μm	spheroidal	echinate	P. Traiperm 31 (BCU)
20. *Argyreia* sp. 2	radial	apolar	polyporate	84-101 μm	spheroidal to sub spheroidal	echinate	P. Traiperm 34 (BCU)
21. *Argyreia* sp .3	radial	apolar	polyporate	98-110 μm	spheroidal	echinate	P. Traiperm 33 (BCU)

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

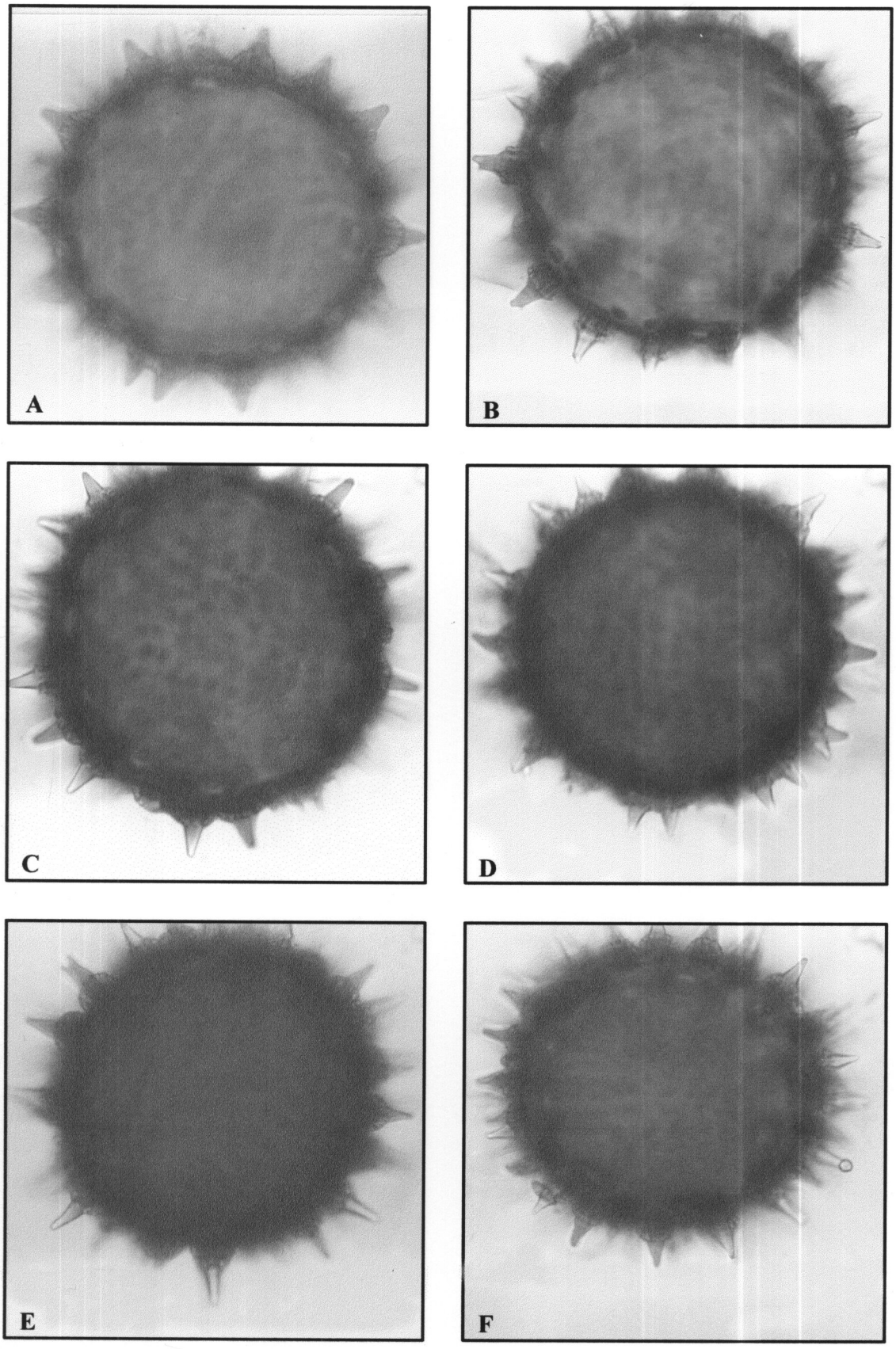


Plate 11. LM micrographs: A. *Argyreia adpressa* (Choisy) Boerl., B. *Argyreia capitiformis* (Poir.) Ooststr., C. *Argyreia collinsae* (Craib) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.), D. *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa*, E. *Argyreia henryi* (Craib) Craib and F. *Argyreia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

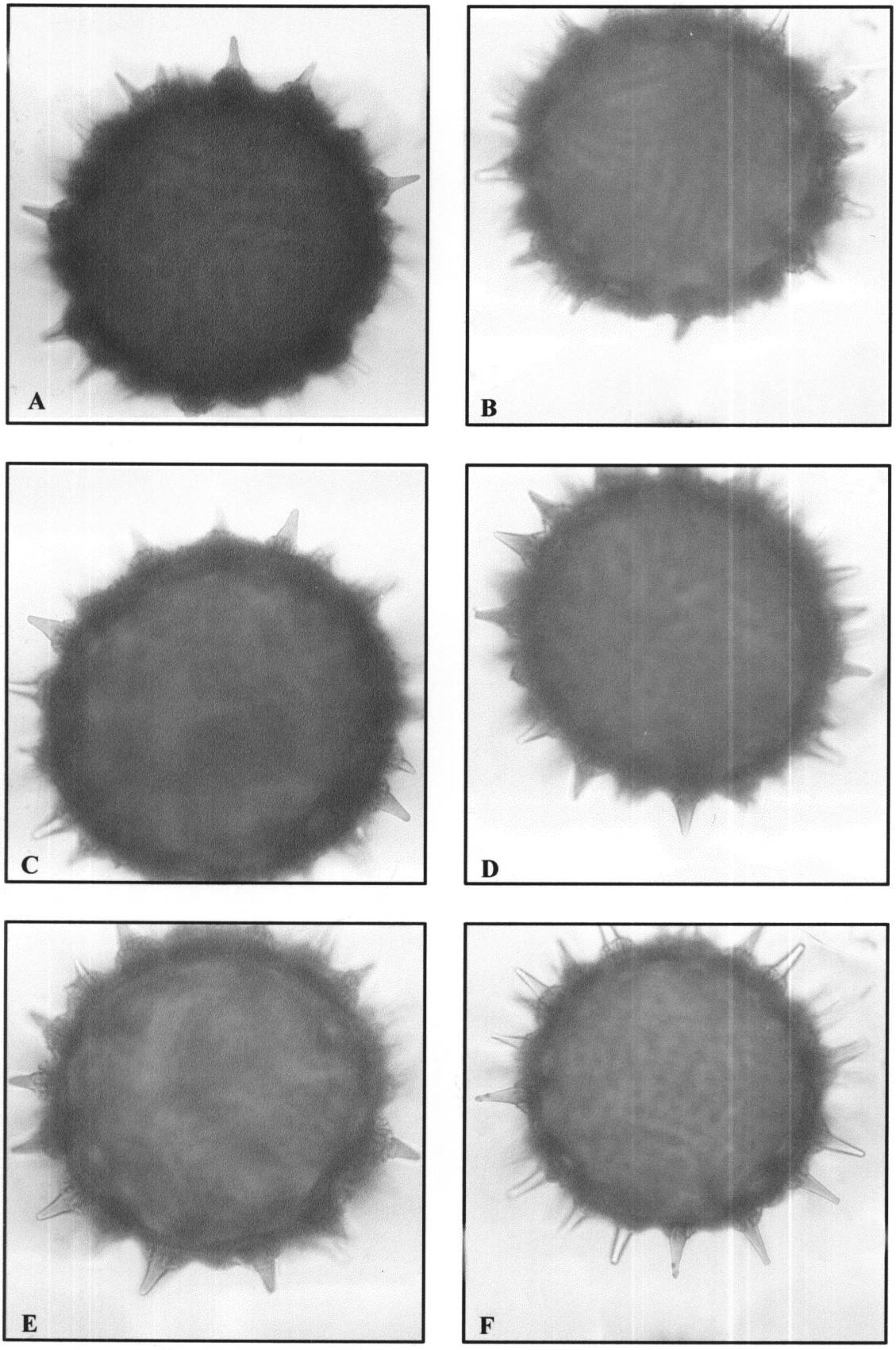


Plate 12. LM micrographs: A. *Argyreia kerrii* Craib, B. *Argyreia lanceolata* Choisy, C. *Argyreia* cf. *laotica* Gagnep., D. *Argyreia maymyo* (W.W. Smith) Raizada, E. *Argyreia mollis* (Burm. f.) Choisy and F. *Argyreia nervosa* (Burm. f.) Boj.

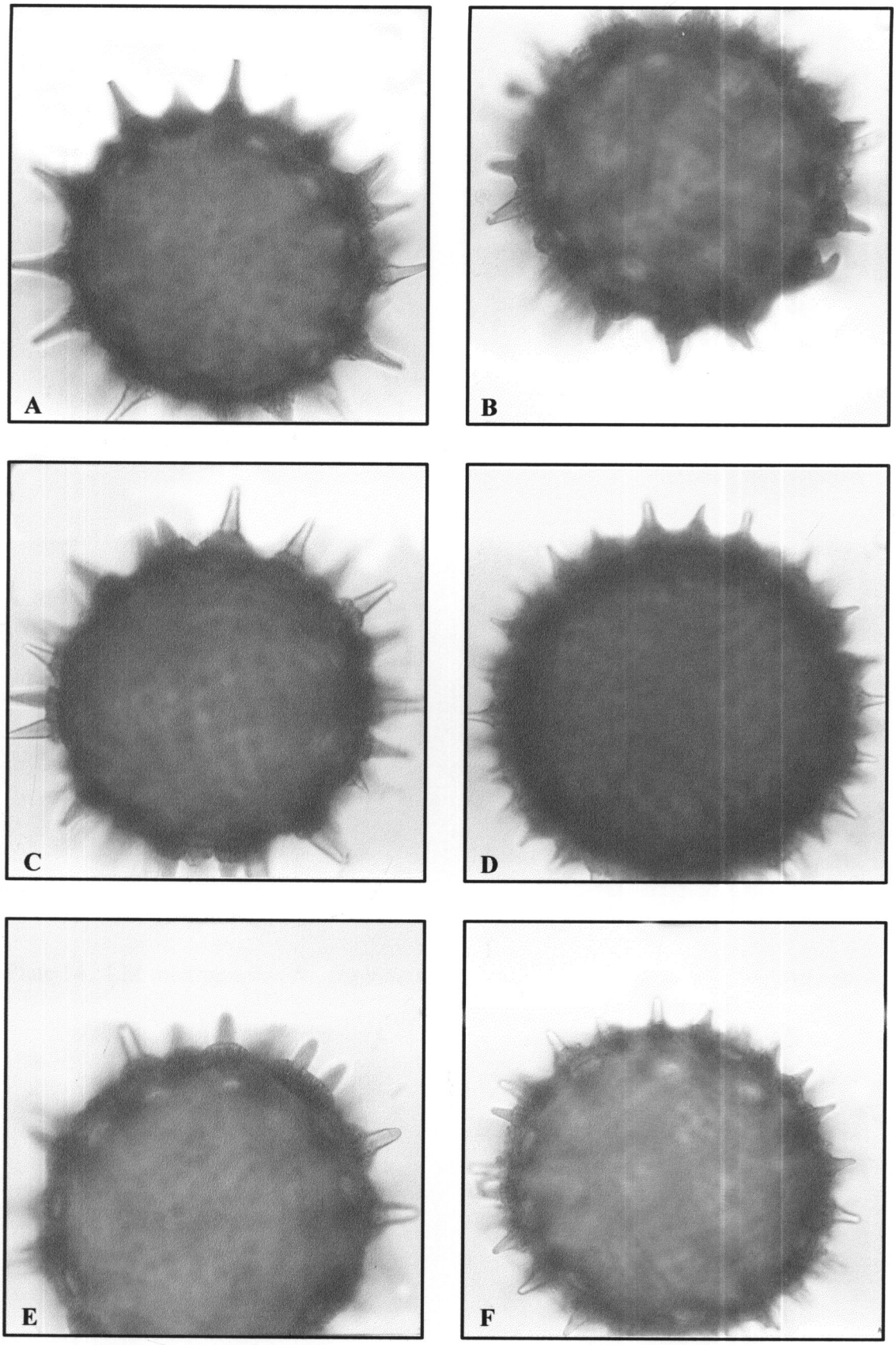


Plate 13. LM micrographs: A. *Argyreia obtecta* C.B. Clarke, B. *Argyreia osyrensis* (Roth) Choisy, C. *Argyreia roxburghii* Choisy, D. *Argyreia splendens* (Hornem.) Sweet, E. *Argyreia thorelii* Gagnep. and F. *Argyreia wallichii* Choisy.

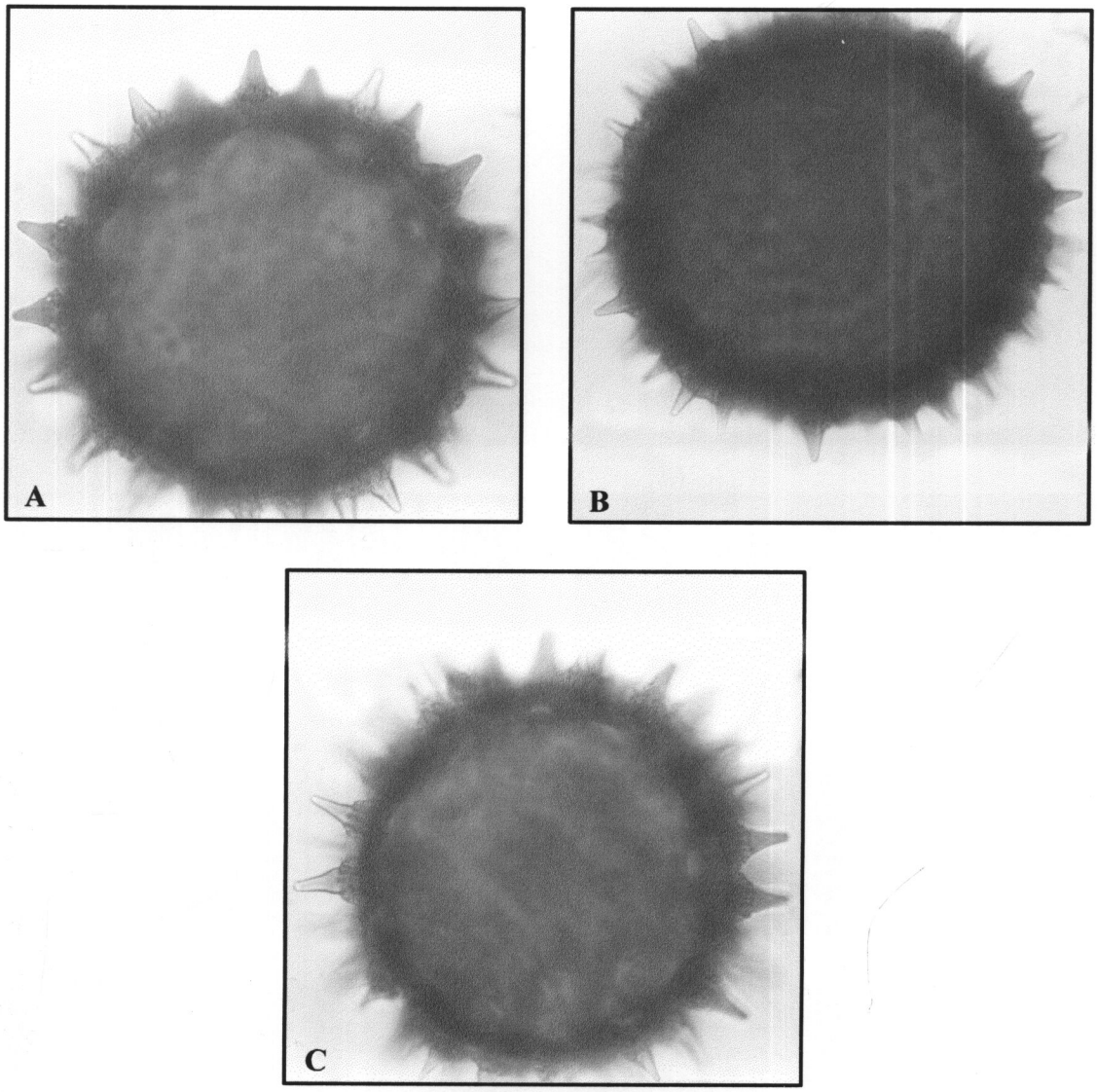


Plate 14. LM micrographs: A. *Argyreia* sp.1., B. *Argyreia* sp. 2. and C. *Argyreia* sp. 3.

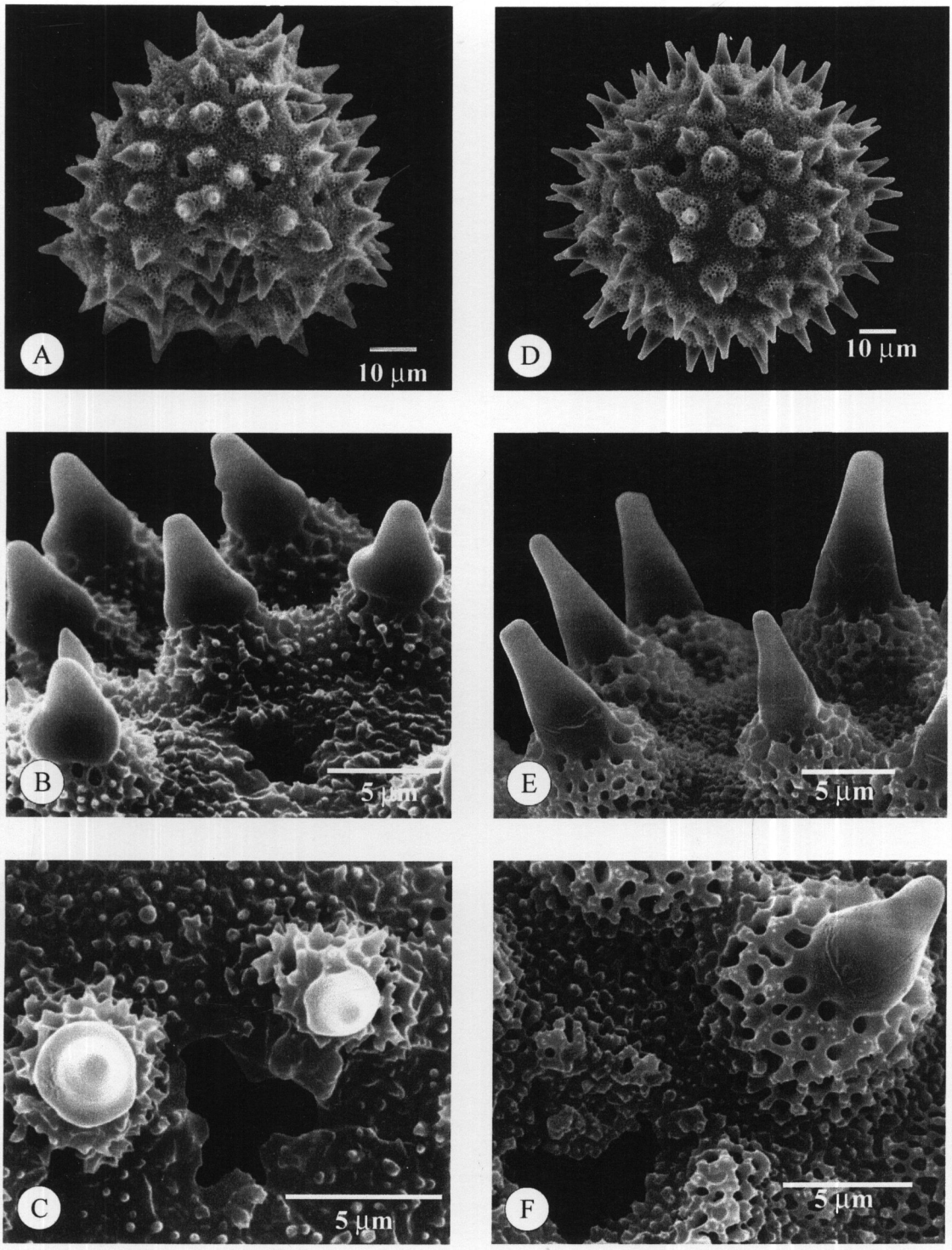


Plate 15. SEM micrographs: A-C. *Argyreia adpressa* (Choisy) Boerl. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia capitiformis* (Poir.) Ooststr. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

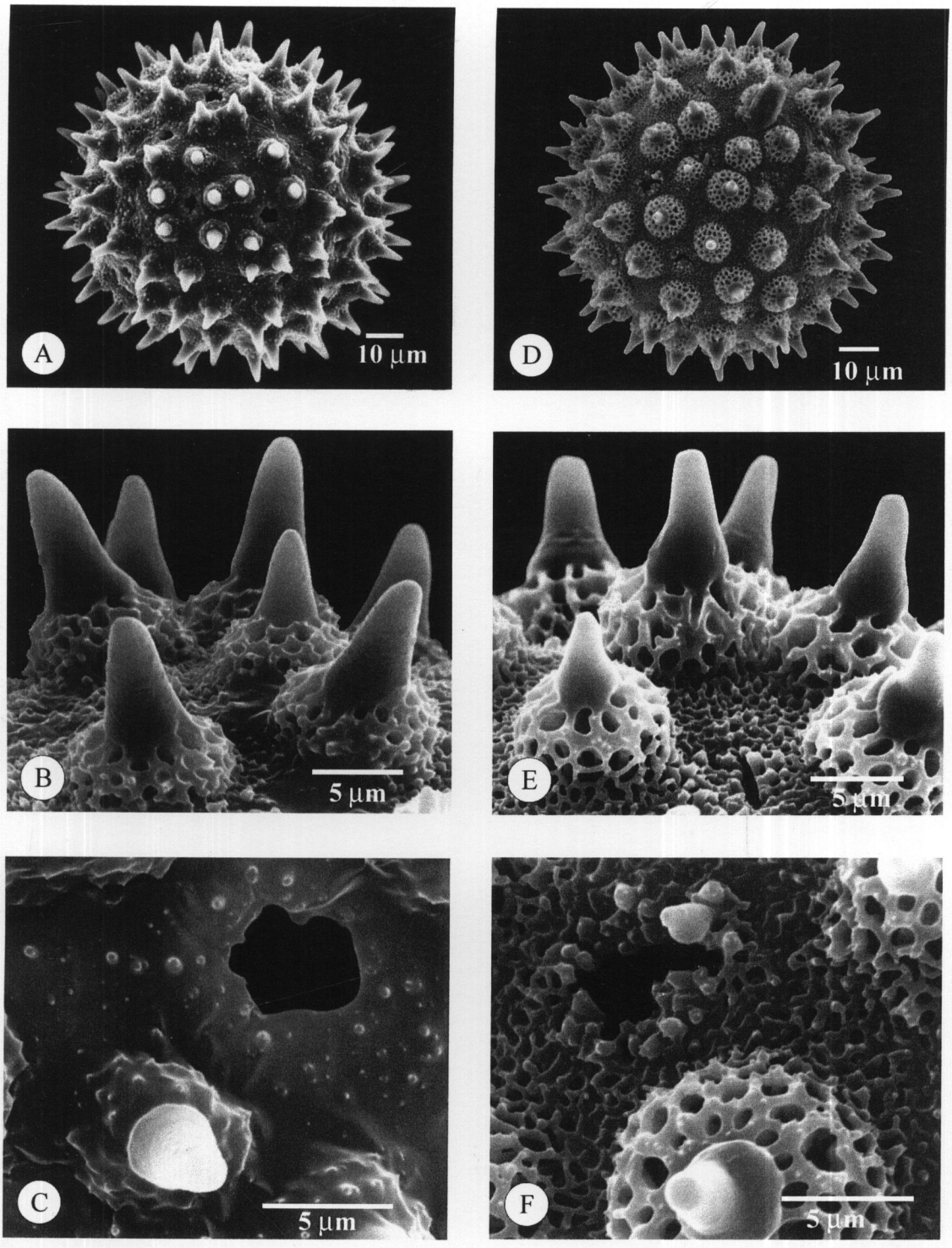


Plate 16. SEM micrographs: A-C. *Argyreia collinsae* (Craib) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.) (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia fulvocymosa* C.Y. Wu var. *fulvocymosa* (D) Pollen grain. (E) Detail of ornamentation. (F) Detail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

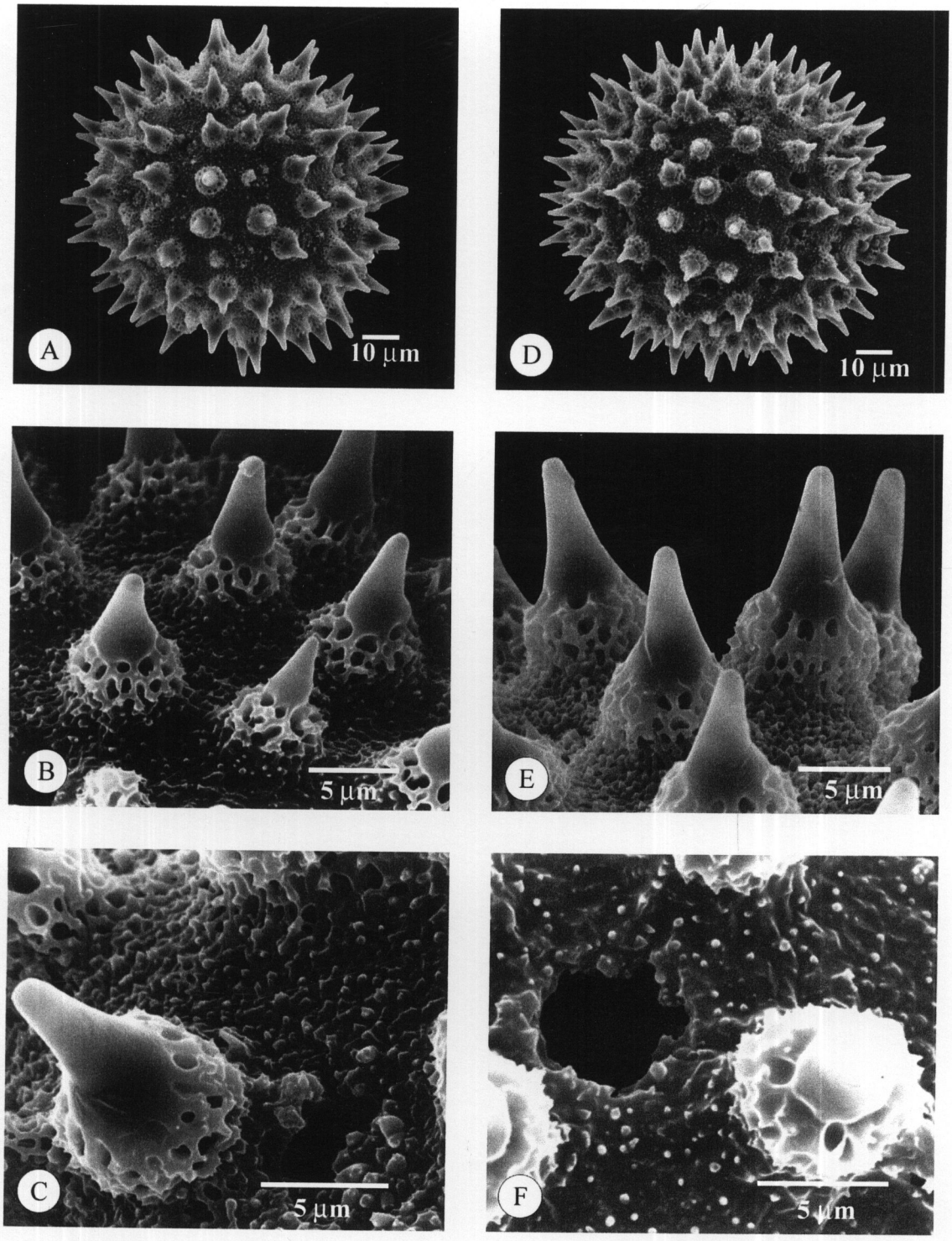


Plate 17. SEM micrographs: A-C. *Argyreia henryi* (Craib) Craib (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia ionantha* (Kerr) C. Khunwasi & P. Traiperm, **comb. nov.** (ined.) (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

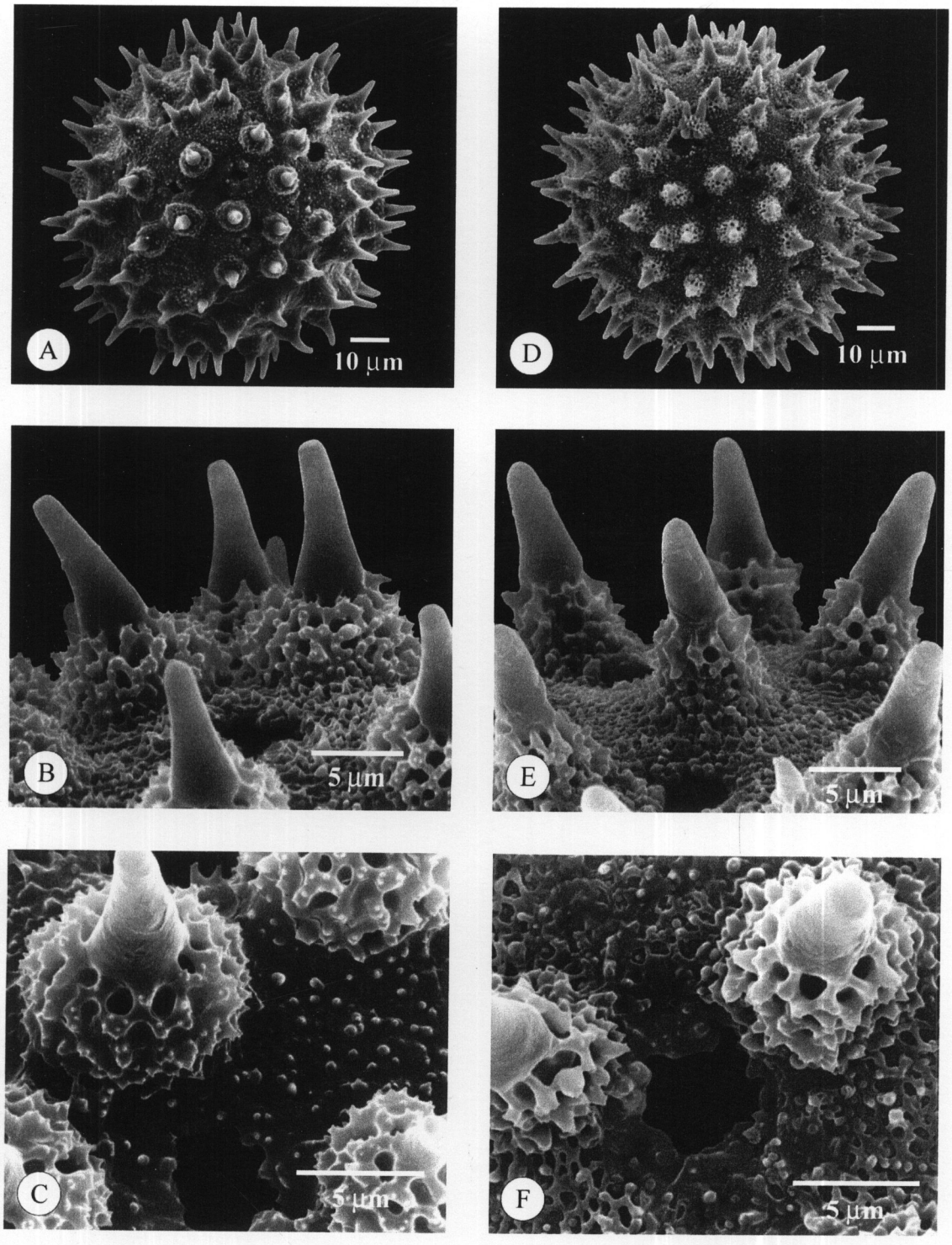


Plate 18. SEM micrographs: A-C. *Argyreia kerrii* Craib (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia lanceolata* Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

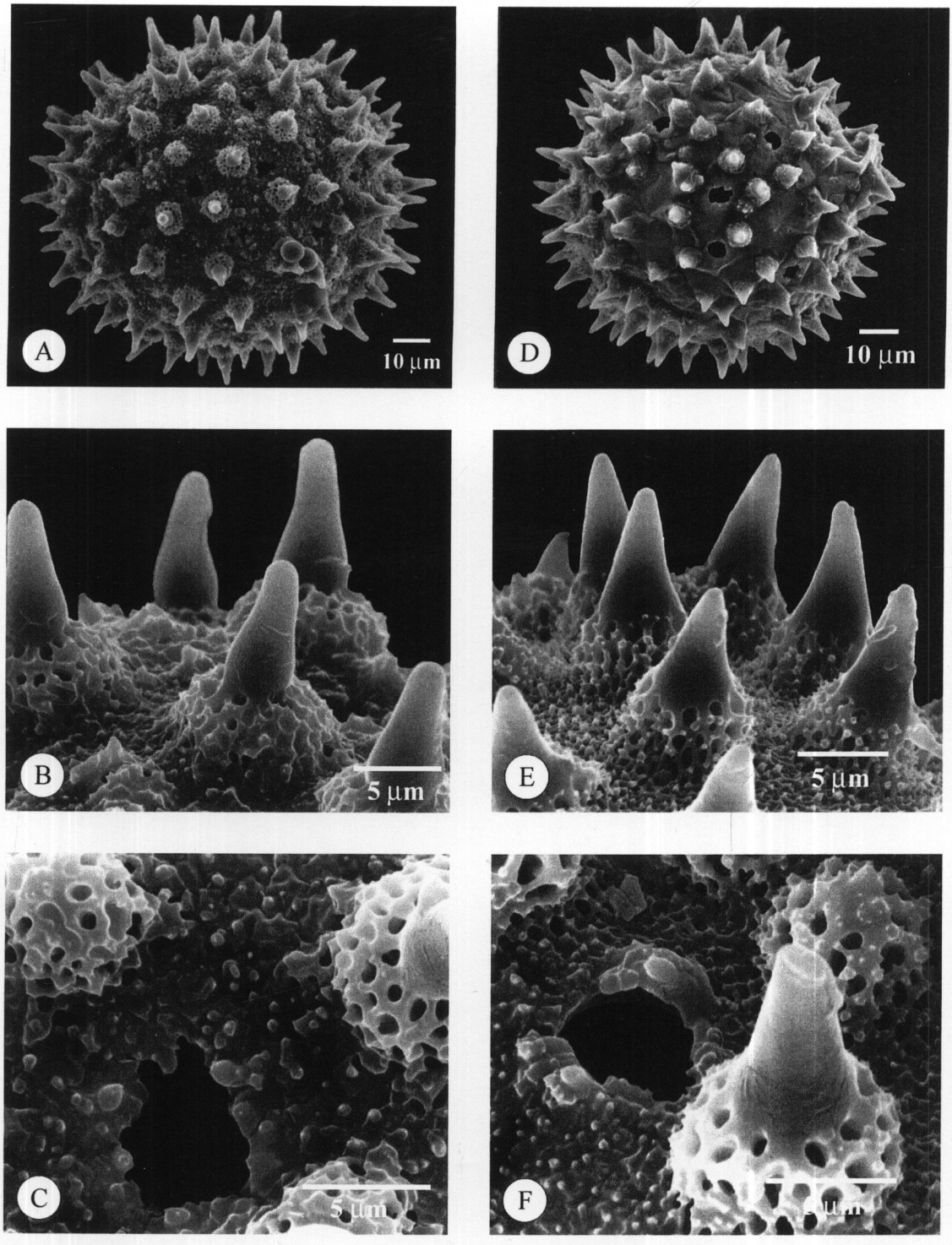


Plate 19. SEM micrographs: A-C. *Argyreia* cf. *laotica* Gagnep. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia maymyo* (W.W. Smith) Raizada (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

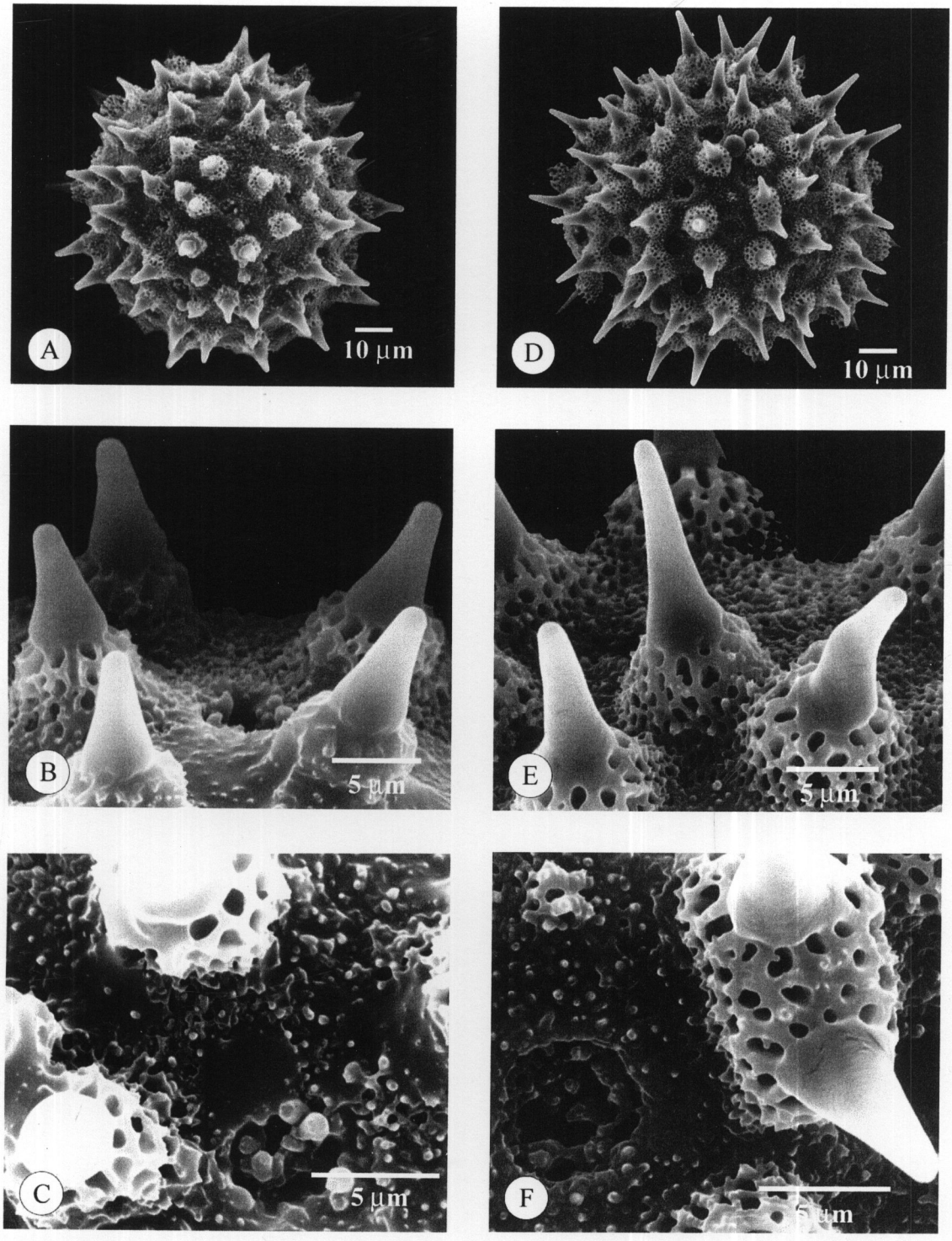


Plate 20. SEM micrographs: A-C. *Argyreia mollis* (Burm. f.) Choisy (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia nervosa* (Burm. f.) Boj. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

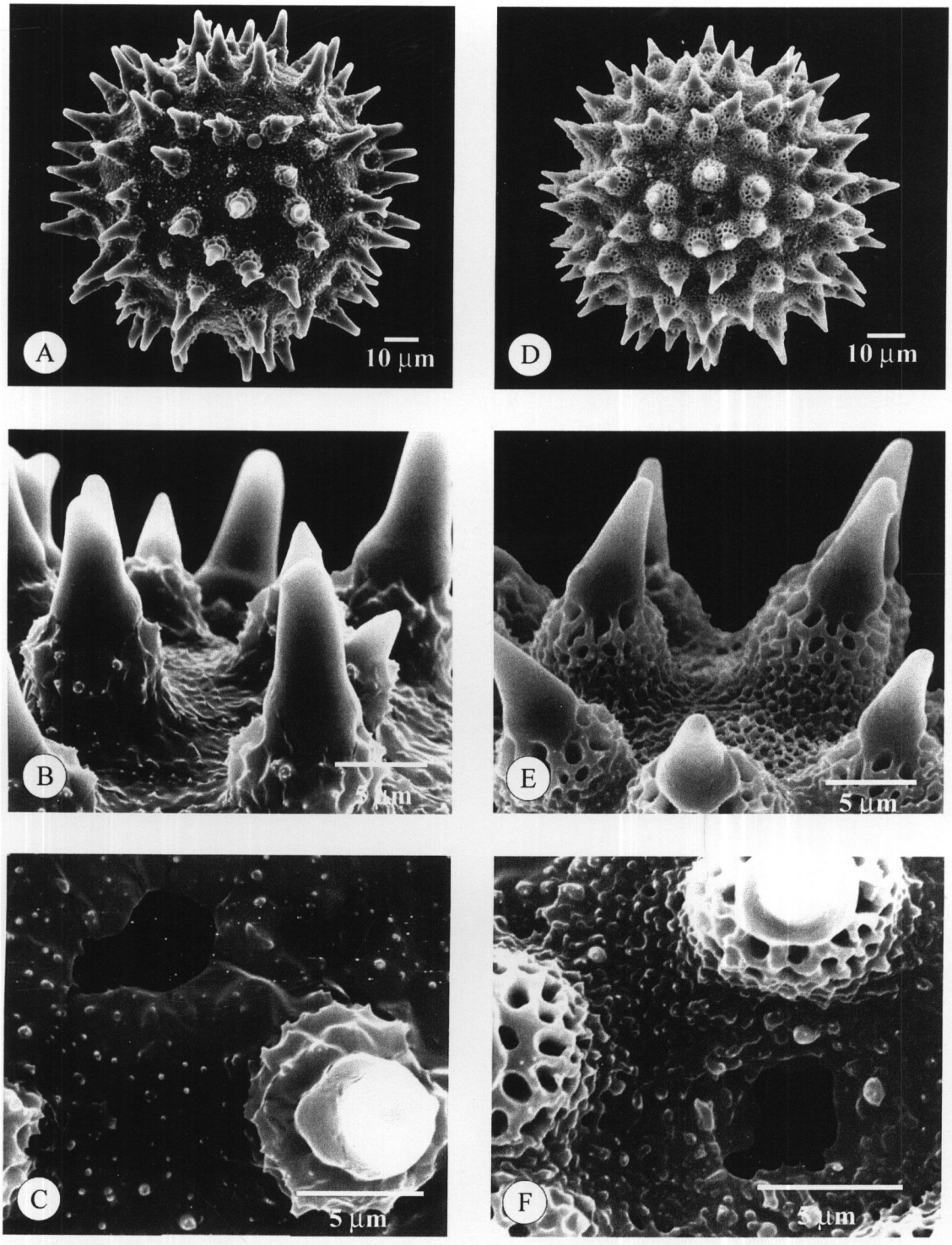


Plate 21. SEM micrographs: A-C. *Argyreia obtecta* C.B. Clarke (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia osyrensis* (Roth) Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

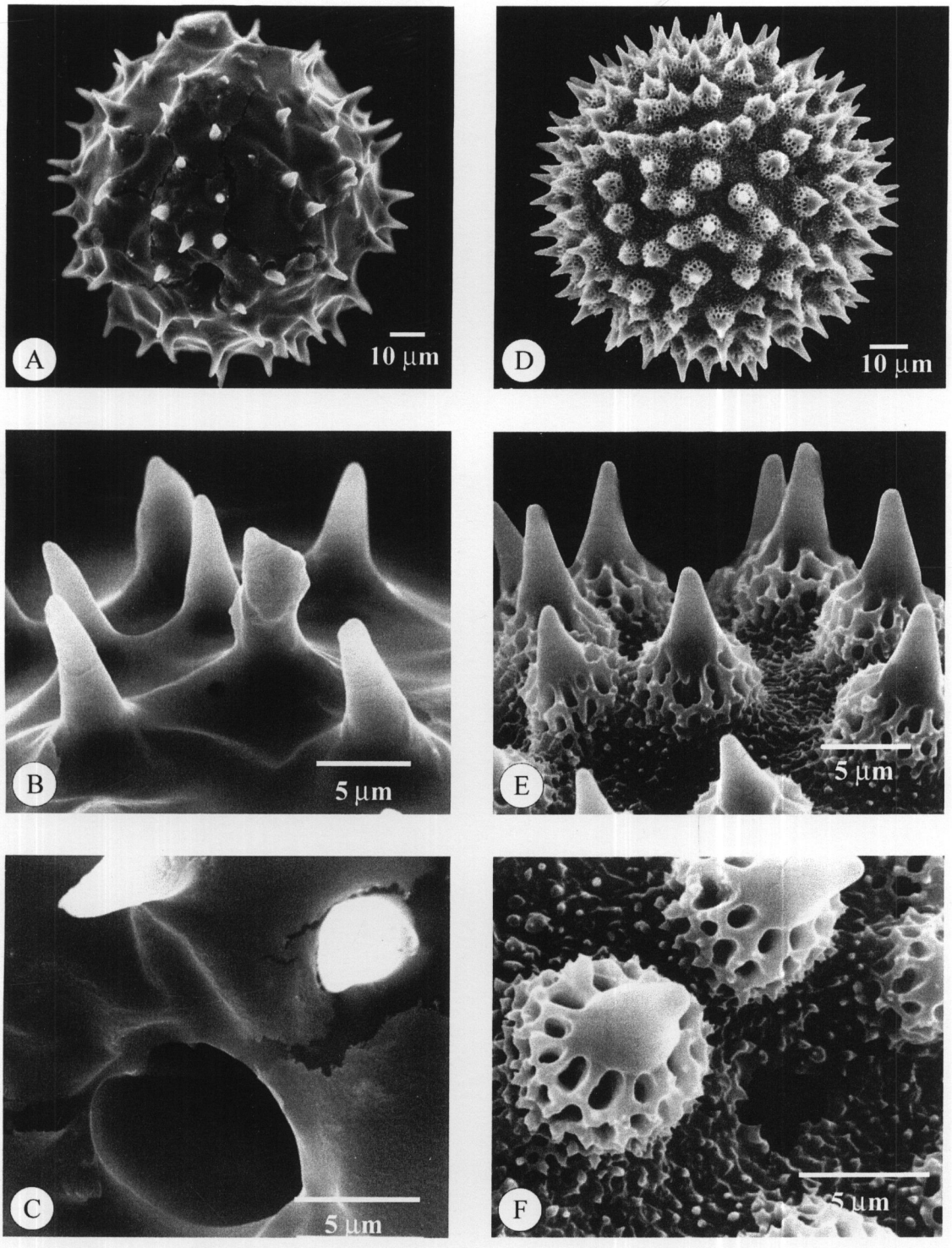


Plate 22. SEM micrographs: A-C. *Argyreia roxburghii* Choisy (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia splendens* (Hornem.) Sweet (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

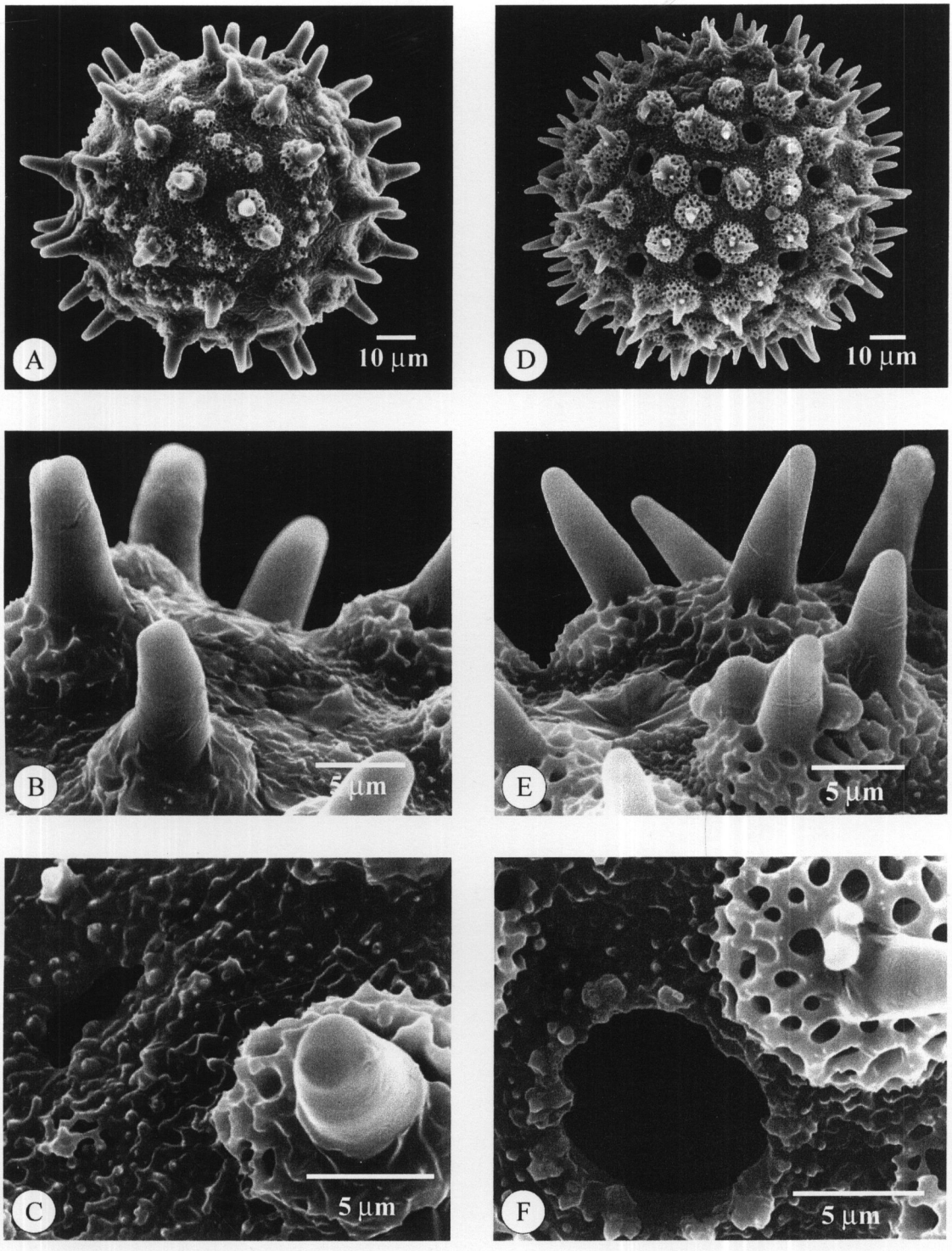


Plate 23. SEM micrographs: A-C. *Argyreia thorelii* Gagnep. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia wallichii* Choisy (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

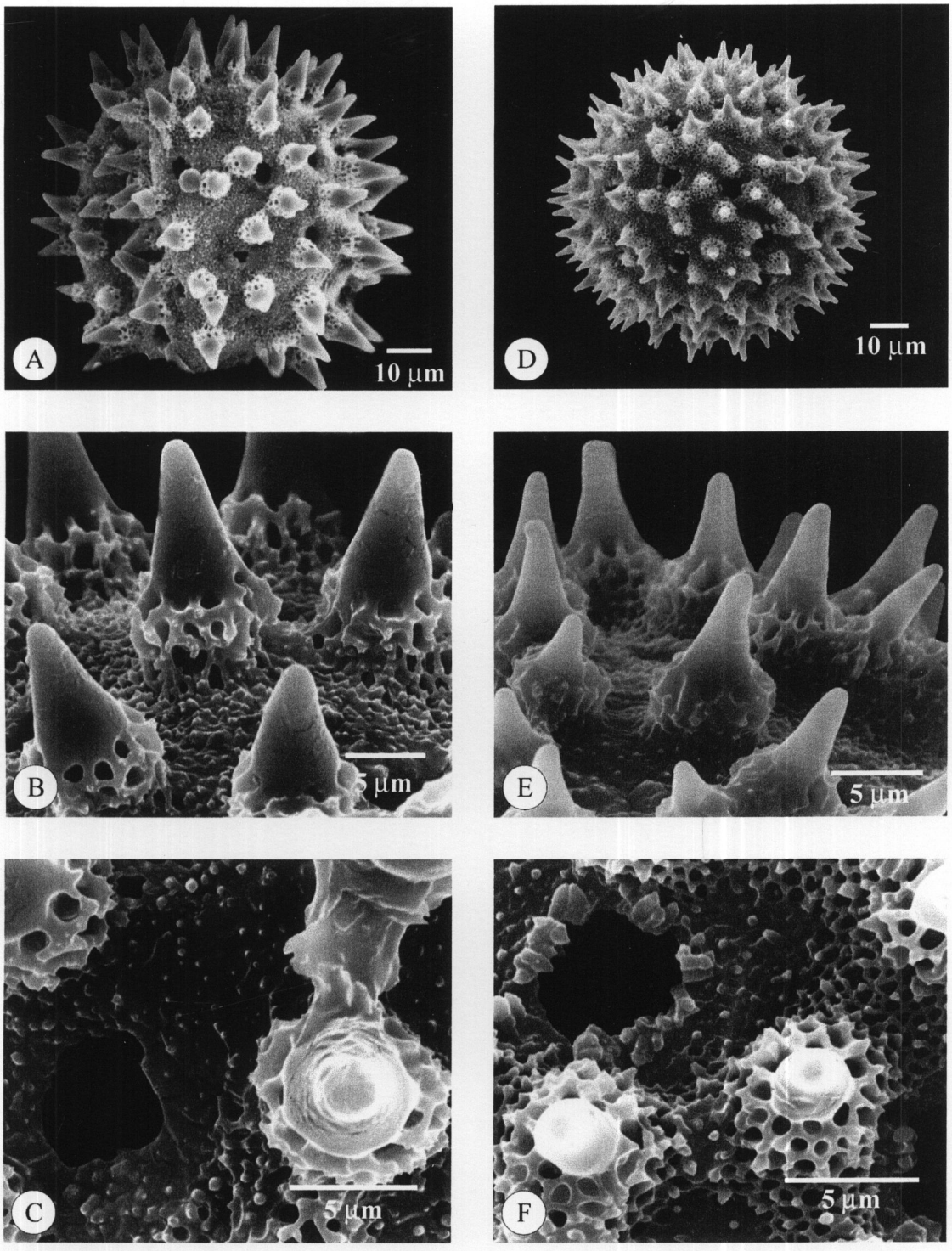


Plate 24. SEM micrographs: A-C. *Argyreia* sp. 1. (A) Pollen grain.(B) Detail of ornamentation. (C) Detail of apertural area. D-F. *Argyreia* sp. 2. (D) Pollen grain. (E) Detail of ornamentation. (F) Detail of apertural area.

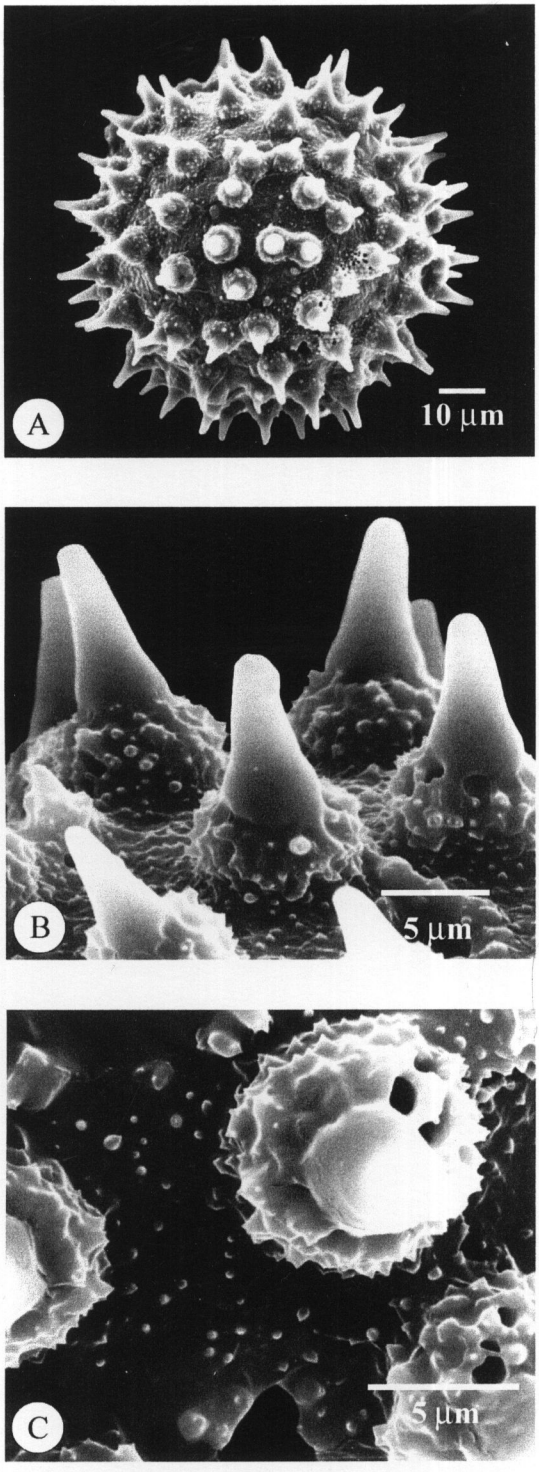


Plate 25. SEM micrographs: A-C. *Argyreia* sp. 3. (A) Pollen grain. (B) Detail of ornamentation. (C) Detail of apertural area.

CHAPTER V

DISCUSSION AND CONCLUSION

Taxonomy of *Argyreia* Lour.

From the present study, the sporophytic characters of *Argyreia* exhibit more tremendous diversity. Both vegetative and reproductive organs play an important role in recognizing its generic character down to the level of species. Even though, pollen morphology is one of the most significant characters in the classification of Convolvulaceae. (Erdtman, 1952 and van Ooststroom, 1953). According to the present investigation, it is however very uniform or displays much less variation in the pollen of *Argyreia*. Thus, pollen morphology seems to be not such a good supporting data for the identification in species level within this genus, at least in Thai species.

From the literature reviews, it can be seen that the *Argyreia* had some taxonomic problems, in the beginning of its history, on its generic delimitation. However, from the last five decades, some taxonomists had been trying to clarify this problem. They have considered and mentioned the difference of its characteristics which are of sufficient magnitude to warrant its separation into a distinct genus from its morphologically resembling genera, i.e. *Ipomoea*, *Lepistemon*, *Mina*, *Stictocardia* and *Turbina*. (van Ooststroom, 1953)

A combination of characters that can be used in recognizing the majority of *Argyreia* is woody climber habit, almost all of vegetative parts (stem, leaf blade, petiole) more or less, with indumentum, calyx distinctly enlarged in fruit, campanulate or funnelform corolla, midpetaline bands usually hariy outside, fleshy or leathery indehiscent fruit and echinate pollen grain.

Table 4. Comparison of *Argyreia* Lour. with other related genera. (van Ooststroom, 1953)

Characters	*Argyreia*	*Ipomoea*	*Lepistemon*	*Mina*	*Stictocardia*	*Turbina*
Habit	Woody twiners	Woody twiners or prostrate	Herbaceous or woody twiners	Herbaceous or twiners	Woody or herbaceous	Herbaceous or subwoody twiners
Indumentum	Mostly of all parts hairy	Mostly of all parts glabrous	Usually hairy	Mostly of all parts glabrous	Mostly of all parts hairy	Mostly of all parts glabrous
Leaf blade	Without dots glands	Without dots glands	Without dots glands	Without dots glands	With dots glands	Without dots glands
Calyx	Enlarge in fruits	Often more or less enlarged in fruits	Not enlarge in fruits	Not enlarge in fruits	Enlarged in fruit and completely enclosing the ripe fruits	Not or slightly enlarged in fruits
Shape of corolla	Campanulate, funnelform or tubular-campanulate	Usually funnelform or campanulate	Urceolate rather small	Narrowly urceolate	funnelform	Usually funnelform
Midpetaline bands	Mostly hairy, rarely glabrous	Mostly glabrous, rarely hairy	Mostly hairy	Mostly glabrous	Somewhat hairy and minute glands like the leaf	Mostly glabrous or sparsely hairs
Fruit	Fleshy, leathery, indehiscent	Capsule, dehiscing	Capsule	Capsule	Fleshy, pericarp thin with two wings	Woody pericarp, indehiscent

Habit and Habitat

According to the data collected from specimens in various herbaria and field observation, most of *Argyreia* species in Thailand are mainly found in opened space with

plentiful of sunlight, usually at the margin of the forests or on the grassy lands in high altitude from sea level (Table 2.). Sometimes they may be found in the crowded areas in the forests but then they grow up to the canopy and flowering up there.

They are all climbers, usually by using stem coiling or spiraling around other plants, however, *A. henryi* (Craib) Craib performs, more or less, shrubby-scandent habit. Sometimes they can be found in a more crowded part in the forest while all twiner species is noticeably found growing on other plants along the edge of the forests, but some particular species, viz. *A. stenophylla* (Kerr) Staples & P. Traiperm comb. nov. (ined.) and *A. osyrensis* (Roth) Choisy are typically found to be a creeper on opened grassland. The stems of these two species are usually not coil or spiral.

Leaves

Leaves of *Argyreia* are varied in shape and size. However their margin are always entire, unlike its closely related genus *Ipomoea*, which lobate or dissected margin occurs in many species, such as *I. triloba* Linn., *I. nil* (L.) Roth, *I pes-trigridis* Linn., etc. (เสริม เกียรติ ลอวีระอมรพันธ์, 2527). Leaves of all species are always hairy on the lower surface. Upper surface in most species are also hairy, except in *A. henryi* (Craib) Craib, *A. lanceolata* Choisy, *A. maymyo* (W.W. Smith) Raizada, *A. mollis* (Burm. f.) Choisy, *A. nervosa* (Burm.f.) Boj., *A. splendens* (Hornem.) Sweet, *A. wallichii* Choisy and unidentified *Argyreia* species no.1 and no.2, which their upper surfaces of leaves are glabrous or hairy only on the midrib and veins.

Flower

Flower of *Argyreia* are bracteate, persistent, occasionally caducous in some species. Persistent bracts are usually large and or rather showy such as in *A. nervosa* (Burm.f.) Boj.

Calyx of *Argyreia* are quincuncial. The third one usually has an irregular or oblique form. They are usually glabrous inside and densely hairy outside, except in *A.*

breviscapa (Kerr) Ooststr., *A. collinsae* (Craib) B. Na Songkhla & P. Traiperm comb. nov. (ined.) and unidentified *Argyreia* species no. 1, which their sepals are glabrous on both sides. Margin of sepal is normally entire, but distinctly undulate in *Argyreia splendens* (Hornem.) Sweet

Petals of the *Argyreia* are united and forming a gamopetalous flower like Rubiaceae, Apocynaceae or Acanthaceae etc. However, the fusion of petals occurs nearly completely along the whole length of the petals, leave only small tips free apart. Thus most species of *Argyreia* have entire or shallowly corolla lobes. The main part of the corolla limb that widely spread is then the part of corolla tube, which is different from other gamopetalous flower where corolla limb is mostly corolla lobe. However, I found that some particular *Argyreia* species have distinctly, deeply 5-lobed, i.e. *A. fulvocymosa* C.Y. Wu var. *fulvocymosa*, *A. osyrensis* (Roth) Choisy, *A. roseopurpurea* (Kerr) Ooststr., *A. thorelii* Gagnep. and unidentified *Argyreia* no. 3. It is noticeable that these species have comparatively small-sized flowers.

When we consider the living specimens, we will find that most species of *Argyreia* have thin and delicate papyraceous corolla. However, some particular species ,viz. *A .collinsae* (Craib) B. Na Songkhla & P. Traiperm comb. nov. (ined.), *A. kerrii* Craib, *A.* cf. *laotica* Gagnep., *A. nervosa* (Burm. f.) Boj., *A. osyrensis* (Roth) Choisy, *A. thorelii* Gagnep. and unidentify *Argyreia* species no.1 and no. 2 distinctly develop rather thick, fleshy corolla. This character may be use as a character in key to species, but it disappears when specimen is dried.

As mentioned above that midpetaline bands of most *Argyreia* are hariy outside. However, three species in this study, i.e. *A. breviscapa* (Kerr) Ooststr., *A. kerrii* Craib and unidentified *Argyreia* species no. 1, have completely glabrous corolla.

Stamen and pistil seem to be organs that have less variation in *Argyreia*. In androecium, the base of filament usually dilated and hairy above the insertion of filament

on corolla tube, except in *A. adpressa* (Choisy) Boerl. and *A. roseopurpurea* (Kerr) Ooststr. where the bases of filaments are glabrous.

Distribution

In over view, *Argyreia* can be found in the whole country, especially *A. capitiformis* (Poir.) Ooststr., *A. obtecta* C.B. Clarke, and *A. osyrensis* (Roth) Choisy which distribute in every floristic region. However, some species seems to be limited in a particular area, i.e. *A. adpressa* (Choisy) Boerl. and *A. roseopurpurea* (Kerr) Ooststr. which are recorded only in southern provinces. There is no record of these two species in any Floras of northern areas like China (Fang & Staples, 1995), Burma (Kurz, 1877), India (C.B. Clarke) or Indochina (Gagnapain & Courchet, 1915) too. The same situation is found in *A. henryi* (Craib) Craib, *A. ionantha* (Kerr) C. Khunwasi & P. Traiperm comb. nov. (ined.), *A. kerrii* Craib , *A. roxburghii* Choisy, which seem to be found in the northern floristic regions only. (Table. 2). These species have never been reported in Floras of the peninsular regions, like Malaysia (van Ooststroom, 1943, 1945, 1950, 1952, 1953) or Indonesia (Backer & Bakhuizen, 1965)

Kerr (1954) reported the occurrence of 28 species of *Argyreia* in Thailand (Table 5.). However, I could not find 4 species those he previously mentioned, i.e *A. atropurpurea* (Wall.) Raizada, *A. confusa* Prain, *A. hookeri* C.B. Clarke, *A. maymyensis* (Lace) Raizada, *A. obtusifolia* Lour., even in their original localities. Furthermore there is no specimen determined under these names, deposited in any herbaria in Thailand, except one specimen for *A. hookeri* C.B. Clarke from Singapore collected by Holttum deposited in BK herbarium. However, two species from my study, are new recorded to Thailand, i.e. *A. fulvocymosa* C.Y. Wu var. *fulvocymosa* from Phitsanulok and *A. thorelii* Gagnep. from Ubon Ratchathani.

Table 5. Comparison of diversity of *Argyreia* Lour. in Thailand from Kerr, 1954; Smitinand, 2001 and the present investigation.

Taxons	Kerr 1954	Smitinand 2001	This Research
1. *A. adpressa* (Choisy) Boerl.	/	-	/
2. *A. aggregata* Choisy	/	= *A. osyrensis*	= *A. osyrensis*
3.*A. aggregata* Roxb. var. *osyrensis*	/	-	= *A. osyrensis*
4. *A. atropurpurea* (Wall.) Raizada	/	-	-
5. *A. brachypoda* (Kerr) Ooststr.	/	/	= *A. osyrensis*
6. *A. breviscapa* (Kerr) Ooststr.	/	/	/
7. *A. calcicola* (Kerr) Ooststr.	/	-	/
8. *A. capitata* (Vahl) Choisy	/	= *A. capitiformis*	= *A. capitiformis*
9. *A. capitiformis* (Poir.) Ooststr.	/	/	/
10. *A. collinsae* (Craib) B. Na Sonkhla & P. Traiperm	/	-	/
11. *A. confusa* Prain	/	-	-
12. *A. fulvocymosa* C.Y. Wu var. *fulvocymosa*	-	-	/
13. *A. henryi* (Craib) Craib	/	/	/
14. *A. hookeri* C.B. Clarke	-	/	-
15. *A. ionantha* (Kerr) C. Khunwasi & P. Traiperm	/	-	/
16. *A. kerrii* Craib	/	/	/
17. *A. lanceolata* Choisy	/	/	/
18. *A. laotica* Gagnep.	/	-	/
19. *A. maymyensis* (Lace) Raizada	/	-	/
20. *A. maymyo* (W.W. Smith) Raizada	/	-	/
21. *A. mekongensis* Gagnep. et Courchet	/	/	/
22. *A. mollis* (Burm. f.) Choisy	-	/	/
23. *A. nervosa* (Burm. f.) Boj.	/	/	/
24. *A. obtecta* C.B. Clarke	/	= *A. mollis*	/
25. *A. obtusifolia* Lour.	/	= *A. mollis*	-
26. *A. osyrensis* (Roth) Choisy	-	/	/
27. *A. roseopurpurea* (Kerr) Ooststr.	/	-	/
28. *A. roxburghii* Choisy	-	/	/
29. *A. roxburghii* Craib var. *siamica*	/	/	= *A. roxburghii*
30. *A. splendens* (Hornem.) Sweet	/	/	/

Taxons	Kerr 1954	Smitinand 2001	This Research
31. *A. stenophylla* (Kerr) Staples & P. Traiperm	/	-	/
32. *A. thorelii* Gagnep.	-	-	/
33. *A. versicolor* (Kerr) Staples & P. Traiperm	/	-	/
34. *A. wallichii* Choisy	/	-	/
35. *Argyreia* sp. 1	-	-	/
36. *Argyreia* sp. 2	-	-	/
37. *Argyreia* sp. 3	-	-	/

Table 5. (Continued) Comparison of diversity of *Argyreia* Lour. in Thailand from Kerr, 1954; Smitinand, 2001 and the present investigation.

According to the present study, 8 species of *Argyreia* found to be endemic species to Thailand, i.e *A. breviscapa* (Kerr) Ooststr., *A. calcicola* (Kerr) Ooststr., *A. collinsae* (Craib) B. Na Songkhla & P. Traiperm comb. nov. (ined.), *A. ionantha* (Kerr) C. Khunwasi & P. Traiperm comb. nov. (ined.), *A. kerrii* Craib, *A. roseopurpurea* (Kerr) Ooststr., *A. stenophylla* (Kerr) Staples & P. Traiperm comb. nov. (ined.) and *A. versicolor* (Kerr) Staples & P. Traiperm comb. nov. (ined.). Among these species, *A. roseopurpurea* (Kerr) Ooststr. was found only once and never be found again since then. Two of them, *A. stenophylla* (Kerr) Staples & P. Traiperm comb. nov. (ined.) and *A. versicolor* (Kerr) Staples & P. Traiperm comb. nov. (ined.), have only two specimens for each deposited in BK herbarium. No new or recent specimen can be collected any more. These three species together with those previously mentioned by Kerr but were not found in this present study may be also extinct from our country. This may result from the deforestation or disturbance of their natural habitat.

Some taxonomic problems in *Argyreia*

***A. osyrensis* (Roth) Choisy & *Argyreia brachypoda* (Kerr) Ooststr.**

According to the Florae Siamensis Enumeratio, *A. brachypoda* (Kerr) Ooststr. (or *Lettsomia brachypoda* Kerr) was recorded as a true species. (Kerr, 1941). This name was firstly published in Kew Bulletin by A.F.G. Kerr in 1941 under the name *Lettsomia*

brachypoda Kerr, based on the specimen kept by Put no. 2190 deposited at BK. Later on van Ooststroom changed this name to *Argyreia brachypoda* (Kerr) Ooststr. and published in Blumea (van Ooststroom, 1952).

The name *A. osyrensis* (Roth) Choisy was published in 1845, based on its basionym *Ipomoea osyrensis* Roth. The name *A. aggregata* (Roxb.) Choisy was published in 1833 and later treated as a synonym of *A. osyrensis* (Roth) Choisy (van Ooststroom, 1953).

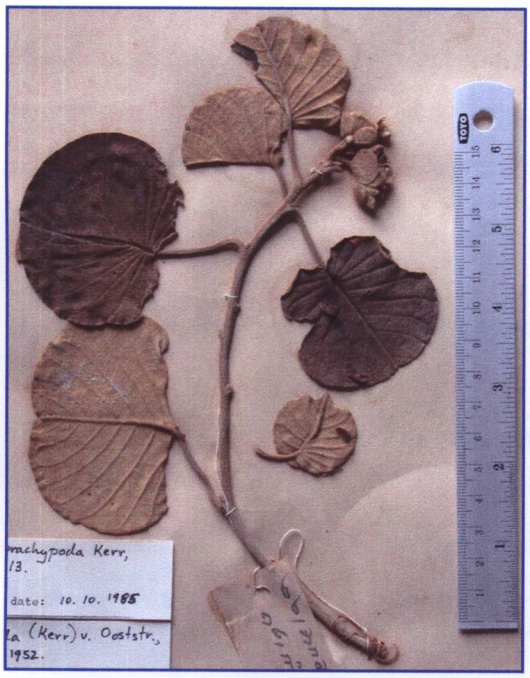


Plate 26. *Argyreia brachypoda* (Kerr) Ooststr.

Plate 27. Inflorescence of *Argyreia brachypoda* (Kerr) Ooststr.

According to the available literatures in the present investigation, I found that there is no difference between the description of *Lettsomia brachypoda* describe by Kerr (1941) and *Argyreia osyrensis* (Roth) Choisy described by van Ooststroom (1953) in Flora Malesiana vol. 4. and specimen "Put 2190" (Plate 26. and Plate 27.) is fit with the description of *A. osyrensis* (Roth) Choisy too. Furthermore, all specimens examined that determined here as *A. osyrensis* (Roth) Choisy, were previously identified as *A.*

aggregata (Roxb.) Choisy (which is treated now as synonym of *A. osyrensis* (Roth) Choisy), and their characters are also in accordance with the description of *A. osyrensis* (Roth) Choisy in Flora Malesiana vol. 4. Thus in the present study, I may treat the name *A. brachypoda* (Kerr) Ooststr., with some hesitation as a synonym of *A. osyrensis* (Roth) Choisy since I have never seen the type specimen of *A. osyrensis* (Roth) Choisy and read its first publication.

***Argyreia obtecta* C.B. Clarke & *Argyreia mollis* (Burm.f.) Choisy**

Argyreia obtecta C.B. Clarke is treated as a synonym of *A. mollis* (Burm.f.) Choisy (van Ooststroom, 1953 and Smitinand, 2001). However, I have found that these two species should be separated from each other, according to the differences of indumentum on upper surface of leaves, sepal arrangement, shape of corolla, as shown in table 6. below.

Table 6. Comparison of *Argyreia obtecta* C.B. Clarke and *Argyreia mollis* (Burm.f.) Choisy

Species	**Leaves upper surface**	**Sepal arrangement**	**Shape of corolla**
A. obtecta C.B.Clarke	appressed hairs	3 outer / 2 inner	funnelform
A. mollis (Burm.f.) Choisy	glabrous	2 outer / 3 inner	campanulate

All specimens that I determined here as *Argyreia obtecta* C.B. Clarke or *A. mollis* (Burm.f.) Choisy will be, on one hand, identified as *A. obtecta* C.B. Clarke by Flora of British India vol. 4 and Flora Génerale Indo-chine. On the other hand, they will be *A. mollis* (Burm.f.) Choisy by Flora Malesiana, since these two species have the same characters that used in key to identification (leave shape, shape and indumentum of sepal and pistil).

However, the first publication of description of *A. obtecta* C.B. Clarke described in Flora of British India is clearly stated that the upper surfaces of leaves are pilose (Clakre, 1885). The first publication of *A. mollis* (Burm.f.) Choisy (under the name

Convolvulus mollis Burm.f.) also described that upper surfaces of leaves are glabrous (Burm.f., 1768). It is clear that the indumentum between these two species is different. Additionally from my investigation, I found that both sepal arrangement in these two species and also shape of corolla, are different (Fig. 16 and 18). Thus I would like to separate these two species apart and deserve their own species status.

New combination

According to previously literatures there are four species, namely *A. collinsae* (Craib) B. Na Songkhla & P. Traiperm, **comb. nov.** (ined.), *A. ionantha* (Kerr) C. Khunwasi & P. Traiperm, **comb. nov.** (ined.), *A. stenophylla* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.), and *A. versicolor* (Kerr) Staples & P. Traiperm, **comb. nov.** (ined.) that are firstly removed from *Lettsomia* Roxb. to *Argyreia* Lour..

Dubious species

In this study, there are three species of *Argyreia* Lour. that can not determine to species level. Though attempts have been made to used key determination from the Flora of neighboring countries.

1. *Argyreia* sp. 1 is a woody climber in dry evergreen forest, climbing on small tree at 650 m alt. It is similar to *Argyreia kerrii* Craib, but their details of indumentum, leaves and sepals, such as, shape and size of lamina, lateral veins, shape and size of sepals and color of indumentum are different.

2. *Argyreia* sp. 2 is a woody climber in deciduous forest, climbing on tree at 1,250 m alt. It looks like *Argyreia splendens* (Hornem.) Sweet. This *Argyreia* sp. 2 has leaves subcoriaceous, margin of sepals undulate and corolla fleshy campanulate. These characters are different from *Argyreia splendens* (Hornem.) Sweet.

3. *Argyreia* sp. 3 is twining in open place, climbing on small tree at 1,250 m alt. It is a closed to *Argyreia roseopurpurea* (Kerr) Ooststr.. However, their filaments hairy at base and a number of lateral nerves are different.

It is actually essential to consult herbarium and or type specimens outside Thailand in order to get the right botanical names for these species.

Problem & Suggestion

1. In this study herbarium specimens were used in some species, it's should be better if fresh specimens are used to compare with dry specimens because dry specimens always change in size shape color etc. which can not complete the data.

2. Plants in this genus are very diverse in morphology, so that in the study specimens from different area should be used; on herbarium specimens should be used and compared.

3. According to the changing of ecosystem in Thailand, flowering period and fruit setting period are affected, in some area the habitat was disturbed, plants disappear from natural habitat or event extinct. So specimens from natural habitats can not collect.

4. In this study type specimens were not compare, or first publications were not study in some species. Therefore, plants specimen should be compare with type specimen or recheck with description in first publications. According to high morphological variation, additional morphological study should be conduct. This study can lead to change in taxonomic status.

5. For the complete of the study, anatomical, biological, cytological study, etc. should be more emphasize.

Benefits of this research

1. The find out will be the fundamental data for the revision study of the genus *Argyreia* Lour. for the Flora of Thailand project.

2. The find out also could be the fundamental data for the researcher that study Convolvulaceae or *Argyreia* Lour.

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APPENDIX

APPENDIX

STANDARD ABBREVIATION

aff.	affinis	akin to, related to, bordering
c. or ca.	circa or circiter	about, approximately
cf.	confer	compare
comb. nov.	combinatio nova	new combination of name and ephithet
cv.	cultivarietas	cultivar
det.	determinavit	he determined
e.g.	exempli gratia	for example
et al.	et aliorum	and others
f.	filius or filial	son or son of
I.c.	loco citato	compare reference
ined.	ineditus	unpublished
nom. nov.	nomen novum	new name
nom. nud	nomen nudum	name published
p.p.	pro parte	partly, in part
sp.	species	species (singular)
spp.	species	species (plural)
ssp.	subspecies	subspecies
var.	varietas	variety
viz	videlicet	namely

BIOGRAPHY

Miss Paweena Traiperm was born on November 24, 1978 in Ayutthaya Province. She was graduated from Khon Kaen University with Bachelor of Science in Biology in 2000, then continued her study for Master of Science in Department of Botany, Chulalongkorn University from 2000-2003.