

Enumeration of Thai pteridophytes collected during 1965-66

by

Motozi TAGAWA and Kunio IWATSUKI

From November 1965 to February 1966, the Center for Southeast Asian Studies sent a botanical party to Thailand and the first Thai-Japanese Botanical Expedition was begun in cooperation with the Royal Forest Department in Bangkok. During a sojourn of more than one hundred days, we observed and collected a comprehensive number of fern species as well as flowering plants and mosses. Here is given an enumeration of all pteridophytes collected on this trip. In this paper, however, only a list of the specific identifications of the collections has been made. In the course of the investigation of the fern flora of Thailand, we met with a good many facts new to science. This information will be forthcoming in other publications.

The field work of the Expedition was accomplished by the following four Japanese botanists and a Thai entomologist, who accompanied the Japanese group from beginning to end:

Motozi TAGAWA, the leader, on pteridophytes and general botany

Kunio IWATSUKI, on pteridophytes

Naofumi KITAGAWA, on bryophytes

Nobuyuki FUKUOKA, on flowering plants in general

Dumrong CHAIGLOM, on entomology in relation to forestry.

The itinerary of the Expedition was as follows (with the vascular plant collectors' names following the location):

1966: —

Nov. 11. Bangkok: M. Tagawa & K. Iwatsuki.

Nov. 13. Bangkhen, north of Bangkok: K. Iwatsuki.

Nov. 14. Rangsit and Bangkhen, north of Bangkok: M. Tagawa & K. Iwatsuki.

Nov. 26. Pha Nuk Khao, Loey: M. Tagawa, K. Iwatsuki & N. Fukuoka.

Nov. 27-30. Phu Kradung, Loey: M. Tagawa, K. Iwatsuki & N. Fukuoka.

Dec. 3-8. Phu Luang, Loey: M. Tagawa, K. Iwatsuki & N. Fukuoka.

Dec. 11-12. Tung Salaeng Luang, Phitsanulok: M. Tagawa, K. Iwatsuki & N. Fukuoka.

Dec. 14, 23, 28 & 31. Doi Suthep, Chiangmai: M. Tagawa, K. Iwatsuki & N. Fukuoka.

Dec. 15-21. Doi Inthanon, Chiangmai : M. Tagawa, K. Iwatsuki & N. Fukuoka.

Dec. 25-27. Doi Pacho, Chiangrai : K. Iwatsuki & N. Fukuoka.

1967 : —

Jan. 3-6. Doi Chiangdao, Chiangmai : M. Tagawa, K. Iwatsuki & N. Fukuoka.

Jan. 8-9. Doi Suthep, Chiangmai : K. Iwatsuki & N. Fukuoka.

Jan. 17-23. Khao Luang, Nakawn Sritamarat : M. Tagawa, K. Iwatsuki & N. Fukuoka.

Jan. 25-28. Khao Chong, Trang : M. Tagawa, K. Iwatsuki & N. Fukuoka.

Feb. 7-11. Khao Soidao, Chantaburi : K. Iwatsuki & N. Fukuoka.

Feb. 16-18. Khao Yai, Nakhon Nayok : K. Iwatsuki & N. Fukuoka.

The approximate locations of the places cited above are shown on the map. (Fig. 1). In the specimen citations following, no collectors' names will be given and specimens will be indicated only by their T-numbers, which are the field numbers of the specimens collected by the Thai-Japanese Botanical Expedition.

About 300 species of pteridophytes have been recorded so far in Thailand. In our enumeration, 116 genera and 442 species are listed. In order to keep our report as short as possible, the references cited have been restricted to only those necessary to understand the fern flora of Thailand. Frequently cited literature will be referred to in abbreviated forms: e.g.

Holtt. (1954) : Holttum, R. E. (1954) "The Ferns of Malaya," The Flora of Malaya, vol. II. Singapore.

Holtt. (1961) : Holttum, R. E. (1961) "Filicinae, excluding Ophioglossales," Dansk Bot. Arkiv 20 : 11-35.

Holtt. (1965) : Holttum, R. E. (1965) "Filicinae, excluding Ophioglossales (second list)," Dansk Bot. Arkiv 23 : 225-244.

Tard. & C. Chr. (1939-51) : Tardieu-Blot, Mme. & C. Christensen (1939-51) "Filicinae," in Lecomte, Flore Générale d'Indo-Chine, vol. 7, fasc. 2.

Tagawa & K. Iwats. (1965) : Tagawa, M. & K. Iwatsuki (1965) "On a Small Collection of Thailand Ferns," The Southeast Asian Studies 3 (3) : 70-89.

Within the range of one genus, the revisions will be cited in shortened forms, as in the case of the floras and the lists, by authors' names and the year of publication.

In our enumeration, the genera and species are arranged mainly in accordance with the system of Holttum (1954), though the names and circumscription of some genera have been changed in the light of recent literature. This does not necessarily mean that we consider Holttum's system as the best ever proposed. In our opinion, the floras should be published with the aim of usefulness, especially for those concerned. In the case of Thai ferns, their close relationship to well-known Malayan ferns cannot be denied; therefore, we have used Holttum's system for

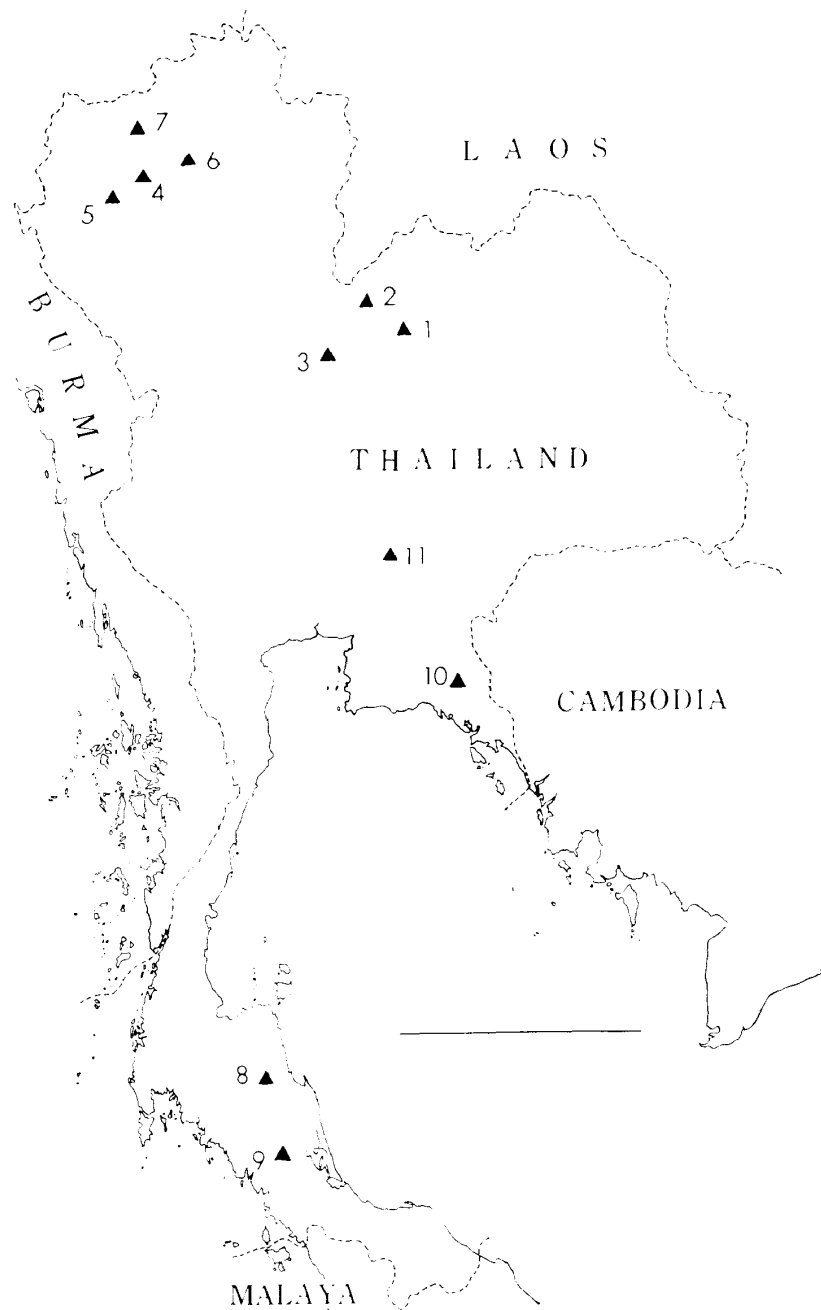


Fig. 1 The main mountains we have visited for botanical research: 1, Phu Kradung; 2, Phu Luang; 3, Tung Salaeng Luang; 4, Doi Suthep (Doi Pui); 5, Doi Inthanon (Doi Angka); 6, Doi Pacho (Doi Langka); 7, Doi Chiangdao; 8, Khao Luang; 9, Khao Chong; 10, Khao Soidao; 11, Khao Yai. A line in the Gulf of Siam shows the length of 300km.

convenience, and have consulted his comprehensive work, *Ferns of Malaya*.

Although our collections of pteridophytes were intended to be listed in complete form in this paper, we were forced to set aside a few because of incompleteness.

The field work in Thailand was accomplished by generous support from Thai

authorities. Especially, the botanical team received various aid and assistance from the National Research Council and the Royal Forest Department. Mr. Tem Smitinand, the curator of the Forest Herbarium of the Royal Forest Department, kindly suggested interesting localities and made ideal arrangements for which we are very grateful. Mr. Dumrong Chaiglom accompanied the group from beginning to end and we appreciate his invaluable aid. Without their hearty and consistent support, our expedition would not have been as fruitful as it was. Prof. T. Motooka and Mr. S. Iijima of the Center for Southeast Asian Studies of Kyoto University aided the botanical team greatly by arranging for the field work in Thailand. Professors S. Iwamura, J. Ashida, T. Shidei and R. Yoshii, all of Kyoto University, generously supported our botanical trip. Professor S. Kitamura and the staff members of the laboratory of plant taxonomy at Kyoto University rendered all kinds of assistance. We would like very much to express our most sincere thanks to all who helped to make our trip a success.

PSILOTACEAE

Psilotum Sw.

1. **Psilotum nudum** (L.) Griseb. Abh. Ges. Wiss. Göttingen 7: 278. 1857.—*Psilotum triquetrum* Sw.; Tard. & C. Chr. (1939-51) 596; Larsen, Dansk Bot. Ark. 23: 59. 1963.

NAKHON NAYOK: between log cabin and Hiewesai Waterfall, Khao Yai National Park, tree trunk in light shade, alt. ca. 800 m, T-7436. NAKAWN SRITAMARAT: eastern slope of Khao Luang, mossy tree trunk in dense forest, alt. ca. 800 m, T-5292.

Tropics and subtropics of the World.

LYCOPODIACEAE

Lycopodium L.

1. **Lycopodium serratum** Thunb. Fl. Jap. 341. 1784; Alston in Lecomte, Fl. Génér. Indo-Chine 7(2): 548. 1951.

LOEY: north ridge of Phu Luang, slope by stream in forest, alt. 1100-1500 m, T-1278; northeastern ridge of Phu Luang, slope by stream in dense forest, alt. 1300-1567 m, T-1508; Phu Kradung, sandy ground in dense forest, alt. 1100-1200 m, T-648. NAKAWN SRITAMARAT: Khao Luang, slope in dense forest at ridge, alt. 1100-1786 m, T-4829.

Widely distributed from the Himalayas to Japan, south to Malaysia.

The Thai plants match well with var. *longipetiolatum* Spring (*L. javanicum* Sw.) occurring at higher elevations in the tropics and subtropics of the East and South-east Asia.

2. **Lycopodium carinatum** Desv. in Lam. Encycl. Bot. Suppl. 3: 555. 1813; Alston, l.c. (1951) 550.

NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense mountain forest, alt. 680-950 m, T-4680.

Malaysia generally, east to Polynesia, north to Thailand, Indo-China, South China, Taiwan and the Yaeyama Islands of the Ryukyus.

The above specimen accords with var. *laxum* (Presl) Christ apud Reinecke, Bot. Jahrb. 23: 365. 1896.

3. **Lycopodium piscium** (Hert.) Tagawa & K. Iwats. Acta. Phytotax. Geobot. 22: 103. 1967.—*Lycopodium pinifolium* Blume, Enum. Pl. Jav. 264. 1828, non Kaulf. 1824; Tagawa & K. Iwats. (1965) 70.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 680-950 m, T-4672.

Java to New Guinea and the Philippines, also on the Malay Peninsula.

4. **Lycopodium squarrosum** Forst. Prodr. 479. 1786; Alston, l.c. (1951) 550.

LOEY: Phu Luang, muddy rock by stream at edge of dense evergreen forest, alt. 900-1400 m, T-1824.

Widely distributed in the Old World tropics, also in Madagascar.

The name is here applied in its broad sense. The Thai specimen may better be referred to *L. ulicifolium* Ventenat ex Sw. Syn. Fil. 177. 1806.

5. **Lycopodium hamiltonii** Spr. Syst. Veg. 5: 429. 1828; C. Chr. Contr. U.S. Nat. Herb. 26: 335. 1931; Alston, l.c. (1951) 549.

CHIANGMAI: Doi Suthep, muddy rock in evergreen forest, alt. 1000-1685 m, T-3199. LOEY: north ridge of Phu Luang, mossy rock in dense evergreen forest, alt. 1100-1500 m, T-1279; Phu Luang, northeastern ridge, vertical surface of cliff in moist dense forest, alt. 1300-1567 m, T-1500; eastern slope of Phu Luang, mossy rock in dense forest, alt. 900-1400 m, T-1834. NAKHON NAYOK: Khao Kiew, Khao Yai National Park, tree trunk in dense mossy forest, alt. ca. 1250 m, T-7490. CHANTABURI: Khao Soidao, mossy trunk of tree in dense forest at ridge, alt. 700-1525 m, T-7155. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 1100-1786 m, T-4831.

Widely spread from the Himalayas to Japan through South China, south to Thailand and Indo-China.

In the sense of Alston, *L. hamiltonii* is a species highly polymorphic. It may be a composite species.

6. **Lycopodium phlegmaria** L. Sp. Pl. 2: 1101. 1753; Alston, l.c. (1951) 551.

LOEY: eastern slope of Phu Luang, mossy tree trunk in dense forest, alt. 900-1400 m, T-1837. NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense evergreen

forest, alt. 680-950 m, T-4625, *ibid.*, tree trunk in dense mossy forest at ridge, alt. 1100-1786 m, T-4811.

Widely distributed in the Old World Tropics.

The binomial is here adopted in its usual but perhaps incorrect usage.

7. ***Lycopodium clavatum*** L. Sp. Pl. 2: 1101. 1753; Alston, l.c. (1951) 553.

CHIANGMAI: Doi Inthanon, dry *Sphagnum* swamp in open place, alt. 1900-2595 m, T-2897; southeastern slope of Doi Inthanon, rather dry ground by marsh in open place, alt. ca. 2500 m, T-3025. LOEY: Phu Kradung, half shaded place at edge of forest, alt. 1100-1200 m, T-638. NAKAWN SRITAMARAT: Khao Luang, open ground at summit, alt. ca. 1786 m, T-4832.

Cosmopolitan.

8. ***Lycopodium cernuum*** L. Sp. Pl. 2: 1103. 1753; Alston, l.c. (1951) 548; Tagawa & K. Iwats. (1965) 71.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, along the upper course of Nam Mae Lao, wet mountain slope in clearing, alt. 900-1200 m, T-3416. PHITSANULOK: Tung Salaeng Luang National Park, open slope at edge of forest, alt. 300-600 m, T-2042. LOEY: Phu Kradung, wet ground in thin thicket, alt. ca. 1200 m, T-785. NAKHON NAYOK: Khao Yai National Park, dry ground by stream in light shade, alt. ca. 800 m, T-7406.

Widely distributed in the tropics and subtropics of the World.

SELAGINELLACEAE

Selaginella Beauv.

1. ***Selaginella tamariscina*** (Beauv.) Spring, Bull. Acad. Bruxelles 10: 136. 1843; Alston in Lecomte, Fl. Génér. Indo-Chine 7(2): 559. 1951.

CHIANGMAI: Doi Chiangdao, dry exposed limestone cliff, alt. ca. 2000 m, T-4233.

From North India to Japan, Korea, Manchuria and East Siberia, south to Tonkin, Annam, northern Thailand and the Philippines, also reported from Java (?) and Lombok.

2. ***Selaginella siamensis*** Hieron. Bot. Tidsskr. 24: 113. 1901; Alston, l.c. (1951) 560.

CHIANGRAI: northern slope of Doi Pacho, dry mountain slope in *Pinus*-forest, alt. 1350-1800 m, T-3683. LOEY: north ridge of Phu Luang, rather dry ground in open place, alt. 1100-1500 m, T-1298; Phu Luang, northeastern ridge, open ground, alt. 1300-1567 m, T-1522; Phu Kradung, rather dry cliff in open place, alt. 1100-1200 m, T-628, *ibid.*, rather dry floor of forest, alt. 1100-1200 m, T-636. NAKHON NAYOK: Khao Kiew, Khao Yai National Park, dry ground in sunny place at edge of mossy forest, alt. ca. 1250 m, T-7491.

Laos, Cambodia, Cochin-China and Thailand.

3. ***Selaginella repanda*** (Desv. ex Poir.) Spring in Gaudich. Voy. Bonite Bot. 1: 329. 1846; Alston, l.c. (1951) 561.

LOEY: Phu Kradung, rather dry slope in deciduous forest, alt. ca. 800 m, T-375, ibid., dry slope, alt. ca. 900 m, T-381, ibid., rather dry rock by stream in open place, alt. 1100-1200 m, T-613.

North India to South China and Taiwan, south to Indo-China, North Thailand, and western Malaysia.

4. ***Selaginella trachyphylla*** A. Br. ex Hieron. in Engl. & Prantl, Nat. Pflanzenfam. 1(4): 693. 1902; Alston, l.c. (1951) 564.

NAKAWN SRITAMARAT: Khao Luang, rather dry slope in dense forest, alt. ca. 900 m, T-4673.

Peninsular Thailand, Tonkin, Annam, Kweichow, Kwangtung and Hongkong.

The Thai plant cited above seems to stand intermediate between *S. trachyphylla* and *S. intermedia*.

5. ***Selaginella intermedia*** (Blume) Spring, l.c. (1843) 144; Alston, l.c. (1951) 565.

LOEY: Phu Kradung, rather dry slope in forest, alt. 1100-1200 m, T-587; ibid., cleyey ground in forest, alt. ca. 1200 m, T-790. NAKHON NAYOK: Khao Yai National Park, rather dry ground in light shade, alt. ca. 800 m, T-7397. NAKAWN SRITAMARAT: Khao Luang, rather dry mountain slope in evergreen forest, alt. 1100-1786 m, T-4792. TRANG: Khao Chong, rather dry mountain slope in dense forest, alt. 100-800 m, T-5575.

Tenasserim, Thailand, Annam, Malaya, Sumatra, Java, Borneo and Celebes.

6. ***Selaginella roxburghii*** (Hook. & Grev.) Spring, l.c. (1843) 228; Alston, l.c. (1951) 51.—*Selaginella* sp.; Tagawa & K. Iwats. (1965) 71.

CHIANGMAI: Doi Suthep, dry roadside bank in deciduous forest, alt. ca. 900 m, T-48. LOEY: Phu Kradung, rather dry slope in light shade, alt. ca. 1200 m, T-935 bis. NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in light shade, alt. 150-1100 m, T-5288.

Thailand, Malaya and Sumatra.

7. ***Selaginella ostefeldii*** Hieron. Bull. Herb. Boiss. II, 5: 721. 1905; Alston, l.c. (1951) 567.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry slope in deciduous forest, alt. ca. 350 m, T-2256; Mae Klang Waterfall to Ban Yang, along Nam Mae Klang, mountain slope in mixed forest, alt. 350-600 m, T-2363. LOEY: Phu Kradung, rather dry slope in deciduous forest, alt. ca. 800 m, T-375 bis.

Burma, Thailand, Cambodia and Cochin-China.

8. ***Selaginella pubescens*** (Wall. ex Hook. & Grev.) Spring, l.c. (1843) 225; Als-

ton, l.c. (1951) 569.—*Selaginella fulcrata* auct. non (Ham. ex Don) Spring; Hieron. l.c. (1905) 721; C. Chr. Contr. U.S. Nat. Herb. 26: 335. 1931.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry slope in deciduous forest, alt. ca. 350 m, T-2256 bis.

Burma and Thailand.

9. *Selaginella biformis* A. Br. ex Kuhn, Forsch. Gazelle IV, Bot. 6: 17. 1889; Alston, l.c. (1951) 570.

LOEY: north ridge of Phu Luang, rather dry ground at edge of forest, alt. 1100-1200 m, T-1316; Phu Kradung, floor of dense forest, alt. 1100-1200 m, T-596. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in open place, alt. 300-600 m, T-2031. NAKHON NAYOK: Khao Yai National Park, dry ground in light shade, T-7402.

Burma to South China and the Ryukyus, south to Malaysia.

10. *Selaginella involvens* (Sw.) Spring, l.c. (1843) 136; Alston, l.c. (1951) 573.

CHIANGMAI: Doi Inthanon, mountain slope in mixed forest, alt. 1350-1900 m, T-2668. CHANTABURI: Khao Soidao, rather dry slope in mixed forest, alt. 700-1525 m, T-7206. TRANG: Khao Chong, rather dry slope in light shade, alt. 100-600 m, T-6975.

Widely spread from North India east to Japan, south to Thailand, Indo-China, Borneo, Celebes and Flores.

11. *Selaginella delicatula* (Desv. ex Poir.) Alston, J. Bot. 70: 282. 1932; Alston, l.c. (1951) 576; Tagawa & K. Iwats. (1965) 71.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, rather dry ground in light shade, alt. 100-700 m, T-4509 bis, *ibid.*, bank of path in light shade, alt. 90-200 m, T-5400. TRANG: Khao Chong, rather dry ground in light shade, alt. 100-800 m, T-6698, *ibid.*, rather dry slope in dense forest, T-6699.

India to South China and Taiwan, south to Malaysia.

12. *Selaginella wallichii* (Hook. & Grev.) Spring in Mart. Fl. Bras. 1(2): 124. 1840; Alston, l.c. (1951) 579.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, damp slope in dense evergreen forest, alt. 100-700 m, T-4508.

Burma, Thailand, Indo-China, Malaya, Sumatra and Borneo.

13. *Selaginella willdenowii* (Desv. ex Poir.) Bak. Gard. Chron. 1867: 783, 950; C. Chr. Contr. U.S. Nat. Herb. 26: 335. 1931; Alston, l.c. (1951) 581; Tagawa & K. Iwats. (1965) 71.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, rather dry ground in light shade, alt. 100-700 m, T-4509. TRANG: Khao Chong, sandy slope in light shade, alt. ca. 100 m, T-5487.

Burma, Thailand, Indo-China, Malaya, Sumatra and Java.

14. ***Selaginella helferi*** Warb. *Monsunia* 1: 107, 121. 1900; Alston, l.c. (1951) 582; Tagawa & K. Iwats. (1965) 71.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, on mountain slope in clearing, alt. 900-1200 m, T-3418. CHIANGMAI: Doi Suthep, in clearing of evergreen forest, alt. ca. 1000 m, T-3840. LOEY: Phu Luang, from Ban Na Luang to north ridge, rather dry slope in mixed forest, alt. ca. 800 m, T-1103; north ridge of Phu Luang, not so dense mountain forest, alt. 1100-1500 m, T-1299, *ibid.*, rather dry slope in open place at edge of forest, T-1300. PHITSANULOK: Tung Salaeng Luang National Park, moist slope by stream in light forest, alt. 300-600 m, T-2107.

Assam, Burma, Kweichow and Kwangsi, northern Thailand, and Indo-China.

15. ***Selaginella pennata*** (Don) Spring, l.c. (1843) 232; Alston, l.c. (1951) 585. —*Selaginella bisulcata* auct. non Spring; Hosséus, *Beih. Bot. Centralbl.* 28 (2): 367. 1911.

PHITSANULOK: Tung Salaeng Luang National Park, moist slope by stream in light shade, alt. 300-600 m, T-2097. LOEY: Phu Luang, from Ban Na Luang to north ridge, dry slope in deciduous forest, alt. ca. 400 m, T-1101.

Nepal, Sikkim, Assam, Burma and northern Thailand.

16. ***Selaginella ornata*** (Hook. & Grev.) Spring, l.c. (1843) 232; Alston, l.c. (1951) 588.

TRANG: Khao Chong, rather dry mountain slope in dense evergreen forest, alt. 600-1100 m, T-6827.

Indo-China, South Thailand, Malaya, and western Malaysia.

17. ***Selaginella bisulcata*** Spring, *Mém. Acad. Sc. Belg.* 24: 259. 1850; Alston, *Bull. Fan Mem. Inst. Biol.* 5: 287. 1934.

CHIANGMAI: Doi Chiangdao, rather dry slope in light shade, alt. 1600-2100 m, T-4205.

North India to Yunnan, Burma and Thailand.

18. ***Selaginella amblyphylla*** Alston, l.c. (1934) 287; Alston, l.c. (1951) 588.

CHIANGMAI: Doi Suthep, cleyey bank in clearing, alt. 1000-1685 m, T-3188. LOEY: Phu Luang, mountain slope at edge of forest, alt. 900-1400 m, T-1816; Phu Kradung, rather dry slope in light shade, alt. ca. 1200 m, T-935.

Burma, Yunnan and Thailand.

19. ***Selaginella minutifolia*** Spring, l.c. (1850) 239; Alston, l.c. (1951) 591.

CHIANGMAI: Doi Suthep, dry sandy slope in mixed forest, alt. ca. 1000 m, T-3953.

Burma, Thailand, Indo-China and Malaya.

20. ***Selaginella tenuifolia*** Spring, l.c. (1850) 253; Alston, l.c. (1951) 592.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, on rather dry slope in thin mixed forest, alt. 900-1200 m, T-3428.

North India and Burma to northern Thailand and Laos.

21. *Selaginella chrysochiza* Spring, l.c. (1850) 251; Alston, l.c. (1951) 593.

PHITSANULOK: Tung Salaeng Luang National Park, on muddy rock in forest, alt. 300-600 m, T-2034. LOEY: Phu Kradung, on dry slope in dense forest, alt. ca. 1100 m, T-374.

Assam, Thailand, Annam and Laos.

22. *Selaginella kurzii* Baker, J. Bot. 23: 249. 1885; Alston, l.c. (1951) 593.

CHIANGMAI: Doi Chiangdao, on dry mountain slope in mixed forest, alt. 500-1600 m, T-4080; en route from Mae Klang Waterfall to Ban Yang, along Nam Mae Klang, rather moist cleyey slope in forest, alt. 350-600 m, T-2368.

Assam, Burma, northern Thailand and Malay Peninsula (?).

EQUISETACEAE

Equisetum L.

1. *Equisetum debile* Roxb. apud Vauch. Mon. Prel. 387. 1822; Tard. & C. Chr. (1939-51) 546; Larsen, Dansk Bot. Ark. 23: 59. 1963.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, wet ground along stream in open place, alt. ca. 350 m, T-2263.

India to South China and Taiwan, south to Malaysia, east to Polynesia.

OPHIOGLOSSACEAE

Ophioglossum L.

1. *Ophioglossum pendulum* L. Sp. Pl. ed. 2, 2: 1518. 1763; Tard. & C. Chr. (1939-51) 9; Holtt. (1954) 40.

NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense evergreen forest, alt. 1100-1786 m, T-4794.

Madagascar to tropical Australia and the Pacific Islands through Malaysia, north to India, Thailand, Tonkin, South China, Taiwan and the Ryukyus.

Helminthostachys Kaulf.

1. *Helminthostachys zeylanica* (L.) Hook. Gen. Fil. t. 47b. 1840; Tard. & C. Chr. (1939-51) 10; Holtt. (1954) 42.

LOEY: Phu Luang, from Ban Na Luang to north ridge, dry floor of mixed forest, alt. ca. 700 m, T-1107; Phu Kradung, humus rich slope in light shade, alt. ca. 1000 m, T-7518.

Ceylon, India, Burma, Thailand, Indo-China, South China, Taiwan, Ryukyu, Malaysia generally, Queensland and New Caledonia.

Botrychium Sw.

1. *Botrychium lanuginosum* Wall. ex Hook. & Grev. Icon. Fil. 1: t. 79. 1831;

Tard. & C. Chr. (1939-51) 11.

CHIANGMAI: Doi Inthanon, rather dry mountain slope in thicket, alt. 1350-1900 m, T-2676.

North India to China and Taiwan, south to Ceylon, Thailand, Tonkin, the Philippines, Java and Sumatra.

MARATTIACEAE

Angiopteris Hoffm.

1. **Angiopteris** sp.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, moist bank of stream in dense forest, alt. 900-1200 m, T-3429. CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3841, T-3848. LOEY: northern ridge of Phu Luang, rather wet ground by stream in dense forest, alt. 1100-1500 m, T-1287. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2021, T-2101. PRACHINBURI: between log cabin and Hiewsai Waterfall, Khao Yai National Park, rather dry bank of river in light shade, alt. ca. 800 m, T-7438. CHANTABURI: Khao Soidao, mountain slope in dense evergreen forest, alt. 700-1525 m, T-7205. NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, along stream in dense evergreen forest, alt. 100-700 m, T-4507.

The species classification of this genus is yet obscure, a number of specific names being proposed. In our collections, there seem to be represented by two or more species, though no identification to species is possible at present.

OSMUNDACEAE

Osmunda L.

1. **Osmunda cinnamomea** L. Sp. Pl. 2: 1066. 1753; Tard. & C. Chr. (1939-51) 32.

LOEY: Phu Kradung, by stream in sunny place, alt. 1100-1200 m, T-590.

Eastern North America, eastern Asia to Annam, northern Thailand and eastern Burma.

Above specimen may better be referred to Asian var. *fokiensis* Copel. (var. *asiatica* Fernald).

2. **Osmunda vachellii** Hook. Icon. Pl. 1: t. 15. 1837; Tard. & C. Chr. (1939-51) 31.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, wet ground in light shade, alt. 600-1350 m, T-2424. LOEY: Phu Kradung, sandy stream bed in open place, alt. 1100-1200 m, T-614.

South and Southwest China, Tonkin, Annam, Cambodia and northern Thailand.

3. **Osmunda angustifolia** Ching ex Ching & Wang, Acta Phytotax. Sin. 8: 160. 1959.

LOEY: eastern slope of Phu Luang, sandy bank along stream in dense forest, alt. 900-1400 m, T-1839; Phu Kradung, rather wet ground along stream in open place, alt. 1100-1200 m, T-609.

Kwangtung, Hongkong, Hainan and northeastern Thailand.

SCHIZAEACEAE

Lygodium Sw.

1. **Lygodium polystachyum** Wall. ex Moore, Gard. Chron. 1859: 671; C. Chr. Contr. U.S. Nat. Herb. 26: 329. 1931; Tard. & C. Chr. (1939-51) 40; Holtt. (1954) 56, Fl. Malesiana ser. II, 1(1): 46. 1959, (1961) 16; Tagawa & K. Iwats. (1965) 72.

CHIANGMAI: Doi Suthep, dry sandy slope in mixed forest, alt. 1000-1150 m, T-3965.

Assam, Burma, Yunnan, Thailand, Indo-China and Malaya.

2. **Lygodium microphyllum** (Cav.) R. Br. Prod. Fl. Nov. Holl. 162. 1810; Holtt. l.c. (1959) 47, (1961) 16.—*Lygodium scandens* (L.) Sw. sensu C. Chr. Contr. U.S. Nat. Herb. 26: 329. 1931; Tard. & C. Chr. (1939-51) 41; Holtt. (1954) 58.

LOEY: Phu Kradung, at edge of thicket in sunny place, ca. 1100-1200 m, T-585. NAKHON NAYOK: Khao Yai National Park, rather dry ground in open place, alt. ca. 800 m, T-7405.

Tropics of the Old World, from Africa to Polynesia and Australia.

3. **Lygodium japonicum** (Thunb.) Sw. Schrad. J. Bot. 1800 (2): 106. 1801; C. Chr. l.c. (1931) 329; Tard. & C. Chr. (1939-51) 37; Holtt. l.c. (1959) 51.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry slope in deciduous forest, alt. ca. 350 m, T-2262; en route from Mae Klang Waterfall to Ban Yang, dry slope in deciduous forest, alt. 300-600 m, T-2367. LOEY: Phu Kradung, along mountain path in open place, alt. ca. 600 m, T-400; *ibid.*, along path in open place, alt. ca. 700 m, T-402.

Tropics and subtropics of East Asia to Australia, north to Japan.

4. **Lygodium salicifolium** Presl, Suppl. Tent. Pterid. 102. 1845; Tard. & C. Chr. (1939-51) 41; Holtt. l.c. (1959) 51, (1961) 16, (1965) 228; Tagawa & K. Iwats. (1965) 72.

CHIANGMAI: Doi Suthep, clearing of evergreen forest, alt. ca. 1000 m, T-3873. LOEY: Phu Luang, from Ban Na Luang to north ridge, on rather dry mountain slope in mixed forest, alt. ca. 800 m, T-1109. NAKHON NAYOK: between log cabin to Hiewesai Waterfall, Khao Yai National Park, rather dry ground in open place at edge of forest, alt. ca. 800 m, T-7431.

Tropics of Asia.

5. **Lygodium flexuosum** (L.) Sw. Schrad. J. Bot. 1800 (2) : 106. 1801; C. Chr. l.c. (1931) 329; Tard. & C. Chr. (1939-51) 38; Holtt. (1954) 57, l.c. (1959) 53, (1961) 15, (1965) 228; Tagawa & K. Iwats. (1965) 72.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, climbing on bush in open mountain slope, alt. 900-1200 m, T-3437. CHIANGMAI: Doi Chiangdao, climbing on shrub in light shade, alt. 500-1600 m, T-4071. LOEY: Phu Luang, from Ban Na Luang to north ridge, rather dry slope along path in deciduous forest, alt. ca. 600 m, T-1098.

South China and Southeast Asia to Queensland.

6. **Lygodium giganteum** Tagawa et K. Iwats. Acta Phytotax. Geobot. 22: 97. 1967.

CHIANGMAI: en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, dry slope in deciduous forest, alt. ca. 500 m, T-2362.

Endemic.

GLEICHENIACEAE

Gleichenia Smith

1. **Gleichenia norrisii** Mett. ex Kuhn, Linnaea 36: 165. 1869; Holtt. (1954) 67, Fl. Malesiana ser. II, 1 (1) : 15. 1959.

LOEY: Phu Kradung, mountain slope along stream in dense forest, alt. ca. 1100 m, T-584. NAKHON NAYOK: Khao Yai National Park, rather dry bank of river in open place, alt. ca. 800 m, T-7383. NAKAWN SRITAMARAT: Khao Luang, in sunny place along path at edge of dense forest, alt. 950-1100 m, T-4685.

Thailand, Malaya, Sumatra and North Borneo.

Dicranopteris Bernh.

1. **Dicranopteris curranii** Copel. Phil. J. Sci. 81: 4. 1952; Holtt. Reinwardtia 4: 274. 1957, Fl. Malesiana ser. II, 1 (1) : 31. 1959; Tagawa & K. Iwats. (1965) 72.—*Gleichenia linearis* var. *malayana* (Christ) v.A.v. Ros.; Holtt. (1954) 70.

NAKHON NAYOK: between log cabin and motels, Khao Yai National Park, rather dry ground in open place, alt. ca. 800 m, T-7404. TRANG: Khao Chong, rather dry slope along highway in sunny place, alt. ca. 100 m, T-7058.

Malay Peninsula to Lesser Sunda Islands, north to Thailand, Celebes and the Philippines.

2. **Dicranopteris splendida** (Hand.-Mazz.) Tagawa, Acta Phytotax. Geobot. 8: 164. 1939.—*Gleichenia splendida* Hand.-Mazz.; Tard. & C. Chr. (1939-51) 50.

NAKAWN SRITAMARAT: Khao Luang, cleyey slope along path in half-shaded place at edge of deep primitive forest, alt. ca. 1600 m, T-4795.

South China to Burma and Indo-China, also in peninsular Thailand.

3. **Dicranopteris speciosa** (Presl) Holtt. l.c. (1957) 273, l.c. (1959) 32.—*Gleichenia opposita* v.A.v. Ros.; Holtt. (1954) 70.

TRANG: Khao Chong, dry slope along high-way in open place, alt. ca. 100 m, T-7057.

Moluccas, Sumatra and Malay Peninsula.

4. **Dicranopteris linearis** (Burm. f.) Uuderw. Bull. Torrey Bot. Club 34: 249. 1907; C. Chr. Contr. U.S. Nat. Herb. 26: 330. 1931; Tard. & C. Chr. (1939-51) 49; Holtt. l.c. (1957) 275, l.c. (1959) 33, (1961) 16, (1965) 228; Tagawa & K. Iwats. (1965) 73.—*Gleichenia linearis* (Burm. f.) Clarke; Holtt. (1954) 70.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, in sunny place at edge of mixed forest, alt. 900-1200 m, T-3421. LOEY: north ridge of Phu Luang, rather dry ground at edge of forest, alt. 1100-1500 m, T-1265; Phu Kradung, dry ground in sunny place at edge of forest, alt. 1100-1200 m, T-635.

Widely distributed in the tropics and subtropics of the Old World, extending north to the Himalayas and Japan, south to Australia, and east to Polynesia.

Var. **tetraphylla** (Rosenst.) Nakai, Bull. Nat. Sci. Mus. Tokyo n. 29, 67. 1950; Holtt. l.c. (1959) 36.

LOEY: Phu Kradung, rather dry ground at edge of forest, alt. 1100-1200m, T-606. Sumatra, Thailand, Indo-China, Hainan, Kwangtung and Taiwan.

Var. **subpectinata** (Christ) Holtt. l.c. (1957) 277, l.c. (1959) 35. — *Gleichenia dichotoma* var. *alternans* Mett. sensu Holtt. (1954) 70.

TRANG: Khao Chong, rather dry slope along road in sunny place, alt. 100-600 m, T-6985.

Koh Chang, Malay Peninsula, Sumatra and Borneo.

HYMENOPHYLLACEAE

Meringium Presl

1. **Meringium bontocense** (Copel.) Copel. Phil. J. Sci. 67: 41. 1938. — *Hymenophyllum bontocense* Copel. Phil. J. Sci. 64: 33. 1937.

NAKAWN SRITAMARAT: Khao Luang, moist rock in dense evergreen forest, alt. ca. 1600 m, T-4815.

Luzon.

By thin interior cell-walls of the lamina, very slender rhizome, hairy axes, and oblong, bipinnatifid frond, the above specimen matches well with the description and figure given by Copeland for *Hymenophyllum* (*Meringium*) *bontocense* which has ever been known only from Luzon. Except for the wide gap in distribution, no objection can be offered to identify our specimen with that.

2. **Meringium denticulatum** (Sw.) Copel. l.c. (1938) 42.—*Hymenophyllum denticulatum* Sw.; Copel. l.c. (1937) 41; Tard. & C. Chr. (1939-51) 57; Holtt. (1954) 79.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense forest at ridge, alt. 1100-1786 m, T-4814, *ibid.*, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4816 bis.

Ceylon and North India through Malaysia to Fiji, north to the Ryukyus.

3. **Meringium acanthoides** (van den Bosch) Copel. l.c. (1938) 42.—*Hymenophyllum acanthoides* (van den Bosch) Rosenst.; Copel. l.c. (1937) 45; Holtt. (1954) 80.

NAKAWN SRITAMARAT: Khao Luang, moist rock in wet place in dense evergreen forest, alt. 680-950 m, T-4634.

Java to New Guinea, north to the Malay Peninsula and Taiwan.

Hymenophyllum Sm.

1. **Hymenophyllum barbatum** (van den Bosch) Baker, Syn. Fil. 68. 1867; Copel. l.c. (1937) 84.—*Hymenophyllum poilanei* Tard. & C. Chr., *H. oxyodon* Baker & *H. khasianum* Baker; Tard. & C. Chr. (1939-51) 57, 58.

CHIANGMAI: Doi Inthanon, muddy rock in deep forest, alt. ca. 1400 m, T-2670, T-2673, *ibid.*, mossy tree trunk in dense forest, alt. 1350-1900 m, T-2671. LOEY: northeastern ridge of Phu Luang, mossy tree trunk in dense forest, alt. 1300-1567 m, T-1502. CHANTABURI: Khao Soidao, mossy tree trunk in dense forest at ridge, alt. 700-1525 m, T-7161 bis.

North India to Japan, south to Taiwan, Annam and Southeast Thailand.

The above localities in Thailand stand at the southernmost part of this species ever known. The materials cited above differ a little from the Japanese plants in such characters as: the axes of fronds densely and persistently hairy, the teeth on segments larger, the internal cell walls of the laminar part thick and wavy, and the receptacles lengthened to some extent. We are not certain whether it is correct or not to refer our materials to such a variable species, but at present they may better be placed tentatively in *H. barbatum*.

Mecodium Presl

1. **Mecodium polyanthos** (Sw.) Copel. l.c. (1938) 19.—*Hymenophyllum polyanthos* Sw.; Copel. l.c. (1937) 97; Tard. & C. Chr. (1939-51) 54; Holtt. (1954) 81, (1961) 17, (1965) 229.

CHIANGMAI: Doi Chiangdao, mossy tree trunk in dense mixed forest, alt. 1600-2100 m, T-4218; higher elevation of Doi Suthep (Doi Pui), mossy tree trunk in dense forest, alt. 1100-1685 m, T-3189; Doi Inthanon, muddy rock in dense forest, alt. 1350-1900 m, T-2653. LOEY: north ridge of Phu Luang, muddy rock by stream in dense forest, alt. 1100-1500 m, T-1282, T-1293; Phu Kradung, mossy cliff along stream in forest, alt. ca. 1200 m, T-631, T-650, *ibid.*, muddy rock along stream in

forest, alt. ca. 1200 m, T-783. NAKAWN SRITAMARAT: Khao Luang, moist rock in dense forest at ridge, alt. 950-1100 m, T-4693

Tropics and subtropics in both the New and the Old World.

2. **Mecodium productum** (Kunze) Copel. l.c. (1938) 20.—*Hymenophyllum productum* Kunze; Copel. l.c. (1937) 113; Holtt. (1954) 83.

NAKAWN SRITAMARAT: Khao Luang, mossy rock in dense evergreen forest, alt. 1100-1786 m, T-4806, *ibid.*, eastern slope, mossy rock in dense forest, alt. 700-800 m, T-5294, T-5296.

Sumatra and the Malay Peninsula to the Philippines, north to Taiwan.

3. **Mecodium javanicum** (Spr.) Copel. l.c. (1938) 20.—*Hymenophyllum javanicum* Spr.; Copel. l.c. (1937) 120; Tard. & C. Chr. (1939-51) 54; Holtt. (1954) 83.

NAKAWN SRITAMARAT: Khao Luang, moist rock in dense evergreen forest, alt. 1100-1786 m, T-4816, T-4817.

Ceylon to New Caledonia and eastern Australia, north to Taiwan.

4. **Mecodium riukiense** (Christ) Copel. l.c. (1938) 21.—*Hymenophyllum riukiense* Christ; Copel. l.c. (1937) 123.

LOEY: north ridge of Phu Luang, wet muddy rock by stream in dense forest, alt. 1100-1500 m, T-1272; Phu Kradung, wet rock along stream in deep forest, alt. 1100-1200 m, T-599.

Southern Japan (Southeast Shikoku, South Kyushu, northern Ryukyu south to Okinawa Island).

This is an extraordinary range extension, but the plants cited here are quite identical in every direction with those from southern Japan.

5. **Mecodium badium** (Hook. & Grev.) Copel. l.c. (1938) 23.—*Hymenophyllum badium* Hook. & Grev.; Copel. l.c. (1937) 144; Tard. & C. Chr. (1939-51) 53; Holtt. (1954) 83, (1961) 16.

CHIANGMAI: Doi Chiangdao, moist rock in dense mossy forest, alt. 1600-2100 m, T-4224; Doi Inthanon, mossy rock in dense forest, alt. 1350-1900 m, T-2672, T-2674, *ibid.*, on southeastern slope, interior of Ban Yang, tree trunk in moist dense forest, alt. ca. 1600 m, T-3020. LOEY: northeastern ridge of Phu Luang, mossy rock in moist dense forest at ridge, alt. 1300-1567 m, T-1521, *ibid.*, on northern ridge, tree trunk in dense evergreen forest, alt. 1100-1500 m, T-1261. CHANTABURI: Khao Soidao, muddy rock in dense forest at ridge, alt. 700-1525 m, T-7202. NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4842.

North India and South China, south to Malaysia, and north to South Japan.

6. **Mecodium exsertum** (Wall. ex Hook.) Copel. l.c. (1938) 23.—*Hymenophyllum exsertum* Wall. ex Hook.; C. Chr. Contr. U.S. Nat. Herb. 26: 330. 1931; Copel. l.c. (1937) 153; Tard. & C. Chr. (1939-51) 53; Holtt. (1954) 86, (1961) 17, (1965) 228.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense mossy forest, alt. 1350-1900 m, T-2669, *ibid.*, alt. 1900-2595 m, T-2883. CHIANGRAI: northern slope of Doi Pacho, tree trunk in rather dry mixed forest at ridge, alt. 1350-1800 m, T-3685. LOEY: northern ridge of Phu Luang, tree trunk in dense forest, alt. 1100-1500 m, T-1258; Phu Kradung, muddy rock along stream in dense forest, alt. 1100-1200 m, T-630. CHANTABURI: Khao Soidao, mossy tree trunk in dense forest at ridge, alt. 700-1525 m, T-7161. NAKHON NAYOK: Khao Kiew, a high ridge in Khao Yai National Park, mossy tree trunk in dense forest, alt. ca. 1250m, T-7497. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 1100-1786 m, T-4841. TRANG: Khao Chong, mossy tree trunk in dense forest at ridge, alt. 600-1100 m, T-6811.

North India, South China, Upper Burma, Indo-China, Thailand, south to the Malay Peninsula.

Microgonium Presl

1. **Microgonium bimarginatum** van den Bosch, Hymen. Jav. 7. 1861; Tagawa & K. Iwats. (1965) 73.—*Trichomanes bimarginatum* van den Bosch; Copel. Phil. J. Sci. 51: 208. 1933; Holtt. (1954) 92, (1961) 17.

NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense mountain forest, alt. 950-1100 m, T-4687, T-4692. TRANG: Khao Chong, muddy rock in dense forest, alt. 100-800 m, T-5585, *ibid.*, muddy tree trunk in dense evergreen forest, alt. 600-1100 m, T-6821.

Ceylon to Samoa, north to the Malay Peninsula.

2. **Microgonium sublimbatum** (K. Müll.) van den Bosch, l.c. (1861) 6 — *Trichomanes sublimbatum* K. Müll.; Copel. l.c. (1933) 198; Tard. & C. Chr. (1939-51) 62; Holtt. (1954) 92

LOEY: northeastern ridge of Phu Luang, muddy rock in moist dense forest at ridge, alt. 1300-1567 m, T-1520. CHANTABURI: Khao Soidao, damp rock in dense evergreen forest, alt. 700-1525 m, T-7189. NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4820.

Assam to New Guinea.

3. **Microgonium motleyi** van den Bosch, l.c. (1861) 5.— *Trichomanes motleyi* van den Bosch; Copel. l.c. (1933) 201; Tard. & C. Chr. (1939-51) 61; Holtt. (1954) 92.

TRANG: Khao Chong, tree trunk in dense forest, alt. 100-800 m, T-5578.

Malay Peninsula and Borneo.

4. **Microgonium minutifolium** Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 98. 1967.

CHANTABURI: Khao Soidao, mossy rock in dense evergreen forest, alt. 700-1525 m,

T-7185. TRANG: Khao Chong, damp rock by river in dense moist forest, alt. 100-600 m, T-6984.

Endemic so far to the regions cited above.

Didymoglossum Desv.

1. **Didymoglossum exiguum** (Bedd.) Copel. l.c. (1938) 78.—*Trichomanes exiguum* (Bedd.) Baker; Copel. l.c. (1933) 205; Holtt. (1954) 94.

CHANTABURI: Khao Soidao, mossy rock in dense evergreen forest, alt. 700-1525 m, T-7179, T-7187. NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, moist rock in dense evergreen forest, alt. 100-700 m, T-4525, *ibid.*, eastern slope, moist rock in dense evergreen forest, alt. ca. 700 m, T-5310. TRANG: Khao Chong, moist rock in dense forest near river, alt. ca. 200 m, T-5579.

Ceylon, South India and Malay Peninsula.

Gonocormus van den Bosch

1. **Gonocormus minutus** (Blume) van den Bosch, l.c. (1861) 7.—*Trichomanes minutum* Blume; Copel. l.c. (1933) 148; Holtt. (1954) 96.—*Trichomanes parvulum* Poir.; Copel. l.c. (1933) 145; Tard. & C. Chr. (1939-51) 65.

LOEY: northern ridge of Phu Luang, mossy rock in moist dense forest, alt. 1100-1500 m, T-1310, eastern slope of Phu Luang, vertical surface of rather dry rock in dense mountain forest, alt. 900-1400 m, T-1833, T-1838, eastern slope of Phu Luang, rather dry rock in light shade, alt. ca. 1200 m, T-2015. TRANG: Khao Chong, mossy tree trunk in dense forest at ridge, alt. 600-1100 m, T-6813.

Widely distributed in the Old World tropics, from Africa to Polynesia, north to Japan.

2. **Gonocormus prolifer** (Blume) Prantl, Hymen. 51. 1875.—*Trichomanes proliferum* Blume; Copel. l.c. (1933) 150; Holtt. (1954) 97; Tard. & C. Chr. (1939-51) 66.

NAKAWN SRITAMARAT: Khao Luang, mossy rock in dense evergreen forest, alt. 1100-1786 m, T-4840, eastern slope of Khao Luang, wet mossy rock in stream-bed in dense forest, alt. ca. 800 m, T-5295.

Malaysia throughout, but its boundary not clear.

3. **Gonocormus teysmanni** van den Bosch, l.c. (1861) 10.—*Trichomanes teysmanni* van den Bosch; Copel. l.c. (1933) 150.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense forest, alt. 680-950 m, T-4565, *ibid.*, damp muddy rock in dense forest, alt. 950-1100 m, T-4688.

Malay Peninsula to Java.

4. **Gonocormus siamensis** Tagawa & K. Iwats. Aata Phytotax. Geobot 22: 99. 1967.

NAKAWN SRITAMARAT: Khao Luang, mossy rock in dense evergreen forest, alt. 1100-1786 m, T-4813.

Known only from the specimen cited above.

Microtrichomanes (Mett.) Copel.

1. **Microtrichomanes digitatum** (Sw.) Copel. l.c. (1938) 36.—*Trichomanes digitatum* Sw.; Copel. l.c. (1933) 159; Tard. & C. Chr. (1939-51) 66; Holtt. (1954) 94.

NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4823.

East African Islands to Samoa, through Malaysia.

Pleuromanes Presl

1. **Pleuromanes pallidum** (Blume) Presl, Epim. Bot. 258. 1849; Copel. l.c. (1938) 56.—*Trichomanes pallidum* Blume; Copel. l.c. (1933) 141; Tard. & C. Chr. (1939-51) 67; Holtt. (1954) 97, (1961) 17.

LOEY: Phu Kradung, rather dry vertical cliff near stream in dense forest, alt. 1100-1200 m, T-605. NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4819.

Ceylon, Sumatra to Polynesia, north to Thailand, Annam and Taiwan.

Crepidopteris Copel.

1. **Crepidopteris humilis** (Forst.) Copel. l.c. (1938) 58; Tagawa & K. Iwats. (1965) 73.—*Trichomanes humile* Forst.; Copel. l.c. (1933) 164; Holtt. (1954) 98.

TRANG: Khao Chong, muddy rock near river in dense forest, alt. ca. 200 m, T-5568.

Sumatra and Malay Peninsula to Tahiti, north to Taiwan.

Crepidomanes Presl

1. **Crepidomanes bipunctatum** (Poir.) Copel. l.c. (1938) 59; Tagawa & K. Iwats. (1965) 74.—*Trichomanes bipunctatum* Poir.; Copel. l.c. (1933) 179; Tard. & C. Chr. (1939-51) 63; Holtt. (1954) 99, (1961) 17.

NAKHON NAYOK: between log cabin to Hiewesai Waterfall, Khao Yai National Park, mossy rock near river in light shade, alt. ca. 800 m, T-7428. NAKAWN SRITAMARAT: Khao Luang, moist mossy rock along stream in dense evergreen forest, alt. 680-950 m, T-4566, *ibid.*, moist mossy rock along stream in dense forest at ridge, alt. 950-1100 m, T-4689, *ibid.*, mossy rock in dense evergreen forest at ridge, alt. 1100-1786 m, T-4818. TRANG: Khao Chong, mossy rock in dense forest along river, alt. 100-800 m, T-5569, T-6701.

Tropics in the Old World.

2. **Crepidomanes bilabiatum** (Nees & Blume) Copel. l.c. (1938) 59.—*Trichomanes bilabiatum* Nees & Blume; Copel. l.c. (1933) 179; Holtt. (1954) 99, (1965) 229, with a question mark.

CHANTABURI: Khao Soidao, mossy rock in rather dry place in mixed forest, alt. 200-700 m, T-7188. NAKAWN SRITAMARAT: Khao Luang, moist mossy rock in dense

evergreen forest, alt. 1100-1786 m, T-4843. TRANG: Khao Chong, mossy rock in dense forest, alt. 100-800 m, T-5580.

Malay Peninsula, Sumatra and Java.

3. **Crepidomanes brevipes** (Presl) Copel. l.c. (1938) 60.—*Trichomanes brevipes* (Presl) Baker; Copel. l.c. (1933) 182, Fern Fl. Phil. I, 71. 1958.

TRANG: Khao Chong, moist rock in dense forest along river, alt. 100-800 m, T-6706, T-6707.

Guam, Borneo and the Philippines.

There remain some doubts to refer the above materials to the nominal species. With narrower segments and irregular false veinlets, our specimens accord well with the Philippine plants of *C. brevipes* which is known to be much variable in its size and accordingly in the construction of fronds. In the presence of the occasional submarginal false veinlets and in the form of sori, especially in not so long tube, our plants differ from *C. megistostomum*, from which, however, we can not distinguish *C. brevipes* sufficiently.

4. **Crepidomanes latemarginale** (Eaton) Copel. l.c. (1938) 60.—*Trichomanes latemarginale* Eaton; Copel. l.c. (1933) 189; Tard. & C. Chr. (1939-51) 63; Holtt. (1954) 101.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, vertical surface of muddy rock in dense evergreen forest, alt. 400-850 m, T-1896. CHANTABURI: Khao Soidao, mossy rock in rather dry place in mixed forest, alt. 200-700 m, T-7105.

Assam to Taiwan, southwards to the Malay Peninsula.

5. **Crepidomanes nanophyllum** Tagawa, Acta Phytotax. Geobot. 9: 143. 1940.—*Crepidomanes* sp.; Tagawa & K. Iwats. (1965) 74.

TRANG: Khao Chong, damp rock near river in dense forest, alt. ca. 200 m, T-6705.

Known so far only from the South Ryukyus and Taiwan.

6. **Crepidomanes latealatum** (van den Bosch) Copel. l.c. (1938) 60.—*Didymoglossum latealatum* van den Bosch; Copel. l.c. (1933) 192.—*Trichomanes latealatum* (van den Bosch) Christ; Tard. & C. Chr. (1939-51) 64; Holtt. (1954) 101, (1961) 17.—*Trichomanes bipunctatum* var. *latealatum* (van den Bosch) Clarke; C. Chr. Contr. U.S. Nat. Herb. 26: 330. 1931.—? *Trichomanes plicatum* (van den Bosch) Bedd.; Tard. & C. Chr. (1939-51) 65; Holtt. (1965) 229.

CHIANGRAI: northern slope of Doi Pacho, moist rock in deep shade, alt. 1350-1800 m, T-3695. CHIANGMAI: Doi Chiangdao, mossy rock in dense forest, alt. 1600-2100 m, T-4212; Ban Yang, at middle elevation of Doi Inthanon, on moist muddy rock in shade along river, alt. 600-1350 m, T-2423; Doi Inthanon, mossy rock in dense evergreen forest, alt. 1350-1900 m, T-2675. PHITSANULOK: Tung Salaeng Luang

National Park, muddy rock near stream in light shade, alt. 300-600 m, T-2025. LOEY: Ban Na Luang to north ridge of Phu Luang, muddy rock by stream in dense forest, alt. ca. 800 m, T-1102; north ridge of Phu Luang, wet mossy rock along stream in dense forest, alt. 1100-1500 m, T-1271; northeastern ridge of Phu Luang, wet mossy rock by stream in dense forest, alt. 1300-1567 m, T-1490; eastern slope of Phu Luang, mossy rock in moist dense forest at ridge, alt. 900-1400 m, T-1840; interior of Nam Thop, eastern slope of Phu Luang, mossy rock in moist dense forest, alt. 400-850 m, T-1905. CHANTABURI: Khao Soidao, mossy rock in dense forest, alt. 700-1525 m, T-7195. TRANG: Khao Chong, mossy rock in dense forest, alt. 600-1100 m, T-7489.

India eastwards to Indo-China.

In Thailand, also, there are various forms of plants of *Crepidomanes* having no distinct submarginal but many short oblique false veinlets. We have as yet no final classification of that group, many names being offered in literature. At present, however, we can not set forth any clear specific boundary among any of the specimens cited above. We will name here our collections as *C. latealatum* tentatively and further investigation of them will be suspended for the future.

Cephalomanes Presl

1. **Cephalomanes javanicum** (Blume) van den Bosch, l.c. (1861) 30; Copel. l.c. (1938) 67; Tagawa & K. Iwats. (1965) 74.—*Trichomanes javanicum* Blume; Copel. l.c. (1933) 246; Tard. & C. Chr. (1939-51) 68; Holtt. (1954) 102, (1961) 17.

TRANG: Khao Chong, wet muddy rock by stream in dense evergreen forest, alt. 600-1100 m, T-6800.

Burma to New Guinea through Malaysia.

Macroglena Copel.

1. **Macroglena gemmata** (J. Smith ex Baker) Copel. l.c. (1938) 84.—*Trichomanes gemmatum* J. Smith ex Baker; Copel. l.c. (1933) 269; Tard. & C. Chr. (1939-51) 69; Holtt. (1954) 104.

NAKAWN SRITAMARAT: Khao Luang, cleyey slope along path in evergreen forest, alt. 1100-1786 m, T-4844.

Malay Peninsula and Borneo.

Vandenboschia Copel.

1. **Vandenboschia auriculata** (Blume) Copel. l.c. (1938) 55.—*Trichomanes auriculatum* Blume; Copel. l.c. (1933) 223; Tard. & C. Chr. (1939-51) 69; Holtt. (1954) 105.

CHANTABURI: Khao Soidao, tree trunk in dense evergreen forest, alt. 700-1525 m, T-7162. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense forest, alt. 950-1100 m, T-4677, T-4690, *ibid.*, alt. 1100-1786 m, T-4778. TRANG: Khao Chong,

tree trunk in dense evergreen forest, alt. 600-1100 m, T-6820.

Northeast India to Japan, southwards throughout Malaysia to New Guinea.

2. **Vandenboschia maxima** (Blume) Copel. l.c. (1938) 54; Tagawa & K. Iwats. (1965) 73.—*Trichomanes maximum* Blume; Copel. l.c. (1933) 217; Tard. & C. Chr. (1939-51) 72; Holtt. (1954) 107.

NAKAWN SRITAMARAT: Khao Luang, wet sandy ground in dense evergreen forest, alt. 1100-1786 m, T-4810, eastern slope of Khao Luang, moist rock by stream in dense forest, alt. ca. 700 m, T-5297. TRANG: Khao Chong, muddy rock by stream in dense forest, alt. 100-800 m, T-5586.

Malay Peninsula and Sumatra to Tahiti.

3. **Vandenboschia birmanica** (Bedd.) Ching in Ching & Wang, Acta Phytotax. Sin. 8: 135. 1959.—*Trichomanes birmanicum* Bedd.; Tard. & C. Chr. (1939-51) 70.—*Trichomanes radicans* Sw. p.p.; Copel. l.c. (1933) 213; Holtt. (1954) 107, (1961) 18.

CHIANGRAI: northern slope of Doi Pacho, moist mossy rock by stream in dense forest, alt. 1350-1800 m, T-3684. CHIANGMAI: Doi Suthep, wet sandy ground in dense forest, alt. ca. 1200 m, T-4460.

Upper Burma, North Thailand, South China, Tonkin and Annam, north to Japan.
Selenodesmium Copel.

1. **Selenodesmium obscurum** (Blume) Copel. l.c. (1938) 81.—*Trichomanes obscurum* Blume; Copel. l.c. (1933) 233; Tard. & C. Chr. (1939-51) 69; Holtt. (1954) 108, (1965) 229.

NAKAWN SRITAMARAT: Khao Luang, wet sandy ground by stream in dense evergreen forest, alt. 1100-1786 m, T-4807.

Ceylon and South India, Malaysia throughout to New Guinea, north to the Ryukyus.

PLAGIOGYRIACEAE

Plagiogyria Kunze

1. **Plagiogyria adnata** (Blume) Bedd. Ferns Brit. Ind. t. 51. 1865; Copel. Phil. J. Sci. 38: 396. 1929; Tard. & C. Chr. (1939-51) 74; Holtt. (1954) 111; Ching, Acta Phytotax. Sin. 7: 145. 1958.

LOEY: north ridge of Phu Luang, rather wet slope in dense forest, alt. 1100-1500 m, T-1307; Phu Kradung, sandy slope along stream in forest, alt. 1100-1200 m, T-619. CHANTABURI: Khao Soidao, rather dry ground in mossy forest at ridge, alt. 700-1525 m, T-7208.

Burma and South China to Sumatra and the Philippines, northwards to Taiwan, the Ryukyus and Japan.

2. **Plagiogyria communis** Ching, l.c. (1958) 147.—*Plagiogyria pycnophylla* sensu

Copel. l.c. (1929) 390, p.p.

CHIANGMAI: Doi Inthanon, at edge of marsh in deep shade, alt. ca. 2500 m, T-2872.

Himalayas to northern Thailand.

DICKSONIACEAE

Cibotium Kaulf.

1. **Cibotium barometz** (L.) J. Smith, Lond. J. Bot. 1: 437. 1842; Tard. & C. Chr. (1939-51) 78; Holtt. (1954) 114, (1961) 18, (1965) 229.

CHIANGRAI: northern ridge of Doi Pacho, rather dry mountain slope in mixed forest, alt. 1350-1800 m, T-3688. PHITSANULOK: Tung Salaeng Luang National Park, open slope along stream in village of a hill tribe, alt. 300-600 m, T-2043. LOEY: north ridge of Phu Luang, in light shade, alt. 1100-1500 m, T-1325; Phu Kradung, cleyey slope in dense forest, alt. 1100-1200 m, T-644. NAKHON NAYOK: between log cabin and motels, Khao Yai National Park, dry ground in light shade, alt. ca. 800 m, T-7396. CHANTABURI: Khao Soidao, rather dry slope in mixed forest, alt. 700-1525 m, T-7192.

Assam to western Malaysia, north to the Ryukyus.

CYATHEACEAE

Cyathea Smith

1. **Cyathea chinensis** Copel. Phil. J. Sci. 3 (Bot.): 355. 1909; Holtt. Kew Bull. 19: 466. 1965.

CHIANGRAI: northern slope of Doi Pacho, in dense mixed forest, alt. ca. 1450 m, T-3575, T-3680.

Bhutan, Upper Burma, Sikkim, Yunnan, northern Thailand and North Vietnam.

2. **Cyathea borneensis** Copel. Phil. J. Sci. 6 (Bot.): 135. 1911; Holtt. (1965) 229, l.c. (1965) 469.

NAKHON NAYOK: between log cabin and motels, Khao Yai National Park, rather dry ground near river in light shade, alt. ca. 800 m, T-7408.

Burma, Thailand, Cambodia and Borneo.

3. **Cyathea latebrosa** (Wall. ex Hook.) Copel. Phil. J. Sci. 4 (Bot.): 52. 1909; Tard. & C. Chr. (1939-51) 85; Holtt. (1954) 120, (1961) 18, Fl. Malesiana ser. II, 1 (2): 115. 1963, Kew Bull. 19: 472. 1965.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, on ground along path by river in light shade, alt. 600-1350 m, T-2434 (a small sterile specimen). NAKHON NAYOK: Khao Yai National Park, on floor of dense forest along river, alt. ca. 800 m, T-7393. CHANTABURI: Khao Soidao, rather dry slope in dense evergreen

forest, alt. 700-1525 m, T-7167. NAKAWN SRITAMARAT: Khao Luang, moist ground along stream in dense evergreen forest, alt. 680-950 m, T-4629, *ibid.*, mountain slope in dense evergreen forest, alt. 1100-1786 m, T-4804. TRANG: Khao Chong, in dense mountain forest, alt. 600-1100 m, T-6814.

Western Malaysia, north to Malay Peninsula, Cambodia and Hainan.

4. **Cyathea podophylla** (Hook.) Copel. *Phil. J. Sci.* 4 (Bot.): 33. 1909; Tard. & C. Chr. (1939-51) 81; Holtt. (1961) 18, l.c. (1965) 475.

LOEY: Phu Kradung, along path by stream at edge of forest, alt. ca. 1100 m, T-647. NAKHON NAYOK: Khao Yai National Park, rather dry ground near river in light shade, alt. ca. 800 m, T-7403. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense forest, alt. 680-950 m, T-4676.

South China, Indo-China east to the Ryukyus and south to the Malay Peninsula.

5. **Cyathea gigantea** (Wall. ex Hook.) Holtt. *Gard. Bull. S.S.* 8: 318. 1935, (1954) 128, (1961) 18, l.c. (1963) 124, l.c. (1965) 476; Tagawa & K. Iwats. (1965) 74. — *Alsophila glabra* sensu Bedd. non (Blume) Copel.; Tard. & C. Chr. (1939-51) 83.

CHIANGMAI: Doi Suthep, moist steep slope in evergreen forest, alt. ca. 1000 m, T-3844; Ban Yang, at middle elevation of Doi Inthanon, moist ground by path along river in light shade, alt. 600-1350 m, T-2432. LOEY: north ridge of Phu Luang, along path in dense mountain forest, alt. 1100-1500 m, T-1268. CHANTABURI: Khao Soidao, mountain slope in dense evergreen forest, alt. 700-1525 m, T-7182. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. 100-700 m, T-4506.

Himalayas to western Malaysia.

6. **Cyathea contaminans** (Wall. ex Hook.) Copel. *Phil. J. Sci.* 4 (Bot.): 60. 1909; Tard. & C. Chr. (1939-51) 86; Holtt. (1954) 119, l.c. (1963) 135, l.c. (1965) 485; Tagawa & K. Iwats. (1965) 74.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, moist slope in dense mixed forest, alt. ca. 500 m, T-5301.

Sikkim to Malaysia.

POLYPODIACEAE

Dipteris Reinw.

1. **Dipteris conjugata** Reinw. *Syll. Pl.* 2: 3. 1824; Tard. & C. Chr. (1939-51) 442; Holtt. (1954) 135.

NAKAWN SRITAMARAT: near summit of Khao Luang, cleyey ground in open place, alt. ca. 1700 m, T-4809.

Malay Peninsula and Sumatra eastwards to New Caledonia and Fiji, northwards to Annam and Cambodia, Philippines, Taiwan and the Yaeyama Islands in the

Ryukyus; not known as yet from the mainland of China, where *D. conjugata* is replaced by *D. chinensis* Christ.

Cheiropleuria Presl

1. **Cheiropleuria bicuspis** (Blume) Presl, Epim. Bot. 189. 1849; Tard. & C. Chr. (1939-51) 443; Holtt. (1954) 136.

NAKAWN SRITAMARAT: Khao Luang, cleyey slope in forest, alt. ca. 1700 m, T-4812.

Malay Peninsula and Sumatra east to New Guinea, north to the Philippines, Tonkin, South China and Taiwan, extending further north to the warmer districts of Japan through the Ryukyus.

Platycerium Desv.

1. **Platycerium wallichii** Hook. Gard. Chron. 1858: 765; C. Chr. Contr. U.S. Nat. Herb. 26: 335. 1931; Holtt. (1954) 141, (1965) 229.

LOEY: Phu Luang, from Ban Na Luang to the north ridge, tree trunk in mixed forest, alt. ca. 800 m, T-1117; Phu Kradung, rather dry rock in open place, alt. ca. 700 m, T-7522.

Tenasserim and Thailand, south to Langkawi Islands and Kedah.

This modest epiphyte seems to be fairly common in deciduous and mixed forests of northern and northeastern hilly countries in Thailand. We observed it actually at the foot of Doi Chiangdao, in the interior of Mae Klang Waterfall, and in Tung Salaeng Luang National Park, where the plants were all growing too high to get them.

Pyrrosia Mirb.

1. **Pyrrosia adnascens** (G. Forst.) Ching, Bull. Chin. Bot. Soc. 1: 45. 1935; Tard. & C. Chr. (1939-51) 505; Holtt. (1954) 144, (1961) 18, (1965) 230; Tagawa & K. Iwats. (1965) 75.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry rock in deciduous forest, alt. ca. 350 m, T-2260. LOEY: eastern slope of Phu Luang, mossy rock in open field at ridge, alt. 900-1400 m, T-1821; Phu Kradung, dry rock in forest, alt. ca. 1000 m, T-379.

India to South China, Taiwan and the Ryukyus, through Malaysia to Polynesia.

2. **Pyrrosia nummularifolia** (Sw.) Ching, l.c. (1935) 47; Holtt. (1954) 144; Tagawa & K. Iwats. (1965) 75.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, rather dry rock in light shade, alt. 100-700 m, T-4513.

North India and Burma, the Malay Peninsula, Sumatra to the Philippines, Celebes and the Lesser Sunda Islands. We have as yet no trustworthy record for Indo-China, though Ching (l.c.) included Cochin-China in the range of this species.

3. ***Pyrrosia mollis*** (Kunze) Ching, l.c. (1935) 53; Tard. & C. Chr. (1939-51) 506; Tagawa, J. Jap. Bot. 38: 327. 1963.

CHIANGMAI: Doi Chiangdao, exposed limestone cliff, alt. 1600-2100 m, T-4220.

Ceylon, India, Burma, Yunnan and Kwangsi, Hainan, Indo-China, Thailand and Java.

4. ***Pyrrosia tonkinensis*** (Gies.) Ching, l.c. (1935) 55; Tard. & C. Chr. (1939-51) 506.

LOEY: north ridge of Phu Luang, muddy crevices of dry rock in half shaded place at edge of forest, alt. 1100-1500 m, T-1255; northeastern ridge of Phu Luang, rather dry rock in open place, alt. 1300-1567 m, T-1515.

Kweichow, Kwangsi, Hainan, Tonkin, Laos and northeastern Thailand.

5. ***Pyrrosia eberhardtii*** (Christ) Ching, l.c. (1935) 59; Tard. & C. Chr. (1939-51) 507.

LOEY: north ridge of Phu Luang, rather dry rock in open place, alt. 1100-1500 m, T-1323; Phu Kradung, rather dry rock in sunny place, alt. 1100-1200 m, T-632. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, rather dry rock in sunny place at edge of mossy forest, alt. ca. 1250 m, T-7493. CHANTABURI: Khao Soidao, rather dry rock in light shade, alt. 700-1525 m, T-7165. NAKAWN SRITAMARAT: Khao Luang, fallen tree trunk in sunny place at edge of forest, alt. ca. 800 m, T-4670, *ibid.*, tree trunk in dense forest, alt. 950-1100 m, T-4697, *ibid.*, trunk of fallen tree in clearing at ridge, alt. ca. 1500 m, T-4779. TRANG: Khao Chong, rather dry rock in light shade, alt. 600-1100 m, T-6826.

Hainan, Laos, Annam, Cambodia and Thailand.

6. ***Pyrrosia stigmosa*** (Sw.) Ching, l.c. (1935) 67; Tard. & C. Chr. (1939-51) 513; Holtt. (1954) 148, (1961) 19, (1965) 230.

CHIANGMAI: Doi Chiangdao, dry rock (limestone) in light shade, alt. 500-1600 m, T-4079. PHITSANULOK: Tung Salaeng Luang National Park, dry cliff in open place, alt. 300-600 m, T-2020. LOEY: north ridge of Phu Luang, rather dry cliff in open place at edge of forest, alt. 1100-1500 m, T-1256.

Peninsular India, Burma, Thailand, Indo-China, Malaya and Sumatra to New Guinea.

7. ***Pyrrosia costata*** (Presl ex Bedd.) Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 100. 1967.—*Pyrrosia beddomeana* (Gies.) Ching, l.c. (1935) 68.

LOEY: north ridge of Phu Luang, rather dry cliff in open place at edge of forest, alt. 1100-1500 m, T-7510.

Himalayas to Yunnan, south to Burma and northern Thailand.

8. ***Pyrrosia varia*** (Kaulf.) Farwell, Amer. Midl. Nat. 12: 302. 1931; Ching, l.c. (1935) 70; Holtt. (1954) 146; Tagawa & K. Iwats. (1965) 75.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, rather dry rock in forest,

alt. 150-1100 m, T-5285. TRANG: Khao Chong, tree trunk in light shade, alt. 100-800 m, T-6710, *ibid.*, rather dry rock in light shade, alt. 600-1100 m, T-6819.

Malay Peninsula, Sumatra to the Philippines, Guam and Polynesia.

9. ***Pyrrosia floccigera*** (Blume) Ching, *l.c.* (1935) 71; Holtt. (1954) 147, (1961) 18.

NAKAWN SRITAMARAT: Khao Luang, tree trunk in light shade, alt. 680-950 m, T-4668, *ibid.*, alt. 950-1100 m, T-4698; eastern slope of Khao Luang, muddy rock in light shade, alt. ca. 800 m, T-5283. TRANG: Khao Chong, rather dry rock in light shade, alt. 600-1100 m, T-6819 bis.

Malay Peninsula and Sumatra to the Philippines.

Drymoglossum Presl

1. ***Drymoglossum piloselloides*** (L.) Presl, *Tent. Pterid.* 227. 1836; C. Chr. *Dansk Bot. Ark.* 6(3): 86. 1929; Tard. & C. Chr. (1939-51) 516; Holtt. (1954) 149, (1961) 19; Tagawa & K. Iwats. (1965) 76.

NAKHON NAYOK: Khao Yai National Park, tree trunk in light shade, alt. ca. 800 m, T-7380.

Northeast India, Thailand, Indo-China, Hainan, and Malaysia throughout.

Pleopeltis Humb. & Bonpl. ex Willd.

1. ***Pleopeltis contorta*** (Christ) Alston & Bonner, *Candollea* 15: 209. 1956. — *Lepisorus contortus* (Christ) Ching, *Bull. Fan Mem. Inst. Biol.* 4: 90. 1933.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense forest, alt. 1350-1900 m, T-2648.

North India to China, also in northern Thailand.

2. ***Pleopeltis heterolepis*** (Rosenst.) Tagawa & K. Iwats. *Acta Phytotax. Geobot.* 22: 100. 1967. — *Lepisorus heterolepis* (Rosenst.) Ching, *l.c.* (1933) 86.

LOEY: north ridge of Phu Luang, tree trunk in thin forest, alt. 1100-1500 m, T-1284; northeastern ridge of Phu Luang, mossy tree trunk in forest, alt. 1300-1567 m, T-1509.

Yunnan and northeastern Thailand.

3. ***Pleopeltis subconfluens*** (Ching) Tagawa & K. Iwats. *l.c.* (1967) 100. — *Lepisorus subconfluens* Ching, *l.c.* (1933) 85. — *Polypodium lineare* auct. non Thunb.; C. Chr. *Contr. U.S. Nat. Herb.* 26: 334. 1931.

CHIANGMAI: Doi Suthep, mossy tree trunk in dense evergreen forest, alt. 1000-1685 m, T-3194; Doi Inthanon, mossy tree trunk in dense forest, alt. 1350-1900 m, T-2663 ter.

Yunnan and northern Thailand.

4. ***Pleopeltis scolopendrium*** (Ham. ex Don) Alston & Bonner, *l.c.* (1956) 207; Tagawa, *J. Jap. Bot.* 38: 326. 1963. — *Lepisorus excavatus* var. *scolopendrium* (Ham. ex Don) Ching, *l.c.* (1933) 69; Tard. & C. Chr. (1939-51) 456. — *Polypodium excavatum*

auct. non Willd.; C. Chr. Contr. U.S. Nat. Herb. 26: 334. 1931.

LOEY: Phu Luang, northeastern ridge, in open field at ridge, alt. 1300-1567 m, T-1512, *ibid.*, terrestrial on open slope below ridge, alt. ca. 1400 m, T-1510.

Himalayas and Tibet through Yunnan and Upper Burma to Thailand, Laos and Annam.

5. **Pleopeltis nuda** Hook. Exot. Fl. 1: t. 63. 1823; Tagawa, l.c. (1963) 326. — *Lepisorus nudus* (Hook.) Ching, l.c. (1933) 83; Holtt. (1961) 19.

CHIANGRAI: en route from Ban Lang Lat to middle elevation of Doi Pacho, muddy rock in dry *Pinus*-forest, alt. 1050-1450 m, T-3571. CHIANGMAI: Doi Chiangdao, muddy limestone cliff in light shade, alt. 1400-1800 m, T-4391; Doi Suthep, mossy tree trunk in evergreen forest, alt. 1000-1685 m, T-3187; Doi Inthanon, mossy tree trunk in dense forest, alt. 1350-1900 m, T-2663 bis. LOEY: Phu Kradung, vertical surface of muddy cliff in open place, alt. ca. 1200 m, T-934.

Ceylon and South India, Himalayas to Yunnan and northern Thailand.

6. **Pleopeltis sublinearis** (Baker ex Takeda) Tagawa & K. Iwats. l.c. (1967) 100. — *Lepisorus sublinearis* (Baker ex Takeda) Ching, l.c. (1933) 78; Tard. & C. Chr. (1939-51) 456.

CHIANGMAI: Doi Chiangdao, mossy limestone cliff in dense forest, alt. 1600-2100 m, T-4228; Doi Inthanon, mossy tree trunk in dense forest, alt. 1900-2595 m, T-2878, southeastern slope of Doi Inthanon, interior of Ban Yang, mossy tree trunk in dense forest, alt. ca. 2200 m, T-3021.

Yunnan, Burma, Tonkin, Laos, and northern Thailand.

7. **Pleopeltis sinensis** (Christ) Copel. Gen. Fil. 184. 1947. — *Neurodium sinense* Christ, Bull. Herb. Boiss. 6: 880. 1898. — *Lemmaphyllum sinense* (Christ) C. Chr. Dansk Bot. Ark. 6(3): 51. 1929. — *Polypodium neurodioides* C. Chr. Contr. U. S. Nat. Herb. 26: 318. 1931, renaming of *N. sinense* Christ. — *Lepisorus sinensis* (Christ) Ching, l.c. (1933) 63.

CHIANGMAI: Doi Chiangdao, mossy rock in dense forest, alt. 1600-2100 m, T-7511. Yunnan, Burma and northern Thailand.

8. **Pleopeltis longifolia** Blume, Enum. Pl. Jav. addend. 1828. — *Paragramma longifolia* (Blume) Moore, Ind. Fil. xxxii. 1857; Copel. l.c. (1947) 190. — *Lepisorus longifolius* (Blume) Holtt. (1954) 151. — *Phymatodes revoluta* Moore apud Tard. & C. Chr. (1939-51) 468.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at foot of Khao Luang, tree trunk in light shade, alt. ca. 100 m, T-5403.

Malaysia generally, north to peninsular Thailand and southern Indo-China.

Belvisia Mirbel

1. **Belvisia revoluta** (Blume) Copel. Gen. Fil. 192. 1947; Holtt. (1954) 155, (1961)

19.—*Hymenolepis revoluta* Blume; C. Chr. Dansk Bot. Ark. 6(3): 58. 1929; Tard. & C. Chr. (1939-51) 452.

LOEY: eastern slope of Phu Luang, mossy rock in open field at ridge, alt. 900-1400 m, T-1821 bis; Phu Kradung, mossy tree trunk in dense forest, alt. ca. 1100 m, T-941. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 1100-1786 m, T-4828, T-4837. TRANG: Khao Chong, mossy tree trunk in dense forest at ridge, alt. 600-1100 m, T-6823, T-6824.

Ceylon to Polynesia through Malaysia, north to Malaya, Thailand and Annam.

2. **Belvisia mucronata** (Fée) Copel. l.c. (1947) 192; Holtt. (1954) 155.—*Hymenolepis mucronata* Fée; C. Chr. l.c. (1929) 62.

NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense forest, alt. 950-1100 m, T-4684.

Ceylon to Polynesia through Malaysia, north to the Malay Peninsula, recorded also from Annam.

3. **Belvisia henryi** (Hieron. ex C. Chr.) Tagawa in Hara, Flora East. Himal. 490. 1966.—*Hymenolepis henryi* Hieron. ex C. Chr. l.c. (1929) 67; Tard. & C. Chr. (1939-51) 451.

CHIANGMAI: Doi Suthep, mossy tree trunk in dense evergreen forest, alt. 1000-1685 m, T-3191. LOEY: north ridge of Phu Luang, muddy rock in dense evergreen forest, alt. 1100-1500 m, T-1290, eastern slope of Phu Luang, mossy rock in moist dense forest, alt. 900-1400 m, T-1832.

Himalayas and Assam to Yunnan, also in Tonkin and Thailand.

4. **Belvisia annamensis** (C. Chr.) Tagawa, Acta Phytotax. Ceobot. 22: 107. 1967.—*Hymenolepis annamensis* C. Chr. l.c. (1929) 68; Tard. & C. Chr. (1939-51) 452.

NAKHON NAYOK: between log cabin and Hiewesai Waterfall, Khao Yai National Park, tree trunk in light shade, alt. ca. 800 m, T-7433. TRANG: Khao Chong, mossy tree trunk in dense forest, alt. 100-600 m, T-6977.

Indo-China, central and peninsular Thailand.

Lemmaphyllum Presl

1. **Lemmaphyllum carnosum** (Hook.) Presl, Epim. Bot. 158. 1849; C. Chr. Dansk Bot. Ark. 6(3): 49. 1929; Ching, Bull. Fan Mem. Inst. Biol. 4: 103. 1933; Tard. & C. Chr. (1939-51) 462.

CHIANGMAI: Doi Chiangdao, branch of tree in dense forest, alt. 1400-2100 m, T-4203, T-4393. LOEY: interior of Nam Thop, eastern slope of Phu Luang, tree trunk in dense evergreen forest, alt. 400-850 m, T-1908 (sterile).

Nepal to Khasia, Yunnan, Kwangsi, Tonkin, Annam, and northern Thailand.

Neocheiropteris Christ

1. **Neocheiropteris normalis** (Don) Tagawa, J. Jap. Bot. 27: 217. 1952.—*Mi-*

Microsorium normale (Don) Ching, Bull. Fan Mem. Inst. Biol. 4: 299. 1934; Tard. & C. Chr. (1939-51) 479; Holtt. (1954) 175.

CHIANGMAI: Doi Inthanon, tree trunk in dense evergreen forest, alt. 1700-2595 m, T-2457, T-2885. LOEY: Phu Luang, tree trunk in dense forest, alt. 1300-1567 m, T-1503. CHANTABURI: Khao Soidao, tree trunk in dense evergreen forest, alt. 700-1525m, T-7196.

Northeast India, Burma, Yunnan, Tonkin, Annam, Thailand, Malaya and Sumatra.

Microsorium Link

1. **Microsorium superficiale** (Blume) Ching, Bull. Fan Mem. Inst. Biol. 4: 299. 1933; Tard. & C. Chr. (1939-51) 480.

CHIANGMAI: Doi Chiangdao, trunk of tree in dense mossy forest, alt. 1600-2100 m, T-4213; Doi Inthanon, tree trunk in dense forest, alt. 1350-1900 m, T-2643. LOEY: Phu Luang, northeastern ridge, tree trunk in dense forest, alt. 1300-1567 m, T-1504.

India, Burma, Southwest China, Tonkin, Thailand, Malaysia throughout and the Bonins.

2. **Microsorium punctatum** (L.) Copel. Univ. Calif. Publ. Bot. 16: 111. 1929; Ching, l.c. (1933) 307; Tard. & C. Chr. (1939-51) 483; Holtt. (1954) 179, (1961) 20, (1965) 231; Tagawa, J. Jap. Bot. 38: 327. 1963; Tagawa & K. Iwats. (1965) 76.

PHITSANULOK: Tung Salaeng Luang National Park, muddy cliff in dense forest, alt. 300-600 m, T-2028. LOEY: north ridge of Phu Luang, mossy tree trunk in dense evergreen forest, alt. 1100-1500 m, T-1308, T-1312; Phu Kradung, tree trunk in dense forest, alt. ca. 1100 m, T-385. TRANG: Khao Chong, tree trunk in light shade, alt. ca. 100 m, T-5493.

Widely distributed throughout the Old World Tropics.

3. **Microsorium heterocarpum** (Blume) Ching, l.c. (1933) 295; Holtt. (1954) 178, (1961) 20; Tagawa & K. Iwats. (1965) 77.

TRANG: Khao Chong, rather dry slope in dense forest, alt. 100-800 m, T-5577. Malaysia, north to Thailand.

4. **Microsorium zippelii** (Blume) Ching, l.c. (1933) 308; Tard. & C. Chr. (1939-51) 479; Holtt. (1954) 176.

LOEY: north ridge of Phu Luang, mountain slope by stream in dense forest, alt. 1100-1500 m, T-1285.

North India to Southwest China and Hainan, Indo-China, Thailand and Malaysia throughout.

5. **Microsorium membranaceum** (Don) Ching, l.c. (1933) 309; Tard. & C. Chr. (1939-51) 478; C. Chr. Contr. U.S. Nat. Herb. 26: 334. 1931.

CHIANGMAI: Doi Inthanon, wet rock by stream in dense forest, alt. 1350-1900 m,

T-2649.

Ceylon, India to South China, Taiwan, Tonkin, Laos, North Thailand and the Philippines.

6. **Microsorium dilatatum** (Bedd.) Sledge, Bull. Brit. Mus. (Nat. Hist.) Bot. 2: 143. 1960, excl. syn. *Polypodium hancockii* Baker.—*Polypodium dilatatum* Wall. ex Hook. Sp. Fil. 5: 85. 1863, non Hoffm. 1796.—*Pleopeltis dilatatum* Bedd. Ferns Brit. Ind. t. 122. 1866.—*Polypodium euryphyllum* C. Chr. Ind. Fil. 525. 1906.—*Microsorium hancockii* Ching, l.c. (1933) 309, p.p.

CHIANGRAI: northern slope of Doi Pacho, muddy rock along stream in dense forest, alt. 1350-1800 m, T-3692. CHIANGMAI: Doi Inthanon, wet sandy ground by stream in dense forest, alt. 1350-1900 m, T-2664. LOEY: north ridge of Phu Luang, muddy rock by stream in dense forest, alt. 1100-1500 m, T-1301. CHANTABURI: Khao Soidao, muddy rock in forest at ridge, alt. 700-1525 m, T-7172. NAKAWN SRITAMARAT: eastern slope of Khao Luang, wet rock along stream in dense evergreen forest, alt. ca. 700 m, T-5276.

Ceylon, North India to Southwest China, south to Indo-China, Thailand and Malaya.

Microsorium dilatatum has been confused with *M. hancockii* (Baker) Ching, but is distinct from the latter in having much larger fronds with more numerous pinnae and the stipe and rachis distinctly edged on the back.

7. **Microsorium pteropus** (Blume) Copel. l.c. (1929) 112; Ching, l.c. (1933) 312; Tard. & C. Chr. (1939-51) 484; Holtt. (1954) 172, (1965) 230; Tagawa & K. Iwats. (1965) 77.

PHITSANULOK: Tung Salaeng Luang National Park, wet mossy rock by stream in light shade, alt. 300-600 m, T-2022. LOEY: from Ban Na Luang to north ridge of Phu Luang, muddy rock by stream in mixed forest, alt. ca. 800 m, T-1090. NAKHON NAYOK: Khao Yai National Park, muddy rock in stream bed in light shade, alt. ca. 800 m, T-7401.

India generally, east to South China and Taiwan, south to Malaysia.

8. **Microsorium cuspidatum** (Don) Tagawa in Hara, Flora East. Himal. 495. 1966.—*Phymatodes cuspidata* (Don) J. Smith; Alston & Bonner, Candollea 15: 206. 1956.—*Phymatodes lucida* (Roxb.) Ching, Contr. Inst. Bot. Nat. Acad. Peiping 2: 61. 1933; Tard. & C. Chr. (1939-51) 475.

LOEY: from Ban Na Luang to north ridge of Phu Luang, tree trunk in dense forest, alt. ca. 1000 m, T-1085; Phu Kradung, rather dry rock in mixed forest, alt. ca. 1000 m, T-388.

North India, South China, Burma, Laos and Tonkin, and northeastern Thailand.

9. **Microsorium rubidum** (Kunze) Copel. Gen. Fil. 197. 1947.—*Phymatodes lon-*

gissima (Blume) J. Smith; Ching, Contr. Inst. Bot. Nat. Acad. Peiping 2: 62. 1933; Tard. & C. Chr. (1939-51) 476; Holtt. (1954) 191.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, wet rock along river in light shade, alt. 100-700 m, T-4500.

Assam, Hainan, Hongkong, Taiwan and the Ryukyus, Tonkin and Annam, Malay Peninsula and Malaysia throughout.

10. **Microsorium nigrescens** (Blume) Copel. Occ. Pap. B.P. Bishop Mus. 14: 74. 1938; Tagawa & K. Iwats. (1965) 77.—*Phymatodes nigrescens* (Blume) J. Smith; Tard. & C. Chr. (1939-51) 473; Holtt. (1954) 193, (1961) 21, (1965) 231.

CHANTABURI: Khao Soidao, rather dry rock in dense mixed forest, alt. 200-700 m, T-7319. NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, rather dry rock in light shade, alt. 100-700 m, T-4502; eastern slope of Khao Luang, rather dry rock in dense evergreen forest, alt. ca. 400 m, T-5293. TRANG: Khao Chong, rather dry rock in light shade, alt. 100-600 m, T-6976.

Through Malaysia to Polynesia, north to Annam, Cambodia, Thailand, Ceylon and South India.

11. **Microsorium scolopendria** (N. L. Burm.) Copel. l.c. (1929) 112; Tagawa & K. Iwats. (1965) 77.—*Phymatodes scolopendria* (N. L. Burm.) Ching, Contr. Inst. Bot. Nat. Acad. Peiping 2: 63. 1933; Tard. & C. Chr. (1939-51) 473; Holtt. (1954) 191.

NAKAWN SRITAMARAT: Khao Luang, interior of Wat Kiri Wang, dry rock in sunny place, alt. 100-700 m, T-4499, T-4499 bis.

Tropics in the Old World.

Myrmecophila (Christ) Ching

1. **Myrmecophila sinuosa** (Wall. ex Hook.) Ching, Sunyatsenia 5: 259. 1940; Tagawa & K. Iwats. (1965) 78.—*Phymatodes sinuosa* (Wall. ex Hook.) J. Smith; Tard. & C. Chr. (1939-51) 470; Holtt. (1954) 190, (1961) 21.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang at foot of Khao Luang, tree trunk in light shade, alt. 90-200 m, T-5402.

Sumatra to New Hebrides and Solomon Island through Malaysia, north to Peninsular Thailand, Cambodia and Annam, and the Philippines.

Colysis Presl

1. **Colysis hemionitidea** (Wall. ex Mett.) Ching, Bull. Fan Mem. Inst. Biol. 4: 320. 1933; Tard. & C. Chr. (1939-51) 494.

CHIANGRAI: northeastern slope of Doi Pacho, wet rock in stream bed in deep shade, alt. ca. 1350 m, T-3686. CHIANGMAI: Doi Inthanon, wet ground in stream bed in dense forest, alt. 1350-1800 m, T-2657. CHANTABURI: Khao Soidao, wet rock by stream in dense evergreen forest, alt. 700-1525 m, T-7158.

North India to South China, Taiwan and the Ryukyus, south to Tonkin, Thailand

and the Philippines.

2. **Colysis pedunculata** (Hook. & Grev.) Ching, l.c. (1933) 321; Tard. & C. Chr. (1939-51) 492; Holtt. (1954) 160, (1965) 23; Tagawa & K. Iwats. (1965) 76.

CHANTABURI: Khao Soidao, wet rock by stream in dense forest, alt. 700-1525 m, T-7157, T-7157 bis, *ibid.*, wet rock in stream bed in light shade, alt. 200-700 m, T-7316. TRANG: Khao Chong, tree trunk in dense forest, alt. 100-800 m, T-5576, T-6702, *ibid.*, moist rock in dense forest, alt. 600-1100 m, T-6805, T-6805 bis.

North India to Yunnan, south to Laos and Annam, Thailand and Malaya.

3. **Colysis wui** (C. Chr.) Ching, l.c. (1933) 322.

NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 950-1100 m, T-4694.

Kwangtung, Kwangsi and southern Thailand.

4. **Colysis pentaphylla** (Baker) Ching, l.c. (1933) 332; Tagawa, J. Jap. Bot. 38: 328. 1963.

CHIANGMAI: Doi Chiangdao, mountain slope in dense mixed forest, alt. ca. 1700 m, T-4216; southeastern slope of Doi Inthanon, interior of Ban Yang, wet ground by stream in dense forest, alt. ca. 1600 m, T-3018, *ibid.*, mountain slope in dense evergreen forest, alt. 1350-1900 m, T-2661. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light forest, alt. 300-600 m, T-2105. LOEY: Phu Luang, northeastern ridge, mountain slope in dense forest, alt. 1300-1567 m, T-1497.

Yunnan and Thailand.

5. **Colysis pothifolia** (Don) Presl, Epim. Bot. 148. 1849.—*Colysis elliptica* var. *pothifolia* (Don) Ching, l.c. (1933) 334; Tard. & C. Chr. (1939-51) 498.

LOEY: north ridge of Phu Luang, mountain slope in dense evergreen forest, alt. 1100-1500 m, T-1322.

North India to South China and Taiwan, extending north to Southwest Japan through the Ryukyus, south to Indo-China, Thailand and the Philippines.

Leptochilus Kaulf.

1. **Leptochilus decurrens** Blume, Enum. Pl. Jav. 206. 1828; Ching, Bull. Fan Mem. Inst. Biol. 4: 345. 1933; Tard. & C. Chr. (1939-51) 502; Holtt. (1954) 165; Tagawa, J. Jap. Bot. 38: 328. 1963.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, muddy rock in ditch in dense evergreen forest, alt. 900-1200 m, T-3420. CHIANGMAI: Doi Chiangdao, moist rock in dense mixed forest, alt. 1900-2100 m, T-4209; Doi Suthep, rock by stream in evergreen forest, alt. ca. 1000 m, T-3870. LOEY: north ridge of Phu Luang, muddy rock in dense forest, alt. 1100-1500 m, T-1292; northeastern ridge of Phu Luang, muddy rock in dense forest, alt. 1300-1567 m, T-1513; Phu Kradung, rather

dry rock in deciduous forest, alt. ca. 1100 m, T-394, *ibid.*, rather wet muddy rock in dense forest, alt. ca. 1100 m, T-936.

South and Northeast India to South China and Taiwan, extending to Malaysia throughout and Polynesia.

Loxogramme (Blume) Presl

1. **Loxogramme involuta** (Don) Presl, *Tent. Pterid.* 215. 1836; Tard. & C. Chr. (1939-51) 464; Holtt. (1965) 230.

CHIANGMAI: Doi Chiangdao, mossy rock in dense forest, alt. 1600-2100 m, T-7512. India, Burma, northern Thailand and Indo-China.

2. **Loxogramme avenia** (Blume) Presl, *l.c.* (1836) 214; Tard. & C. Chr. (1939-51) 465; Holtt. (1954) 167.

TRANG: Khao Chong, mossy tree trunk in dense forest, alt. 100-600 m, T-6974, *ibid.*, rather dry mossy rock in dense forest, alt. 100-800 m, T-5571.

Western Malaysia, north to peninsular Thailand.

3. **Loxogramme chinensis** Ching, *Sinensia* 1: 13. 1929; Hu & Ching, *Icon. Fil. Sin.* 1: pl. 47. 1930; Tard. & C. Chr. (1939-51) 466.

CHIANGMAI: Doi Suthep, mossy tree trunk in evergreen forest, alt. 1000-1685 m, T-3195; Doi Inthanon, mossy tree trunk in dense forest, alt. 1350-1900 m, T-2663; southeastern slope of Doi Inthanon, interior of Ban Yang, alt. ca. 200 m, T-3017.

South and Southwest China, Tonkin, northern Thailand and Upper Burma.

4. **Loxogramme subecostata** (Hook.) C. Chr. *Gard. Bull. S.S.* 4: 405. 1929; Holtt. (1954) 169; Tagawa & K. Iwats. (1965) 76.

TRANG: Khao Chong, muddy rock in dense forest, alt. 100-800 m, T-5574.

Malay Peninsula and Sumatra to Borneo.

Polypodium L.

1. **Polypodium manmeiense** Christ, *Bull. Herb. Boiss.* 6: 870. 1898; Ching, *Contr. Inst. Bot. Nation. Acad. Peiping* 2: 41. 1933; Tard. & C. Chr. (1939-51) 535; Holtt. (1961) 21.

LOEY: northeastern ridge of Phu Luang, mossy tree trunk in forest, alt. 1300-1567 m, T-1507.

Sikkim, Burma, Yunnan, northern Thailand and Laos.

2. **Polypodium amoenum** Wall. ex Mett. *Abhandl. Senckenb. Naturforsch. Ges.* 2: 80. 1857; C. Chr. *Contr. U.S. Nat. Herb.* 26: 333. 1931; Ching, *l.c.* (1933) 43; Tard. & C. Chr. (1939-51) 536; Tagawa, *J. Jap. Bot.* 38: 325. 1963.

CHIANGMAI: Doi Suthep, tree trunk in mossy forest, alt. ca. 1600 m, T-3200; Doi Inthanon, mossy rock in dense forest, alt. 1350-1900 m, T-2651. LOEY: northeastern ridge of Phu Luang, mossy rock in moist dense forest, alt. 1300-1567 m, T-1495.

Himalayas through Burma and China to Taiwan, also in northern Thailand and

Indo-China.

3. **Polypodium microrhizoma** Clarke ex Baker in Hook. & Baker, Syn. Fil. ed. 2. 511. 1874; Ching, l.c. (1933) 47.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense forest, alt. 1900-2595 m, T-2898.

Himalayas to Upper Burma, Yunnan, Szechwan and Taiwan, also in northern Thailand.

4. **Polypodium beddomei** Baker in Hook. & Baker, l.c. (1874) 344, based on *Goniophlebium molle* Bedd. Ferns Brit. Ind. pl. 206. 1867; Ching, l.c. (1933) 50.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, muddy rock in mixed forest, alt. 600-1350 m, T-2430. LOEY: Phu Kradung, muddy rock near stream in forest, alt. ca. 1200 m, T-782.

Burma and Thailand.

5. **Polypodium argutum** Wall. ex Hook. Sp. Fil. 5: 32. 1863; C. Chr. Contr. U.S. Nat. Herb. 26: 333. 1931; Ching, l.c. (1933) 51; Tard. & C. Chr. (1939-51) 537.

CHIANGMAI: Doi Suthep, mossy tree trunk in evergreen forest, alt. 1000-1685 m, T-3196. LOEY: northeastern ridge of Phu Luang, mossy rock in dense forest, alt. 1300-1567 m, T-1493.

Himalayas to China and Taiwan, south to Thailand, Indo-China and the Philippines.

6. **Polypodium subauriculatum** Blume, Enum. Pl. Jav. 133. 1828; Ching, l.c. (1933) 51; Tard. & C. Chr. (1939-51) 538; Holtt. (1954) 207, (1961) 21, (1965) 232.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, mossy rock in light shade, alt. 900-1200 m, T-3440. LOEY: north ridge of Phu Luang, mossy rock in moist dense forest alt. 1100-1500 m, T-1294; Phu Kradung, mossy cliff in forest, alt. ca. 1200 m, T-787.

Sumatra to New Guinea and Australia, north to the Philippines, Yunnan and Northeast India.

7. **Polypodium persicifolium** Desv. Berl. Mag. 5: 316. 1811; Tard. & C. Chr. (1939-51) 537; Holtt. (1954) 206.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in light shade at ridge, alt. 680-950 m, T-4667, *ibid.*, mossy rock in dense evergreen forest, alt. 1100-1786 m, T-4786. TRANG: Khao Chong, tree trunk in dense forest at ridge, alt. 600-1100 m, T-6836.

Malaysia throughout, north to Annam and peninsular Thailand.

Aglaomorpha Schott emend. Copel. (1929)

1. **Aglaomorpha coronans** (Wall. ex Mett.) Copel. Univ. Calif. Publ. Bot. 16: 117. 1929; Tard. & C. Chr. (1939-51) 488; Holtt. (1961) 21; Tagawa, J. Jap. Bot. 38: 328.

1963.—*Pseudodrynaria coronans* (Wall. ex Mett.) Ching, *Sunyatsenia* 6: 10. 1941; Holtt. (1965) 231.

LOEY: eastern slope of Phu Luang, tree trunk in evergreen forest, alt. 900-1400 m, T-1830; Phu Kradung, muddy rock in dense forest, alt. ca. 1000 m, T-378, *ibid.*, dry rock in thin forest, alt. ca. 1000 m, T-387, *ibid.*, dry rock in deciduous forest, alt. ca. 1000 m, T-398. CHANTABURI: Khao Soidao, rather dry rock in dense mixed forest, alt. 700-1525 m, T-7174. NAKAWN SRITAMARAT: Khao Luang, rather dry rock in dense forest, alt. 950-1100 m, T-4699, eastern slope of Khao Luang, fallen tree trunk in dense evergreen forest, alt. ca. 1000 m, T-5286. TRANG: Khao Chong, tree trunk in dense forest, alt. 600-1100 m, T-6817.

Himalayas to South China, Taiwan and Okinawa Island of the Ryukyus, south to Cochin-China and peninsular Thailand.

Photinopteris Presl

1. **Photinopteris speciosa** (Blume) Presl, *Epim. Bot.* 264. 1849; Tard. & C. Chr. (1939-51) 502; Holtt. (1954) 187.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, muddy trunk of fallen tree in dense evergreen forest, alt. ca. 1000 m, T-5280.

Indo-China, Malay Peninsula, Sumatra to the Philippines.

Rhizome carnose, greenish, and glaucous, to 2.5 cm in diameter, but only 1 cm thick or less when dried.

Drynaria J. Smith

1. **Drynaria sparsisora** (Desv.) Moore, *Ind. Fil.* 348. 1862; Holtt. (1954) 183, (1965) 231, Tagawa & K. Iwats. (1965) 78.

NAKHON NAYOK: between log cabin and Hiewesai Waterfall, Khao Yai National Park, tree trunk in light shade, alt. ca. 800 m, T-7435. TRANG: Khao Chong, mossy tree trunk in dense forest, alt. 100-600 m, T-6972.

Ceylon, Thailand, Cambodia, through Malaysia to Polynesia and tropical Australia.

2. **Drynaria bonii** Christ, *Notul. Syst.* 1: 186. 1910; Tard. & C. Chr. (1939-51) 517; Holtt. (1961) 20, (1965) 231; Tagawa, *J. Jap. Bot.* 38: 329. 1963.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry rock in deciduous forest, alt. ca. 350 m, T-2259. PHITSANULOK: Tung Salaeng Luang National Park, muddy crevices of rock in light shade, alt. 300-600 m, T-2032. LOEY: from Ban Na Luang to north ridge of Phu Luang, rock in mixed forest, alt. ca. 800 m, T-1116; Phu Kradung, mossy rock in dense forest, alt. ca. 1000 m, T-383.

Kweichow, Indo-China and Thailand.

The rhizome of this species is peculiar in alternately arranging parts of different kinds, one being compressed, to 15 cm long by 3 cm wide and bearing several

adpressed imbricate nest-leaves, the other terete, 2-3 cm long, 1 cm thick and bearing 2-3 foliage leaves.

3. **Drynaria quercifolia** (L.) J. Smith, *J. Bot.* **3**: 398. 1841; *C. Chr. Contr. U.S. Nat. Herb.* **26**: 335. 1931; *Tard. & C. Chr.* (1939-51) 518; *Holtt.* (1954) 182, (1965) 231; Tagawa & K. Iwats. (1965) 79.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry rock in light shade, alt. 300-600 m, T-2027.

India to Thailand, Indo-China, Hainan, through Malaysia to Fiji and tropical Australia.

4. **Drynaria propinqua** (Wall. ex Mett.) J. Smith apud *Bedd. Ferns Brit. India* **2**: t. 160. 1866; *C. Chr. Contr. U.S. Nat. Herb.* **26**: 334. 1931; *Tard. & C. Chr.* (1939-51) 521; *Holtt.* (1961) 20; Tagawa, *J. Jap. Bot.* **38**: 329. 1963.

CHIANGMAI: Doi Chiangdao, tree trunk in rather dry mixed forest, alt. 500-1600 m, T-4073.

North India, Burma, South China, northern Thailand, Laos and Tonkin, also reported from Java.

5. **Drynaria rigidula** (Sw.) *Bedd. Ferns Brit. India* **2**: t. 314. 1869; *Tard. & C. Chr.* (1939-51) 521; *Holtt.* (1954) 183, (1961) 20, (1965) 231.

CHIANGMAI: en route from Mae Klang Waterfall to Ban Yang, muddy rock in mixed forest, alt. 350-600 m, T-2359; Ban Yang, at middle elevation of Doi Inthanon, tree trunk in rather dense mixed forest, alt. 600-1350 m, T-2433. LOEY: eastern slope of Phu Luang, muddy crevices of exposed rock in forest, alt. 900-1400 m, T-1841; Phu Kradung, dry cliff in open place, alt. 1100-1200 m, T-586.

Thailand, Indo-China, through Malaysia to Polynesia and tropical Australia.

Crypsinus Presl

1. **Crypsinus griffithianus** (Hook.) Copel. *Gen. Fil.* 206. 1947; Tagawa, *J. Jap. Bot.* **38**: 330. 1963.—*Phymatodes griffithiana* (Hook.) Ching, *Contr. Inst. Bot. Nat. Acad. Peiping* **2**: 71. 1933; *Tard. & C. Chr.* (1939-51) 472.

CHIANGMAI: Doi Chiangdao, rock in light shade, alt. 1600-2100 m, T-4204; Doi Inthanon, mossy tree trunk in forest at ridge, alt. 1350-1900 m, T-2662 bis; southeastern slope of Doi Inthanon, mossy tree trunk in dense forest at ridge, alt. ca. 2200 m, T-3016.

Himalayas, Burma, Southwest China, northern Thailand, Tonkin and Annam.

2. **Crypsinus rhynchophyllus** (Hook.) Copel. *l.c.* (1947) 206; *Holtt.* (1961) 21; Tagawa, *l.c.* (1963) 330.—*Polypodium rhynchophyllum* Hook.; *C. Chr. Contr. U.S. Nat. Herb.* **26**: 334. 1931.—*Phymatodes rhynchophylla* (Hook.) Ching, *l.c.* (1933) 69; *Tard. & C. Chr.* (1939-51) 471.

CHIANGMAI: Doi Suthep, mossy tree trunk in evergreen forest, alt. 1000-1685 m,

T-3197; Doi Inthanon, mossy tree trunk in forest at ridge, alt. 1350-1900 m, T-2662. LOEY: north ridge of Phu Luang, tree trunk in not so dense forest, alt. 1100-1500 m, T-1317; eastern slope of Phu Luang, mossy tree trunk in not so dense forest, alt. 900-1400 m, T-1827; northeastern ridge of Phu Luang, tree trunk in forest, alt. 1300-1567 m, T-1511, T-1511 bis. CHANTABURI: Khao Soidao, mossy rock in forest at ridge, alt. 700-1525 m, T-7164.

Assam to Southwest China, Tonkin, Annam, Laos and Thailand.

3. **Crypsinus trilobus** (Houtt.) Copel. l.c. (1947) 206; Holtt. (1954) 197.—*Phymatodes triphylla* (Jacq.) C. Chr. & Tard.; Tard. & C. Chr. (1939-51) 470.

NAKAWN SRITAMARAT: Khao Luang, mossy trunk of fallen tree in clearing at ridge, alt. ca. 1500 m, T-4776.

Laos and Annam, Malay Peninsula, Sumatra, Java, Borneo and the Philippines.

4. **Crypsinus oxylobus** (Wall. ex Kunze) Sledge, Bull. Brit. Mus. (Nat. Hist.) Bot. 2: 145. 1960.—*Polypodium oxylobum* Wall. ex Kunze; C. Chr. Contr. U.S. Nat. Herb. 26: 334. 1931.—*Phymatodes oxyloba* (Wall. ex Kunze) Presl ex Ching, l.c. (1933) 67; Tard. & C. Chr. (1939-51) 474.

LOEY: northeastern ridge of Phu Luang, tree trunk in dense forest, alt. 1300-1567 m, T-1518.

North India, Burma, Yunnan, northern Thailand, Tonkin, Annam and Cambodia.

5. **Crypsinus ebenipes** (Hook.) Copel. l.c. (1947) 206.—*Phymatodes ebenipes* (Hook.) Ching, l.c. (1933) 86.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense forest, alt. 1900-2595 m, T-2894.

Himalayas to Yunnan, also in northern Thailand.

6. **Crypsinus laciniatus** (Presl) Holtt. (1954) 198, (1961) 21.

NAKAWN SRITAMARAT: Khao Luang, trunk of fallen tree in clearing at ridge, alt. ca. 1500 m, T-4802, T-4802 bis.

Western Malaysia, north to peninsular Thailand.

Arthromeris J. Smith

1. **Arthromeris lehmannii** (Mett.) Ching, Contr. Inst. Bot. Nat. Acad. Peiping 2: 96. 1933.—*Polypodium lehmannii* Mett.; C. Chr. Contr. U.S. Nat. Herb. 26: 334. 1931.

CHIANGMAI: Doi Inthanon, on moist mossy rock in dense forest, alt. 1900-2595 m, T-2882; southeastern slope of Doi Inthanon, mossy tree trunk in dense forest at ridge, alt. ca. 2200 m, T-3015.

Himalayas, Assam, Upper Burma, South and Southwest China, Taiwan and northern Thailand.

2. **Arthromeris amplexifolia** (Christ) Ching, l.c. (1933) 94; Tagawa, J. Jap. Bot. 38: 330. 1963.

NAKAWN SRITAMARAT: Khao Luang, evergreen forest, alt. ca. 1500 m, T-7514 (cultivated at Kyoto).

Laos, Annam and Thailand.

3. **Arthromeris phluangensis** Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 100. 1967.

LOEY: Phu Luang, mossy rock in moist forest, alt. ca. 1400 m, T-1488.

Endemic.

GRAMMITIDACEAE

Grammitis Sw.

1. **Grammitis hirtella** (Blume) Tuyama, Bot. Mag. Tokyo 51: 125. 1937; Tard. & C. Chr. (1939-51) 523; Copel. Phil. J. Sci. 80: 226. 1952; Holtt. (1954) 216.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 1500-1700 m, T-4797.

South China to western Malaysia.

2. **Grammitis dorsipila** (Christ) C. Chr. & Tard. Notul. Syst. 8: 179. 1939; Tard. & C. Chr. (1939-51) 524; Copel. l.c. (1952) 234.

NAKHON NAYOK: near Hiew sai Waterfall, Khao Yai National Park, mossy tree trunk in light shade along river, alt. ca. 800 m, T-7425.

South China, Indo-China, north to South Japan.

3. **Grammitis jagoriana** (Mett.) Tagawa, Acta Phytotax. Geobot. 10: 284. 1941; Copel. l.c. (1952) 225.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest at ridge, alt. 1400-1700 m, T-4797 ter.

Peninsular Thailand, Borneo, the Philippines, Taiwan and Celebes.

4. **Grammitis bongoensis** (Copel.) Copel. l.c. (1952) 232.

LOEY: eastern slope of Phu Luang, mossy rock by stream in dense evergreen forest, alt. ca. 1200 m, T-1825.

Sarawak and northeastern Thailand.

5. **Grammitis setosa** Blume, Enum. Pl. Jav. 116. 1828; Copel. l.c. (1952) 241.

CHANTABURI: Khao Soidao, mossy tree trunk in dense forest, alt. ca. 1500 m, T-7156. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense primitive forest at ridge, alt. 1200-1600 m, T-4797 bis.

Malaysia generally, north to Taiwan.

Xiphopteris Kaulf.

1. **Xiphopteris** sp. aff. *X. hieronymi* (C. Chr.) Holtt.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest at ridge, alt. 1200-1600 m, T-4825, T-4826 bis, T-4826 ter.

Calymmodon Presl

1. **Calymmodon cucullatus** (Nees & Blume) Presl, Tent. Pterid. 204. 1836; Copel. Phil. J. Sci. 34: 261. 1927; Holtt. (1954) 220.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest at ridge, alt. 1100-1786 m, T-4825 bis.

Ceylon, Malay Peninsula to Australia through Malaysia.

2. **Calymmodon asiaticus** Copel. Phil. J. Sci. 38: 154. 1929; Tard. & C. Chr. (1939-51) 526.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, muddy rock in spraying stream-bed in dense forest, alt. ca. 900 m, T-5279.

Peninsular Thailand and Annam.

Acrosorus Copel.

1. **Acrosorus triangularis** (Scort.) Copel. Phil. J. Sci. 3C: 347. 1909; Holtt. (1954) 222.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense primitive forest at ridge, alt. 1300-1600 m, T-4826.

Malay Peninsula, Borneo and the Philippines.

Ctenopteris Blume

1. **Ctenopteris tenuisecta** (Blume) J. Smith, Hist. Fil. 185. 1875; Holtt. (1954) 226.

NAKAWN SRITAMARAT: Khao Luang, cleyey path-side in dense mossy forest, alt. ca. 1500 m, T-4846.

Sumatra and Malay Peninsula, Java, north to the Philippines and Taiwan, also reported for New Guinea and Samoa.

2. **Ctenopteris moultonii** (Copel.) C. Chr. & Tard. Notul. Syst. 8: 181. 1939; Tard. & C. Chr. (1939-51) 534; Holtt. (1954) 229.

TRANG: Khao Chong, mossy tree trunk in dense forest at ridge, alt. 600-1100 m, T-6828.

Sumatra, Malay Peninsula and Borneo, also in Indo-China.

3. **Ctenopteris subfalcata** (Blume) Kunze, Bot. Zeit. 6: 120. 1848.—*Ctenopteris subminuta* (v.A.v. Ros.) Holtt. (1954) 228.

CHIANGMAI: Doi Inthanon, mossy tree trunk in forest at ridge, alt. ca. 1400 m, T-2639.

Ceylon, Sumatra, Java, Borneo, North India, South China and Taiwan.

Prosaptia Presl

1. **Prosaptia khasyana** (Hook.) C. Chr. & Tard. Notul. Syst. 8: 180. 1939; Tard. & C. Chr. (1939-51) 531.—*Ctenopteris khasyana* (Hook.) Holtt. (1954) 233.

LOEY: north ridge of Phu Luang, muddy rock in dense evergreen forest, alt. 1100-1500 m, T-1305; Phu Kradung, on cliff in dense forest, alt. 1100-1200 m, T-598.

Himalayas to western Malaysia.

2. **Prosaptia alata** (Blume) Christ, Ann. Jard. Bot. Buit. II, 5: 127. 1905. —
Ctenopteris alata (Blume) Holtt. (1954) 232.

TRANG: Khao Chong, mossy tree trunk in dense mossy forest at ridge, alt. 400–1000 m, T-6708, T-6825, T-6973.

Widely distributed in the tropics of Asia, from Ceylon to Polynesia.

3. **Prosaptia contigua** (Forst.) Presl, Tent. Pterid. 166. 1836. —*Ctenopteris contigua* (Forst.) Holtt. (1954) 230.

NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense mossy forest at ridge, alt. 1200–1500 m, T-4821, T-4821 bis.

Tropics of Asia.

4. **Prosaptia obliquata** (Blume) Mett. Reise Oest. Freg. Nov. Bot. 1: 214. 1870. —
Ctenopteris obliquata (Blume) Tagawa; Holtt. (1954) 229.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest at ridge, alt. 1200–1600 m, T-4822.

Tropics of Asia, from Ceylon to New Guinea.

Scleroglossum v.A.v. Ros.

1. **Scleroglossum pusillum** (Blume) v.A.v. Ros. Bull. Jard. Bot. Buit. II, 7: 39. 1912; C. Chr. Dansk Bot. Ark. 6(3): 27. 1929; Tard. & C. Chr. (1939–51) 524; Holtt. (1954) 234.

NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense mossy forest, alt. 1100–1600 m, T-4827 bis.

Malaysia throughout, north to Thailand, Annam, Hainan and Taiwan.

2. **Scleroglossum minus** (Fée) C. Chr. l.c. (1929) 29; Holtt. (1954) 236.

LOEY: from Ban Na Luang to north ridge of Phu Luang, mossy rock in dense forest, alt. ca. 900 m, T-1083; northeastern ridge of Phu Luang, mossy tree trunk in forest at ridge, alt. ca. 900 m, T-1506. NAKAWN SRITAMARAT: Khao Luang, tree trunk in dense mossy forest at ridge, alt. 1100–1786 m, T-4827.

Amboina, Malaya, Thailand, Borneo and the Philippines.

THELYPTERIDACEAE

Thelypteris Schmid.

1. **Thelypteris singalanensis** (Baker) Ching, Bull. Fan Mem. Inst. Biol. 6: 334. 1936; Tard. & C. Chr. (1939–51) 365; Holtt. (1954) 243.

PHITSANULOK: Tung Salaeng Luang National Park, mountain slope near stream in light shade, alt. 300–600 m, T-2019. NAKAWN SRITAMARAT: Khao Luang, mountain slope in evergreen forest, alt. ca. 1500 m, T-4782.

Annam, Malaya, Sumatra and Borneo.

2. ***Thelypteris torresiana*** (Gaud.) Alston, *Lilloa* **30**: 111. 1960; K. Iwats. *J. Jap. Bot.* **38**: 314. 1963; Tagawa & K. Iwats. (1965) 78.—*Thelypteris uliginosa* (Kunze) Ching, l.c. (1936) 342; Tard. & C. Chr. (1939-51) 371; Holtt. (1954) 241, (1965) 232.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, sunny slope along road at edge of forest, alt. ca. 350 m, T-2251.

Throughout tropical Asia, north to Japan and south to Australia.

3. ***Thelypteris ornata*** (Wall. ex Bedd.) Ching, l.c. (1936) 346.

CHANTABURI: Khao Soidao, cleyey ground by stream in open place, alt. ca. 600 m, T-7317.

Himalayas, South India, and Taiwan.

4. ***Thelypteris immersa*** (Blume) Ching, l.c. (1936) 306; Holtt. (1954) 243, (1961) 22.

CHANTABURI: Khao Soidao, rather dry slope in dense evergreen forest, alt. ca. 1300 m, T-7200. TRANG: Khao Chong, rather dry bank of path in light shade, alt. ca. 200 m, T-6980.

Malaysia and Hainan.

5. ***Thelypteris viscosa*** (J. Smith) Ching, l.c. (1936) 315; Holtt. (1954) 252.

NAKAWN SRITAMARAT: Khao Luang, cleyey slope in dense evergreen forest near summit, alt. ca. 1750 m, T-4788.

Malay Peninsula, Sumatra and Borneo.

6. ***Thelypteris hirsutipes*** (Clarke) Ching, l.c. (1936) 314.

LOEY: north ridge of Phu Luang, mountain slope in evergreen forest, alt. 1100-1500 m, T-1264; Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-615. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. 1100-1786 m, T-4791.

Sikkim Himalaya and Southwest China, south to Thailand.

The identification of the above specimens to this species is rather tentative. They differ to some extent from each other, too.

7. ***Thelypteris cylindrothrix*** (Rosenst.) K. Iwats. in Hara, *Flora East. Himal.* **482**, 1966.—*Cyclosorus cylindrothrix* (Rosenst.) Ching, *Bull. Fan Mem. Inst. Biol.* **8**: 199. 1938; Holtt. (1961) 22.—*Dryopteris procurrens* auct. non (Mett.) O. Ktze.; C. Chr. *Contr. U.S. Nat. Herb.* **26**: 330. 1931.

CHIANGMAI: Doi Chiangdao, dry mountain slope in mixed forest, alt. ca. 600 m, T-4076; Doi Suthep, rather dry mountain slope in forest, alt. ca. 1000 m, T-3449, T-3955; en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Intanon, rather dry ground along path in light shade, alt. ca. 500 m, T-2360. LOEY: from Ban Na Luang to north ridge of Phu Luang, dry slope in deciduous forest, alt. ca. 600 m, T-1099, *ibid.*, alt. ca. 800 m, T-1113; Phu Kradung, rather dry floor of

mountain forest, alt. ca. 900 m, T-373.

Sikkim Himalayas and Southwest China, south to Thailand.

8. **Thelypteris siamensis** Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 101. 1967.

LOEY: north ridge of Phu Luang, terrestrial on mountain slope by stream in dense evergreen forest, alt. ca. 1400 m, T-1277.

Endemic so far to the place cited above.

9. **Thelypteris parasitica** (L.) Fosberg, Occ. Pap. Bishop Mus. 23: 30. 1962; K. Iwats. J. Jap. Bot. 38: 315. 1963; Tagawa & K. Iwats. (1965) 79.—*Cyclosorus parasiticus* (L.) Farw.; Ching, l.c. (1938) 201; Tard. & C. Chr. (1939-51) 381; Holtt. (1954) 281.

CHIANGMAI: Doi Suthep, rather dry bank of path in light shade, alt. 1350-1500 m, T-4494; near Mae Klang Waterfall, interior of Chom Thong, dry slope in deciduous forest along river, alt. ca. 350 m, T-2254. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in open place, alt. 300-600 m, T-2024. LOEY: Phu Kradung, rather dry slope along path in evergreen forest, alt. ca. 1000 m, T-937.

Tropics and subtropics of East Asia.

10. **Thelypteris dentata** (Forsk.) St. John, Amer. Fern J. 26: 44. 1936; Tagawa & K. Iwats. (1965) 79.—*Cyclosorus dentatus* (Forsk.) Ching, l.c. (1938) 206; Holtt. (1961) 22, (1965) 233.

CHIANGMAI: Mae Klang Waterfall, interior of Chom Thong, dry slope along stream in deciduous forest, alt. ca. 350 m, T-2255. PHITSANULOK: Tung Salaeng Luang National Park, rather dry bank along path in open place, alt. 300-600 m, T-2036. LOEY: en route from Nam Thop to Ban Na Luang, eastern foot of Phu Luang, along path in shade, alt. 300-400 m, T-1988; Pha Nuk Khao, grassy ground along stream in dry deciduous forest, alt. ca. 300 m, T-308. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at lower elevation of Khao Luang, dry ground in light shade or in open place, alt. 400-700 m, T-4521, T 4522.

Pantropics.

11. **Thelypteris subpubescens** (Blume) K. Iwats. Mem. Coll. Sci. Univ. Kyoto, B, 31: 173. 1965.—*Cyclosorus subpubescens* (Blume) Ching, l.c. (1938) 211; Holtt. (1954) 273.—*Cyclosorus parasiticus* var. *subpubescens* (Blume) Tard. & C. Chr.; Tard. & C. Chr. (1939-51) 382.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry wayside in light shade, alt. 900-1200 m, T-3430. CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, rather dry ground in sunny place at edge of forest, alt. 600-1350 m, T-2418, T-2429. CHANTABURI: Khao Soidao, rather dry mountain slope in dense forest, alt. 200-700 m, T-7106.

Asian tropics to Queensland, north to Japan.

In T-3430 lower reduced pinnae are more than ten in pairs and both surfaces are almost glabrous except costae and veins.

12. ***Thelypteris sumatrana*** (v.A.v. Ros.) K. Iwats. Acta Phytotax. Geobot. **22**: 101. 1967.—*Cyclosorus sumatranus* (v.A.v. Ros.) Ching, Bull. Fan Mem. Inst. Biol. **10**: 249. 1941; Holtt. (1954) 275, (1965) 233.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 700 m, T-5306.

Indo-China to Malaysia through Malay Peninsula.

13. ***Thelypteris latipinna*** (Hook.) K. Iwats. Acta Phytotax. Geobot. **23**: 166. 1965.—*Cyclosorus latipinnus* (Hook.) Tard. Notul. Syst. **7**: 73. 1938; Tard. & C. Chr. (1939-51) 397; Holtt. (1954) 276.

NAKHON NAYOK: Khao Yai National Park, rather dry ground along river in light shade, alt. ca. 800 m, T-7384. TRANG: Khao Chong National Park, sandy slope in light shade, alt. ca. 100 m, T-5489.

Tropics of Asia.

14. ***Thelypteris subelata*** (Baker) K. Iwats. J. Jap. Bot. **38**: 315. 1963; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus subelatus* (Baker) Ching, l.c. (1938) 224.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry bank of road in sunny place, alt. 900-1200 m, T-3438. CHIANGMAI: Doi Suthep, mountain slope in dense forest, alt. 1000-1150 m, T-3943, T-3954; en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, mountain slope along path in mixed forest, alt. 350-600 m, T-2365. LOEY: Phu Kradung, dry slope along mountain path in light shade, alt. ca. 800 m, T-399. CHANTABURI: Khao Soidao, rather dry slope in dense mixed forest, alt. 700-1525 m, T-7197.

South China, Upper Burma and Thailand.

15. ***Thelypteris evoluta*** (Clarke) Tagawa & K. Iwats. Acta Phytotax. Geobot. **22**: 101. 1967.—*Cyclosorus evolutus* (Clarke) Ching, l.c. (1938) 219.

LOEY: north ridge of Phu Luang, dense evergreen forest, alt. 1100-1500 m, T-1275.

Assam and northern Thailand.

16. ***Thelypteris hirtisora*** (C. Chr.) K. Iwats. J. Jap. Bot. **38**: 314. 1963.—*Dryopteris hirtisora* C. Chr. Contr. U.S. Nat. Herb. **26**: 277, 330. 1931.—*Cyclosorus hirtisorus* (C. Chr.) Ching, l.c. (1938) 221.—*Cyclosorus validus* (Christ) Tard.; Tard. & C. Chr. (1939-51) 398, p.p.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry mountain slope in mixed forest, alt. 900-1200 m, T-3432. CHIANGMAI: Doi Suthep, rather dry slope in mixed forest, alt. ca. 1000 m, T-3946, *ibid.*, moist ground in evergreen for-

est, alt. ca. 1000 m, T-3950; Ban Yang, at middle elevation of Doi Inthanon, rather dry ground in sunny place at edge of forest, alt. 600-1350 m, T-2429 bis; en route from Ban Yang to Mae Klang Waterfall, rather dry slope along river in shade, alt. ca. 900 m, T-3169. LOEY: from Ban Na Luang to north ridge of Phu Luang, mountain slope in mixed forest, alt. ca. 900 m, T-1105.

South China, Upper Burma, northern Thailand and Indo-China.

17. **Thelypteris valida** (Christ) Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 101. 1967.—*Cyclosorus validus* (Christ) Tard. ex C. Chr. & Tard. Notul. Syst. 7: 78. 1938, excl. syn. *D. hirtisora*; Tard. & C. Chr. (1939-51) 398; Ching, l.c. (1938) 221.

CHIANGMAI: Doi Suthep, dry mountain slope in mixed forest, alt. ca. 1100 m, T-3963.

Tonkin and northern Thailand.

The above two species seem to be closely related to each other and Tardieu-Blot united the two into a single species. As noted by Ching appropriately, the distinction is found in the presence of the lower reduced pinnae in the latter species. Three to five pairs of reduced lower pinnae and the following narrower ones may sufficiently distinguish the latter from the former species.

18. **Thelypteris crassifolia** (Blume) Ching, l.c. (1936) 285; Holtt. (1954) 246.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1400 m, T-4783.

Malay Peninsula and western Malaysia throughout.

19. **Thelypteris repens** (Hope) Ching, l.c. (1936) 304.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, wet sandy ground by stream in light shade, alt. ca. 1000 m, T-3446 bis. CHIANGMAI: en route from Ban Yang to Mae Klang Waterfall, rather dry ridge between rice fields, alt. ca. 900 m, T-3164.

Himalayas, Southwest China, northern Thailand and Tonkin.

20. **Thelypteris xylodes** (Kunze) Ching, l.c. (1936) 296; Tard. & C. Chr. (1939-51) 357.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, wet sandy ground by stream in light shade, 900-1200 m, T-3436, T-3443, T-3446. CHIANGMAI: en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, wet sandy stream-bed in light shade, alt. 350-600 m, T-2361; en route from Ban Yang to Mae Klang Waterfall, rather dry ground at edge of forest, alt. ca. 1300 m, T-3165.

India, Ceylon, South and Southwest China, northern Thailand and Annam.

21. **Thelypteris tuberculifera** (C. Chr.) Ching, l.c. (1936) 295; Tagawa & K. Iwats. (1965) 78.—*Dryopteris tuberculifera* C. Chr. Contr. U.S. Nat. Herb. 26: 275. 1931.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, sandy ground along stream in light shade, alt. ca. 900 m, T-3435.

Assam, Yunnan and northern Thailand.

22. **Thelypteris ciliata** (Wall. ex Benth.) Ching, l.c. (1936) 289; Holtt. (1954) 250, (1961) 22; Tagawa & K. Iwats. (1965) 78.

CHIANGRAI: northern slope of Doi Pacho, wet sandy ground by stream in dense forest, alt. ca. 1350 m, T-3691. CHIANGMAI: Doi Suthep, by stream in dense forest, alt. 1000-1150 m, T-3855, T-3956; Doi Inthanon, muddy wet rock in stream-bed in evergreen forest, alt. ca. 1500 m, T-2638; southeastern slope of Doi Inthanon, interior of Ban Yang, wet ground by stream in dense forest, alt. ca. 1600 m, T-3022. NAKAWN SRITAMARAT: eastern slope of Khao Luang, moist rock in stream-bed in dense evergreen forest, alt. ca. 800 m, T-5300.

Nepal to western Malaysia.

23. **Thelypteris crinipes** (Hook.) K. Iwats. J. Jap. Bot. 38: 315. 1963; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus crinipes* (Hook.) Ching, l.c. (1938) 179.

CHIANGMAI: Mae Klang Waterfall, interior of Chom Thong, rather wet slope by stream in dry deciduous forest, alt. ca. 350 m, T-2261; Ban Yang, at middle elevation of Doi Inthanon, mountain slope by stream in deep shade, alt. 600-1350 m, T-2419.

Himalayas, Southwest China to northern Thailand, also in Malacca.

24. **Thelypteris arida** (Don) Morton, Amer. Fern J. 49: 113. 1959; K. Iwats. J. Jap. Bot. 38: 314. 1963.—*Cyclosorus aridus* (Don) Ching, l.c. (1938) 194; Tard. & C. Chr. (1939-51) 395; Holtt. (1954) 259, (1961) 22.

CHIANGMAI: Doi Suthep, open grassy swamp, alt. ca. 1000 m, T-3940; Ban Yang, at middle elevation of Doi Inthanon, cleyey bank of ditch along path in open place, alt. 600-1350 m, T-2431.

India to western Malaysia, Hongkong and Taiwan.

25. **Thelypteris gongylodes** (Schkuhr) Small, Ferns S.E. States 248. 1938; Tagawa & K. Iwats. (1965) 79.—*Cyclosorus gongylodes* (Schkuhr) Link; Tard. & C. Chr. (1939-51) 383; Holtt. (1954) 261, (1961) 23.

CHIANGMAI: Mae Klang Waterfall, interior of Chom Thong, grassy bank along stream in open place, alt. ca. 350 m, T-2258.

Pantropic.

26. **Thelypteris interrupta** (Willd.) K. Iwats. J. Jap. Bot. 38: 314. 1963; Tagawa & K. Iwats. (1965) 79.—*Cyclosorus interruptus* (Willd.) H. Ito; Ching, l.c. (1938) 184 cum var. *hirsutus* Ching, l.c. 186; Tard. & C. Chr. (1939-51) 397; Holtt. (1954) 262, (1961) 23.—*Dryopteris pteroides* (Sw.) O. Ktze. p.p.; C. Chr. Contr. U.S. Nat. Herb. 26: 184. 1931.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, open mountain slope, alt. 900-1200 m, T-3442. CHIANGMAI: Doi Chiangdao, dry mountain slope in deciduous forest, alt. ca. 700 m, T-4415. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2029. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry slope in deciduous forest, alt. ca. 600 m, T-1108; Phu Kradung, dry mountain slope in half shaded place, alt. ca. 900 m, T-384; Pha Nuk Khao, rather dry ground in deciduous forest, alt. ca. 300 m, T-307. CHANTABURI: Khao Soidao, rather dry ground in dense mixed forest, alt. 200-700 m, T-7322. NAKAWN SRITAMARAT: eastern slope of Khao Luang, rather dry slope in half shaded place, alt. ca. 400 m, T-5299.

Tropical Asia to Queensland.

27. **Thelypteris extensa** (Blume) Morton, Amer. Fern J. **49**: 113. 1959; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus extensus* (Blume) Ching, l.c. (1938) 182; Holtt. (1954) 264, (1961) 23, (1965) 232.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, sandy mountain slope in light shade, alt. ca. 500 m, T-5308. TRANG: Khao Chong National Park, mountain slope in light shade, alt. ca. 100 m, T-5490.

Ceylon to western Malaysia.

28. **Thelypteris polycarpa** (Blume) K. Iwats. Mem. Coll. Sci. Univ. Kyoto, B, **31**: 32. 1964; Tagawa & K. Iwats. (1965) 78.—*Cyclosorus polycarpus* (Blume) Holtt. (1954) 283.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at foot of Khao Luang, rather dry ground in open place, alt. ca. 150 m, T-4516. TRANG: Khao Chong, rather dry ground by road in sunny place, alt. ca. 100 m, T-6986.

Malaysia.

29. **Thelypteris truncata** (Poir.) K. Iwats. Mem. Coll. Sci. Univ. Kyoto B, **31**: 33. 1964; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus truncatus* (Poir.) Farw.; Holtt. (1954) 266, (1961) 23.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, wet ground along stream in light shade, alt. ca. 1000 m, T-3445. CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3842, T-3854, *ibid.*, rather dry mountain slope in mixed forest, alt. 1000-1150 m, T-3962; near Mae Klang Waterfall, interior of Chom Thong, rather wet ground by deciduous forest, alt. ca. 350 m, T-2253. PHITSANULOK: Tung Salaeng Luang National Park, rather wet ground by stream in light shade, alt. 300-600 m, T-2037. LOEY: north ridge of Phu Luang, wet ground by stream in dense forest, alt. 1100-1500 m, T-1266. CHANTABURI: Khao Soidao, rather dry ground in dense mixed forest, alt. 200-700 m, T-7323. TRANG: Khao Chong, moist mountain forest along stream in light shade, alt. ca. 100 m, T-5492.

Pantropic.

30. **Thelypteris megaphylla** (Mett.) K. Iwats. Mem. Coll. Sci. Univ. Kyoto B, 31: 34. 1964; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus megaphyllus* (Mett.) Ching, l.c. (1938) 225; Holtt. (1954) 268.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at foot of Khao Luang, moist slope in dense evergreen forest, alt. ca. 200 m, T-4515.

Malaysia.

31. **Thelypteris triphylla** (Sw.) K. Iwats. Mem. Coll. Sci. Univ. Kyoto B, 31: 190. 1965.—*Cyclosorus triphyllus* (Sw.) Tard.; Tard. & C. Chr. (1939-51) 386.—*Abacopteris triphylla* (Sw.) Ching, l.c. (1938) 241; Holtt. (1954) 287.

LOEY: Phu Kradung, rather dry slope near stream in forest, alt. 1100-1200 m, T-611. NAKHON NAYOK: Khao Yai National Park, rather dry bank of river in light shade, alt. ca. 800 m, T-7382.

Tropical Asia, extending south to Australia, north to South Japan.

Var. **parishii** (Bedd.) K. Iwats. Mem. Coll. Sci. Univ. Kyoto B, 31: 191. 1965.—*Cyclosorus parishii* (Bedd.) Tard.; Tard. & C. Chr. (1939-51) 387.—*Abacopteris triphylla* var. *parishii* (Bedd.) Ching, l.c. (1938) 242; Holtt. (1954) 287.

NAKHON NAYOK: Khao Yai National Park, rather dry bank of river in light shade, alt. ca. 800 m, T-7386.

India, Burma, Thailand, Indo-China, Malaya, Taiwan and the Ryukyus.

32. **Thelypteris rubra** (Ching) K. Iwats. J. Jap. Bot. 38: 315. 1963; Tagawa & K. Iwats. (1965) 81.—*Abacopteris rubra* (Ching) Ching, l.c. (1938) 245; Holtt. (1961) 23.

CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3851; Ban Yang, at middle elevation of Doi Inthanon, mountain slope along stream in shade, alt. 600-1350 m, T-2411. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in mountain slope, alt. 300-600 m, T-2038. LOEY: north ridge of Phu Luang, by stream in dense evergreen forest, alt. 1100-1500 m, T-1296.

Himalayas to Southwest China and Tonkin, also in Thailand.

Var. **hirsuta** (Ching) comb. nov.—*Abacopteris rubra* var. *hirsuta* Ching, l.c. (1938) 248.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, floor of thin forest, alt. ca. 900 m, T-2412.

Kwangtung and Burma, also in northern Thailand.

33. **Thelypteris multilineata** (Wall. ex Hook.) Morton, Am. Fern J. 49: 113. 1959; K. Iwats. J. Jap. Bot. 38: 315. 1963; Tagawa & K. Iwats. (1965) 80.—*Cyclosorus multilineatus* (Wall. ex Hook.) Tard. & C. Chr. (1939-51) 388.—*Abacopteris multilineata* (Wall. ex Hook.) Ching, l.c. (1938) 253; Holtt. (1954) 297, (1961) 23, (1965)

233.—*Dryopteris moulemeinensis* (Bedd.) C. Chr.; C. Chr. Contr. U.S. Nat. Herb. 26: 330. 1931.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, along path in light shade, alt. 900-1200 m, T-3439. CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, rather dry ground along path in light shade, alt. 600-1350 m, T-2420. PHITSANULOK: Tung Salaeng Luang National Park, among thicket in thin forest, alt. 300-600 m, T-2108. NAKHON NAYOK: Khao Yai National Park, cleyey ground along river in light shade, alt. ca. 800 m, T-7426. CHANTABURI: Khao Soidao, dry path-side in light shade near river, alt. ca. 300 m, T-7320.

Continental Southeast Asia.

Var. **malayensis** (Holtt.) comb. nov.—*Abacopteris multilincata* var. *malayensis* Holtt. (1954) 297.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in dense forest, alt. ca. 400 m, T-4514.

Malay Peninsula.

34. ***Thelypteris urophylla*** (Wall. ex Hook.) K. Iwats. in Tagawa & K. Iwats. (1965) 81.—*Cyclosorus urophyllus* (Wall. ex Hook.) Tard.; Tard. & C. Chr. (1939-51) 391.—*Abacopteris urophylla* (Wall. ex Hook.) Ching, l.c. (1938) 251; Holtt. (1954) 296, (1961) 24.

LOEY: Ban Na Luang to north ridge of Phu Luang, mountain slope in evergreen forest, alt. ca. 1000 m, T-1082. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. 680-950 m, T-4626.

Thailand to Malaya, Sumatra and Borneo.

DENNSTAEDTIACEAE

Dennstaedtioideae

Microlepia Presl

1. ***Microlepia hookeriana*** (Wall. ex Hook.) Presl, Epim. Bot. 95. 1849; Tard. & C. Chr. (1939-51) 93; Holtt. (1961) 24.

CHIANGRAI: northern slope of Doi Pacho, moist ground along stream in dense forest, alt. ca. 1400 m, T-3693. LOEY: Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-610. NAKAWN SRITAMARAT: Khao Luang, rather dry ground in dense forest, alt. 950-1100m, T-4686.

North India, Upper Burma, South China, Taiwan, Ryukyu, Thailand, Tonkin, Sumatra, Java and Borneo.

2. ***Microlepia calvescens*** (Wall. ex Hook.) Presl, Epim. Bot. 95. 1849.—*Microlepia marginata* var. *calvescens* (Wall. ex Hook.) C. Chr.; Tard. & C. Chr. (1939-51)

94.—*Microlepia marginata* auct. non (Houtt.) C. Chr.; Holtt. (1965) 233.

CHIANGMAI: Doi Suthep, rather dry slope in evergreen forest, alt. ca. 1000 m, T-3860, T-3941. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry mountain slope in dense evergreen forest, alt. ca. 1000 m, T-1104; Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-629.

North India, Upper Burma, South China, Taiwan, Thailand and Annam.

3. ***Microlepia herbacea*** Ching et C. Chr. apud C. Chr. & Tard. Notul. Syst. 6: 6. 1937; Tard. & C. Chr. (1939-51) 97; Holtt. (1965) 233.

LOEY: Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-591. NAKHON NAYOK: Khao Yai National Park, rather dry floor of mixed forest, alt. ca. 800 m, T-7409.

Thailand and Annam.

4. ***Microlepia strigosa*** (Thunb.) Presl, Epim. Bot. 95. 1849; Tard. & C. Chr. (1939-51) 98; Holtt. (1954) 310, (1961) 24.

CHIANGMAI: Doi Inthanon, mountain slope in dense evergreen forest, alt. 1500-2200 m, T-2646, T-3013.

Tropics of Asia and Polynesia, north to Japan.

5. ***Microlepia firma*** Mett. ex Kuhn, Linnaea 36: 146. 1869.—*Microlepia hirta* auct. non (Kaulf.) Presl; C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1931.

CHIANGMAI: Doi Inthanon, rather dry floor of dense evergreen forest, alt. ca. 2300 m, T-2891.

North India and Ceylon, also in northern Thailand.

6. ***Microlepia trapeziformis*** (Roxb.) Kuhn, Chaetopt. 347. 1882; Tard. & C. Chr. (1939-51) 96; Holtt. (1954) 313.

CHIANGMAI: Doi Inthanon, rather moist slope near stream in dense evergreen forest, alt. 1000-2100 m, T-2644, T-3023.

Tropics of Asia.

7. ***Microlepia taiwaniana*** Tagawa, Acta Phytotax. Geobot. 10: 199. 1941.—*Microlepia trapeziformis* auct. non (Roxb.) Kuhn; Tagawa & K. Iwats. (1965) 82.

CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3852. PHITSANULOK: Tung Salaeng Luang National Park, moist ground by stream in rather deep shade, alt. ca. 500 m, T-2109.

Northern Thailand and Taiwan.

8. ***Microlepia spelunca*** (L.) Moore, Ind. Fil. xciii. 1857; C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1931; Tard. & C. Chr. (1939-51) 99; Holtt. (1954) 314, (1961) 24.

Var. ***pubescens*** (Hook.) Sledge, Kew Bull. 1956: 525. 1957; Tagawa & K. Iwats. (1965) 81.—var. ***villosissima*** C. Chr.; Holtt. (1954) 315, (1961) 24.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, along path in mixed

forest, alt. 900-1200 m, T-3431, T-3434; Doi Pacho, rather dry mountain slope in mixed forest, alt. ca. 1400 m, T-3573. CHIANGMAI: Doi Suthep, moist place in evergreen forest, alt. ca. 1000 m, T-3843, *ibid.*, cleyey slope by stream in light shade, alt. 1350-1500 m, T-4495. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry mountain slope in evergreen forest, alt. ca. 1100 m, T-1091. CHANTABURI: Khao Soidao, rather dry slope in dense evergreen forest, alt. 700-1525 m, T-7170. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense forest, alt. 680-950 m, T-4669; interior of Wat Kiri Wang, at foot of Khao Luang, mountain slope in light shade, alt. 90-200 m, T-5401. TRANG: Khao Chong National Park, rather dry slope in light shade, alt. ca. 100 m, T-5485.

Palaeotropics.

9. ***Microlepia puberula*** v.A.v. Ros. Bull. Jard. Bot. Buit. II, **11**: 17. 1913; Holtt. (1954) 312, (1961) 24, (1965) 233.

CHIANGMAI: Doi Inthanon, rather dry slope in forest, alt. 1350-1900 m, T-2666. Thailand, Malaya, Sumatra, Java and Borneo.

10. ***Microlepia platyphylla*** (Don) J. Smith, Lond. J. Bot. **1**: 427. 1842; Tard. & C. Chr. (1939-51) 99; Tagawa & K. Iwats. (1965) 81.

CHIANGMAI: Doi Suthep, cleyey ground near stream in light shade, alt. ca. 1400 m, T-4492.

North India, Southwest China, Taiwan, Ceylon, Thailand, Annam and the Philippines.

Hypolepis Bernh.

1. ***Hypolepis punctata*** (Thunb.) Mett. ex Kuhn, Fil. Afr. 120. 1868; Tard. & C. Chr. (1939-51) 101; Holtt. (1954) 318.

LOEY: northeastern ridge of Phu Luang, open field at edge of forest, alt. 1300-1567 m, T-1505; Phu Kradung, rather dry ground in open place or light shade alt. 1100-1200 m, T-589, T-786.

Tropics of the Old World.

Lindsayoideae

Lindsaya Dry.

1. ***Lindsaya macraeana*** (Hook. & Arn.) Copel. Bull. B.P. Bishop Mus. **59**: 70. 1929; Holtt. (1954) 324. — *Lindsaya repens* auct. not (Bory) Bedd.; Tard. & C. Chr. (1939-51) 120.

TRANG: Khao Chong, climbing on tree in dense forest, alt. ca. 1000 m, T-6818. Ceylon to Hawaii.

2. ***Lindsaya pectinata*** Blume, Enum. Pl. Jav. 217. 1828; Tard. & C. Chr. (1939-51) 124, p.p.; Holtt. (1954) 324.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1600 m, T-4781 bis.

Malaysia to southern Thailand and Annam.

3. **Lindsaya lucida** Blume, l.c. (1828) 216; Tard. & C. Chr. (1939-51) 122; Holtt. (1954) 328, (1961) 24.

NAKHON NAYOK: Khao Yai National Park, rather dry ground in light shade near river, alt. ca. 800 m, T-7389.

Throughout Malaysia, northwards to Thailand, Indo-China and Hainan.

4. **Lindsaya cultrata** (Willd.) Sw. Syn. Fil. 119. 1806; Tard. & C. Chr. (1939-51) 120; Holtt. (1954) 328, (1961) 24.

LOEY: Phu Kradung, sandy rock in stream-bed in forest, alt. ca. 1200 m, T-595. Old World Tropics, north to Japan.

5. **Lindsaya borneensis** Hook. Syn. Fil. 107. 1867; Holtt. (1954) 331.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, tree trunk in dense evergreen forest, alt. ca. 700 m, T-5277.

Malay Peninsula and Borneo.

A form with long climbing rhizome.

6. **Lindsaya davallioides** Blume, l.c. (1828) 218; Tard. & C. Chr. (1939-51) 127; Holtt. (1954) 332.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1500 m, T-4781.

Western Malaysia, north to Indo-China, Hainan and Taiwan.

7. **Lindsaya orbiculata** (Lam.) Mett. ex Kuhn, Ann. Lugd. Bat. 4: 279. 1869; Tard. & C. Chr. (1939-51) 125.—*Schizoloma orbiculatum* (Lam.) Kuhn; Holtt. (1954) 344, (1961) 25.

NAKHON NAYOK: Khao Yai National Park, rather dry bank of river in light shade, alt. ca. 800 m, T-7434.

South China, Thailand, Indo-China and Malaysia, extending north to Japan through Taiwan and the Ryukyus.

8. **Lindsaya ensifolia** Sw. Schrad. J. Bot. 1800 (2): 77. 1801.—*Schizoloma ensifolium* (Sw.) J. Smith; Tard. & C. Chr. (1939-51) 129; Holtt. (1954) 346, (1961) 25.

CHIANGMAI: Doi Suthep rather dry ground in evergreen forest, alt. ca. 1000 m, T-3937. LOEY: northern ridge of Phu Luang, rather dry slope in evergreen forest, alt. 1100-1500 m, T-1262, *ibid.*, rather dry ground in half shaded place at edge of forest, alt. ca. 1200 m, T-1309; Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-594. NAKHON NAYOK: near Hiewesai Waterfall, Khao Yai National Park, rather dry ground by river in light shade, alt. ca. 800 m, T-7432.

Tropics of the Old World, from Africa to the Pacific, north to the Ryukyus.

9. **Lindsaya heterophylla** Dry. Tr. Linn. Soc. 3: 41. 1797. —*Schizoloma heterophyllum* (Dry.) J. Smith; Holtt. (1954) 345.

CHIANGMAI: Doi Suthep, dry ground in evergreen forest, alt. ca. 1000 m, T-3951. LOEY: eastern slope of Phu Luang, rather dry slope in dense mountain forest, alt. 900-1400 m, T-1831; Phu Kradung, rather dry floor of forest, alt. 1100-1200 m, T-592.

Continental Southeast Asia and Malaysia.

10. **Lindsaya javanensis** Blume, l.c. (1828) 219; Tard. & C. Chr. (1939-51) 124. —*Schizoloma javanense* (Blume) Holtt. (1954) 349.

LOEY: north ridge of Phu Luang, rather dry mountain slope in forest, alt. 1100-1500 m, T-1311; northeastern ridge of Phu Luang, rather dry slope in evergreen forest, alt. 1300-1567 m, T-1514.

Western Malaysia, north to Thailand and Indo-China, Taiwan and the Ryukyus.

11. **Lindsaya tenera** Dry. Tr. Linn. Soc. 3: 42. 1797; Tard. & C. Chr. (1939-51) 126. —*Schizoloma tenerum* (Dry.) Holtt. (1954) 348.

CHIANGMAI: Doi Suthep, rather dry ground in evergreen forest, alt. ca. 1000 m, T-3939. LOEY: northern ridge of Phu Luang, rather dry mountain slope in evergreen forest, alt. 1100-1500 m, T-1259; Phu Kradung, cleyey ground in forest, alt. 1100-1200 m, T-601, T-637. CHANTABURI: Khao Soidao, rather dry ground in light shade at ridge, alt. 700-1525 m, T-7153. NAKAWN SRITAMARAT: Khao Luang, cleyey slope in dense mossy forest, alt. 1100-1786 m, T-4808.

South India and Ceylon to Thailand and Indo-China, south to Malaya and Borneo, north to South China.

Tapeinidium (Presl) C. Chr.

1. **Tapeinidium biserratum** (Blume) v.A.v. Ros. Mal. Ferns Suppl. 509. 1917; Holtt. (1954) 339.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1400 m, T-4830.

Malaysia throughout, north to peninsular Thailand and Botel Tobago Island in South Taiwan.

Sphenomeris Maxon

1. **Sphenomeris chusana** (L.) Copel. B.P. Bishop Mus. Bull. 59: 69. 1929; Holtt. (1954) 341. —*Stenoloma chusana* (L.) Ching; Tard. & C. Chr. (1939-51) 130.

LOEY: northern ridge of Phu Luang, sandy bank by stream in dense forest, alt. 1100-1500 m, T-1273; Phu Kradung, sandy rock near stream in open place, alt. 1100-1200 m, T-588.

Tropics of the Old World, north to Japan.

Davallioideae

Leucostegia Presl

1. **Leucostegia immersa** (Wall. ex Hook.) Presl, Tent. Pterid. 95. 1836; C. Chr. Contr. U.S. Nat. Herb. 26: 331. 1931; Tard. & C. Chr. (1939-51) 113; Holtt. (1954) 352.

CHIANGMAI: Doi Suthep, mountain slope in evergreen forest, alt. ca. 1500 m, T-3186. LOEY: north ridge of Phu Luang, foot of rock in half shaded place, alt. 1100-1500 m, T-1283; northeastern ridge of Phu Luang, foot of exposed rock in open place at ridge, alt. 1300-1567 m, T-1516; Phu Kradung, muddy crevices of cliff in half shaded place, alt. ca. 1200 m, T-947.

South India, eastern Himalayas, Southwest China, Burma, Thailand, Indo-China, through western Malaysia to the Philippines, north to Taiwan.

Davallia Smith

1. **Davallia corniculata** Moore, Ind. Fil. 292. 1861; Holtt. (1954) 359.

NAKAWN SRITAMARAT: Khao Luang, trunk of fallen tree in clearing at ridge, alt. ca. 1500 m, T-4784.

Western Malaysia.

2. **Davallia trichomanoides** Blume, Enum. Pl. Jav. 238. 1828; Holtt. (1954) 361, (1961) 25.

LOEY: north ridge of Phu Luang, moist rock in dense evergreen forest, alt. 1100-1500 m, T-1263; Phu Kradung, dry rock in light shade, alt. ca. 1000 m, T-401, *ibid.*, tree trunk in light shade, alt. 1100-1200 m, T-583, T-623. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense forest, alt. 950-1100 m, T-4691; eastern slope of Khao Luang, mossy tree trunk in dense forest, alt. ca. 1000 m, T-5287.

Ceylon, Himalayas to Malaysia.

All of the above cited specimens are referable to var. *lorrainii* with nearly black scales bearing long pale spreading hairs.

3. **Davallia divaricata** Blume, Enum. Pl. Jav. 237. 1828; Tard. & C. Chr. (1939-51) 107; Holtt. (1954) 362, (1965) 234.

NAKHON NAYOK: near Hiewesai Waterfall, in Khao Yai National Park, rather dry rock along river in light shade, alt. ca. 800 m, T-7423. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at lower elevation of Khao Luang, rather dry rock along river in light shade, alt. ca. 200 m, T-4512; Khao Luang, trunk of fallen tree in clearing at ridge, alt. ca. 1600 m, T-4835, T-4839; eastern slope of Khao Luang, mossy tree trunk in dense forest, alt. ca. 800 m, T-5282.

Thailand, Tonkin and Malaysia throughout.

Araiostegia Copel.

1. **Araiostegia faberiana** (C. Chr.) Ching, Fl. Reip. Popul. Sin. 2: 293. 1959.

CHIANGMAI: Doi Inthanon, tree trunk in dense mossy forest, alt. ca. 2200 m, T-2889.

South China, Burma and northern Thailand.

2. **Araiostegia** sp. aff. *A. pulchra* (Don) Copel.

LOEY: Phu Luang, tree trunk in dense forest, alt. ca. 1200 m, T-1818.

Davallodes Copel.

1. **Davallodes viscidulum** (Mett. ex Kuhn) v.A.v. Ros. Bull. Jard. Bot. Buit. II, 1: 6. 1911.

TRANG: Khao Chong, rather dry rock in dense forest, alt. ca. 400 m, T-5565.

Peninsular Thailand, Sumatra, Java, Borneo, Celebes and New Guinea.

Humata Cav.

1. **Humata repens** (L.f.) Diels, Nat. Pfl.-fam. 1 (4): 209. 1899; Tard. & C. Chr. (1939-51) 111; Holtt. (1954) 371, (1961) 26, (1965) 235.

CHIANGMAI: Doi Suthep, mossy tree trunk in dense forest, alt. ca. 1550 m, T-3193. LOEY: north ridge of Phu Luang, mossy rock in half shaded place, alt. 1100-1500 m, T-1319; eastern slope of Phu Luang, tree trunk in dense forest, alt. 900-1400 m, T-1815; Phu Kradung, dry rock in half shaded place at edge of forest, alt. 1100-1200 m, T-625. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, mossy tree trunk in dense forest, alt. ca. 1250 m, T-7496. NAKAWN SRITAMARAT: Khao Luang, mossy trunk of fallen tree in clearing at ridge, alt. ca. 1600 m, T-4800. TRANG: Khao Chong, rather dry mossy rock in half shaded place, alt. 600-1100 m, T-6815.

North India, South China, through Southeast Asia to Australia, north to Japan.

2. **Humata vestita** (Blume) Moore, Ind. Fil. xcii. 1857; Holtt. (1954) 370.

NAKAWN SRITAMARAT: Khao Luang, mossy trunk of fallen tree in clearing at ridge, alt. ca. 1600 m, T-4805.

Malaysia, north to Taiwan.

Oleandroideae

Nephrolepis Schott

1. **Nephrolepis acuminata** (Houtt.) Kuhn, Ann. Lugd. Bat. 4: 286. 1869; Holtt. (1954) 378.

NAKAWN SRITAMARAT: Khao Luang, trunk of fallen tree in clearing at ridge, alt. ca. 1600 m, T-4787. TRANG: Khao Chong, rather dry rock in dense forest at ridge, alt. 600-1100 m, T-6803.

Malay Peninsula, Sumatra to New Guinea.

2. **Nephrolepis cordifolia** (L.) Presl, Tent. Pterid. 79. 1836; Tard. & C. Chr. (1939-51) 289; Holtt. (1954) 379, (1961) 26.—*Nephrolepis paucifrons* d'Almeida; Holtt. (1965) 235.

LOEY: northeastern ridge of Phu Luang, foot of exposed rock in open place at ridge, alt. 1300-1567 m, T-1519; Phu Kradung, cleyey bank along path in open place,

alt. 1100-1200 m, T-633.

Pantropics, extending north to Japan and south to New Zealand.

3. **Nephrolepis falcata** (Cav.) C. Chr. Dansk Bot. Ark. **9**: 15. 1937; Tard. & C. Chr. (1939-51) 289; Holtt. (1954) 381, (1965) 235.

CHANTABURI: Khao Soidao, rather dry rock in dense forest, alt. ca. 800 m, T-7176. Indo-China, Thailand and Malaysia throughout.

4. **Nephrolepis hirsutula** (Forst.) Presl, Tent. Pterid. 79. 1836; Tard. & C. Chr. (1939-51) 290; Holtt. (1954) 382.

NAKAWN SRITAMARAT: Khao Luang, rather dry ground along path in light shade, alt. ca. 400 m, T-4505.

Tropical Asia, also in the Pacific.

This is an unusually large plant having the pinnae more than 13 cm in length, but no discriminative feature is found in this specimen except only for the size.

Oleandra Cav.

1. **Oleandra wallichii** (Hook.) Presl, Tent. Pterid. 78. 1836; Tard. & C. Chr. (1939-51) 284; Holtt. (1961) 26.

CHIANGMAI: Doi Inthanon, rather dry mountain slope in thin forest, alt. ca. 2000 m, T-2893.

North India to Taiwan, also in Thailand and Indo-China.

2. **Oleandra musifolia** (Blume) Presl, Epim. Bot. 42. 1849; Tard. & C. Chr. (1939-51) 284; Holtt. (1965) 235.

LOEY: northeastern ridge of Phu Luang, at foot of rock in open place at ridge, alt. 1300-1567 m, T-1524; Phu Kradung, on muddy rock in open place, alt. 1100-1200 m, T-618, *ibid.*, on rotten tree trunk in open place, alt. ca. 1200 m, T-634.

Ceylon, Indo-China to Malaysia.

3. **Oleandra undulata** (Willd.) Ching, Lingn. Sci. J. **12**: 565. 1933; Tard. & C. Chr. (1939-51) 286; Holtt. (1954) 384, (1961) 26, (1965) 235.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry slope in mixed forest, alt. 900-1200 m, T-3424. LOEY: Phu Kradung, in crevices of dry rock in open place, alt. ca. 1100 m, T-646.

Burma and South China to Malaya.

Pteridoideae

Pteridium Scopoli

1. **Pteridium aquilinum** (L.) Kuhn in Deck. Reis. **3-3**, Bot. 11. 1879; Tard. & C. Chr. (1939-51) 136; Tryon, Rhodora **43**: 12. 1941; Holtt. (1954) 389.

Var. **wightianum** (Ag.) Tryon, l.c. 22; Tagawa & K. Iwats. (1965) 82.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, sunny path at ridge,

alt. ca. 1200 m, T-3417.

Himalayas to Malaysia and Taiwan.

Var. **yarrabense** Domin, *Bibl. Bot.* 85 (1): 161. 1914; Tryon, l.c. 63.—*Pteridium esculentum* auct. non (Forst.) Nakai; Tard. & C.Chr. (1939-51) 138; Holtt. (1954) 390.

LOEY: Phu Kradung, dry ground in open place, alt. 1100-1200 m, T-593, T-643. NAKHON NAYOK: Khao Yai National Park, dry ground near river in open place, alt. ca. 800 m, T-7407.

India to Australia.

Histiopteris J. Smith

1. **Histiopteris incisa** (Thunb.) J. Smith, *Hist. Fil.* 295. 1875; Tard. & C. Chr. (1939-51) 139; Holtt. (1964) 391, (1965) 237.

LOEY: northeastern ridge of Phu Luang, open field at edge of forest, alt. 1300-1567 m, T-1501; Phu Kradung, mountain slope by stream in forest, alt. ca. 1100 m, T-641. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, sunny ground at edge of mossy forest, alt. ca. 1250 m, T-7495. NAKAWN SRITAMARAT: Khao Luang, rather dry ground in dense mountain forest, alt. 680-950 m, T-4632, T-4674, *ibid.*, cleyey slope in open place at ridge, alt. ca. 1400 m, T-4789.

Pantropical, in East Asia north to Japan.

Pteris L.

1. **Pteris stenophylla** Wall. ex Hook. & Grev. *l.c. Fil. t.* 130. 1829; Tard. & C.Chr. (1939-51) 145.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, mountain slope in evergreen forest, alt. ca. 800 m, T-1900.

North India, northern Thailand and Laos.

2. **Pteris ensiformis** Burm. *Fl. Ind.* 230. 1786; Tard. & C.Chr. (1939-51) 149; Holtt. (1954) 399, (1961) 27, (1965) 235.

LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry slope in deciduous forest, alt. ca. 800 m, T-1112; north ridge of Phu Luang, mountain slope in dense forest, alt. 1100-1500 m, T-1315; Phu Kradung, mountain slope along stream in dense evergreen forest, alt. ca. 1100 m, T-938; Pha Nuk Khao, dry grassy slope in deciduous forest, alt. ca. 350 m, T-310. TRANG: Khao Chong, mountain slope in dense forest, alt. 100-800 m, T-5581.

Tropical Asia generally, through Malaysia to Australia and Polynesia.

3. **Pteris vittata** L. *Sp. Pl.* 2: 1074. 1753; Tard. & C. Chr. (1939-51) 143; Holtt. (1954) 396, (1961) 27, (1965) 236; Tagawa & K. Iwats. (1965) 82.

CHIANGMAI: Ban Yang, interior of Mae Klang Waterfall, grassy bank of ditch between rice fields, alt. ca. 1300 m, T-3166.

Tropics and subtropics of the Old World.

4. **Pteris linearis** Poir. in Lam. Encycl. Bot. 5 : 723. 1804 ; Tard. & C. Chr. (1939-51) 158.

CHIANGMAI : Doi Chiangdao, mountain slope in dense mixed forest, alt. ca. 1800 m, T-4232.

Tropical Asia and Madagascar.

5. **Pteris biaurita** L. Sp. Pl. 2 : 1076. 1753 ; C. Chr. Contr. U.S. Nat. Herb. 26 : 333. 1931 ; Tard. & C. Chr. (1939-51) 159 ; Holtt. (1954) 407, (1961) 27, (1965) 235 ; Tagawa & K. Iwats. (1965) 83.

CHIANGRAI : interior of Ban Lang Lat, north of Doi Pacho, by road in light shade, alt. 900-1200 m, T-3419, T-3444. CHIANGMAI : Ban Yang, at middle elevation of Doi Inthanon, rather dry slope in thin forest, alt. 600-1350 m, T-2426. LOEY : from Ban Na Luang to north ridge of Phu Luang, rather dry slope in mixed forest, alt. 800-900 m, T-1095, T-1110, T-1115 ; Phu Kradung, rather dry slope in mountain forest, alt. ca. 1000 m, T-392, *ibid.*, dry slope along path in mixed forest, alt. ca. 900 m, T-396, *ibid.*, mountain slope in dense evergreen forest, alt. ca. 1200 m, T-933. NAKHON NAYOK : Khao Yai National Park, rather dry ground along river in dense forest, alt. ca. 800 m, T-7381. TRANG : Khao Chong, rather dry ground by road in open place, alt. ca. 200 m, T-6983.

Pantropic.

6. **Pteris subquinata** Wall. ex Ag. Rec. Pter. 21. 1839.

CHIANGMAI : Doi Chiangdao, rather dry grassy slope in light shade, alt. ca. 1400 m, T-4077, *ibid.*, rather dry slope at foot of limestone cliff in light shade, alt. 1400-1800 m, T-4395.

Himalayas to northern Thailand.

7. **Pteris asperula** J. Smith ex Hieron. Hedwigia 55 : 362. 1914 ; Holtt. (1954) 406, (1965) 235.

PHITSANULOK : Tung Salaeng Luang National Park, rather dry bank along path in open place, alt. 300-600 m, T-2023.

Malaysia, north to Thailand.

8. **Pteris grevilleana** Wall. ex Ag. l.c. (1839) 23 ; Tard. & C. Chr. (1939-51) 153 ; Holtt. (1954) 402.

LOEY : eastern slope of Phu Luang, mountain slope in evergreen forest, alt. ca. 1000 m, T-1817.

India to South China, Taiwan and the Ryukyus, southward to western Malaysia.

9. **Pteris** sp. aff. *P. grevilleana* Wall. ex. Ag.

LOEY : Phu Luang, rather dry slope in mixed forest, alt. ca. 800 m, T-1093, 1093 bis.

This is very near to *P. grevilleana*, but differs from the nominal species by the branch of basal pinna which is much smaller or none.

10. ***Pteris mertensioides*** Willd. Sp. Pl. 5: 394. 1810; Holtt. (1954) 404.

NAKAWN SRITAMARAT: Khao Luang, damp slope in dense evergreen forest, alt. ca. 600 m, T-4497.

Tropics of the Old World, Ceylon to Polynesia.

11. ***Pteris blumeana*** Ag. l.c. (1839) 22; Tard. & C. Chr. (1939-51) 157.

NAKHON NAYOK: Khao Yai National Park, rather dry ground near river in light shade, alt. ca. 800 m, T-7400. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry mountain slope in evergreen forest, alt. 800-900 m, T-1088, T-1089; north ridge of Phu Luang, mountain slope in evergreen forest, alt. 1100-1500 m, T-1267; interior of Nam Thop, eastern slope of Phu Luang, alt. 400-850 m, T-1904.

India to Malaysia.

12. ***Pteris decrescens*** Christ, Bull. Acad. Géogr. Bot. 16: 244. 1906; Tard. & C. Chr. (1939-51) 152; Holtt. (1961) 27; Tagawa & K. Iwats. (1965) 83.

CHIANGMAI: Ban Yang, between Mae Klang Waterfall and Doi Inthanon, dry slope along path, alt. ca. 600 m, T-2370, *ibid.*, alt. ca. 1000 m, T-3170. LOEY: eastern slope of Phu Luang, rather dry slope in dense forest, alt. 900-1400 m, T-1828.

South China to Indo-China and Thailand.

13. ***Pteris bella*** Tagawa, Acta Phytotax. Geobot. 8: 166. 1939.

CHIANGMAI: Doi Inthanon, in dense mountain forest, alt. 1900-2500 m, T-2876. LOEY: north ridge of Phu Luang, mountain slope in dense forest, alt. 1100-1500 m, T-1281; northeastern ridge of Phu Luang, mountain slope in dense forest, alt. 1300-1567 m, T-1491. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. 1100-1789 m, T-4799.

Thailand and Taiwan.

14. ***Pteris wallichiana*** Ag. l.c. (1839) 69; C. Chr. Contr. U.S. Nat. Herb. 26: 333. 1931; Tard. & C. Chr. (1939-51) 160; Tagawa & K. Iwats. (1965) 83.

CHIANGMAI: Doi Chiangdao, mountain slope in mixed forest, alt. ca. 1700 m, T-4223; Doi Suthep, mountain slope along road in clearing, alt. ca. 1100 m, T-3185; southeastern slope of Doi Inthanon, moist floor of dense mossy forest, alt. ca. 2200 m, T-3014; Doi Inthanon, moist slope by stream in dense forest, alt. ca. 2200 m, T-2887. LOEY: Phu Kradung, at foot of cliff in light shade, alt. ca. 1100 m, T-942.

North India through China to Japan, south to Malaysia.

15. ***Pteris longipes*** Don, Prodr. Fl. Nepal. 15. 1825; Tard. & C. Chr. (1939-51) 154; Tagawa & K. Iwats. (1965) 83.

CHIANGMAI: Doi Chiangdao, rather dry floor of mixed forest, alt. ca. 1700 m, T-4399; Doi Suthep, moist floor of evergreen forest, alt. ca. 1000 m, T-3862, *ibid.*, moist

mountain slope in dense forest, alt. 1000-1200 m, T-4464. LOEY: north ridge of Phu Luang, grassy mountain slope in mixed forest, alt. ca. 1000 m, T-1097, *ibid.*, near stream in dense mountain forest, alt. 1100-1500 m, T-1320; Phu Kradung, dry slope along path in open place, alt. ca. 700 m, T-339, *ibid.*, dry mountain slope in dense forest, alt. ca. 900 m, T-371.

North India through China to Taiwan, also in Thailand, Tonkin and the Philippines.

16. ***Pteris heteromorpha*** Fée, *Gen. Fil.* 127. 1852; Tard. & C. Chr. (1939-51) 147.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, rather dry slope along path in mixed forest, alt. 900-1200 m, T-2438, T-2438 bis, *ibid.*, dry slope in *Pinus*-forest, alt. ca. 900 m, T-3168.

Burma, Thailand, Indo-China, the Philippines and Celebes.

17. ***Pteris tokioi*** Masam. *Trans. Nat. Hist. Soc. Formosa* 25: 13. 1935.

LOEY: north ridge of Phu Luang, mountain slope in dense evergreen forest, alt. 1100-1500 m, T-1324. CHANTABURI: Khao Soidao, mountain slope in dense evergreen forest, alt. 700-1525 m, T-7190.

Indo-China, Taiwan and southern edge of Japan.

18. ***Pteris plumbea*** Christ, *Notul. Syst.* 1: 49. 1909; Tard. & C. Chr. (1939-51) 150.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, rather dry mountain slope in dry mixed forest, alt. 400-850 m, T-1902. CHANTABURI: Khao Soidao, rather dry slope in mixed forest, alt. 200-700 m, T-7104.

China, Indo-China and Thailand.

19. ***Pteris scabripes*** Wall. ex Hook. *Sp. Fil.* 2: 165. 1858; Holtt. (1954) 399.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 500 m, T-4498.

Malay Peninsula.

20. ***Pteris aspericaulis*** Wall. ex Ag. *l.c.* (1839) 22.

CHIANGMAI: Doi Inthanon, mountain slope in dense evergreen forest, alt. ca. 2200 m, T-2875, T-2876 bis.

Himalayas, Burma, Yunnan and northern Thailand.

21. ***Pteris cretica*** L. *Mant.* 130. 1767; Tard. & C. Chr. (1939-51) 148; Holtt. (1961) 27.

CHIANGMAI: Doi Chiangdao, sandy slope at foot of limestone cliff in light shade, alt. ca. 1600 m, T-4206. CHANTABURI: Khao Soidao, dry mountain slope in deciduous forest, alt. 300-800 m, T-7103, T-7199.

Tropics and subtropics throughout the world.

22. ***Pteris venusta*** Kunze, *Bot. Zeit.* 6: 115. 1848; Tard. & C. Chr. (1939-51) 145;

Holtt. (1965) 236.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, mountain slope in rather dense forest, alt. 600-1350 m, T-2421. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry mountain slope in mixed forest, alt. ca. 800 m, T-1111. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2018. CHANTABURI: Khao Soidao, rather dry ground in mixed forest, alt. 200-700 m, T-7318.

North India to Malaysia.

23. **Pteris** sp.

CHIANGMAI: Doi Inthanon, on floor of dense evergreen forest, alt. ca. 2000 m, T-2881.

Stenochlaena J. Smith

1. **Stenochlaena palustris** (Burm.) Bedd. Ferns Br. Ind. Suppl. 26. 1876; Tard. & C. Chr. (1939-51) 165; Holtt. (1954) 412, (1961) 27; Tagawa & K. Iwats. (1965) 84.

LOEY: from Nam Thop to Ban Na Luang, eastern foot of Phu Luang, rather dry floor of forest, alt. 300-400 m, T-1989. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, at foot of Khao Luang, rather dry path-side in light shade, alt. ca. 100 m, T-5399. TRANG: Khao Chong National Park, climbing on tree trunk in light shade, alt. ca. 100 m, T-5491.

Tropics of Asia, Australia and the Pacific.

Asplenioidae

Asplenium L.

1. **Asplenium delavayi** (Franch.) Copel. Gen. Fil. 165. 1947.

LOEY: from Ban Na Luang to north ridge of Phu Luang, muddy crevices of rock in dense forest, alt. ca. 900 m, T-1084.

Southwest China, Upper Burma, northeastern Thailand and Tonkin.

2. **Asplenium nidus** L. Sp. Pl. 2: 1079. 1753; C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1931; Tard. & C. Chr. (1939-51) 219; Holtt. (1954) 419, (1961) 28, (1965) 236; Tagawa & K. Iwats. (1965) 84.

CHIANGRAI: northern slope of Doi Pacho, mossy rock in dense mountain forest, alt. 1350-1800 m, T-3687. LOEY: from Ban Na Luang to north ridge of Phu Luang, muddy rock in dense forest, alt. ca. 800 m, T-1106; interior of Nam Thop, eastern slope of Phu Luang, tree trunk in dense forest, alt. 400-850 m, T-1895; Phu Kradung, mossy rock along path in dense mountain forest, alt. ca. 1000 m, T-386. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, muddy rock along river in shade, alt. 100-700 m, T-4511.

Old World tropics.

3. **Asplenium phyllitidis** Don, Prodr. Fl. Nepal. 7. 1825; Holtt. (1954) 420.

NAKHON NAYOK: near Hiew sai Waterfall, Khao Yai National Park, mossy tree trunk in light shade along river, alt. ca. 800 m, T-7424. CHANTABURI: Khao Soidao, tree trunk in dense mossy forest at ridge, alt. ca. 1400 m, T-7171. TRANG: Khao Chong, muddy rock in dense forest at ridge, alt. ca. 1000 m, T-6812.

Himalayas to Southeast Asia.

4. **Asplenium grevillei** Wall. ex Hook. & Grev. Ic. Fil. t. 228. 1831; Tard. & C. Chr. (1939-51) 217; Holtt. (1961) 28.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, rather dry way-side in light shade, alt. ca. 200 m, T-4527; eastern slope of Khao Luang, mountain slope along path in dense forest, alt. ca. 700 m, T-5274. TRANG: Khao Chong, rather dry slope in dense mountain forest, alt. ca. 600 m, T-5570.

Burma, Thailand and Indo-China.

5. **Asplenium antrophyoides** Christ, Bull. Acad. Géogr. Bot. 20: 170. 1909; Tard. & C. Chr. (1939-51) 218.

CHIANGMAI: Doi Chiangdao, moist limestone cliff in dense forest, alt. ca. 1800 m, T-4210.

Southwest China, Indo-China and northern Thailand.

6. **Asplenium cheilosorum** Kunze ex Mett. Aspl. 133. 1859; Tard. & C. Chr. (1939-51) 223; Holtt. (1954) 435.

CHIANGRAI: northern slope of Doi Pacho, moist rock by stream in deep shade, alt. ca. 1400 m, T-3690 bis. CHIANGMAI: Doi Inthanon, muddy rock by stream in evergreen forest, alt. 1350-1900 m, T-2667. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1700 m, T-4836.

Southeast Asia to Malaysia, north to southern edge of Japan.

7. **Asplenium unilaterale** Lam. Encycl. 2: 305. 1786; Tard. & C. Chr. (1939-51) 224; Holtt. (1954) 438, (1961) 29.

CHIANGRAI: northern slope of Doi Pacho, moist rock by stream in deep shade, alt. ca. 1400 m, T-3690. CHIANGMAI: Doi Suthep, wet sandy slope along stream in dense forest, alt. ca. 1100 m, T-4461. TRANG: Khao Chong, sandy ground by stream in dense forest, alt. ca. 700 m, T-6833.

Tropics of the Old World.

8. **Asplenium excisum** Presl, Epim. Bot. 74. 1849; Holtt. (1954) 439, (1961) 28.

CHIANGMAI: Doi Suthep, wet muddy rock by stream in dense forest, alt. ca. 1100 m, T-3964. PHITSANULOK: Tung Salaeng Luang National Park, moist ground by small stream in deep shade, alt. 300-600 m, T-2104. NAKHON NAYOK: near Hiew-

sai Waterfall, Khao Yai National Park, cleyey slope along river in light shade, alt. ca. 800 m, T-7430. CHANTABURI: Khao Soidao, rather dry slope in mixed forest, alt. 200-700 m, T-7102, *ibid.*, wet slope along stream in dense forest, alt. 700-1525 m, T-7163.

Tropical Africa, Ceylon, India, Malaysia to Polynesia, north to Thailand, Tonkin, South China, Taiwan and the Ryukyus, also in Hawaii.

9. **Asplenium obscurum** Blume, Enum. Pl. Jav. 181. 1828; Tard. & C. Chr. (1939-51) 225; Tagawa & K. Iwats. (1965) 84.

CHIANGRAI: northern slope of Doi Pacho, sandy ground by stream in deep shade, alt. ca. 1400 m, T-3689. CHIANGMAI: Doi Suthep, wet sandy ground by stream in dense forest, alt. ca. 1100 m, T-4463; Doi Inthanon, wet sandy ground by stream in dense forest, alt. 1350-1900 m, T-2647; southeastern slope of Doi Inthanon, wet ground by stream in dense forest, alt. ca. 1600 m, T-3019.

Madagascar, Ceylon, India, Burma, Thailand, Indo-China, South China, Taiwan and Malaysia throughout.

10. **Asplenium ensiforme** Wall. ex Hook. & Grev. Ic. Fil. t. 71. 1829; C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1931; Tard. & C. Chr. (1939-51) 221.

CHIANGMAI: Doi Chiangdao, muddy rock in dense mixed forest, alt. ca. 1800 m, T-4222; Doi Suthep, mossy tree trunk in evergreen forest, alt. ca. 1600 m, T-3198; Doi Inthanon, mossy tree trunk in dense evergreen forest, alt. ca. 2200 m, T-2886. LOEY: northeastern ridge of Phu Luang, mossy rock in moist dense forest, alt. 1300-1567 m, T-1489.

India, Southwest China, northern Thailand, Indo-China, north to Japan.

11. **Asplenium scortechinii** Bedd. J. Bot. 1887: 322; Tard. & C. Chr. (1939-51) 220; Holtt. (1954) 420, (1961) 28.

LOEY: north ridge of Phu Luang, tree trunk in dense evergreen forest, alt. 1100-1500 m, T-1304; eastern slope of Phu Luang, mossy tree trunk in dense evergreen forest, alt. 900-1400 m, T-1826; Phu Kradung, mossy rock along path in dense forest, alt. ca. 1100 m, T-393. CHANTABURI: Khao Soidao, mossy tree trunk in dense forest, alt. 700-1525 m, T-7175. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. ca. 1600 m, T-4775. TRANG: Khao Chong, tree trunk in dense forest at ridge, alt. ca. 1000 m, T-6834.

India, Thailand and Indo-China.

12. **Asplenium salignum** Blume, Enum. Pl. Jav. 175. 1828; Holtt. (1954) 421.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mossy rock in dense forest, alt. ca. 800 m, T-5290.

South China, Burma and Malaysia.

13. **Asplenium batuense** v.A.v. Ros. Bull. Dept. Agr. Ind. Néerl. 18: 13. 1908;

Holtt. (1954) 423.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in dense forest, alt. ca. 700 m, T-5273.

Western Malaysia.

14. **Asplenium squamulatum** Blume, Enum. Pl. Jav. 174. 1828; Holtt. (1954) 426; Tagawa & K. Iwats. (1965) 84.

TRANG: Khao Chong, muddy rock in dense forest, alt. ca. 600 m, T-6978.

Malaysia.

15. **Asplenium normale** Don, Prodr. Fl. Nepal. 7. 1825; Tard. & C. Chr. (1939-51) 225; Holtt. (1954) 436, (1961) 28, (1965) 236.

LOEY: north ridge of Phu Luang, mossy rock in dense evergreen forest, alt. 1100-1500 m, T-1257; eastern slope of Phu Luang, rather dry slope in dense evergreen forest, alt. 900-1400 m, T-1823; Phu Kradung, muddy rock along stream in dense forest, alt. ca. 1200 m, T-602, T-617. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, rather dry floor of dense mossy forest, alt. ca. 1250 m, T-7498. CHANTABURI: Khao Soidao, tree trunk in mossy forest at ridge, alt. ca. 1400 m, T-7198. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense forest, alt. 950-1100 m, T-4682, *ibid.*, sandy slope in dense evergreen forest, alt. 1100-1786 m, T-4834.

Old World tropics, north to Japan.

16. **Asplenium tenerum** Forst. Prod. 80. 1786; Tard. & C. Chr. (1939-51) 226; Holtt. (1954) 432.

NAKAWN SRITAMARAT: Khao Luang, moist rock in dense forest, alt. 950-1100 m, T-4683; eastern slope of Khao Luang, muddy rock in dense evergreen forest, alt. ca. 700 m, T-5275. TRANG: Khao Chong, tree trunk in dense forest at ridge, alt. 600-1100 m, T-6835.

India to Polynesia, north to Taiwan.

17. **Asplenium longissimum** Blume, Enum. Pl. Jav. 178. 1828; Tard. & C. Chr. (1939-51) 226; Holtt. (1954) 427.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, rather dry ground along path in light shade, alt. ca. 200 m, T-4526.

Indo-China to Malaysia.

18. **Asplenium pellucidum** Lam. Encycl. 2: 305. 1786; Holtt. (1954) 428, (1961) 28, (1965) 236.

TRANG: Khao Chong, mossy rock in dense forest along river, alt. ca. 600 m, T-6700.

Old World tropics, from Madagascar to New Guinea.

19. **Asplenium paradoxum** Blume, Enum. Pl. Jav. 179. 1828; Holtt. (1954) 430.

LOEY: north ridge of Phu Luang, muddy rock in moist dense forest, alt. 1100-

1500 m, T-1252; northeastern ridge of Phu Luang, vertical surface of moist rock in dense forest at ridge, alt. 1300-1567 m, T-1523.

Western Malaysia.

20. **Asplenium macrophyllum** Sw. Schrad. J. Bot. 1800 (2): 52. 1801; Holtt. (1954) 431, (1961) 28.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mossy tree trunk in dense evergreen forest, alt. ca. 700 m, T-5298.

Mascarene Islands to Polynesia.

21. **Asplenium** sp. aff. *A. decrescens* Kunze

LOEY: northeastern ridge of Phu Luang, muddy rock by stream in dense forest, alt. 1300-1567 m, T-1496. TRANG: Khao Chong, rather dry mossy rock in dense forest at ridge, alt. 600-1100 m, T-6804.

This is very near to *A. caudatum*, but differs from it in the long creeping rhizome and the smaller fronds with less scaly axes.

22. **Asplenium** sp.

LOEY: Phu Luang, on muddy rock in moist dense mountain forest, alt. 1100-1500 m, T-1306; Phu Kradung, tree trunk in dense forest, alt. 1100-1200 m, T-391, T-943.

This is also one of *A. caudatum* group; sori occurring only in lobes, rachis scaly and texture coriaceous.

23. **Asplenium crinicaule** Hance, Ann. Soc. Nat. 1866: 254; Tard. & C. Chr. (1939-51) 227.

CHIANGRAI: Ban Lang Lat, north of Doi Pacho, mossy trunk in dense mixed forest, alt. ca. 1000 m, T-3415. CHIANGMAI: Doi Chiangdao, mossy tree trunk in dense mixed forest, alt. ca. 1700 m, T-4400. LOEY: north ridge of Phu Luang, muddy rock in moist dense forest, alt. 1100-1500 m, T-1295; Phu Kradung, mossy rock along path in mountain forest, alt. ca. 1000 m, T-390, *ibid.*, mossy tree trunk in dense forest, alt. ca. 1100 m, T-944.

South China, India, Thailand and Indo-China.

24. **Asplenium planicaule** Wall. ex Mett. Abhandl. Senckenb. Naturf. Ges. 3: 201. 1859, non Lowe 1858; C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1931; Tard. & C. Chr. (1939-51) 231.

CHIANGRAI: from Ban Lang Lat to Doi Pacho, mossy rock along stream in dry mixed forest, alt. 1050-1450 m, T-3567. CHIANGMAI: Doi Chiangdao, muddy limestone rock in mixed forest, alt. 1600-2100 m, T-4236; Doi Inthanon, mossy tree in dense forest, alt. 1350-1900 m, T-2658. LOEY: northeastern ridge of Phu Luang, muddy rock by stream in dense forest, alt. 1300-1567 m, T-1492.

North India and Burma to South China and Taiwan, south to Ceylon and South

India, Thailand, Indo-China and the Philippines.

25. **Asplenium perakense** Matthew & Christ, J. Linn. Soc. Bot. **39**: 214. 1909; Holtt. (1954) 429.

NAKAWN SRITAMARAT: Khao Luang, moist rock in dense evergreen forest, alt. 1300-1786 m, T-4785.

Malaya.

26. **Asplenium rockii** C. Chr. Contr. U.S. Nat. Herb. **26**: 332. 1931.

CHIANGRAI: from Ban Lang Lat to Doi Pacho, rock in mixed forest, alt. ca. 1450m, T-3570. CHIANGMAI: Doi Chiangdao, mossy tree trunk in dense mixed forest, alt. ca. 1700 m, T-4221; Doi Inthanon, mossy tree trunk in moist dense forest, alt. ca. 1500m, T-2641. LOEY: from Ban Na Luang to north ridge of Phu Luang, muddy crevices of cliff in dense forest, alt. ca. 1000 m, T-1096.

Endemic to northern Thailand.

27. **Asplenium varians** Wall. ex Hook. & Grev. Ic. Fil. t. 172. 1830; Tard. & C. Chr. (1939-51) 235.

CHIANGMAI: Doi Chiangdao, moist limestone cliff in dense forest, alt. ca. 2000 m, T-4230.

Tropical Africa to Hawaii, north to Himalayas and Japan.

28. **Asplenium confusum** Tard. & Ching, Notul. Syst. **5**: 148. 1936; Tard. & C. Chr. (1939-51) 240.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, tree trunk in dense forest, alt. 400-850 m, T-1894; Phu Kradung, muddy rock in dense forest, alt. 1100-1200 m, T-604.

Indo-China.

Blechnoideae

Blechnum. L.

1. **Blechnum orientale** L. Sp. Pl. **2**: 1077. 1753; C. Chr. Contr. U.S. Nat. Herb. **26**: 333. 1931; Tard. & C. Chr. (1939-51) 207; Holtt. (1954) 446, (1961) 29; Tagawa & K. Iwats. (1965) 84.

CHIANGMAI: Doi Suthep, rather dry steep slope in evergreen forest, alt. ca. 1000m, T-3938. LOEY: north ridge of Phu Luang, rather dry slope along path in light shade, alt. 1100-1500 m, T-1253; Phu Kradung, dry slope in light shade, alt. ca. 1200m, T-600. NAKAWN SRITAMARAT: Khao Luang, rather dry mountain slope in dense forest, alt. 680-950 m, T-4678. NAKHON NAYOK: Khao Yai National Park, cleyey slope along road in light shade, alt. ca. 800 m, T-7394.

Tropics of Asia, Australia and the Pacific.

Woodwardia Smith

1. **Woodwardia cochinchinensis** Ching, Bull. Fan Mem. Inst. Biol. 2: 7. 1931; Tard. & C. Chr. (1939-51) 211.

CHIANGRAI: from Ban Lang Lat to Doi Pacho, rather dry mountain slope in *Pinus*-forest, alt. ca. 1200 m, T-3569.

South China and Indo-China.

Brainea J. Smith

1. **Brainea insignis** (Hook.) J. Smith, Cat. Kew Ferns 5. 1856; C. Chr. Contr. U.S. Nat. Herb. 26: 333. 1931; Tard. & C. Chr. (1939-51) 207; Holtt. (1954) 450, (1961) 29, (1965) 237.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry slope in thin forest, alt. ca. 1100 m, T-3423. CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, cleyey slope in *Pinus*-forest, alt. ca. 1300 m, T-2417. LOEY: Phu Kra-dung, rather dry floor of forest near stream, alt. ca. 1200 m, T-784.

South China to Malaysia.

Lomariopsidoideae

Elaphoglossum Schott

1. **Elaphoglossum yunnanense** (Baker) C. Chr. Contr. U.S. Nat. Herb. 26: 327, 335. 1931; Tard. & C. Chr. (1939-51) 539; Holtt. (1954) 455.

CHIANGMAI: Doi Chiangdao, tree trunk in dense mixed forest, alt. 1600-2100 m, T-4219. LOEY: north ridge of Phu Luang, wet muddy rock near stream in dense forest, alt. 1100-1500 m, T-1321; Phu Kradung, muddy rock along stream in dense forest, alt. 1100-1200 m, T-603, *ibid.*, rather dry rock in dense forest, T-620, *ibid.*, muddy cliff near stream in forest, alt. ca. 1200 m, T-789.

South China to Malaysia throughout.

2. **Elaphoglossum yoshinagae** (Yatabe) Makino, Phan. Pter. Jap. Ic. Ill. 1: pls. 51, 52. 1901. — *Elaphoglossum austrosinicum* Matthew & Christ; Tard. & C. Chr. (1939-51) 540; Holtt. (1965) 237.

LOEY: northeastern ridge of Phu Luang, tree trunk in dense forest, alt. 1300-1567 m, T-1498.

South China, northeastern Thailand, Laos, Taiwan, Ryukyu and Japan.

3. **Elaphoglossum** sp. aff. *E. melanostictum* (Blume) Moore

NAKHON NAYOK: Khao Yai National Park, mossy tree trunk in dense forest, alt. ca. 1250 m, T-7494.

4. **Elaphoglossum subellipticum** Rosenst. Hedwigia 56: 348. 1915.

LOEY: eastern slope of Phu Luang, mossy rock in evergreen forest, alt. ca. 1200m, T-1822.

Taiwan.

This distinct fern is known only by two collections, Faurie's and ourselves. The identity of them is clear and doubtless, though we don't know for sure whether any ever published species are there or not which accords with the above materials.

5. **Elaphoglossum conforme** (Sw.) Schott, Gen. Fil. ad t. 14. 1834; C. Chr. Contr. U.S. Nat. Herb. 26: 335. 1931; Tard. & C. Chr. (1939-51) 541.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense mountain forest, alt. 1900-2595 m, T-2896. LOEY: north ridge of Phu Luang, mossy tree trunk in moist dense forest, alt. 1100-1500 m, T-1288.

Tropics of the Old World.

6. **Elaphoglossum callifolium** (Blume) Moore, Ind. Fil. 7. 1857; Tard. & C. Chr. (1939-51) 541; Holtt. (1954) 459.

CHANTABURI: Khao Soidao, mossy rock in dense forest at ridge, alt. 700-1525 m, T-7166. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. 1100-1786 m, T-4798, T-4801. TRANG: Khao Chong, mossy tree trunk in dense evergreen forest at ridge, alt. 600-1100 m, T-6829.

Western Malaysia.

7. **Elaphoglossum** sp.

LOEY: Phu Kradung, muddy rock along stream in dense forest, alt. ca. 1100 m, T-621, *ibid.*, alt. ca. 1200 m, T-788.

Bolbitis Schott

1. **Bolbitis appendiculata** (Willd.) K. Iwats. Acta Phytotax. Geobot. 18: 48. 1959; Tagawa & K. Iwats. (1965) 85.—*Egenolfia appendiculata* (Willd.) J. Smith; Tard. & C. Chr. (1939-51) 426; Holtt. (1954) 459, (1961) 29.

LOEY: from Ban Na Luang to north ridge of Phu Luang, wet ground in dense forest, alt. ca. 800 m, T-1094. NAKAWN SRITAMARAT: Khao Luang, damp mountain slope in dense forest, alt. 680-950 m, T-4671, *ibid.*, alt. 950-1100 m, T-4695. TRANG: Khao Chong National Park, muddy rock in light shade, alt. ca. 100 m, T-5486.

North India, South China to Malaysia throughout.

2. **Bolbitis sinensis** (Baker) K. Iwats. Acta Phytotax. Geobot. 18: 49. 1959; Tagawa & K. Iwats. (1965) 85.—*Egenolfia sinensis* (Baker) Maxon; Tard. & C. Chr. (1939-51) 424; Holtt. (1961) 30.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, mountain slope in dense forest, alt. 900-1200 m, T-3427. CHIANGMAI: Doi Chiangdao, tree trunk in dense mixed forest, alt. ca. 1700 m, T-4214; Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3872 bis; Doi Inthanon, rather dry floor of dense evergreen forest, alt. 1350-1900 m, T-2665. LOEY: from Ban Na Luang to north ridge of Phu Luang, cleyey slope in dense forest, alt. ca. 800 m, T-1100. CHANTABURI: Khao Soidao, rather dry slope in dense evergreen forest, alt. ca. 800 m, T-7169.

Himalayas, South and Southwest China, Thailand and Tonkin.

Var. **costulata** (Hook.) Tagawa & K. Iwats. Acta Phytotax. Geobot. 22: 102. 1967.

CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3872.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light forest, alt. 300-600 m, T-2106.

Khasi Hills, Burma and Thailand.

3. **Bolbitis heteroclita** (Presl) Ching ex C. Chr. Ind. Fil. Suppl. III, 48. 1934; Tard. & C. Chr. (1939-51) 434; Holtt. (1954) 462, (1961) 30, (1965) 237; Tagawa & K. Iwats. (1965) 85.

PHITSANULOK: Tung Salaeng Luang National Park, moist ground by stream in deep shade, alt. 300-600 m, T-2103. NAKHON NAYOK: Khao Yai National Park, muddy ground along river in light shade, alt. ca. 800 m, T-7387. NAKAWN SRITAMARAT: eastern slope of Khao Luang, muddy rock in dense evergreen forest, alt. ca. 1000 m, T-5289.

Himalayas, throughout Malaysia to New Guinea.

4. **Bolbitis contaminans** (Clarke) Ching ex C. Chr. Ind. Fil. Suppl. III, 47. 1934.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, cleyey slope in dense evergreen forest, alt. 400-850 m, T-1909; Phu Kradung, grassy slope in dense forest, alt. ca. 1100 m, T-380, *ibid.*, floor of dense mountain forest, alt. ca. 1100 m, T-940.

Himalayas, Thailand and Taiwan.

5. **Bolbitis copelandii** Ching ex C. Chr. & Tard. Notul. Syst. 5: 101; Tard. & C. Chr. (1939-51) 434.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, rather dry mountain slope in dense evergreen forest, alt. ca. 800 m, T-1910.

Indo-China.

6. **Bolbitis costata** (Wall. ex Presl) Ching ex C. Chr. Ind. Fil. Suppl. III, 47. 1934; Holtt. (1961) 30.—*Campium costatum* Wall. ex Presl; C. Chr. Contr. U.S. Nat. Herb. 26: 331. 1931.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, rather dry slope in mountain forest, alt. 600-1350 m, T-2414.

Himalayas to northern Thailand.

7. **Bolbitis deltigera** (Wall. ex Clarke) C. Chr. Ind. Fil. Suppl. III, 48. 1934.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light forest, alt. 300-600 m, T-2110.

North India.

8. **Bolbitis virens** (Wall. ex Hook. & Grev.) Schott, Gen. Fil. ad t. 14. 1834; Holtt. (1954) 468; Tagawa & K. Iwats. (1965) 85.

CHIANGMAI: Doi Suthep, evergreen forest, alt. ca. 1000 m, T-3853, *ibid.*, moist mountain slope by stream in dense forest, alt. 1000-1150 m, T-3959. LOEY: from Ban Na Luang to north ridge of Phu Luang, cleyey slope in dense forest, alt. ca. 800 m, T-1086; Phu Kradung, grassy bank in mountain forest, alt. ca. 800 m, T-1086; Phu Kradung, grassy bank in mountain forest, alt. ca. 1000 m, T-372, *ibid.*, mountain slope in dense evergreen forest, alt. ca. 1000 m, T-932. CHANTABURI: Khao Soidao, mountain slope in dense forest, alt. 700-1525 m, T-7180. TRANG: Khao Chong, moist ground by stream in dense forest, alt. 100-600 m, T-6802, T-6979.

Himalayas to Java.

There are two forms of plants distinguished by their fertile fronds: the fertile fronds of northern plants are with the pinnae linear and less than 0.8 mm in breadth; the Khao Chong plants have the fertile fronds with oblong lanceolate pinnae, 1.5 cm broad in the broadest portion.

Teratophyllum Mett.

1. **Teratophyllum aculeatum** (Blume) Mett. ex Kuhn, *Ann. Lugd. Bat.* 4: 296. 1869; Holtt. (1954) 473.

NAKAWN SRITAMARAT: Khao Luang, base of tree trunk in dense evergreen forest, alt. ca. 1000 m, T-5278 (bathyphyll).

Malay Peninsula, Sumatra, Java, Borneo, the Philippines and New Guinea.

Dryopteridoideae

Acrophorus Blume

1. **Acrophorus stipellatus** Moore, *Gard. Chron.* 1854: 135; Tard. & C. Chr. (1939-51) 296.

CHIANGMAI: Doi Inthanon, humus-rich floor of dense evergreen forest, alt. ca. 2200 m, T-2890.

Himalayas to Malaysia, north to South Japan.

Diacalpe Blume

1. **Diacalpe aspidioides** Blume, *Enum. Pl. Jav.* 241. 1828; Tard. & C. Chr. (1939-51) 292; Holtt. (1954) 481, (1965) 237.

CHIANGMAI: Doi Inthanon, mountain slope in dense evergreen forest, alt. ca. 2100 m, T-2892. LOEY: north ridge of Phu Luang, dense mountain forest, alt. 1100-1500 m, T-1313; northeastern ridge of Phu Luang, mountain slope in dense forest, alt. 1300-1567 m, T-1517; Phu Kradung, rather dry floor of dense forest, alt. ca. 1100 m, T-597. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, rather dry floor of dense mossy forest, alt. ca. 1250 m, T-7489. CHANTABURI: Khao Soidao, rather dry ground in mossy forest at ridge, alt. 700-1525 m, T-7201. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1600 m, T-4780.

Widely distributed in tropical Asia.

Didymochlaena Desv.

1. **Didymochlaena truncatula** (Sw.) J. Smith, *J. Bot.* **4**: 196. 1841; Tard. & C. Chr. (1939-51) 331; Holtt. (1964) 483.

CHIANGRAI: northern slope of Doi Pacho, moist slope along stream in deep shade, alt. ca. 1400 m, T-3696. CHANTABURI: Khao Soidao, dense evergreen forest at ridge, alt. ca. 1300 m, T-7183. NAKAWN SRITAMARAT: Khao Luang, cleyey slope of mountain in dense evergreen forest, alt. ca. 900 m, T-4664, *ibid.*, alt. ca. 1000 m, T-4696. TRANG: Khao Chong, rather dry mountain slope in dense forest, alt. ca. 600 m, T-5566.

Pantropic

Arachniodes Blume

1. **Arachniodes chinensis** (Rosenst.) Ching, *Acta Bot. Sin.* **10**: 257. 1962.—*Rumohra chinensis* (Rosenst.) Ching, *Sinensia* **5**: 46. 1934; Tard. & C. Chr. (1939-51) 322.—*Polystichopsis chinensis* (Rosenst.) Holtt. (1954) 486.

LOEY: Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-607, T-651. CHANTABURI: Khao Soidao, rather dry mountain slope in dense evergreen forest, alt. ca. 1400 m, T-7203.

South and West China to Indo-China, Thailand and Malaya.

2. **Arachniodes spectabilis** (Ching) Ching, *l.c.* (1962) 259.—*Rumohra spectabilis* Ching, *l.c.* (1934) 58.

CHIANGRAI: from Ban Lang Lat to Doi Pacho, dry mountain slope in mixed forest, alt. 1050-1450 m, T-3574. CHIANGMAI: Doi Inthanon, mountain slope in mixed forest, alt. 1350-1900 m, T-2659.

Yunnan and northern Thailand.

3. **Arachniodes speciosa** (Don) Ching, *l.c.* (1962) 259.—*Rumohra speciosa* (Don) Ching, *l.c.* (1934) 53; Tard. & C. Chr. (1939-51) 325.

CHIANGMAI: Doi Suthep, steep slope in evergreen forest, alt. ca. 1000 m, T-3871. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, 300-600 m, T-2026.

North India to Burma and Southwest China, south to Annam and northern Thailand.

4. **Arachniodes simulans** (Ching) Ching, *l.c.* (1962) 259.—*Rumohra simulans* Ching, *l.c.* (1934) 54; Tard. & C. Chr. (1939-51) 326; Holtt. (1961) 31.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, mountain slope along path in dense evergreen forest, alt. ca. 1150 m, T-3426. CHIANGMAI: Doi Suthep, moist ground in evergreen forest, alt. ca. 1000 m, T-3861, *ibid.*, rather dry mountain slope in evergreen forest, alt. 1000-1200 m, T-4465.

Central and West China to Burma, northern Thailand and Annam.

Polystichum Roth

1. **Polystichum lindsaefolium** Ridley, J. Mal. Br. R. Asiat. Soc. 4: 61. 1926; Holtt. (1954) 489.

CHIANGMAI: Doi Chiangdao, moist limestone cliff in dense forest, alt. ca. 1800 m, T-4215.

Malaya.

This is a form a little different from the Malayan plants in having the lower pinnae not reduced nor deflexed.

2. **Polystichum eximium** (Mett. ex Kuhn) C. Chr. Ind. Fil. Suppl. III, 163. 1934. —? *Polystichum indochinensis* Tard. et C. Chr. Notul. Syst. 8: 82. 1938; Tard. & C. Chr. (1939-51) 339.

LOEY: eastern slope of Phu Luang, mountain slope in dense evergreen forest, alt. 900-1400 m, T-1819; Phu Kradung, slope in dense mountain forest, alt. ca. 1000 m, T-395, *ibid.*, along stream in dense evergreen forest, alt. ca. 1100 m, T-939. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1300 m, T-4838. TRANG: Khao Chong, mountain slope in dense forest, alt. ca. 400 m, T-6704, *ibid.*, rather dry mountain slope in dense forest, alt. ca. 900 m, T-6838.

Ceylon to Japan.

3. **Polystichum** sp.

LOEY: north ridge of Phu Luang, mountain slope in dense evergreen forest, alt. 1100-1500 m, T-1291; northeastern ridge of Phu Luang, mountain slope in dense forest, alt. 1300-1567 m, T-1487.

4. **Polystichum biaristatum** (Blume) Moore, Ind. Fil. 86. 1858; Tard. & C. Chr. (1939-51) 342.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, mountain slope in dense mixed forest, alt. ca. 1100 m, T-3433. CHIANGMAI: Doi Suthep, rather dry slope in evergreen forest, alt. ca. 1000 m, T-3846, *ibid.*, floor of dense mixed mountain forest, alt. ca. 1100 m, T-3957; Doi Inthanon, mountain slope in evergreen forest, alt. ca. 1500 m, T-2642. CHANTABURI: Khao Soidao, mountain slope in dense evergreen forest, alt. ca. 1000 m, T-7154.

North India, South China, Taiwan, Thailand and Malaysia.

5. **Polystichum semifertile** (Clarke) Ching, Lingnan Sci. J. 15: 398. 1936; Tard. & C. Chr. (1939-51) 341,

CHIANGMAI: Doi Inthanon, floor of dense mountain forest, alt. 1900-2595 m, T-2871; southeastern slope of Doi Inthanon, interior of Ban Yang, mountain slope in dense forest, alt. ca. 2000 m, T-3008.

Sikkim, Yunnan, northern Thailand, Tonkin and Annam.

6. **Polystichum tenggerense** Rosenst. Rep. Sp. Nov. 8: 164. 1910.

CHIANGMAI: Doi Inthanon, mountain slope in dense forest, alt. 1900-2595 m, T-2888.

Java.

7. **Polystichum** sp.

CHIANGMAI: Doi Chiangdao, mountain slope in dense forest, alt. ca. 1800 m, T-4208.

Dryopteris Adans.

1. **Dryopteris scottii** (Bedd.) Ching, Bull. Dept. Biol. Sun Yatsen Univ. no. 6. 3. 1933, Bull. Fan Mem. Inst. Biol. 8: 402. 1938; Tard. & C. Chr. (1939-51) 310.

CHIANGMAI: Doi Inthanon, wet ground by stream in dense evergreen forest, alt. ca. 1600 m, T-2645.

North India, Upper Burma, South China, Indo-China and Taiwan.

2. **Dryopteris hirtipes** (Blume) O. Ktze. Rev. Gen. Pl. 2: 813. 1891; Ching, l.c. (1938) 407; Holtt. (1961) 30.

CHIANGMAI: Doi Suthep, mountain slope in light shade, alt. ca. 1500 m, T-3201.
LOEY: north ridge of Phu Luang, mountain slope in dense forest, alt. 1100-1500 m, T-1270.

Ceylon and western Malaysia, as north as Thailand.

3. **Dryopteris cochleata** (Don) C. Chr. Ind. Fil. 258. 1905; Ching, l.c. (1938) 434; Tard. & C. Chr. (1939-51) 312; Holtt. (1961) 30.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, cleyey slope along path in dense forest, alt. ca. 1100 m, T-3441. CHIANGMAI: Doi Chiangdao, rather dry slope along path in mixed forest, alt. ca. 1400 m, T-4072; interior of Mae Klang Waterfall, on approach to Doi Inthanon, alt. ca. 500 m, T-2371; Ban Yang, at middle elevation of Doi Inthanon, cleyey slope in thin forest, alt. ca. 1200 m, T-2425. LOEY: Phu Kradung, rather dry slope at edge of thin forest, alt. ca. 1000 m, T-7519.

Himalayas to western Malaysia.

4. **Dryopteris neochrysochoma** Ching, Lingnan Sci. J. 21: 31. 1945.

CHIANGMAI: Doi Inthanon, mountain slope in dense evergreen forest, alt. ca. 2200 m, T-2896.

Kwangtung.

5. **Dryopteris hendersonii** (Bedd.) C. Chr. Ind. Fil. 270. 1905; Ching, l.c. (1938) 458.

CHIANGMAI: southeastern slope of Doi Inthanon, moist ground by stream in dense mossy forest, alt. ca. 2500 m, T-3011.

Himalayas, South China and Taiwan, as north as southern edge of Japan (Isl. Yakushima off Kyushu).

6. **Dryopteris sparsa** (Ham. ex Don) O. Ktze. Rev. Gen. Pl. 2: 813. 1891; Ching,

l.c. (1938) 470; Tard. & C. Chr. (1939-51) 318; Holtt. (1954) 492.

CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3847. LOEY: north ridge of Phu Luang, mountain slope in dense evergreen forest, alt. 1100-1500 m, T-1260; Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-622. CHANTABURI: Khao Soidao, mountain slope in dense evergreen forest, alt. 700-1525 m, T-7193.

Tropics of Asia, north of South Japan.

7. **Dryopteris polita** Rosenst. Rep. Sp. Nov. 13: 218. 1914; Tard. & C. Chr. (1939-51) 317; Holtt. (1954) 492.—*Dryopteris chapaensis* C. Chr. & Ching ex Ching, l.c. (1938) 457; Holtt. (1961) 30.

LOEY: north ridge of Phu Luang, mountain forest, alt. 1100-1500 m, T-1303; Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-612.

Indo-China, Thailand, Malaya, Sumatra and Borneo.

8. **Dryopteris integriloba** C. Chr. Bull. Dept. Biol. Sun Yatsen Univ. no. 6. 5. 1933; Ching, l.c. (1938) 479; Tard. & C. Chr. (1939-51) 314.

NAKHON NAYOK: Khao Yai National Park, rather dry ground in light shade, alt. ca. 800 m, T-7399.

South China, Thailand and Tonkin.

9. **Dryopteris neoassamensis** Ching, l.c. (1938) 480.

CHIANGMAI: Doi Suthep, rather dry slope in evergreen forest, alt. ca. 1000 m, T-3942, T-3952. LOEY: north ridge of Phu Luang, rather dry slope in dense evergreen forest, alt. 1100-1500 m, T-1297; Phu Kradung, floor of dense forest, alt. 1100-1200 m, T-624. NAKHON NAYOK: Khao Kiew in Khao Yai National Park, rather dry floor of mossy forest, alt. ca. 1250 m, T-7492.

Kwangtung and Thailand.

10. **Dryopteris subtriangularis** (Hope) C. Chr. Ind. Fil. 296. 1905; Ching, l.c. (1938) 485; Tard. & C. Chr. (1939-51) 315; Holtt. (1965) 238.

CHIANGMAI: Doi Suthep, rather dry slope in evergreen forest, alt. ca. 1000 m, T-3850. LOEY: Phu Kradung, rather dry floor of dense forest, alt. 1100-1200 m, T-645, T-652.

Assam, South China, Thailand and Tonkin.

11. **Dryopteris pseudosparsa** Ching, l.c. (1938) 489.

CHIANGMAI: Doi Suthep, moist mountain slope in dense mixed forest, alt. ca. 1000 m, T-3948.

Yunnan, Kweichow and Thailand.

Tectarioideae

Ctenitis C. Chr. et Ching

1. **Ctenitis mannii** (Hope) Ching, Bull. Fan Mem. Inst. Biol. 8: 289. 1938; Holtt. (1954) 497.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in dense forest, alt. ca. 600 m, T-4520; eastern slope of Khao Luang, mountain slope by path in dense evergreen forest, alt. ca. 900 m, T-5284.

Assam to Malaya.

Lastreopsis Ching

1. **Lastreopsis parishii** (Hook.) Ching, Bull. Fan Mem. Inst. Biol. 8: 159. 1938; Holtt. (1954) 498.

LOEY: Phu Kradung, in crevices of rock in light shade, alt. ca. 400 m, T-344.

Burma to Malaya.

Tectaria Cav.

1. **Tectaria fuscipes** (Wall. ex Bedd.) C. Chr. Contr. U.S. Nat. Herb. 26: 290. 1931; Ching, Sinensia 2: 14. 1931.—*Ctenitopsis fuscipes* (Wall. ex Bedd.) C. Chr. ex C. Chr. & Tard.; Tard. & C. Chr. (1939-51) 354.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2094, T-2095. LOEY: north ridge of Phu Luang, mountain slope along path in moist dense forest, alt. 1100-1500 m, T-1289; Phu Kradung, grassy slope along path in dense mountain forest, alt. ca. 1100 m, T-389. CHANTABURI: Khao Soidao, rather dry slope in dense forest, alt. 700-1525 m, T-7181, T-7194.

Sikkim to South China, as south as Thailand.

2. **Tectaria coadunata** (J. Smith) C. Chr. l.c. (1931) 331; Ching, l.c. (1931) 18; Tagawa & K. Iwats. (1965) 86.—*Tectaria macrodonta* (Fée) C. Chr.; Tard. & C. Chr. (1939-51) 410; Holtt. (1954) 505.

CHIANGMAI: Doi Chiangdao, mountain slope in dense mixed forest, alt. ca. 1600 m, T-4398.

India and Southwest China, northern Thailand and Malaya.

3. **Tectaria variolosa** (Wall. ex Hook.) C. Chr. l.c. (1931) 289; Ching, l.c. (1931) 21; Tard. & C. Chr. (1939-51) 412; Holtt. (1954) 506, (1961) 31, (1965) 242.

CHIANGMAI: Ban Yang at middle elevation of Doi Inthanon, mountain slope in thin forest, alt. 600-1350 m, T-2415. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light forest, alt. 300-600 m, T-2099. LOEY: from Ban Na Luang to north ridge of Phu Luang, rather dry slope in dense forest, alt. ca. 900 m, T-1087; interior of Nam Thop, eastern slope of Phu Luang, alt. ca. 700 m, T-1897; Pha Nuk Khao, grassy ground in deciduous forest, alt. ca. 300 m, T-306.

Sikkim, Southwest China, south to Java.

4. **Tectaria griffithii** (Baker) C. Chr. Ind. Fil. Suppl. III, 180. 1934; Tard. & C. Chr. (1939-51) 411; Holtt. (1954) 240.—*Tectaria multicaudata* Ching, l.c. (1931) 20;

Holtt. (1954) 507.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 500 m, T-4519.

Sikkim to western Malaysia.

5. **Tectaria crenata** Cav. Descr. 250. 1802; Tard. & C. Chr. (1939-51) 407; Holtt. (1954) 510.

TRANG: Khao Chong, mountain slope in dense forest, alt. ca. 800 m, T-6807.

Malaysia and Polynesia, north to peninsular Thailand and Indo-China.

6. **Tectaria phaeocaulis** (Rosenst.) C. Chr. Ind. Fil. Suppl. III, 183. 1934.—*Tectaria laciniata* Ching, Bull. Fan Mem. Inst. Biol. 2: 200. 1931, l.c. (1931) 24; Tard. & C. Chr. (1939-51) 414.

CHIANGMAI: northern slope of Doi Pacho, mountain slope in mixed forest, alt. ca. 1400 m, T-3682.

South China, Tonkin and Annam, Thailand, Taiwan and the Ryukyus.

7. **Tectaria rockii** C. Chr. l.c. (1931) 331; Holtt. (1965) 238.

LOEY: north ridge of Phu Luang, mountain slope in dense forest, alt. 1100-1500 m, T-1276. CHANTABURI: Khao Soidao, rather dry mountain slope in dense forest, alt. 700-1525 m, T-7178.

Burma and Thailand.

8. **Tectaria simonsii** (Bedd.) Ching, l.c. (1931) 32; Tard. & C. Chr. (1939-51) 421.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light forest, alt. 300-600 m, T-2102.

Sikkim to South China, Taiwan and the Ryukyus, North Thailand and Tonkin.

9. **Tectaria singaporeana** (Wall. ex Hook. & Grev.) Ching, l.c. (1931) 25; Holtt. (1954) 512.

NAKAWN SRITAMARAT: Khao Luang, cleyey slope in dense mountain forest, alt. 680-950 m, T-4630. TRANG: Khao Chong, moist slope by stream in dense forest, alt. 600-1100 m, T-6801.

Western Malaysia.

10. **Tectaria vasta** (Blume) Copel. Phil. J. Sci. 2C: 411. 1907; Ching, l.c. (1931) 26; Tard. & C. Chr. (1939-51) 416; Holtt. (1954) 512.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 800 m, T-5309.

Sikkim to western Malaysia.

11. **Tectaria fauriei** Tagawa, J. Jap. Bot. 14: 102. 1938, 36: 208. 1961.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. ca. 600 m, T-2098.

Taiwan and the Ryukyus.

12. **Tectaria maingayi** (Baker) C. Chr. Ind. Fil. Suppl. III, 182. 1934; Holtt. (1954) 513, (1961) 31; Tagawa & K. Iwats. (1965) 86.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 700 m, T-5307. TRANG: Khao Chong National Park, sandy slope in light shade, alt. ca. 100 m, T-5488; Khao Chong, rather dry slope in dense forest, alt. 100-800 m, T-5573, *ibid.*, alt. 600-1100 m, T-6807 bis.

Western Malaysia.

13. **Tectaria decurrens** (Presl) Copel. Elmer's Leaflet 1: 236. 1907; Ching, l.c. (1931) 22; Tard. & C. Chr. (1939-51) 406; Holtt. (1965) 242.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. ca. 600 m, T-2100.

Sikkim to Taiwan and the Ryukyus, Southeast Asia generally, farther to Polynesia.

14. **Tectaria polymorpha** (Wall. ex Hook.) Copel. Phil. J. Sci. 2C: 413. 1907; C. Chr. l.c. (1931) 330; Ching, l.c. (1931) 30; Tard. & C. Chr. (1939-51) 417, p.p.; Holtt. (1954) 518, (1961) 31, (1965) 240.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, rather dry slope in mixed forest, alt. 900-1200 m, T-3422. CHIANGMAI: Doi Chiangdao, rather dry grassy slope in mixed forest, alt. 500-1600 m, T-4075, T-4078. LOEY: north ridge of Phu Luang, rather dry slope in dense forest, alt. 1100-1500 m, T-1314; interior of Nam Thop, eastern slope of Phu Luang, rather dry mountain slope in dense evergreen forest, alt. 400-850 m, T-1898, T-1899. CHANTABURI: Khao Soidao, dry ground in dense mixed forest, alt. 200-700 m, T-7321. TRANG: Khao Chong, rather dry slope in dense evergreen forest, alt. ca. 400 m, T-5567, *ibid.*, alt. 600-1100 m, T-6831.

Sikkim to South China and Taiwan, south to Ceylon and Malay Peninsula.

15. **Tectaria herpetocaulos** Holtt. Dansk Bot. Ark. 23: 241. 1965.

LOEY: from Ban Na Luang to north ridge of Phu Luang, mountain slope in dense forest, alt. ca. 800 m, T-1092; Phu Kradung, grassy floor of dense forest, alt. ca. 900 m, T-377, *ibid.*, dry slope in light shade, alt. ca. 1100 m, T-397.

South India, Burma, Thailand, Indo-China and Malaya.

Hemigramma Christ

1. ? **Hemigramma decurrens** (Hook.) Copel. Phil. J. Sci. 37: 404. 1928.

NAKHON NAYOK: Khao Yai National Park, rather dry ground in light shade near river, alt. ca. 800 m, T-7388.

West China to the Ryukyus, south to Thailand.

Heterogonium Presl

1. **Heterogonium gurupahensis** (C. Chr.) Holtt. Reinwardtia 3: 272. 1955.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in dense forest, alt. ca. 600 m, T-4517; eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 700 m, T-5302. TRANG: Khao Chong, mountain slope in dense forest, alt. 600-1100 m, T-6808, *ibid.*, alt. 100-600 m, T-6981.

Malay Peninsula to Celebes.

Quercifilix Copel.

1. **Quercifilix zeylanica** (Houtt.) Copel. *Phil. J. Sci.* **37**: 409. 1928; Tard. & C. Chr. (1939-51) 440; Holtt. (1954) 528, (1961) 31.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, muddy rock in dry mixed forest, alt. ca. 600 m, T-1906. PHITSANULOK: Tung Salaeng Luang National Park, muddy rock in dense forest, alt. ca. 500 m, T-2033.

Tropics of Asia.

Pteridrys C. Chr. & Ching

1. **Pteridrys syrmatica** (Willd.) C. Chr. & Ching, *Bull. Fan Mem. Inst. Biol.* **5**: 131. 1934; Tard. & C. Chr. (1939-51) 302; Holtt. (1954) 530.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, moist mountain slope in dense evergreen forest, alt. 300-600 m, T-4510, T-4524. TRANG: Khao Chong, mountain slope in dense forest, alt. ca. 300 m, T-6711.

Ceylon, Cochin-China, Malay Peninsula and Malaysia.

2. **Pteridrys australis** Ching, *l.c.* (1934) 142; Tard. & C. Chr. (1939-51) 306; Holtt. (1954) 532, (1961) 31.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 800 m, T-5305.

Yunnan, Burma, Indo-China, Thailand and Malaya.

Pleocnemia Presl

1. **Pleocnemia hemiteliiformis** (Racib.) Holtt. *Reinwardtia* **1**: 179. 1951, (1954) 536.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense forest, alt. ca. 700m, T-4623.

Western Malaysia, north to peninsular Thailand.

2. **Pleocnemia winitii** Holtt. *l.c.* (1951) 181. — *Tectaria leuzeana* auct. non (Gaud.) Copel.; C. Chr. *Contr. U.S. Nat. Herb.* **26**: 331. 1931.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry mountain slope near stream in light shade, alt. ca. 600 m, T-2040.

Assam to Hainan.

This species may be identical with *Dryopteris submembranacea* Hayata from Taiwan.

Arcypteris Underw.

1. **Arcypteris irregularis** (Presl) Holtt. *Reinwardtia* 1: 193. 1951, (1954) 538, (1961) 31.

PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2017. CHANTABURI: Khao Soidao, rather dry slope in mixed forest, alt. ca. 800 m, T-7195. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, mountain slope in light shade, alt. ca. 300 m, T-4504.

Malaysia generally, north to peninsular Thailand and Cambodia.

Athyrioideae

Microchlaena Ching

1. **Microchlaena cuspidata** (Bedd.) Ching, *Acta Phytotax. Sin.* 9: 99. 1964; Tagawa & K. Iwats. *Acta Phytotax. Geobot.* 22: 103. 1967.—*Microchlaena yunnanensis* (Christ) Ching; Tagawa & K. Iwats. (1965) 87.

CHIANGMAI: Doi Chiangdao, rather dry mountain slope in dry mixed forest, alt. 1400-1800 m, T-4397; Ban Yang, at middle elevation of Doi Inthanon, rather dry cleyey ground in thin forest, alt. 600-1350 m, T-2436, *ibid.*, alt. ca. 900 m, T-3167.

Assam, Upper Burma, Southwest China and northern Thailand.

Anisocampium Presl

1. **Anisocampium cumingianum** Presl, *Epim. Bot.* 59. 1849; Tard. & C. Chr. (1939-51) 281; Sledge, *Bull. Brit. Mus. (Nat. Hist.) Bot.* 2: 281. 1962; Holtt. (1965) 243.

CHIANGMAI: Doi Suthep, rather dry sandy slope in mixed forest, alt. ca. 1100 m, T-3961.

Himalayas, South India, Ceylon, northern Thailand, Laos and the Philippines.

Dryoathyrium Ching

1. **Dryoathyrium boryanum** (Willd.) Ching, *Bull. Fan Mem. Inst. Biol.* 11: 81. 1941.—*Athyrium boryanum* (Willd.) Tagawa; Holtt. (1954) 567.

CHIANGRAI: interior of Ban Lang Lat, north of Doi Pacho, wet sandy stream bed in deep shade, alt. ca. 1000 m, T-3425.

South India, Ceylon, North India, South China, northern Thailand, Java, Borneo, the Philippines and Taiwan.

Athyrium Roth

1. **Athyrium dissitifolium** (Baker) C. Chr. *Contr. U.S. Nat. Herb.* 26: 296, 332. 1931; Tagawa & K. Iwats. (1965) 87.

CHIANGRAI: from Ban Lang Lat to Doi Pacho, rather dry mountain slope in mixed forest, alt. ca. 1400 m, T-3572. CHIANGMAI: Doi Suthep, rather dry ground in

evergreen forest, alt. ca. 1400 m, T-3192; Ban Yang, at middle elevation of Doi Inthanon, rather cleyey slope in *Pinus*-forest, alt. ca. 1200 m, T-2437.

Yunnan and northern Thailand.

2. ***Athyrium appendiculiferum*** v.A.v. Ros. Bull. Jard. Bot. Buit. II, 16: 3. 1914; Holtt. (1954) 565.

CHIANGMAI: Doi Inthanon, mountain slope near stream in dense mossy forest, alt. 1900-2595 m, T-2874, T-3026.

Java, Sumatra, Malaya and Thailand.

3. ***Athyrium mackinnoni*** (Hope) C. Chr. Ind. Fil. 143. 1905; Tard. & C. Chr. (1939-51) 277.

LOEY: Phu Kradung, rather dry floor of dense forest, alt. ca. 1150 m, T-616. CHANTABURI: Khao Soidao, rather dry mountain slope in dense evergreen forest, alt. ca. 1300 m, T-7168.

India, West China, Thailand and Indo-China.

4. ***Athyrium setiferum*** C. Chr. Ind. Fil. 146. 1905.

CHIANGMAI: Doi Inthanon, mountain slope near stream in dense mossy forest, alt. 2000-2595 m, T-2877, T-3009.

Himalayas to Yunnan, also in northern Thailand.

5. ***Athyrium*** sp.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, rather dry mountain slope in dense evergreen forest, alt. ca. 700 m, T-1907.

Diplazium Sw.

1. ***Diplazium cordifolium*** Blume, Enum. Pl. Jav. 190. 1828.—*Athyrium cordifolium* (Blume) Copel.; Holtt. (1954) 548.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 800 m, T-4631, *ibid.*, alt. ca. 1300 m, T-4833; eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 800 m, T-5270 (pinnate form). TRANG: Khao Chong, moist mountain slope by stream in dense evergreen forest, alt. 600-1100 m, T-6816.

Malay Peninsula to Solomon Islands, northwards to the Philippines.

2. ***Diplazium xiphophyllum*** (Baker) C. Chr. Ind. Fil. 241. 1905; Holtt. Gard. Bull. S.S. 11: 106. 1940.—*Athyrium xiphophyllum* (Baker) Copel.; Holtt. (1954) 553.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, moist slope in dense evergreen forest, alt. ca. 600 m, T-4523; Khao Luang, damp slope in dense evergreen forest, alt. ca. 800 m, T-4675; eastern slope of Khao Luang, moist mountain slope in dense forest, alt. ca. 700 m, T-5304.

Malay Peninsula, Borneo and the Philippines (sec Copel.).

3. ***Diplazium donianum*** (Mett.) Tard. Aspl. Tonkin 58. 1932; Tard. & C. Chr.

(1939-51) 249.

PHITSANULOK: Tung Salaeng Luang National Park, in thicket on rather dry slope in thin forest, alt. ca. 500 m, T-2039. NAKHON NAYOK: Khao Yai National Park, rather dry slope in mixed forest near river, alt. ca. 800 m, T-7392. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, moist slope in dense evergreen forest, alt. ca. 400 m, T-4528; Khao Luang, mountain slope in dense forest, alt. ca. 800 m, T-4563; eastern slope of Khao Luang, mountain slope in dense forest, alt. ca. 700 m, T-5269.

North India to South China and Taiwan, north to the Ryukyus, south to Indo-China and Thailand.

4. **Diplazium** sp. aff. *D. donianum* (Mett.) Tard.

CHIANGMAI: Doi Suthep, moist ground in evergreen forest, alt. ca. 1000 m, T-3859.

5. **Diplazium bantamense** Blume, l.c. (1828) 191. — *Athyrium bantamense* (Blume) Milde; Holtt. (1954) 558.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, moist slope by stream in dense evergreen forest, alt. ca. 800 m, T-5303. TRANG: Khao Chong, mountain slope by stream in dense evergreen forest, alt. 600-1100 m, T-6822.

Western Malaysia to peninsular Thailand.

6. **Diplazium mettenianum** (Miq.) C. Chr. Ind. Fil. 236. 1906; Tard. & C. Chr. (1939-51) 253.

LOEY: Phu Kradung, along path in dense forest, alt. ca. 1100 m, T-649.

Japan, China, Tonkin and Thailand.

7. **Diplazium subintegrum** Holtt. Gard. Bull. S.S. 9: 125. 1937. — *Athyrium subintegrum* (Holtt.) Holtt. (1954) 557.

NAKHON NAYOK: Khao Yai National Park, rather dry ground near river in light shade, alt. ca. 800 m, T-7379.

Malaya and Thailand.

8. **Diplazium prescottianum** (Wall. ex Hook.) Moore, Ind. Fil. 156, 334. 1859; Holtt. Gard. Bull. S.S. 11: 94. 1940. — *Athyrium prescottianum* (Wall. ex Hook.) Holtt. (1954) 557.

NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1600 m, T-4790.

Malay Peninsula.

9. **Diplazium tomentosum** Blume, l.c. (1828) 192; Tard. & C. Chr. (1939-51) 257. — *Athyrium tomentosum* (Blume) Milde; Holtt. (1954) 551.

NAKAWN SRITAMARAT: Khao Luang, cleyey mountain slope in dense evergreen forest, alt. ca. 700 m, T-4622, *ibid.*, alt. ca. 1000 m, T-4681.

Tenasserim to Malaya, Annam and Cochin-China, Sumatra, Java, Borneo and Mindanao.

10. **Diplazium crenatoserratum** (Blume) Moore, Ind. Fil. 121. 1859.—*Athyrium crenatoserratum* (Blume) Milde; Holtt. (1954) 561.

NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, damp mountain slope in dense evergreen forest, alt. ca. 600 m, T-4501; Khao Luang, mountain slope in dense evergreen forest, alt. 680-950 m, T-4627, T-4628, T-4633; eastern slope of Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1000 m, T-5271.

Peninsular Thailand to Malaysia.

11. **Diplazium silvaticum** (Bory) Sw. Syn. Fil. 92. 1806; Holtt. Gard. Bull. S.S. 11: 99. 1940; Tagawa & K. Iwats. (1965) 87.—*Athyrium pinnatum* (Blanco) Copel.; Holtt. (1954) 560, (1961) 32.

PHITSANULOK: Tung Salaeng Luang National Park, moist ground in rather deep shade, alt. 300-600 m, T-2096. CHANTABURI: Khao Soidao, moist mountain slope in evergreen forest, alt. 700-1525 m, T-7202. TRANG: Khao Chong, mountain slope in dense forest near stream, alt. 100-800 m, T-5584.

Mauritius, India, Burma, Thailand, Malaya, Java and the Philippines.

12. **Diplazium malaccense** Presl, Epim. Bot. 86. 1849; Tard. & C. Chr. (1939-51) 258.—*Athyrium malaccense* (Presl) Holtt. (1954) 552.

TRANG: Khao Chong, rather dry mountain slope in dense evergreen forest, alt. ca. 800 m, T-6830.

Indo-China to Malaysia.

13. **Diplazium siamense** C. Chr. Contr. U.S. Nat. Herb. 26: 332. 1929.

CHIANGRAI: northern slope of Doi Pacho, mountain slope in mixed forest, alt. ca. 1500 m, T-3681. CHIANGMAI: Doi Suthep, mountain slope in dense forest, alt. ca. 1200 m, T-4462.

Endemic to northern Thailand.

14. **Diplazium petri** Tard. Aspl. Tonkin 67. 1932; Tard. & C. Chr. (1939-51) 260.

CHANTABURI: Khao Soidao, rather dry mountain slope in dense evergreen forest, alt. ca. 1000 m, T-7160. NAKAWN SRITAMARAT: Khao Luang, mountain slope in dense evergreen forest, alt. ca. 1400 m, T-4777.

Ryukyu, Taiwan, Indo-China and Thailand.

15. **Diplazium incomptum** Tagawa, Acta Phytotax. Geobot. 3: 35. 1934.

CHANTABURI: Khao Soidao, rather dry mountain slope in dense evergreen forest, alt. ca. 1400 m, T-7160 bis.

Ryukyu, Taiwan and Thailand.

16. **Diplazium muricatum** (Mett.) v.A.v. Ros. Mal. Ferns 829. 1909; Sledge, Bull.

Brit. Mus. (Nat. Hist.) Bot. 2: 312. 1962.

CHIANGMAI: Doi Chiangdao, moist mountain slope in dense mixed forest, alt. 1600–2100 m, T-4226; Doi Inthanon, moist slope by stream in dense evergreen forest, alt. 1900–2595 m, T-2879.

Ceylon to North India and Burma, also in Thailand and Java.

17. **Diplazium leptophyllum** Christ apud C. Chr. Ind. Fil. Suppl 103. 1913, based on *Asplenium leptophyllum* Baker, Kew Bull. 1906: 10. 1906, non Sw. 1791; C. Chr. Contr. U.S. Nat. Herb. 26: 303. 1931.

CHIANGMAI: Doi Chiangdao, mountain slope with humus in dense mixed forest, alt. ca. 1600 m, T-4369; Doi Suthep, moist ground in evergreen forest, alt. ca. 1000 m, T-3863.

Yunnan, Burma and northern Thailand.

18. **Diplazium conterminum** Christ, J. de Bot. 1905: 67; Tard. & C. Chr. (1939–51) 258.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, mountain slope along path in dense forest, alt. ca. 900 m, T-5272.

Thailand, Annam, South China, the Ryukyus and Japan.

19. **Diplazium taiwanense** Tagawa, Acta Phytotax. Geobot. 5: 259. 1936.

NAKHON NAYOK: Khao Yai National Park, moist ground along river in light shade, alt. ca. 800 m, T-7385.

Thailand, Tonkin, Taiwan, Ryukyu and as north as South Japan.

20. **Diplazium** sp.

CHIANGMAI: Doi Inthanon, mountain slope in dense evergreen forest, alt. 1350–1900 m, T-2656. LOEY: eastern slope of Phu Luang, mountain slope in dense evergreen forest, alt. 900–1400 m, T-1820.

21. **Diplazium polypodioides** Blume, l.c. (1828) 194; Tard. & C. Chr. (1939–51) 266; Tagawa & K. Iwats. (1965) 88.—*Diplazium asperum* Blume; Tard. & C. Chr. (1939–51) 265.—*Athyrium asperum* (Blume) Milde; Holtt. (1954) 571.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, mountain slope in mixed forest, alt. 600–1350 m, T-2416, T-2427; Doi Inthanon, mountain slope in dense forest, alt. 1350–1900 m, T-2655, *ibid.*, moist floor of dense forest, alt. 1900–2595 m, T-2880; southeastern slope of Doi Inthanon, moist ground by stream in dense mossy forest, alt. ca. 2500 m, T-3010, *ibid.*, moist mountain slope in dense forest, alt. ca. 2000 m, T-3027. CHANTABURI: Khao Soidao, moist slope along stream in dense forest, alt. ca. 500 m, T-7107, *ibid.*, mountain slope in dense evergreen forest, alt. ca. 1200 m, T-7204. NAKAWN SRITAMARAT: interior of Wat Kiri Wang, lower elevation of Khao Luang, moist slope near stream in dense evergreen forest, alt. ca. 600 m, T-4518.

Ceylon, South India, Thailand, Indo-China, Taiwan and Malaysia throughout.

This is another collective species, and further studies are in need both in the fields and in the herbaria.

22. **Diplazium simplicivenium** Holtt. Gard. Bull. S.S. 11: 100. 1940; Tagawa & K. Iwats. (1965) 88.—*Athyrium simplicivenium* (Holtt.) Holtt. (1954) 573, (1961) 32.

NAKAWN SRITAMARAT: Khao Luang, damp mountain slope in dense evergreen forest, alt. 1100–1786 m, T-4803. TRANG: Khao Chong, moist slope in dense forest, alt. ca. 400 m, T-6982.

Thailand and Malaya.

23. **Diplazium dilatatum** Blume, l.c. (1828) 194; Sledge, Bull. Brit. Mus. (Nat. Hist.) Bot. 2: 303. 1962; Tagawa & K. Iwats. (1965) 87.—*Athyrium dilatatum* (Blume) Milde; Holtt. (1954) 574.—*Diplazium maximum* (Don) C. Chr.; Tard. & C. Chr. (1939–51) 263.

CHIANGRAI: Ban Lang Lat to Doi Pacho, moist slope along stream in light shade, alt. ca. 1400 m, T-3568. CHIANGMAI: Doi Suthep, by stream in evergreen forest, alt. ca. 1000 m, T-3849, *ibid.*, moist mountain slope in dense mixed forest, alt. ca. 1100 m, T-3960; Doi Inthanon, wet ground by stream in dense forest, alt. 1350–1900 m, T-2654. LOEY: north ridge of Phu Luang, mountain slope in dense forest, alt. 1100–1500 m, T-1269; Phu Kradung, moist dense forest, alt. ca. 1100 m, T-642. PHITSANULOK: Tung Salaeng Luang National Park, rather wet ground by stream in light shade, alt. ca. 500 m, T-2041. NAKHON NAYOK: near Hiewesai Waterfall, Khao Yai National Park, moist cleyey slope along river in light shade, alt. ca. 800 m, T-7427. CHANTABURI: Khao Soidao, moist mountain slope in dense evergreen forest, alt. ca. 1000 m, T-7184. TRANG: Khao Chong, mountain slope along stream in dense forest, alt. ca. 800 m, T-6832.

India generally, Burma, South China, Taiwan, Ryukyu and Southwest Japan, Indo-China, Thailand, Malaysia and to northern Australia.

24. **Diplazium esculentum** (Retz.) Sw. Schrad. J. Bot. 1801 (2): 312. 1803; Tard. & C. Chr. (1939–51) 269; Tagawa & K. Iwats. (1965) 88.—*Athyrium esculentum* (Retz.) Copel.; Holtt. (1954) 562.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, rather wet ground by rice fields in open place, alt. ca. 350 m, T-2257. NAKHON NAYOK: Khao Yai National Park, moist ground by river in open place, alt. ca. 800 m, T-7395.

Tropic of Asia generally, north to central China and Japan (South Kyushu), east to southern Pacific Islands.

Hypodematium Kunze

1. **Hypodematium crenatum** (Forsk.) Kuhn, Deck. Reis. Bot. 3 (3): 37. 1879; Ching, Sunyatsenia 3: 9. 1935; Tard. & C. Chr. (1939–51) 374; Holtt. (1954) 501, (1965) 238.

CHIANGMAI: Doi Chiangdao, in crevices of a little moist limestone cliff in thin mixed forest, alt. ca. 1450 m, T-4394.

Palaeotropics: South and East Africa, Cape Verde Islands, Mauritius, Arabia, North India, Thailand and Malaya, South and Central China, Taiwan, the Philippines and north to Japan.

ADIANTACEAE

Ceratopteris Brongn.

1. **Ceratopteris thalictroides** (L.) Brongn. Bull. Soc. Phil. 1821: 186. 1822; Tard. & C. Chr. (1939-51) 194; Holtt. (1954) 578, (1961) 32, (1965) 243; Tagawa & K. Iwats. (1965) 88.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, ditch in rice fields, alt. ca. 1300 m, T-2413. PHRA NAKHON: Bankhen, north of Bangkok, in rice field, T-281; Soi Somprasong, Bangkok, wet open place along ditch, T-7082. PATHUM THANI: Rangsit, north of Bangkok, in ditch in sunny place, T-284, T-286, T-288.

Tropics and the warm temperate regions of the Old World.

T-284 is distinct in having finely dissected fronds, but it seems to be monstrous.

Taenitis Willd.

1. **Taenitis blechnoides** (Willd.) Sw. Syn. Fil. 24, 220. 1806; Tard. & C. Chr. (1939-51) 134; Holtt. (1954) 586, (1961) 32.

NAKHON NAYOK: Khao Yai National Park, rather dry floor of mixed forest, alt. ca. 800 m, T-7390.

India to Hainan, Malaysia, eastwards to Fiji.

Coniogramme Fée

1. **Coniogramme petelotii** Tard. Bull. Mus. Paris II, 5: 334. 1933; Tard. & C. Chr. (1939-51) 192.

CHIANGMAI: Doi Inthanon, wet sandy ground by stream in dense evergreen forest, alt. ca. 1600 m, T-2660, T-3024.

Yunnan, Tonkin and northern Thailand.

2. **Coniogramme fraxinea** (Don) Diels var. **serrulata** (Blume) Hieron. Hedwigia 57: 289. 1916; Tard. & C. Chr. (1939-51) 191.

CHIANGMAI: Doi Chiangdao, mountain slope in dense mixed forest, alt. ca. 1900 m, T-4231, T-4231 bis; Doi Suthep, moist slope in thicket, alt. ca. 1400 m, T-4493; Doi Inthanon, mountain slope in dense evergreen forest, alt. ca. 2000 m, T-2884. LOEY: north ridge of Phu Luang, mountain slope in dense evergreen forest, alt. 1100-1500 m, T-1280.

Thailand and Indo-China. The area of species is: India, South China to Taiwan, Indo-China, Malaysia throughout.

3. **Coniogramme procera** Fée, 10^{me} Mém. 22. 1865.

CHIANGMAI: southeastern slope of Doi Inthanon, wet floor of dense mossy forest, alt. ca. 2500 m, T-3012.

Himalayas, Southwest China, Taiwan, also in northern Thailand.

Onychium Kaulf.

1. **Onychium contiguum** Hope, J. Nat. Hist. Soc. Bombay 13: 444. 1901; Ching, Lingn. Sci. J. 13: 498. 1934.

CHIANGMAI: Doi Chiangdao, dry sandy slope in light shade, alt. ca. 2000 m, T-4207.

North India, Southwest China and northern Thailand.

Cheilanthes Sw.

1. **Cheilanthes tenuifolia** (Burm.) Sw. Syn. Fil. 129, 332. 1806; Tard. & C. Chr. (1939-51) 173; Holtt. (1954) 590, (1961) 33, (1965) 243.

CHIANGMAI: en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, moist cleyey bank along path in mixed forest, alt. ca. 500 m, T-2364.

Tropical Asia to Australia, extending eastwards to the Pacific and New Zealand.

2. **Cheilanthes belangeri** (Bory) C. Chr. Ind. Fil. 172. 1905; Tard. & C. Chr. (1939-51) 172; Holtt. (1954) 591, (1961) 33, (1965) 243.

CHIANGMAI: en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, cleyey bank of path in mixed forest, alt. ca. 500 m, T-2358.

North India to South China, Thailand, Indo-China and Malaya.

3. **Cheilanthes subrufa** Baker, Kew Bull. 1906: 8; Tard. & C. Chr. (1939-51) 171.

CHIANGMAI: Doi Chiangdao, rather dry limestone cliff in mixed forest, alt. 500-1600 m, T-4074, *ibid.*, dry exposed limestone cliff in sunny place, alt. 1600-2100 m, T-4227, T-4235.

Yunnan, North Thailand and Tonkin.

4. **Cheilanthes farinosa** (Forsk.) Kaulf. Enum. Fil. 202. 1824; Tard. & C. Chr. (1939-51) 171; Holtt. (1954) 592, (1961) 33.

CHIANGMAI: Doi Chiangdao, muddy limestone cliff in forest, alt. 1600-2100 m, T-4211, T-4234, *ibid.*, dry limestone cliff in light shade, alt. 1400-1800 m, T-4401; Doi Suthep, old stone-wall in light shade, alt. ca. 1650m, T-3183, *ibid.*, exposed rock in dry deciduous forest, alt. 400-800 m, T-4441; en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, cleyey slope along path in forest, alt. 350-600 m, T-2369; Ban Yang, at middle elevation of Doi Inthanon, cleyey bank of path in mixed forest, alt. 600-1350 m, T-2428.

Temperate and tropical regions throughout the World.

This is one of the so-called collective species. Even in the materials cited above, we can notice a good deal of variations. Owing to the unlimited range of distribution of this species, it is almost impossible at present to give here a good classification.

Pityrogramma Link

1. **Pityrogramma calomelanos** (L.) Link, Handb. Gew. **3**: 20. 1833; Tard. & C. Chr. (1939-51) 189; Holtt. (1954) 593, (1961) 33, (1965) 243; Tagawa & K. Iwats. (1965) 88.

NAKAWN SRITAMARAT: eastern slope of Khao Luang, rather dry slope in open place, alt. ca. 400 m, T-5291.

Pantropic.

Doryopteris J. Smith

1. **Doryopteris ludens** (Wall. ex Hook.) J. Smith, Hist. Fil. 289. 1875; C. Chr. Contr. U.S. Nat. Herb. **26**: 333. 1931; Tard. & C. Chr. (1939-51) 176; Tryon, Contr. Gray Herb. no. 143. 60. 1942; Holtt. (1954) 594, (1965) 243.

LOEY: north ridge of Phu Luang, dry muddy rock in evergreen forest, alt. ca. 1200 m, T-1254; interior of Nam Thop, eastern slope of Phu Luang, cleyey slope at foot of cliff in dry mixed forest, alt. ca. 600 m, T-1903.

North India and Burma to Yunnan, Indo-China and Thailand, south to Malaya, Sumatra and Java, also in the Philippines and New Guinea.

Adiantum L.

1. **Adiantum caudatum** L. Mant. 308. 1771; Tard. & C. Chr. (1939-51) 180; Holtt. (1954) 599, (1961) 33, (1965) 244; Ching, Acta Phytotax. Sin. **6**: 313. 1957.

LOEY: from Ban Na Luang to north ridge of Phu Luang, dry slope in deciduous forest, alt. ca. 700 m, T-1114; Pha Nuk Khao, dry limestone cliff on mountain slope in dry deciduous forest, alt. ca. 300 m, T-309. PHITSANULOK: Tung Salaeng Luang National Park, rather dry slope in light shade, alt. 300-600 m, T-2035.

Tropics of the Old World.

2. **Adiantum zollingeri** Mett. ex Kuhn, Ann. Lugd. Bat. **4**: 280. 1869.

CHIANGMAI: Doi Suthep, by exposed rock in dry deciduous forest, alt. 400-800 m, T-4440; near Mae Klang Waterfall, interior of Chom Thong, dry slope along path in deciduous forest, alt. ca. 350m, T-2264. LOEY: Phu Kradung, dry ground along path in thin deciduous forest, alt. ca. 600 m, T-345.

Himalayas, Thailand and Java.

We refer here tentatively the above materials to the nominal species. However, we are not certain whether the Himalayan plants included in this species are really the same with the typical Javanese *A. zollingeri*. *Adiantum sinicum* Ching seems to be an ally of this species group.

3. **Adiantum edgeworthii** Hook. Sp. Fil. **2**: 14. 1851; Ching, l.c. (1957) 315.

CHIANGMAI: Doi Suthep, muddy rock in evergreen forest, alt. ca. 1500 m, T-3184.

Northwest India to Burma, China (north to Manchuria) to Taiwan, Thailand, Tonkin and the Philippines, also in Kyushu in Japan.

4. **Adiantum soboliferum** Wall. ex Hook. Sp. Fil. **2**: 13. 1851; Tard. & C. Chr.

(1939-51) 181; Holtt. (1954) 598; Ching, l.c. (1957) 320.

LOEY: interior of Nam Thop, eastern slope of Phu Luang, rather dry bank of stream, in mixed forest, alt. ca. 800 m, T-1901; Pha Nuk Khao, dry slope in deciduous forest, alt. ca. 300 m, T-305.

Asian tropics.

5. **Adiantum philippense** L. Sp. Pl. 2: 1094. 1753; Tard. & C. Chr. (1939-51) 182; Holtt. (1954) 598, (1961) 33, (1965) 244; Ching, l.c. (1957) 318.

CHIANGMAI: Doi Chingdao, rather dry slope in mixed forest, alt. 500-1600 m, T-4081; Doi Suthep, rather dry slope in mixed forest, alt. 1000-1150 m, T-3857, T-3958; en route from Mae Klang Waterfall to Ban Yang, on approach to Doi Inthanon, along path in mixed forest, alt. 350-600 m, T-2366; Ban Yang, at middle elevation of Doi Inthanon, rather dry cleyey slope in light shade, alt. 600-1350 m, T-2435. PHITSANULOK: Tung Salaeng Luang National Park, dry slope in light shade, alt. 300-600 m, T-2030. LOEY: eastern slope of Phu Luang, dry slope in evergreen forest, alt. 900-1400 m, T-1829; Phu Kradung, rather dry slope in mixed forest, alt. ca. 800m, T-7520.

Tropics of the Old World.

6. **Adiantum erylliae** C. Chr. et Tard. Notul. Syst. 6: 172. 1938; Tard. & C. Chr. (1939-51) 184.

CHIANGMAI: near Mae Klang Waterfall, interior of Chom Thong, dry slope along river in dry deciduous forest, alt. ca. 350 m, T-2252.

Northern Thailand, Tonkin and Cambodia.

Antrophyum Kaulf.

1. **Antrophyum callifolium** Blume, Enum. Pl. Jav. 111. 1828; Tard. & C. Chr. (1939-51) 204; Holtt. (1954) 605, (1965) 244; Tagawa & K. Iwats. (1965) 89.

LOEY: eastern slope of Phu Luang, muddy rock in dense forest, alt. 900-1400 m, T-1836; interior of Nam Thop, eastern slope of Phu Luang, muddy rock in dense forest, alt. 400-850 m, T-1893; Phu Kradung, dry muddy rock in mixed forest, alt. ca. 900 m, T-376. NAKHON NAYOK: Khao Yai National Park, tree trunk in light shade near river, alt. ca. 800 m, T-7391; between log cabin and Hiewesai Waterfall, Khao Yai National Park, tree trunk along river in light shade, alt. ca. 800 m, T-7437. CHANTABURI: Khao Soidao, mossy tree trunk in dense evergreen forest, alt. 700-1525 m, T-7177. NAKAWN SRITAMARAT: Khao Luang, moist rock in dense evergreen forest, alt. 1100-1786 m, T-4793; eastern slope of Khao Luang, muddy wet rock along stream in dense evergreen forest, alt. ca. 800 m, T-5281. TRANG: Khao Chong, muddy rock by stream in dense forest, alt. ca. 200 m, T-5572, *ibid.*, alt. ca. 600 m, T-5583, *ibid.*, alt. 600-1100 m, T-6806.

Old World tropics.

2. **Antrophyum obovatum** Baker, Kew Bull. 1898: 233; Tard. & C. Chr. (1939-51) 202.

CHIANGMAI: Doi Chiangdao, mossy tree trunk in dense mixed forest, alt. ca. 1600 m, T-4392.

North India, China, North Thailand, Indo-China, Taiwan and Japan.

3. **Antrophyum parvulum** Blume, Enum. Pl. Jav. 110. 1828; Holtt. (1954) 605.

LOEY: Phu Kradung, muddy rock in dense forest, alt. 1100-1200 m, T-608.

TRANG: Khao Chong, mossy tree trunk in dense forest, alt. ca. 600 m, T-6703.

Thailand, Malaya and Java, known also in Taiwan and the Ryukyus. Probably widely distributed in Malaysia.

Vittaria Sm.

1. **Vittaria ensiformis** Sw. Ges. Nat. Fr. Berl. Neu. Schr. 2: 134. 1799; Holtt. (1954) 613, (1961) 34.

CHANTABURI: Khao Soidao, tree trunk in dense forest, alt. 700-1525 m, T-7191.

TRANG: Khao Chong, tree trunk in dense primitive forest, alt. 600-1100 m, T-6809.

Tropics of the Old World.

2. **Vittaria sikkimensis** Kuhn, Linnaea 36: 66. 1869; Ching, Sinensia 1: 180. 1931; Tard. & C. Chr. (1939-51) 198; Holtt. (1961) 34.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense forest, alt. ca. 1600m, T-2650.

Sikkim, Yunnan and northern Thailand.

3. **Vittaria angustifolia** Blume, Enum. Pl. Jav. 199. 1828; Holtt. (1954) 610.

LOEY: eastern slope of Phu Luang, moist rock in dense forest, alt. ca. 1200 m, T-2016. NAKAWN SRITAMARAT: Khao Luang, muddy rock in dense evergreen forest, alt. 1100-1786 m, T-4824. TRANG: Khao Chong, mossy tree trunk in dense evergreen forest, alt. 600-1100 m, T-6810.

Throughout Malaysia to New Caledonia.

4. **Vittaria elongata** Sw. Syn. Fil. 109, 302. 1806; Ching, l.c. (1931) 179; Tard. & C. Chr. (1939-51) 197; Holtt. (1954) 614, (1961) 34.

NAKHON NAYOK: Khao Yai National Park, mossy tree trunk in light shade, alt. ca. 800 m, T-7398. NAKAWN SRITAMARAT: Khao Luang, mossy tree trunk in dense evergreen forest, alt. ca. 1400 m, T-4796.

Tropics of the Old World, north to Sikkim, Hainan, Taiwan and the Bonins.

This is one of the variable species. T-4796 is a form called *V. merrillii*, which was reduced to *V. zosterifolia* by Copeland.

5. **Vittaria flexuosa** Fée, 3^{me} Mém. 16. 1852; Ching, l.c. (1931) 187; Tard. & C. Chr. (1939-51) 199; C. Chr. Contr. U.S. Nat. Herb. 26: 333. 1931; Holtt. (1954) 611, (1965) 244.

CHIANGMAI: Doi Suthep, mossy tree trunk in dense forest, alt. ca. 1400 m, T-3190;

Doi Inthanon, muddy rock near stream in dense forest, alt. 1350-1900 m, T-2652. LOEY: northeastern ridge of Phu Luang, tree trunk in dense mountain forest, alt. 1300-1567 m, T-1494; Phu Kradung, rotten tree trunk in dense forest, alt. ca. 1100 m, T-946.

Himalayas to Southwest China, Thailand, also in Japan.

6. **Vittaria amboinensis** Fée, 3^{me} Mém. 14. 1852; Ching, l.c. (1931) 189; Tard. & C. Chr. (1939-51) 199.

LOEY: north ridge of Phu Luang, tree trunk in dense evergreen forest, alt. 1100-1500 m, T-1286, northeastern ridge of Phu Luang, tree trunk in dense forest, alt. 1300-1567 m, T-1499; Phu Kradung tree trunk in dense forest, alt. 1100-1200 m, T-639, T-945. CHANTABURI: Khao Soidao, tree trunk in mossy forest at ridge, alt. ca. 1450 m, T-7173. TRANG: Khao Chong, tree trunk in dense mountain forest, alt. 600-1100 m, T-6837.

Himalayas to Burma, Thailand, Indo-China, south to Java.

7. **Vittaria forrestiana** Ching, l.c. (1931) 191; Tard. & C. Chr. (1939-51) 200.

CHIANGMAI: Doi Inthanon, mossy tree trunk in dense evergreen forest, alt. ca. 2200 m, T-2873.

Yunnan, Burma, Indo-China, northern Thailand, further north to southern edge of Japan.

Vaginularia Fée

1. **Vaginularia trichoidea** Fée, 3^{me} Mém. 54. 1852; Tagawa & K. Iwats. (1965) 89.—*Monogramma trichoidea* J. Smith ex Hook. & Baker; Holtt. (1954) 616.

TRANG: Khao Chong, muddy rock in dense forest along river, alt. ca. 300 m, T-6709.

Malay Peninsula, Borneo and the Philippines.

MARSILEACEAE

Marsilea L.

1. **Marsilea crenata** Presl, Rel. Haenk. 1: 84. 1825; Holtt. (1954) 619.

CHIANGMAI: Ban Yang, at middle elevation of Doi Inthanon, wet ground by stream in open place, alt. 600-1350 m, T-2422. PHRA NAKHON: Bangkhen, north of Bangkok, canal along highway in sunny place, T-239.

Sumatra, Malaya, north to Thailand, east to the Philippines, extending north to the Ryukyus.

SALVINIACEAE

Salvinia Adans.

1. **Salvinia cucullata** Roxb. ex Bory, Bèl. Voy. Bot. 2: 6. 1833; Tard. & C. Chr. (1939-51) 543; Holtt. (1954) 621; Tagawa & K. Iwats. (1965) 89.

PHRA NAKHON : Bangkhen, north of Bangkok, floating on canal, T-236.
India, Thailand, Indo-China and Malaya

AZOLLACEAE

Azolla L.

1. **Azolla pinnata** R. Br. Prodr. Fl. N. Holl. 167. 1810; Holtt. (1954) 622.

PHRA NAKHON : Bangkhen, north of Bangkok, floating on canal along highway in sunny place, T-235.

The specific delimitation of this species group is not certain, and the area of this is not so clear.

INDEX

The following index is an alphabetical list of the pteridophytes collected by the first Thai-Japanese Botanical Expedition in 1965-66. Synonyms and binomials referred to in the notes are printed in italics, and new name combinations are in bold face type.

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