

NEW COMBINATIONS IN THE FERNS OF THAILAND

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New combinations are made in the fern genera *Colysis*, *Cyclosorus*, *Haplopteris* and *Selliguea* from Thailand. A new combination for *Pteridaceae* subfamily *Cryptogrammoideae* is made.

Keywords. *Colysis*, *Cryptogrammoideae*, *Cyclosorus*, fern, *Haplopteris*, *Polypodiaceae*, *Pteridaceae*, *Selliguea*, Thailand, *Thelypteridaceae*.

INTRODUCTION

A multi-access key to the ferns of Thailand is currently being developed at the Royal Botanic Garden Edinburgh in collaboration with the Forest Herbarium Bangkok and Chulalongkorn University in Bangkok. This work will be explained in greater detail in forthcoming papers to be published in *Thai Forest Bulletin* but one of the aims is to ensure that all species which occur in Thailand bear the name which best reflects current research into generic delimitation. Fortunately, much of this research has been summarised by Smith *et al.* (2006, 2008) and we shall adopt the family and generic concepts laid out in these works. As it is not possible at this stage to taxonomically revise the c.670 species of fern which occur in Thailand species delimitation will follow Tagawa & Iwatsuki (1979, 1985, 1988, 1989), unless specific pieces of taxonomic work have superseded these publications (e.g. Hovenkamp *et al.*, 1998), or we have come to our own differing opinion in specific groups. One of the consequences of updating generic delimitations of Thai ferns is that a number of new combinations are necessary.

POLYPODIACEAE

The limits of the family *Polypodiaceae* and the generic concepts within the family have changed greatly over the years. In Nooteboom (1997, 1998) *Colysis* C.Presl was treated as a synonym of *Leptochilus* Kaulf. and included *Leptochilus macrophyllus* var. *pedunculatus*. This taxon had been treated by Tagawa & Iwatsuki (1989) as *Colysis pedunculata*. We follow Tagawa & Iwatsuki (1989) and Smith *et al.* (2006, 2008) who treat *Colysis* and *Leptochilus* as distinct. We are, however, following

Nooteboom's recognition of this taxon at the rank of variety, rather than at the species rank, and a new combination is necessary in *Colysis*.

In Hovenkamp (1998) and Smith *et al.* (2006, 2008) *Crypsinus* C.Presl is treated as a synonym of *Selliguea* Bory and several new combinations are therefore necessary for *Crypsinus* species from Thailand.

Colysis macrophylla (Blume) C.Presl var. ***pedunculata*** (Hook. & Grev.) S.Linds., **comb. nov.** – *Ceterach pedunculatum* Hook. & Grev., Icon. Filic. 1: t.5 (1827). – *Selliguea pedunculata* (Hook. & Grev.) C.Presl, Epimel. Bot. 146 (1851). – *Polypodium pedunculatum* (Hook. & Grev.) Salomon, Nomencl. Gefässkrypt. 312 (1883). – *Pleopeltis pedunculata* (Hook. & Grev.) Alderw., Bull. Dept. Agric. Indes Neerl. 27: 12 (1909). – *Colysis pedunculata* (Hook. & Grev.) Ching, Bull. Fan Mem. Inst. Biol. 4: 321 (1933). – *Leptochilus macrophyllus* var. *pedunculatus* (Hook. & Grev.) Noot., Blumea 42: 290 (1997). – Type: Bangladesh, Sylhet, 1815, *D. Smith* 1074 (holo K!).

Selliguea cruciformis (Ching) S.Linds., **comb. nov.** – *Polypodium cruciforme* Ching, Sinensia 1: 47 (1930). – *Phymatodes cruciformis* (Ching) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2: 77 (1933). – *Crypsinus cruciformis* (Ching) Tagawa, Acta Phytotax. Geobot. 14: 193 (1952). – *Phymatopsis cruciformis* (Ching) Ching, Acta Phytotax. Sin. 9: 192 (1964). – *Phymatopteris cruciformis* (Ching) Pic.Serm., Webbia 28: 462 (1973). – Type: China, Kwangtung [Guangdong], Lung-tau Shan, *The Herbarium of Lingnan University* 12482 (holo SYS, n.v.).

Selliguea ebenipes (Hook.) S.Linds., **comb. nov.** – *Polypodium ebenipes* Hook., Sp. Fil. 5: 88 (1864). – *Phymatopsis ebenipes* (Hook.) J.Sm., Hist. Fil. 105 (1875). – *Pleopeltis ebenipes* (Hook.) Bedd., Handb. Ferns Brit. India 363 (1883). – *Phymatodes ebenipes* (Hook.) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2: 86 (1933). – *Crypsinus ebenipes* (Hook.) Copel., Gen. Fil. 206 (1947). – *Phymatopteris ebenipes* (Ching) Pic.Serm., Webbia 28: 462 (1973). – Type: India, Kamalori, *Edgeworth* 32 (lecto K!, designated here).

Selliguea griffithiana (Hook.) S.Linds., **comb. nov.** – *Polypodium griffithianum* Hook., Hooker's Icon. Pl. 10: t.951 (1854). – *Pleopeltis griffithiana* (Hook.) T.Moore, Ind. Fil. lxxviii (1857). – *Phymatopsis griffithiana* (Hook.) J.Sm., Hist. Fil. 104 (1875). – *Phymatodes griffithiana* (Hook.) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2: 71 (1933). – *Crypsinus griffithianus* (Hook.) Copel., Gen. Fil. 206 (1947). – *Phymatopteris griffithiana* (Ching) Pic.Serm., Webbia 28: 462 (1973). – Type: Bootan [Bhutan], *Griffith* s.n. (lecto K!, designated here).

Selliguea hirsuta (Tagawa & K.Iwats.) S.Linds., **comb. nov.** – *Crypsinus hirsutus* Tagawa & K.Iwats., Acta Phytotax. Geobot. 24: 176 (1970). – Type: Thailand, Chiang Mai, Doi Chiang Dao, 1800 m, *Put for Eryl Smith* 1160 (holo K!; iso K! [but without mention of *Put* and altitude given as 5000 ft]).

Selliguea oxyloba (Wall. ex Kunze) S.Linds., **comb. nov.** – *Polypodium oxylobum* Wall. ex Kunze, *Linnaea* 24: 255 (1851). – *Polypodium hastatum* var. *oxylobum* (Wall. ex Kunze) C.B.Clarke, *Trans. Linn. Soc. London, Bot.* 1: 563 (1880). – *Phymatodes oxyloba* (Wall. ex Kunze) C.Presl ex Ching, *Contr. Inst. Bot. Natl. Acad. Peiping* 2: 67 (1933). – *Crypsinus oxylobus* (Wall ex Kunze) Sledge, *Bull. Brit. Mus. (Nat. Hist.), Bot.* 2: 145 (1960). – *Phymatopsis oxyloba* (Wall. ex Kunze) Ching, *Acta Phytotax. Sin.* 9: 190 (1964). – *Phymatopteris oxyloba* (Ching) Pic.Serm., *Webbia* 28: 464 (1973). – Type: India, Kamoun [Kumaon], *Wallich* 294 (lecto K-W!, designated by Morton, *Contr. U.S. Natl. Herb.* 38: 260 (1974); isolecto K(×2)!, US!).

Morton (1974) designated *Wallich* 294 (K-W) as the lectotype of this name but incorrectly cited the locality as Nepal. There is only one specimen under *Wallich* 294 in the Wallich Herbarium at Kew, quite clearly labelled Kamoun [in India], as are the isolectotypes.

Selliguea rhynchophylla (Hook.) S.Linds., **comb. nov.** – *Polypodium rhynchophyllum* Hook., *Hooker's Icon. Pl.* 10: t.954 (1854). – *Pleopeltis rhynchophylla* (Hook.) T.Moore, *Index Fil.* lxxviii (1857). – *Phymatopsis rhynchophylla* (Hook.) J.Sm., *Hist. Fil.* 104 (1875). – *Phymatodes rhynchophylla* (Hook.) Ching, *Contr. Inst. Bot. Natl. Acad. Peiping* 2: 69 (1933). – *Crypsinus rhynchophyllus* (Hook.) Copel., *Gen. Fil.* 206 (1947). – *Phymatopteris rhynchophylla* (Hook.) Pic.Serm., *Webbia* 28: 464 (1973). – Type: India, Khasia, Mamloo, *Hooker & Thomson* s.n. (lecto K! [barcode K000575673], first step designated by Ching, *Contr. Inst. Bot. Natl. Acad. Peiping* 2: 70 (1933), second step designated here; isolecto K! [barcode K000575672]).

The two-step lectotypification has been done under Art. 9.15 of the ICBN (McNeill *et al.*, 2006) as Ching (1933) narrowed down the typification to one of the collections cited in the protologue but did not specify a particular specimen.

Selliguea trisecta (Baker) S.Linds., **comb. nov.** – *Polypodium trisectum* Baker, *Bull. Misc. Inform. Kew* 1898: 232 (1898). – *Crypsinus trisectus* (Baker) Tagawa, *Acta Phytotax. Geobot.* 14: 194 (1952). – *Phymatopsis trisecta* (Baker) Ching, *Acta Phytotax. Sin.* 9: 189 (1964). – *Phymatopteris trisecta* (Baker) Pic.Serm., *Webbia* 28: 465 (1973). – Type: China, Yunnan, Mi-le District, *Henry* 9891 (holo K!; iso E!).

PTERIDACEAE

Haplopteris winitii (Tagawa & K.Iwats.) S.Linds., **comb. nov.** – *Antrophyum winitii* Tagawa & K.Iwats., *Acta Phytotax. Geobot.* 23: 176, f.13 (1969). – Type: Thailand, Chiang Rai, *Winit* 1114 (holo SING!; iso BKF!).

In their description of *Antrophyum winitii* Tagawa & Iwatsuki (1969) stated that this was an unusual taxon as it exhibited characteristics of both *Antrophyum* and *Vittaria* (sensu Tagawa & Iwatsuki and other authors prior to Crane (1997)). Of the two genera, they chose to describe this species as an *Antrophyum*. However, a re-examination of the type material has revealed an error in their description. The sporangial paraphyses are capitate with yellow funnellform apical cells and are not, as the protologue states, 'ribbon-like' and 'dark red'. Within the Old World vittarioid genera funnellform paraphyses are characteristic of *Haplopteris*, into which all Old World *Vittaria* have now been placed (Crane, 1997), and *Monogramma* (Ruhfel *et al.*, 2008). *Haplopteris* and *Monogramma* are distinguished by the two rows of linear sori in *Haplopteris* vs. only one row in *Monogramma*. *Haplopteris winitii* has two rows. Tagawa & Iwatsuki (1969) did not describe the spores. These are, however, monolete like those of most species of *Haplopteris*, not trilete like all known species of *Antrophyum*.

Pteridaceae subfamily **Cryptogrammoideae** (Pic.Serm.) S.Linds., **comb. et stat. nov.**
– *Cryptogrammeaceae* Pic.Serm., Webbia 17: 299 (1963). – Type genus: *Cryptogramma* R.Br.

The *Pteridaceae* as delimited by Smith *et al.* (2006, 2008) is larger than traditionally recognised as it now includes a number of other families such as *Adiantaceae* and *Vittariaceae*. They do, however, note that there are five monophyletic groups within this expanded family which could be recognised at the family or subfamily level. We choose to recognise each of these groups at the subfamily level. All five of these groups have a name available at the family rank but only four of the five have a name available at the subfamily rank. Here we make a new combination for the remaining subfamily, which includes three *Coniogramme* species from Thailand.

THELYPTERIDACEAE

The generic concepts in the *Thelypteridaceae* adopted by Smith *et al.* (2006, 2008) are intermediate between the very broad approach of Tagawa & Iwatsuki (1988), in which almost all species were placed in *Thelypteris* Schmidel, and the much narrower generic concepts employed by Holttum (1982), in which 22 genera were recognised, most of which also occur in Thailand. Application of Smith *et al.*'s generic concepts to the *Thelypteridaceae* of Thailand results in four genera (*Cyclosorus* Link, *Macrothelypteris* (H.Ito) Ching, *Pseudophegopteris* Ching and *Thelypteris*), with the largest number of species in *Cyclosorus*. Whether or not these four genera adequately describe the diversity of Thai *Thelypteridaceae* is the subject of much debate but unfortunately this debate cannot be properly resolved without further research involving a broad sampling of Thai and other Old World taxa. For the time being we choose to follow Smith *et al.* and in order to do so a number of *Thelypteris* species in Thailand require new combinations in *Cyclosorus*.

Cyclosorus canus (Baker) S.Linds., **comb. nov.** – *Nephrodium canum* Baker, Syn. Fil. 267 (1867). – *Dryopteris cana* (Baker) Kuntze, Rev. Gen. Pl. 2: 812 (1891). – *Pseudocyclosorus canus* (Baker) Holttum & Jeff.W.Grimes, Kew Bull. 34: 509 (1980). – Type: ‘NW India’, *Edgeworth* s.n. (holo K!).

This species was referred to as *Thelypteris repens* (Hope) Ching in Tagawa & Iwatsuki (1988). We are following Holttum & Grimes’ (1980) species concept in which *Thelypteris repens* was placed as a synonym of *Pseudocyclosorus canus*. *Pseudocyclosorus* Ching is now treated as a synonym of *Cyclosorus* Link and a combination in this genus is necessary for this species.

Cyclosorus crassifolius (Blume) S.Linds., **comb. nov.** – *Aspidium crassifolium* Blume, Enum. Pl. Javae 158 (1828). – *Dryopteris crassifolia* (Blume) Kuntze, Rev. Gen. Pl. 2: 812 (1891). – *Thelypteris crassifolia* (Blume) Ching, Bull. Fan Mem. Inst. Biol. Bot. 6: 285 (1936). – *Mesoneuron crassifolium* (Blume) Ching, Acta Phytotax. Sin. 8: 325 (1963). – *Mesophlebion crassifolium* (Blume) Holttum, Blumea 22: 232 (1975). – Type: Java, *Zippelius* s.n. (lecto L! [acc. no. 908,342-64], designated by Holttum, Blumea 22: 232 (1975)).

Cyclosorus exsculptus (Baker) S.Linds., **comb. nov.** – *Acrostichum exsculptum* Baker, J. Bot. 26: 326 (1888). – *Leptochilus exsculptus* (Baker) C.Chr., Ind. Fil. 385 (1906). – *Dryopteris exsculpta* (Baker) Copel., Philipp. J. Sci. 37: 410 (1928). – *Thelypteris exsculpta* (Baker) K.Iwats., Acta Phytotax. Geobot. 21: 170 (1965). – *Pronephrium exsculptum* (Baker) Holttum, Blumea 20: 117 (1972). – Type: Sarawak, *Hose* 244 (holo K!).

Cyclosorus immersus (Blume) S.Linds., **comb. nov.** – *Aspidium immersum* Blume, Enum. Pl. Javae 156 (1828). – *Lastrea immersa* (Blume) T.Moore, Index Fil. lxxxix (1857). – *Dryopteris immersa* (Blume) Kuntze, Rev. Gen. Pl. 2: 813 (1891). – *Thelypteris immersa* (Blume) Ching, Bull. Fan Mem. Inst. Biol. Bot. 6: 306 (1936). – *Parathelypteris immersa* (Blume) Ching, Acta Phytotax. Sin. 9: 303 (1963). – *Amphineuron immersum* (Blume) Holttum in Nayar & Kaur, Companion Handb. Ferns Brit. India 203 (1974). – Type: Java, *Blume* s.n. (lecto L! [acc. no. 908,335-404], designated by Holttum, Blumea 23: 211 (1977)).

Cyclosorus rubicundus (Alderw.) S.Linds., **comb. nov.** – *Phegopteris rubicunda* Alderw., Bull. Jard. Bot. Buitenzorg III. 2: 162 (1920). – *Abacopteris rubicunda* (Alderw.) Holttum, Rev. Fl. Mal. 2: 292, f.170 (1955). – *Thelypteris rubicunda* (Alderw.) K.Iwats., Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 31: 195 (1965). – *Pronephrium rubicundum* (Alderw.) Holttum, Blumea 20: 123 (1972). – Type: Sumatra, Benkoelen, Lebong Tandai, *Brooks* 232.S (holo BO; iso BM(×2)!).

Cyclosorus triphyllus (Sw.) Tardieu var. **parishii** (Bedd.) S.Linds., **comb. nov.** – *Meniscium parishii* Bedd., Ferns Brit. India t.184 (1866). – *Meniscium triphyllum* Sw. var. *parishii* (Bedd.) Bedd., Handb. Ferns Brit. India 399 (1883). – *Abacopteris triphylla* (Sw.) Ching var. *parishii* (Bedd.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 8: 241 (1938). – *Thelypteris triphylla* (Sw.) K.Iwats. var. *parishii* (Bedd.) K.Iwats., Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 31: 191 (1965). – *Pronephrum parishii* (Bedd.) Holttum, Blumea 20: 123 (1972). – Type: Burma, Moulmein, Parish 135 (lecto K! [barcode K000575671], designated here; isolecto K! [barcode K000575670]).

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