Ann. Bot. Fennici 40: 459–461 ISSN 0003-3847
Helsinki 17 December 2003

New combinations in *Haplopteris* (Pteridophyta: Vittariaceae)

Xian-Chun Zhang

Institute of Botany, Chinese Academy of Sciences, Beijing 100093, China

Received 13 Mar. 2003, revised version received 22 May 2003, accepted 30 May 2003

Zhang, X.-C. 2003: New combinations in *Haplopteris* (Pteridophyta: Vittariaceae). — *Ann. Bot. Fennici* 40: 459–461.

A new phylogenetic classification of the fern family Vittariaceae, based on molecular and morphological characters, necessitates the following new combinations in *Haplopteris*: *H. amboinensis* (Fée) X.C. Zhang, *H. linearifolia* (Ching) X.C. Zhang, *H. mediosora* (Hayata) X.C. Zhang, and *H. plurisulcata* (Ching) X.C. Zhang. The names *Haplopteris forrestiana* (Ching) E.H. Crane and *H. modesta* (Hand.-Mazz.) E.H. Crane are reduced to synonyms.

Key words: *Haplopteris,* nomenclature, taxonomy, Vittariaceae

The fern family Vittariaceae comprises two main genera, *Antrophyum* and *Vittaria*, which, according to recent morphological and molecular systematic studies, are closely related (Crane *et al*. 1995, Hasebe *et al*. 1995). Vittariaceae and Adiantaceae are sister groups and close to Pteridaceae *s. lato* (Hasebe *et al*. 1995, Pryer *et al*. 1995). The molecular phylogeny is partly congruent with the traditional classification by Kramer (Kubitzki 1990). Based on phylogenetic analysis of *rbc*L gene sequences, and morphological characters, Crane *et al*. (1995) found that *Vittaria* and *Antrophyum* are, respectively, polyphyletic and paraphyletic. In the new circumscriptions based on phylogenetic analyses (Crane 1997), species previously placed in *Vittaria* are now in three genera: *Vittaria*, *Haplopteris*, and *Radiovittaria*. *Vittaria*, typified by *V. lineata* (L.) Sm., is mainly a neotropical taxon, with but one species, *V. isoetifolia* Bory occurring in Africa and on the islands of the SW Indian Ocean. Species with narrow leaves (ca. 4 mm) and paraphyses bearing narrow apical cells are retained in *Vittaria*. *Haplopteris*, the largest genus segregated from *Vittaria*, with the generitype *H. scolopendrina* (Bory) C. Presl, is a paleotropical genus found in Africa, south-central and SE Asia, Australia, and on the islands of the Pacific Ocean. The Old World species with funnelform terminal cells on paraphyses and distichous phyllotaxy are placed in *Haplopteris*. *Radiovittaria*, typified by *R. remota* (Fée) E.H. Crane, is restricted to Central America, South America, and the West Indies. Its species have funnelform terminal cells on paraphyses and a spiral phyllotaxy (Crane 1997).

The Chinese species of *Vittaria* (Ching 1931, Zhang 1999) all have funnelform terminal cells of paraphyses and a distichous phyllotaxy. Accordingly, they belong to the genus *Haplopteris* as circumscribed by Crane (1997), and many of the Old World *Vittaria* including most of the Chinese species were transferred by him into *Haplopteris*. However, some names applied

to Chinese species still need to be transferred. Here I propose the necessary new combinations, and some Chinese names transferred into *Haplopteris* by Crane are placed in synonymy.

Haplopteris amboinensis (Fée) X.C. Zhang, *comb. nova*

Vittaria amboinensis Fée, Mém. Foug. 3: 14, table 1, fig. 1. 1851–52. — Type: Indonesia. Amboina, *Labillardière s.n.* (holotype P).

Distribution: China (Guangdong, Guangxi, Hainan, Hong Kong, Yunnan), NE India, Myanmar, Vietnam, Thailand, Laos, Cambodia, Malaysia and Indonesia.

Haplopteris doniana (Mett. *ex* Hieron.) E.H. Crane

Syst. Bot. 22: 514. 1997. — *Vittaria doniana* Mett. *ex* Hieron., Hedwigia 57: 204. 1916. — Type: "Bhutan vel in regno Mishme", *Griffith 905* (holotype B; isotype K!).

Vittaria forrestiana Ching, Sinensia 1(12): 181, pl. 6, figs. 1–2. 1931. — *Haplopteris forrestiana* (Ching) E.H. Crane, Syst. Bot. 22: 514. 1997, *syn. nov.* — Syntypes: China. Yunnan, Salwin Divide, *Forrest 18387, 25106* (E, PE!).

Distribution: China (Guizhou, Guangxi, Xizang, Yunnan), N Myanmar, Bhutan, NE India.

Vittaria forrestiana is a form with much broader leaves of herbaceous texture. The records of it from Indo-China (Tardieu & Christensen 1940), Thailand (Tagawa & Iwatsuki 1985), and Japan (Nakaike 1992, Iwatsuki 1995) are all misidentifications of *Haplopteris amboinensis*. The two plants are superficially similar, but the rhizome scales of *H. amboinensis* are black, while those of *H. doniana* are yellow-brown.

Haplopteris flexuosa (Fée) E.H. Crane

Syst. Bot. 22: 514. 1997. — *Vittaria flexuosa* Fée, Mém. Foug. 3: 16. 1851–52. — Type: "India orientali ad Kamaon", 1821, *Wallich 144* (holotype P; isotype K).

Vittaria modesta Hand.-Mazz., Symb. Sin. 6: 42. 1929. — *Haplopteris modesta* (Hand.-Mazz.) E.H. Crane, Syst. Bot. 22: 514. 1997. — Type: China. Hunan, Wugang, Yunshan, alt. 800 m, 20.VIII.1918 *Handel-Mazzetti 12592* (holotype W).

Distribution: China (Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang), Indo-China, Thailand, Myanmar, India, Bhutan, Nepal, Japan, Korea.

This is a common and widely distributed species in China and the neighbouring regions. Some small and large ecological forms were published as different species (for synonyms *see* Zhang 1999). *Haplopteris modesta* is a small form of the widespread *H. flexuosa*, which grows in limestone crevices in wet shaded places.

Haplopteris linearifolia (Ching) X.C. Zhang, *comb. nova*

Vittaria linearifolia Ching, Sinensia 1(12): 183, pl. 1, figs. 1–3. 1931. — Type: China. Yunnan, Maikhai-Salwin Divide, V.1919 *Forrest 17954* (holotype PE!; isotype E).

Distribution: China (Xizang, Yunnan), N Myanmar, India (Assam).

Haplopteris mediosora (Hayata) X.C. Zhang, *comb. nova*

Vittaria mediosora Hayata, Icon. Pl. Formos. 5: 346, fig. 149g–i. 1915. — Type: Taiwan. Mt. Arisan, Tozan (Hainodai), ad 7800 ped. alt., III.1913 *S. Sasaki s. n.* (holotype TI!; isotype TAIF).

Vittaria stenophylla Copel., Philipp. J. Sci. 40: 312. 1929, *syn. nov.* — Type: Philippines. Luzon, Benguet, Mt. Santo Tomas, 2300 m, V.1909 *Copeland PPE122* (isotypes UC, K!).

Distribution: China (Sichuan, Taiwan, Xizang, Yunnan), India (Sikkim), Philippines.

Vittaria stenophylla was regarded as a synonym of *V. anguste-elongata* by Shieh *et al.* (1994) and myself (Zhang 1999). I re-checked the isotype (*Copeland PPE122*) in K and found out that its sori are not along the leaf margins but superficial between costae and margin. The latter species has marginal sori.

I once checked the isotype of *Haplopteris taeniophylla* (Copel.) E.H. Crane (*Vittaria taeniophylla* Copel., Philip. J. Sci. Suppl. 1: 157. 1906. Type: Philippines. Luzon, Benguet, 7000 ft, XI-1905, *Copeland 1936*, isotype K!). It is almost identical to a form of *H. fudzinoi* (Makino) E.H. Crane (*Vittaria fudzinoi* Makino), with broad leaves and more or less superficial sori. The reports of *Vittaria taeniophylla* from E

Himalaya, Myanmar and N Thailand (Iwatsuki 1975, Dixit 1981, Shieh *et al*. 1994) are due to a confusion with *Haplopteris mediosora*. So far, *Haplopteris taeniophylla* is known only from Taiwan and the Philippines.

Haplopteris plurisulcata (Ching) X.C. Zhang, *comb. nova*

Vittaria plurisulcata Ching, Sinensia 1: 186, pl. 4, figs. 1–3. 1931. — Type: China. Yunnan, Mengtze, 8500 ft. alt., on the trunk of tree in woods, *Henry 9195* (holotype K; isotype PE!).

Distribution: China (Yunnan), N Vietnam (Sapa; first record).

The sheet *Henry 9195A* in PE is *Haplopteris amboinensis*.

Acknowledgements

This study was financially supported by the Key Project of the National Natural Sciences Foundation of China and a grant from the Chinese Academy of Sciences for taxonomic and floristic studies. Thanks to the Directors and Curators of K, L, and P for assistance during my visit and TI for sending types on loan. I am especially grateful to Drs. Hans P. Nooteboom (L), Toshiyuki Nakaike (Chiba) and Stuart Lindsay (A) for generous help and suggestions.

References

Ching, R. C. 1931: The studies of Chinese ferns VI. Genus *Vittaria* of China and Sikkime-Himalaya. — *Sinensis* 1(12): 175–192.

Ching, R. C., Wang, C. H. & Wu, S. H. 1964: Vittariaceae. — In: Chun, W. Y. *et al*. (eds.), *Flora Hainanica* 1: 201–204. Science Press, Beijing.

Crane, E. H., Farrar, D. R. & Wendel, J. F. 1995: Convergent simplification leads to a polyphyletic *Vittaria*. — *Am. Fern J*. 85: 283–305.

Crane, E. H. 1997: A revised circumscription of the genera of the fern family Vittariaceae. — *Syst. Bot*. 22: 509–517.

Dixit, R. D. 1981: The fern genus *Vittaria* Sm. In India. — *J. Econ. Taxon. Bot*. 2: 209–222.

Hasebe, M., Wolf, P. G., Pryer, K. M., Ueda, K., Ito, M., Sano, R., Gastony, G. J., Yokoyama, J., Manhart, J. R., Murakami, N., Crane, E. H., Haufler, C. H. & Hauk, W. D. 1995: Fern phylogeny based on *rbc*L nucleotide sequences. — *Am. Fern J*. 85: 134–181.

Iwatsuki, K. 1975: Pteridophyta. — In: Ohashi, H. (ed.), *The flora of Eastern Himalaya*, 3rd Report: 166–205. Univ. Tokyo Press, Tokyo.

Iwatsuki, K. 1995: Vittariaceae. — In: Iwatsuki, K. *et al*. (eds.), *Flora of Japan*. Vol. 1. *Pteridophyta and Gymnospermae*: 86–88. Kodansha, Tokyo.

Kubitzki, K. (ed.) 1990: *The families and genera of vascular plants*. Vol. 1. *Pteridophytes and gymnosperms*. — Springer-Verlag, Berlin.

Nakaike, T. 1992: *New flora of Japan*. *Pteridophytes*. — Shibundo Co. Ltd., Tokyo.

Pryer, K. M., Smith, A. R. & Skog, J. E. 1995: Phylogenetic relationships of extant ferns based on evidence from morphology and *rbc*L sequences. — *Am. Fern J*. 85: 205–282.

Shieh, W. C., Chiou, W. L. & DeVol, C. 1994: Vittariaceae. — In: Huang, T. C. (ed.), *Flora of Taiwan*, 2nd ed., Vol. 1: 254–263. Edit. Committee Flora of Taiwan, Taipei, Taiwan.

Tagawa, M. & Iwatsuki, K. 1985: Vittariaceae. — In: Smitinanda, T. & Larsen, K. (eds.), *Flora of Thailand* 3(2): 217–230. Supita Techathada, Bangkok.

Tardieu-Blot, M. L. & Christensen, C. 1940: Fougéres. — In: Lecomte, H. (ed.), *Florae Générale de l'Indo-Chine* 7(2): 196–200. Masson & Cie, Paris.

Zhang, X. C. 1999: Vittariaceae. — In: Chu, W. M. (ed.), *Flora Reipublicae Popularis Sinicae* 3(2): 12–31. Science Press, Beijing.