



Ten new records of *Polystichum* (Dryopteridaceae) for Vietnam and lectotypification of *Polystichum atroviridissimum* and *P. fimbriatum*

NGAN THI LU^{1*}, LIANG ZHANG^{2*} & LI-BING ZHANG^{3†}

¹Department of Botany, Vietnam National Museum of Nature, Vietnam Academy of Science and Technology, 18th Hoang Quoc Viet Road, Cau Giay, Ha Noi, Việt Nam.

²Chengdu Institute of Biology, Chinese Academy of Sciences, P.O. Box 416, Chengdu, Sichuan 610041, China.

³Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

*Co-first authors

†Author for correspondence: Libing.Zhang@mobot.org

Abstract

Ten new records of *Polystichum* (Dryopteridaceae; pteridophyta) for Vietnam, *P. auriculum*, *P. dangii*, *P. excellens*, *P. fimbriatum*, *P. liboense*, *P. minimum*, *P. mucronifolium*, *P. nepalense*, *P. subacutidens*, and *P. xichouense*, are reported from new collections, incorrectly attributed past collections, or unidentified material. Color images are provided for newly collected species. Type information is given for all related names. We also lectotypified two names of *Polystichum*: *P. atroviridissimum* and *P. fimbriatum*.

Introduction

Only fairly recently has Vietnam been recognized as a country of enormously rich biodiversity. Although understanding the biodiversity in Vietnam has been achieved for a number of groups of seed plants in recent years (e.g., Actinidiaceae: Nguyen, 2006; *Begonia* sect. *Platycentrum*: Nguyen, 2004; *Camellia*: Ming, 2000; cycads: Osborne *et al.* 2007; Euphorbiaceae: Nguyen, 2007; Orchidaceae: Averyanov, 2003; etc.), little is known about the fern diversity in Vietnam (Tardieu-Blot & Christensen 1941, Pham 1999, Phan 2010).

Recent explorations of fern diversity in some nature reserves of Vietnam have led to new record of 22 species of ferns to Vietnam (Wu *et al.* 2005a, b, 2006, 2012). Notably, two new genera of ferns, *Caobangia* Smith & Zhang (2002: 546) and *Kontumia* S.K.Wu & K.L.Phan (in Wu *et al.* 2005a: 245), and a new species of *Polystichum*, *P. hagiangense* Li Bing Zhang, Ngan T. Lu & Liang Zhang (in Lu *et al.* 2014), have been discovered in Vietnam in recent years. These discoveries underscore the rich diversity of ferns in Vietnam.

As a continuation of efforts to study fern diversity in Vietnam, we here report ten new records of the genus *Polystichum* Roth (Dryopteridaceae) for Vietnam based on recent fieldwork and herbarium investigation.

New distributional records

Polystichum auriculum Ching (1949: 309). Type:—CHINA. Yunnan Province: Mar-li-po, Hwang-gin-yin, 1100 m, under dense forest, 21 January 1940, C. W. Wang 86309 (holotype PE-00044666!) (Fig. 1).

Additional specimens examined:—VIETNAM. Ha Giang Province: Bat Dai Son Community, Bat Dai Son Provincial Protected Area, valley just west of Bat Dai Son border station, valley of slash and burn agriculture, then up, degraded secondary vegetation in shade, 23°09'04"N, 104°59'53"E, 1000 m, 11 February 2001, D.K. Harder, P.K. Loc, L.V. Averyanov, G.E. Schatz & S. Bodine 6141 (HNU!, MO!). Ha Giang Province: Vi Xuyen District, Tung Ba Community, Khau Ca Nature Reserve, Khau Ca top, Hom Mountain, 22°50'40"N, 105°07'47"E, 850 m, 13 December 2013, Li Bing Zhang, Liang Zhang & Ngan T. Lu 6952 (CDBI!, MO!, VNMN!).

Polystichum xichouense has pinnae less oblique at the base and more regularly toothed on the margins, especially on the upper margins, than the morphologically most similar species, *P. minimum* (Y.T.Hsieh) Li Bing Zhang (Fig. 6).

Acknowledgements

We thank Wang Peishan for providing type image of *Polystichum minimum*, David Barrington and Marcus Lehnert for helpful comments, and Phan Ke Loc and the curators of the herbaria CDBI, E, HGAS, HN, HNU, KUN, MO, P, PE, PYU, TAIF and VNMN for providing access to the material in their care.

References

- Averyanov, L.V. & Averyanova, A.L. (2003) *Updated checklist of the orchids of Vietnam*. Hanoi: Vietnam National University Publishing House, 101 pp.
- Beddome, R.H. (1883) *Handbook to the ferns of British India, Ceylon and the Malay Peninsula*. Calcutta: Thacker, Spink & Co., 500 pp.
<http://dx.doi.org/10.5962/bhl.title.49551>
- Benniamin, A., Fraser-Jenkins, C.R. & Irudayaraj, V. (2008) *Polystichum manickamianum* (Dryopteridaceae), a new species from South India. *Novon* 18: 287–293.
<http://dx.doi.org/10.3417/2006082>
- Blume, C.L. von. (1828) *Enumeratio Plantarum Javae et insularum adjacentium*. J. W. van Leeuwen, Leiden, 274 pp.
<http://dx.doi.org/10.5962/bhl.title.44901>
- Ching, R.C. (1938) A revision of the Chinese and Sikkim Himalaya *Dryopteris* with reference to some species in the neighbouring regions. 9. *Cyrtogonellum* Ching. *Bulletin of the Fan Memorial Institute of Biology, Botany* 8: 327–331.
- Ching, R.C. (1949) The Studies of Chinese Ferns – XXXV. *Bulletin of the Fan Memorial Institute of Biology, new series* 1(3): 267–317.
- Ching, R.C. (1958) *Icones Filicarum Sinicarum*, vol. 5. Nanking (Nanjing): The Metropolitan Museum of Natural History, Academia Sinica and Peiping (Beijing): The Fan Memorial Institute of Biology, 102 pp.
- Christ, H. (1906) Filices Cavalerianae II. *Bulletin de l'Académie Internationale de Géographie Botanique* 16(199–201): 233–246.
- Christensen, C. (1906) *Index Filicum*. H. Hagerup, Copenhagen, 745 pp.
- Clarke, C.B. (1880) A review of the ferns of northern India. *Transactions of the Linnean Society of London, 2nd series Botany* 1: 425–611.
<http://dx.doi.org/10.1111/j.1095-8339.1880.tb00668.x>
- Hsieh, Y.T. & Li, N. (1989) New taxa of genus *Cyrtogonellum* Ching. *Bulletin of Botanical Research (Harbin)* 9(3): 15–19.
- Kodama, S. (1915) On the Japanese *Polystichum aculeatum* and its allied species. *Botanical Magazine Tokyo* 29: 322–334.
- Lu, T.N., Zhang, L. & Zhang, L.-B. (2014) *Polystichum hagiangense* (subg. *Haplopolystichum*; Dryopteridaceae), a new fern species from Ha Giang Province, northern Vietnam. *Phytotaxa*
- Ming, T.-L. (2000) *Monograph of the genus Camellia*. Kunming: Yunnan Science and Technology Press, 352 pp.
- Moore, T. (1858) *Index Filicum*. W. Pamplin, London, 204 pp.
- Nair, N.C. & Nag, K. (1978) A new species of *Polystichum* from Shillong (Meghala). *Journal of the Bombay Natural History Society* 75(1): 153–156, pl. 1–2.
- Nguyen, M.C. (2006) *Taxonomic revision of the Actinidiaceae in Vietnam*. M.Sc. thesis, University of Missouri, St. Louis, 70 pp.
- Nguyen, N.T. (2007) *Taxonomy of Euphorbiaceae in Vietnam*. Vietnam National University, Hanoi, 407 pp.
- Nguyen, Q.H. (2004) *Systematic revision of the indigenous Begonia sect. Platycentrum in Vietnam*. M.Sc. thesis, University of Missouri, St. Louis, 60 pp.
- Osborne, R., Hill, K.D., Nguyen, H.T. & Pan, K.L. (2007) *Cycads of Vietnam*. Roy Osborne, Brisbane & Wynand van Eeden, Cape Town, 116 pp.
- Pham, H.H. (1999) *An illustrated flora of Vietnam*, vol. 1. Nha Xuat Ban Tre, Hanoi, 618 pp.
- Phan, K.L. (2010) The updated checklist of the fern flora of Vietnam following the classification scheme of A. Smith et al. (2006). *Journal of Fairylake Botanical Garden* 9(3): 1–13.
- Presl, C.B. (1851) *Epimeliae Botanicae*. A. Haase fil., Prague, 264 pp.
<http://dx.doi.org/10.5962/bhl.title.61845>
- Smith, A.R. & Zhang, X.-C. (2002) *Caobangia*, a new genus and species of Polypodiaceae from Vietnam. *Novon* 12: 546–550.
<http://dx.doi.org/10.2307/3393137>
- Sprengel, C.P.J. (1827) *Systema vegetabilium, editio decima sexta* 4(1). Dieterich., Göttingen, 410 pp.

- Tagawa, M. (1937) Miscellaneous notes on east-Asiatic pteridophytes with special reference to Japanese species (IV). *Journal of Japanese Botany* 13(3): 186.
- Tardieu-Blot, M.-L. & Christensen, C. (1941) Cryptogames Vasculaires. in Lecomte, H. & Gagnepain, F. (eds.), *Flore générale de l'Indo-Chine*, vol. 7(2). Masson & Cie, Paris, 596 pp.
- Wang, P.-S. & Wang, X.-Y. (2001) *Pteridophyte flora of Guizhou*. Guiyang: Guizhou Science & Technology Press, 727 pp.
- Wu, S.-G. (2005) *Final report of expedition and study on the ferns of central and northern Vietnam*. Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, 24 pp.
- Wu, S.-G., Pan, K.L. & Xiang, J.-Y. (2005a) A new genus and two new species of ferns from Vietnam. *Novon* 15: 245–249.
- Wu, S.-G., Xiang, J.-Y. & Pan, K. L. (2005b) Some new records of ferns from Vietnam (1). *Acta Botanica Yunnanica* 27: 249–252.
- Wu, S.-G., Xiang, J.-Y. & Pan, K.L. (2006) Some new records of ferns from Vietnam (2). *Acta Botanica Yunnanica* 28: 17–18.
- Wu, S.-G., Xiang, J.-Y., Pan, K.L. & Souliya, O. (2012) Some new records of ferns from Vietnam and Laos (3) *Pteris* (Pteridaceae). *Plant Diversity & Resources* 28: 17–18.
- Wu, S.K. & Mitsuta, S. (1985) Two new species of cyrtomioid ferns from limestone area of Yunnan. *Acta Phytotaxonomica Geobotanica* 36: 22–26.
- Xiang, L.-L. (1994) A taxonomic study of the genus *Polystichum* Roth section *Haplopolystichum* Tagawa from Yunnan. *Acta Phytotaxonomica Sinica* 32: 258–267.
- Zhang, L.-B. (2012) Taxonomic and nomenclatural notes on the fern genus *Polystichum* (Dryopteridaceae) from China. *Phytotaxa* 60: 57–60.
- Zhang, L.-B. & Barrington, D.S. (2013) *Polystichum*. In: Wu, Z.-Y., P. H. Raven & D.-Y. Hong (eds.). *Flora of China*. Vol. 2–3. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, Pp. 629–713