



Taxonomic revision of the *Pteris cadieri* complex (Pteridaceae)

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Abstract

The *Pteris cadieri* complex is widely distributed in South and East Asia. Due to tremendous morphological variation within and between taxa, previous taxonomic treatments have been plagued with an element of uncertainty. In this study, the morphological characteristics, along with data from previous studies on reproductive modes, cytology, and genotypes, are integrated to clarify and delineate each taxon. Nine taxa are recognized in the *Pteris cadieri* complex: three original species (*P. cadieri*, *P. hainanensis* and *P. grevilleana*), one reinstated name (*P. dimorpha*, synonymized under *P. cadieri*), two new species (*P. incurvata* sp. nov. and *P. perplexa* sp. nov.), two new varieties (*P. dimorpha* var. *prolongata* var. nov., and *P. dimorpha* var. *metagrevilleana* var. nov.), and a forma (*P. grevilleana* f. *ornata* stat. nov.). The lectotypes of *P. cadieri*, *P. dimorpha*, *P. grevilleana*, and *P. hainanensis* are designated. Each taxon is described in detail. A key is provided to facilitate the identification of all taxa.

Key words: Asian *Pteris*, cryptic species, lectotypes, new species, species complex

Introduction

Pteris cadieri Christ (1905: 72) has long been distinguished by its pinnate fronds with digital projections and remarkable by its varied frond morphology, which ranges from different degrees of pinnate and bipinnatifid (Figure 1). However, the varied frond morphologies result in the difficulty to circumscribe the related taxa, which thus are defined as the *P. cadieri* complex herein. Although the morphologies are diverse, in general, all the sterile and fertile laminae in *P. cadieri* complex possess short erect and scaly rhizomes, forked veins and false veinlets (Shieh 1966; Kao *et al.* 2008), and antrorse awns on adaxial costa and junction of costa and costule.

The *Pteris cadieri* complex is distributed in South and East Asia, from India to Japan. The varied morphology of the *P. cadieri* complex has probably resulted from the hybrid origin of many taxa in the complex. Evidence for hybridization can be found in the reproductive traits, including apogamous reproduction, irregular spore sizes, and variable number of spores in each sporangium (Chao *et al.* 2010). The parent taxa of the *P. cadieri* complex could not be determined. However, ploidy levels and molecular evidence, combined with cpDNA and nuclear data, indicate that multiple hybridizations occurred at different times and in different geographic regions. These hybridizations produced the varied morphology of taxa in the *P. cadieri* complex (Chao *et al.* 2012b).

In this study, the morphology of ferns in the *P. cadieri* complex was re-examined in detail and their taxonomy revised accordingly. The unique characters and morphological variation of each taxon in *P. cadieri* complex are described. Reproductive mode (Chao *et al.* 2010) and genotype (Table 1; Chao *et al.* 2012b) data were also used to delineate taxa. Based on this analysis, six species, two varieties, and one form are recognized. Among them, each of *P. hainanensis* and *P. grevilleana* contains two genotypes with indistinguishable morphology. Those cryptic species are not given a new name to avoid a practical problem of identifying specimens, following the concept and suggestions of Paris *et al.* (1989) and Sáez & Lozano (2005). On the other hand, *P. perplexa* and *P. incurvata* were previously lumped in the *P. cadieri* complex but has been revealed as two independent species by the integrated analysis.