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Research Article

Pteridryaceae: A new fern family of Polypodiineae (Polypodiales) including taxonomic treatments

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Abstract We undertook phylogenetic analyses to resolve the relationships of *Pteridrys* and related taxa based on six plastid markers (*atpA*, *atpB*, *matK* & *rps16-matK*, *rbcL*, *rps4* & *rps4-trnS*, and *trnL* & *trnL-F*) and nuclear *pgiC*. We included 195 accessions representing approximately 147 species in 38 genera, and seven of the nine families in Polypodiineae (eupolypods I). Tectariaceae s.l. (i.e., *Arthropteris*, *Draconopteris*, *Hypoderris*, *Malaifilix*, *Pteridrys*, *Tectaria*, and *Triplophyllum* in addition to *Polydictyum*) is recovered as monophyletic (97% maximum likelihood bootstrap value), but with low (<50%) maximum parsimony jackknife value. The family Tectariaceae s.l. is therefore the only family in ferns without a corresponding non-parametric-based strong support in spite of our data totaling 9616 aligned base pairs. Tectariaceae s.l. can not be unambiguously recognized by any of the 13 morphological characters analyzed. However, if the clade composed of *Draconopteris*, *Malaifilix*, *Polydictyum*, and *Pteridrys* (DMPP) is recognized as a distinct family, at least four morphological characters enable the distinction of the DMPP clade from its sister clade. Considering the uncertainty in the monophyly, the diagnosability, and the deep divergence, we propose to establish a new family, Pteridryaceae, to accommodate the DMPP clade. Species of Pteridryaceae share mostly the following characteristics: erect to suberect rhizomes, reduced basal pinnae, anastomosing or free venation, absence of catenate hairs at the leaf surface, and perine ornamentation lacking spines or spinules. Identification keys are provided for the four genera and 31 species of the DMPP clade (or Pteridryaceae). Reflecting the presented results, the recognition of Arthropteridaceae is the preferred taxonomic status of the *Arthropteris* clade.

Key words: *Arthropteris*, Eupolypods I, fern phylogeny, Polypodiaceae, Pteridryaceae, *Pteridrys*, Tectariaceae.

1 Introduction

The tropical Asian fern genus *Pteridrys* (Figs. 1I–1N) is characterized by having free veins and a small tooth on each sinus between adjacent pinna or pinnule lobes (Christensen & Ching, 1934; Wang, 1999). It has been recognized as a genus since its publication, but its systematic placement has been controversial and, before the advent of molecular phylogenetics, it had been placed in or associated with various families. When Christensen & Ching (1934) described it, they did not place it in any family, however, they thought that *Pteridrys* was similar to *Pteris quadriaurita* Retz. (Pteridaceae) in habit and venation, to *Dryopteris filix-mas* (L.) Schott (Dryopteridaceae) in sori and indusium, to *Bolbitis quoyana* (Gaud.) Ching (Dryopteridaceae) in sinus morphology, and to some tectarioid ferns (comparable to Tectariaceae sensu Zhang et al., 2016) in its simple and free venation. Christensen (1938) placed it in Thelypterideae, one of the two tribes in Dryopteridoideae (itself one of the 15 subfamilies of Polypodiaceae he recognized). Ching (1940), Copeland (1947), and Pichi Sermolli (1977) placed it in "Aspidiaceae" (nom. illeg.). Holttum (1947) placed it under Tectarioideae, one of 11 subfamilies of Dennstaedtiaceae s.l., together with *Ctenitis* (C. Chr.) C. Chr. (now in Dryopteridaceae; Liu et al., 2007a; Duan et al., 2017), *Cyclopeltis* J. Sm. (now in Lomariopsidaceae; Lu & Li, 2007), *Pleocnemia* C. Presl (now in Dryopteridaceae; Liu et al., 2007a, 2014), and another 10 segregates of *Tectaria* Cav. (which have recently been shown to be members of *Tectaria*;