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The true identity of *Tectaria nesiotica* Holttum (Tectariaceae), with comments on the species identification in *Pleocnemia* (Dryopteridaceae)

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Abstract

The species *Tectaria nesiotica* Holttum, described from New Guinea, is confirmed to be a member of the genus *Pleocnemia* and thus a new combination, *P. nesiotica*, is proposed here. It superficially resembles some species of *Tectaria* with large, finely dissected fronds and with veins anastomosing only along costae but differs in venation pattern. Within *Pleocnemia*, *P. nesiotica* is readily distinguished from other species by the blackish rachis and the sori confined to the apex of pinnule lobes. We fail to provide a key to all known species of *Pleocnemia* from New Guinea because for this group the species concept is currently very confusing, which was probably resulted from the incomplete herbarium specimens and the overemphasis of the character, sori indusiate or not, in recognizing species. Field observations are called for the clarification of species boundary in *Pleocnemia*.

Key words: *Pleocnemia*, new combination, New Guinea, taxonomy

Introduction

Tectaria Cavanilles (1799: 115) (Tectariaceae) is a large and morphologically diverse genus with some 250 species in pantropical areas of the world. Recently phylogenetic studies indicated the *Tectaria* in a broad sense being a monophyletic group, which includes *Heterogonium* C. Presl (1851: 142), *Psomiocarpa* C. Presl (1851: 161) and *Tectaridium* Copeland (1926: 329), while excludes *Hypoderris* R. Brown ex Hooker (1838: t.1) and *Pseudotectaria* Tardieu (1955: 87) (Ding *et al.* 2014, Moran *et al.* 2014, Wang *et al.* 2014). The genera *Ctenitis* C. Christensen (1938: 544) and *Pleocnemia* C. Presl (1836: 183), which had long been regarded as being allied to *Tectaria* in traditional classifications (e.g., Ching 1978, Tryon & Tryon 1982, Kramer 1990, Holttum 1991b), were confirmed to be members of Dryopteridaceae (Ding *et al.* 2014, Liu *et al.* 2014). The monophyletic *Tectaria* defined by molecular data is morphologically highly polymorphic and two characters, i.e., the peculiar pattern of venation and the basal chromosome number $x = 40$, were inferred to be synapomorphic for *Tectaria* (Ding *et al.* 2014), while $x = 41$ is most likely a synapomorphy of the entire eupolypods I (Zhang & Zhang 2015) and even the entire eupolypods (Sundue & Rothfels 2014). The peculiar pattern of venation refers to the basal veins of pinna lobes (or pinnule lobes) on the basiscopic side arising from the costa (or correspondingly costule) bearing the lobes but not from the midribs of lobes (there are veins, besides midribs of lobes, arising from costae or costules) (Fig. 1A–1D), which could be readily used to separate *Tectaria* from closely or remotely related genera.

The true identity of Tectaria nesiotica

When preparing an account of *Tectaria* from New Guinea, we noticed that the species *T. nesiotica* Holttum (1991a: 553) is somewhat distinct from other species in *Tectaria*. Its holotype, *Croft & Marsh LAE71234* (K), has amply 1-pinnated pinna which bears as many as 18 pairs of free pinnules (Fig. 2A). In contrast, for the species in *Tectaria* with large fronds the pinnules or segments of lateral pinna are generally adnate to pinna-rachis and the free pinnules are

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Besides the incomplete herbarium specimens (each containing only a small part of a leaf), one reason for the confusion of species concept in *Pleocnemia* is that the character, sori indusiate or not, is overemphasized in recognizing species. Viewing herbarium specimens, we can find quite a few specimens which are highly similar in overall morphology, but were treated as representing different species based solely on the sori indusiate or not. One impressive example is the identification of the specimens, *Cuming 33* (BR, P) and *Cuming 34* (BR, P), both from Luzon of the Philippines. The *Cuming 33* was determined as *Pleocnemia presliana* because of the frond having indusiate sori while the latter (*Cuming 34*) as *P. conjugata* for the sori exindusiate (Holttum 1974). Another example involves the observation of the indusia (present or not) in *P. winitii* from Hainan Island, southern China. *Pleocnemia winitii* was described as sori exindusiate, with distribution in NE India to southern China (Holttum 1951, 1974). Based on herbarium specimens, as well as our wide observation in the field, there seems only one species in Hainan and the collections therein are confirmed mostly without indusia on sori. However, we can detect the indusia present in a few collections, such as *Dong 156* (IBSC, PE), *Li 1549* (IBSC), and *Xing 5891* (IBSC). It is necessary to mention that the collection *Dong 156* includes two leaves, one with sori indusiate and the other with sori naked. This indicates that the presence of indusia is not very stable within a given species of this group and it cannot be used as a reliable character in recognizing species of *Pleocnemia*.

Doubtlessly it is the field work only by that we are possible to clarify the species boundary in *Pleocnemia*. We are needed to collect information on the configuration and the size variation of mature leaves in a given population in the wild, and pay more attention to gather complete leaves as specimens. The morphology of perispores was considered significant in separating species of this group (Holttum 1951) but so far we have very few data of this kind. So the mature sori containing well developed spores are extremely desirable in the wild. In addition, the scales on basal stipe seem to be a potentially useful character (e.g., narrow lanceolate vs. filiform in outline, entire vs. toothed at margin) in recognizing species. However, the stipe scales were rarely presented in existing herbarium specimens and thus we should deliberately collect the scales (together with the basal part of stipe) in the field. Of course the DNA materials from fieldworks are badly needed. As shown in the phylogenetic analyses conducted by Ding *et al.* (2014) where eight samples of *Pleocnemia* were included, molecular data can provide positive systematic information and some clues on the species recognition for this group.

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