



Revision of the fern family Marattiaceae in the Seychelles with two new species and a discussion of the African *Ptisana fraxinea* complex.

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Abstract

The fern flora of the Seychelles archipelago remains relatively poorly known. Current projects involving the development of the Seychelles National Herbarium and study of key biodiversity areas have resulted in extensive new explorations on the granitic islands. Historical literature, newly collected specimens and older collections have been revised for the fern family Marattiaceae as a prelude for a fern checklist, resulting in the rediscovery of *Ptisana* a century after it was last reported (as *Marattia*). Two species of *Angiopteris* are recognised in the Seychelles, one of them new to science. In total, three species are recorded from the granitic Seychelles islands, Mahé and Silhouette, and none from the coral islands, which are too dry to harbour Marattiaceae. These three species are described in detail. The newly described *Angiopteris chongsengiana* is characterized by the elongated terminal pinnules and progressively reduced distal pairs of pinnules. Based on phylogenetic molecular analyses the *Ptisana fraxinea* complex is discussed and several new combinations are proposed. The Seychellois *Ptisana* is most closely related to Ascension Island endemic *P. purpurascens* and is described as a new species, *Ptisana laboudalloniana*. It differs from *P. fraxinea* in its winged secondary rachises and from *P. salicifolia* in its smaller habit, with the laminae shorter than broad and shorter than the petioles. Preliminary revisions of other fern families indicate that more discoveries are likely to be made in the fern flora of the Seychelles.

Key words: *Angiopteris*, Baton Monseny, island flora, long distance dispersal, *Marattia*, Mauritia, montane rain forest, phytogeography, pteridophytes, *trnSGG*, Western Indian Ocean

Introduction

The granitic Seychelles form a tropical archipelago of continental fragments that belong to a Precambrian microcontinent called Mauritia, which “was separated from Madagascar and fragmented into a ribbon-like configuration by a series of mid-ocean ridge jumps during the opening of the Mascarene ocean basin between 83.5 and 61 million years ago” (Torsvik *et al.* 2013). This could have contributed to some phytogeographical links observed between the Seychelles, Madagascar and Sri Lanka (e.g. *Nesolindsaea* Lehtonen & Christenh. in Lehtonen *et al.* 2010). Only few synthetic studies exist focusing on the phytogeographical affinities of the Seychelles flora, and although extremely valuable, they are already outdated (Summerhayes 1931, Rakotondrainibe *et al.* 1996).

Summerhayes (1931) observed that the indigenous flora of the Seychelles has been influenced by both Asia and Africa, and additionally has a strong Western Indian Ocean element (Mascarenes and Madagascar). His study indicated that the African influence tends to decrease when considering affinities of the Seychelles endemic

The spores of Marattiaceae are also relatively large and short-lived, making wind-dispersal over long distances less likely. We therefore hypothesize that long-distance dispersal associated with birds could play an important role in speciation processes in the genus *Ptisana*, but not at higher taxonomic levels (see Christenhusz & Chase 2013). Birds could be carrying both the spores of the fern and the associated mycorrhizae, facilitating these rare colonization events. The absence of *Ptisana laboudalloniana* on Silhouette Island (although suitable habitat does exist there) appears to support this hypothesis.

If our interpretation of Marattiaceae in the African-Madagascan region is correct, i.e. including the recognition of several local endemics (*Ptisana odontosora* in Guinea, *P. robusta* in São Tomé, *P. purpurascens* in Ascension Island, *P. laboudalloniana* in the Seychelles and *P. boivinii* in Madagascar), it will be necessary to study plants of this family more carefully, both in herbarium and in the field, especially in isolated mountains and remote islands, with more attention drawn to elevational gradients and micro-habitats. Our study suggests the presence of two additional species on the African mainland. In total, we recognize nine species of *Ptisana* in Africa and neighbouring islands: two from Atlantic Central Africa and São Tomé, one from Ascension Island, three from Guinea to Ethiopia (at the periphery of the Guineo-Congolian region) and to South Africa, and three from the Western Indian Ocean islands.

Phylogenetic affinities between *Ptisana fraxinea sensu stricto* (confirmed to occur only on the Mascarenes and Madagascar), the southern African *P. salicifolia* and the mostly East African *P. sp. A* remain to be studied into more details. A broad geographical sampling using highly variable molecular markers (e.g. AFLPs) may be needed to more precisely investigate the biogeography of Marattiaceae and to fully resolve the *Ptisana* complex in Africa and surrounding islands.

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