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Riccardia regnellii, an older name for *R. amazonica* (Marchantiophyta: Aneuraceae)

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Abstract – *Riccardia amazonica* is one of the most widespread tropical species in the genus *Riccardia*, occurring on soil, shaded rock and rotten wood in lowland and montane rainforests throughout tropical South America. A study of type specimens shows that the name *R. amazonica* should be replaced by *R. regnellii*. The latter species has been confused with *R. sprucei*. *Riccardia regnellii* is a further example of a *Riccardia* species that can be monoicous or dioicous. African specimens identified as *R. amazonica* do not belong to this species; the correct name for the African plants is *R. longispica*. *Riccardia regnellii* is lectotypified.

Liverworts / monoicy / *Riccardia* / synonymy / taxonomy / tropical America / typification

INTRODUCTION

Riccardia amazonica (Spruce) Gradst. & Hekking is widespread in tropical South America, occurring on soil, shaded rock and decaying wood in lowland and montane rainforests up to the páramo belt (Meenks, 1987; Gradstein & Costa, 2003). The species has additionally been recorded from Africa (Meenks & Pócs, 1985; Perold, 2003) but Reeb & Bardat (2014) found that African specimens did not belong to *R. amazonica* and questioned the occurrence of the species in Africa (see below). The species is recognized by: 1) thallus prostrate, 0.5-1.5 cm long, irregularly 1-2-pinnate, without stolons and without gemmiparous branches; 2) main axis 4-8 cells thick, with a flat dorsal side and a convex ventral side, without wing or with a narrow, 1-2-cells wide wing upon and just below a ramification in the upper portion of the main axis; 3) branches flat, winged, with straight or curved margins, often tongue-shaped, apex rounded to shallowly retuse; 4) surface cells on ultimate branches frequently arranged in oblique rows; 5) oil bodies present in almost all epidermis cells, pale brown, finely granular, subspherical to ellipsoid, 1-2 per cell, if 2, one smaller than the other (Perold, 2003; observations based on African material); 6) apex of the calyptra umbonate. *Riccardia amazonica* is dioicous and sexually dimorphous, with male thalli being smaller and more elongate than female thalli. The two types of thalli may occur mixed in the same mat (Reeb & Bardat, 2014).

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In the course of our study of *Riccardia* species of Africa and the Neotropics we have examined the type of *Pseudoneura regnellii* Ångstr. (= *Riccardia regnellii* [Ångstr.] K.G.Hell). This is one of the older species names in *Riccardia* from tropical South America, having been established in 1876 by J. Ångström based on a specimen from Caldas, Brazil collected by A.F. Regnell. Our study of the type material showed that *R. regnellii* is morphologically identical to *R. amazonica* except for the occurrence of monoicy (*R. amazonica* is dioicous). Indeed, Ångström (1876) diagnosed *R. regnellii* as "monoica" and Stephani (1899) described it as "synoicous", mentioning the presence of minute, single or paired male branches at the base of the female branch. However, our examination revealed the presence of a single bisexual shoot in the isotype material of *R. regnellii* in the Stephani herbarium (G). The rest of the isotype as well as the original material in S consists of unisexual plants. We therefore conclude that monoicy in *R. regnelli* is rare and that the species is more frequently dioicous than monoicous. Since no further differences with *R. amazonica* could be detected and since the basionym of *Riccardia regnellii* antedates that of *R. amazonica*, the latter species is reduced to a synonym of *R. regnellii.*

Riccardia regnellii was described and illustrated in detail by Hell (1969) based on material from São Paulo. The plant illustrated by Hell, however, has a biconvex main axis with short stolons and upright branches, and apparently belongs to *R. sprucei* (Steph.) Meenks & DeJong. The latter species is readily separated from true *R. regnellii* (= *R. amazonica*) by the above-mentioned characters. In genuine *R. regnellii* the branches are prostrate, and the main axis lacks stolons and is plano-convex in cross section, with a flat upper side. The treatment of *R. regnellii* in Gradstein & Costa (2003) also refers to *R. sprucei*.

Gradstein & Ilkiu-Borges (2009) described and illustrated *R. amazonica* and *R. sprucei* based on material from French Guiana and found that *R. amazonica* was common in lowland and montane forest whereas *R. sprucei* was restricted to montane forest. In addition, they noted that the two species differ in sexuality, *R. amazonica* being dioicous and *R. sprucei* monoicous. Our observations, however, indicate that the difference in sexuality between the two species does not hold.

Riccardia regnellii (= *R. amazonica*) is a further example of a *Riccardia* species that can be monoicous or dioicous. The occurrence of monoicous and dioicous plants within a single species of *Riccardia* is not unusual and was earlier reported by, e.g., Arnell (1952), Berrie (1966), Hewson (1970), Hässel de Menendez (1972) and Meenks & Pócs (1985). Berrie (1966) found that the two different sexual types were correlated with polyploidy, the monoicous plants having a gametophytic chromosome number of n = 20 (or higher) whereas the dioicous plants had n = 10. The latter is the basic chromosome number in the genus *Riccardia*. Other examples of polyploid bryophytes in which diploids are dioicous and polyploids monoicous were listed by Heitz (1942), Berrie (1964) and Ramsay (1983). A karyological study should be undertaken of the monoicous and dioicous plants of *R. regnellii*.

Concerning the African populations of *R. regnellii*, Reeb & Bardat (2014) found several differences with the neotropical plants, including: 1) absence of heterothally; 2) inner thallus cells thin-walled; 3) costa of ultimate branches narrower, only 2-3(-4) cells wide; 4) male branches longer (to 18 pairs of antheridia) and with a conspicuously crenulate margin. Molecular data support the separation of the American and African populations, and resolve the African plants in a clade together with R. longispica (Reeb *et al.*, in prep.). The correct name of the African plants previously called "R. amazonica" is therefore R. longispica (Steph.) E.W.Jones.

FORMAL TREATMENT

Riccardia regnellii (Ångstr.) K.G.Hell, *Bol. Fac. Filos. Univ. Sao Paulo, Bot*. 25: 110. 1969 ≡ *Pseudoneura regnellii* Ångstr., *Öfvers. Kongl. Vetensk.-Akad. Forh.* 33: 90. 1876 ≡ *Aneura regnellii* (Ångstr.) Steph., *Sp. hepat.* 1: 214. 1899. **Type**: Brazil, Minas Gerais, Caldas, *Regnell s.n.* (lectotype, designated here, S-B260631!; isotype, G-00282990!). Although no monoicous shoots were found in the specimen in S, this material is designated as the lectotype because Ångström's herbarium is in S and the label of the specimen in S is in his handwriting. Following McNeill (2014) this specimen is not considered the holotype because Ångström did not use the word "type" and the original gathering is represented by more than one specimen.

= *Aneura amazonica* Spruce, *Trans. & Proc. Bot. Soc. Edinburgh* 15: 545. 1885 ≡ *Riccardia amazonica* (Spruce) Gradst. & Hekking, *J. Hattori Bot. Lab.* 45: 129. 1979, **syn. nov. Type**: Venezuela, San Carlos del Río Negro, "in tronco putrido", *Spruce H16* (lectotype, MANCH-EM71234!, designated by Meenks & Pócs, 1985, p. 84). The type has erroneously been cited as originating from Brazil (e.g., Meenks & Pócs, 1985).

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