

Towards a better understanding of the *Ruppia maritima* complex (Ruppiaceae): Notes on the correct application and typification of the names *R. cirrhosa* and *R. spiralis*

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Abstract *Ruppia cirrhosa* and *R. maritima* are two widely used names, each applied respectively to a long- and coiled-pedunculate species or a short- and non-coiled pedunculate species of *Ruppia*. The nomenclatural history of the two names is outlined here. A lectotype for the name *R. cirrhosa* is designated and the name is shown to be a homotypic synonym of *R. maritima*. Consequently, *R. spiralis* has nomenclatural priority over *R. cirrhosa* for the long- and coiled-pedunculate *Ruppia*.

Keywords Alismatales; monocots; nomenclature; synonym; taxonomy

■ INTRODUCTION

Ruppia L. (Linnaeus, 1753: 127; 1754: 162) is the only genus in the aquatic plant family Ruppiaceae (“Cymodoceaceae complex” in Les & Tappin, 2013) and is distributed almost all over the world (Zhao & Wu, 2008). The plants grow submerged in mostly brackish waters and exhibit simplified morphology, such as flowers without perianths and needle-like leaves (Tomlinson, 1982). This reduced morphology has long caused a “chaotic taxonomic situation” (Den Hartog & Kuo, 2006), with authors recognising one species (*R. maritima* L.; Linnaeus, 1753: 127; Ascherson & Graebner, 1897; Graebner, 1907), two cosmopolitan species (*R. maritima*, *R. cirrhosa* (Petagna) Grande; Grande, 1918: 58; Reese, 1962; Hara, 1983), five species (the two cosmopolitan species plus three Australasian ones; Zhao & Wu, 2008), or six species (the two cosmopolitan species plus three Australasian and one Mediterranean ones; Mannino & al., 2015). The two cosmopolitan species are delimited according to their peduncle morphology, occasionally in association with differences in leaf tips (Dumortier, 1827; Hagström, 1911; Ascherson & Graebner, 1897; Graebner, 1907; Setchell, 1946; Reese, 1962; Van Vierssen & al., 1981; Hara, 1983; Triest & Symoens, 1991; Cook, 2004; Zhao & Wu, 2008; Mannino & al., 2015) (Table 1). Of these, the leaf tip characters, i.e., acute or obtuse,

have usually been considered to be of less importance because of their apparent instability and variability, e.g., those of *R. maritima* are described or depicted as varying from acute to obtuse (Hagström, 1911; Jacobs & Brock, 1982, 2011). In contrast, peduncle characters are relatively reliable and have been used to distinguish the two cosmopolitan taxa (Setchell, 1946; Zhao & Wu, 2008). In the recent literature, the species have been commonly circumscribed as follows: (1) long- and coiled-pedunculate = *R. cirrhosa* and (2) short- and non-coiled pedunculate = *R. maritima* (Table 1).

Recently, a series of molecular phylogenetic studies has provided useful insights into the phylogeny of the genus. These studies did not completely support any of the previous taxonomic hypotheses and instead proposed a classification of four species and one species complex (*R. maritima* complex) (Ito & al., 2010, 2013, 2015). When revising the literature, including protologues, and type specimens relating to the proposed *R. maritima* complex, we came across a nomenclatural problem that has been widely neglected, namely that the commonly cited *R. cirrhosa* had no designated type specimen. A typification of the name presented here demonstrates that *R. cirrhosa* is a homotypic synonym of *R. maritima*. We also typify *R. spiralis* L. ex Dumort. (Dumortier, 1827: 164), a name once widely applied and recently synonymized under *R. cirrhosa*.

■ HISTORY OF *RUPPIA* L. AND TYPIIFICATION OF THE NAME *R. MARITIMA*

Linnaeus (1753: 127) introduced the genus *Ruppia* to accommodate a single species, *R. maritima*. In the protologue of *R. maritima*, in addition to two other citations of pre-Linnaean works, Linnaeus cited “*Buccaferrea maritima, foliis acutissimis. Mich. gen. 72. t. 35*”. That citation combined a reference to one phrase name published by Micheli (1729: 72; “*Buccaferrea maritima, foliis acutissimis*”) with the reference to an illustration that Micheli (1729: 72) cited both in association with the name “*Buccaferrea*” itself, and a second phrase name (“*Buccaferrea maritima, foliis minus acutis*”). The caption for the illustration published by Micheli does not specifically reference the latter phrase name and instead only identifies the plant generally as “*Buccaferrea*”. Although Linnaeus did not explicitly cite both of Micheli’s phrase names, it seems clear that both of the taxa Micheli recognized were combined in Linnaeus’s concept of *R. maritima*. Indeed, this is the conclusion that other authors have also arrived at (e.g., Setchell, 1946).

A specimen named *Ruppia maritima* by Linnaeus exists in the Linnaean Herbarium (LINN 176.1), however, Linnaeus (1753) did not definitely designate any specimens as the type. In treating *R. maritima*, Setchell (1946) did not select the Linnaean specimen as the lectotype because he considered the collection to have been obtained after Linnaeus had described the species and thus the specimen could not definitely be treated as original material. Instead, under Art. 8.1 and Art. 9.2 (ICN; McNeill & al., 2012) Setchell (1946) designated as the lectotype one of the three illustrations that Linnaeus (1753) cited in the protologue. The lectotype illustration (Micheli, 1729: t. 35) depicts a whole plant and detailed vegetative morphology of “*Buccaferrea maritima, foliis minus acutis*” and thus characterizes *R. maritima* as having “short, nonspiral peduncles” (Fig. 1). This lectotypification has been followed subsequently by Jacobs & Brock (1982, 2011) and Jarvis (2007).

■ TYPIIFICATION OF THE NAME *RUPPIA CIRRHOSA*

Although Linnaeus connected Micheli’s “*Buccaferrea*” to *Ruppia* through the citation of Micheli’s phrase name and illustration in the protologue of *R. maritima*, the name was later validated by Petagna (1787b) when he formally described *B. cirrhosa* Petagna. Petagna was aware of Linnaeus’s treatment of *Ruppia* and his citation of both of Micheli’s taxa under *R. maritima*. However, Petagna recognized that Micheli described what he considered to be two morphologically distinct taxa, and found Linnaeus’s uniting of the two confusing in light of Micheli’s published illustration (viz. “*Miror sane Linnaeum acutissimum Botanicum Nullam habuisse rationem Michelianae iconis, et cum eo eandem neglexisse Ceteros Botanicos*” (I really wonder why the very sharp minded botanist Linnaeus did not consider Micheli’s illustration at all and why other botanists follow him) (Petagna 1787a). In fact, when Petagna (1787a: 289) treated *Ruppia* and *R. maritima* he specifically stated “*excludenda ab hoc genere et specie Buccaferrea*”. Understanding that Petagna considered Micheli’s two taxa to be distinct explains why he (Petagna, 1787b) excluded Micheli’s figure from his concept of *Ruppia*, resurrecting “*Buccaferrea*” as a separate genus and formally describing Micheli’s second phrase name “*Buccaferrea maritima, foliis minus acutis*” as *B. cirrhosa*.

Petagna (1787b) did not designate a type for *Buccaferrea cirrhosa* but mentioned a locality of “*Lacu vulgo di Licola*” (in a lake commonly called di Licola). He (Petagna, 1787a) also provided the phenology of the species at the lake based either on his observation or on specimen(s) that he examined: “*Invenimus Majo florentem*” (in flower in May). These facts suggest that Petagna (1787b) described his species based on his own collection from the lake in Italy or alternatively on specimen(s) collected by Tenore and Terracciano, as Grande (1918) suggested when he transferred *B. cirrhosa* to *Ruppia*:

Table 1. Diagnostic characters for two well-established species of *Ruppia* L.

	Leaf tip		Peduncle length		Peduncle coils in fruit	
	<i>R. maritima</i>	<i>R. spiralis</i> (<i>R. cirrhosa</i>)	<i>R. maritima</i>	<i>R. spiralis</i> (<i>R. cirrhosa</i>)	<i>R. maritima</i>	<i>R. spiralis</i> (<i>R. cirrhosa</i>)
Dumortier (1827) ^a	acute	acute	short	long	not spirally coiled	spirally coiled
Hagström (1911) ^b	acute/obtuse	obtuse	short	elongated	n/a	n/a
Setchell (1946)	n/a	n/a	short	elongated	non-spiral	spiral
Reese (1962)	acute	obtuse	<5 cm	>10 cm	non-coiled	coiled
Verhoeven (1979)	acute	obtuse	short	long	n/a	n/a
Van Vierssen & al. (1981)	acute	obtuse	<5 cm	>10 cm	non-coiled	coiled
Triest & Symoens (1991)	acute	obtuse	0.5–3(–5) cm	7–120 cm	non-coiled	spirally coiled
Cook (2004)	acute	obtuse	(0.8–)1.2–2.6 cm	4–30(–77) cm	non-coiled	coiled
Zhao & Wu (2008)	n/a	n/a	<5 cm	>10 cm	not spirally coiled	spirally coiled
Mannino & al. (2015)	acute	obtuse	1–5 cm	5–20(–100) cm	straight	spirally coiled

a Based on the cited illustrations of Reichenbach (1824); — b Based on the illustrations cited.

“Ivi fu ritrovata da Tereno (*l.c.*) e da N. Terracciano (*l.c.*)” (it [*Buccaferea cirrhosa*]) was found there by Tenore and N. Terracciano). In spite of our exhaustive herbarium surveys for this study, however, specimens relevant for this lectotypification have neither been found in POR and PORUN where Petagna’s collections are most likely to be deposited (Stafleu & Cowan, 1983: 201), nor at NAP where Tenore and Terracciano primarily donated their collections (Stafleu & Cowan, 1983: 222). In FI, specimens of *Buccaferea* collected by Micheli were found, including those apparently used by Micheli to prepare his illustration (Micheli, 1729: t. 35), but none of them are considered to have originated from “Lacu vulgo di Licola”. Micheli’s (1729) illustration is another candidate for the lectotypification of *B. cirrhosa* because Petagna (1787b: 1826) in his protologue stated: “BUCC. *cirrhosa* nobis. *Mich. nov. gen. pl. 72. tab. 35.*” This interpretation does not disagree with Petagna’s explanation of the background history of the description and recognition of *B. cirrhosa* by Petagna (1787b).

Considering that Petagna (1787a) well recognized Micheli’s (1729) illustration, which he (Petagna 1787b) cited for *Buccaferea* and its type, *B. cirrhosa*, the illustration is a logical choice as a potential lectotype. It is also the only option for a lectotype because it comprises the only original material that can unambiguously be linked to the protologue of *B. cirrhosa*. As such we here designate Micheli’s illustration as lectotype of *B. cirrhosa*. The implications of this action are discussed more fully below.

■ IMPLICATION OF THE TYPIFICATIONS

The selection of Micheli’s illustration as the lectotype of *Buccafferea cirrhosa* means that as a result that the name is an obligate homotypic junior synonym of *R. maritima*. By extension *Buccafferea* must also be treated as an obligate homotypic synonym of *Ruppia*. This treatment is unfortunate because it clearly contradicts the intention of Petagna (1787a, b) to recognize two distinct species. It must be recognized, however, that this action is not a result of the typification of *B. cirrhosa*, but rather a consequence of the earlier typification of *R. maritima* by Setchell (1946). Similarly, it is important to note that when Petagna published *B. cirrhosa*, no type had been selected for *R. maritima* and thus the latter name could have been typified by another element from amongst the original material other than Micheli’s illustration. As such none of the criteria for Art. 52.2 were fulfilled and *B. cirrhosa* is a legitimate name.

In addition to his published work on the subject, Linnaeus appears to have recognized one more species of *Ruppia*, a “long-spiral, pedunculate form”, to which the name “*Ruppia spiralis*” was unofficially given on a herbarium sheet (LINN 176.2; Setchell, 1946). Dumortier (1827: 164) later validated this name as *R. spiralis* L. ex Dumort. via citation of Reichenbach’s (1824) illustration of *R. maritima* having long-coiled peduncles as a synonym of *R. spiralis* (Art. 38.1, 38.8, 38.9). Here we resurrect *R. spiralis* for the species previously referred to as

R. cirrhosa because this name was synonymized under *R. cirrhosa* by Grande (1918: 58) when he combined the latter epithet into *Ruppia*.

Ruppia spiralis was published without designation of a type, without a diagnosis, and without a description. In the protologue of *R. spiralis* Dumortier (1827) referred to “*spiralis*, L.!” indicating his reference to the specimen now preserved in LINN. We select this specimen as the lectotype below. As typified here, *R. spiralis* should be applied to the long- and coiled-pedunculate species of *Ruppia* that has previously widely been referred to as *R. cirrhosa*.

■ NOMENCLATURE

Ruppia maritima L., Sp. Pl.: 127. 1753 = *Buccaferea cirrhosa* Petagna, Inst. Bot.: 1826. 1787 = *Ruppia cirrhosa* (Petagna) Grande in Bull. Orto Bot. Regia Univ. Napoli 5: 58. 1918 – **Lectotype** (designated by Setchell in Proc. Calif. Acad. Sci. 25: 470. 1946 for *Ruppia maritima*; **designated here**



Fig. 1. Illustration of “*Buccaferea maritima*, foliis minus acutis” from Micheli (1729: t. 35). This is designated by Setchell (1946) as the lectotype of *Ruppia maritima* L. and below designated as the lectotype of *B. cirrhosa* Petagna and its later name, *R. cirrhosa* (Petagna) Grande.

for *Buccaferrea cirrhosa*): [illustration] “*Buccaferrea*” in Micheli, Nov. Pl. Gen.: t. 35. 1729.

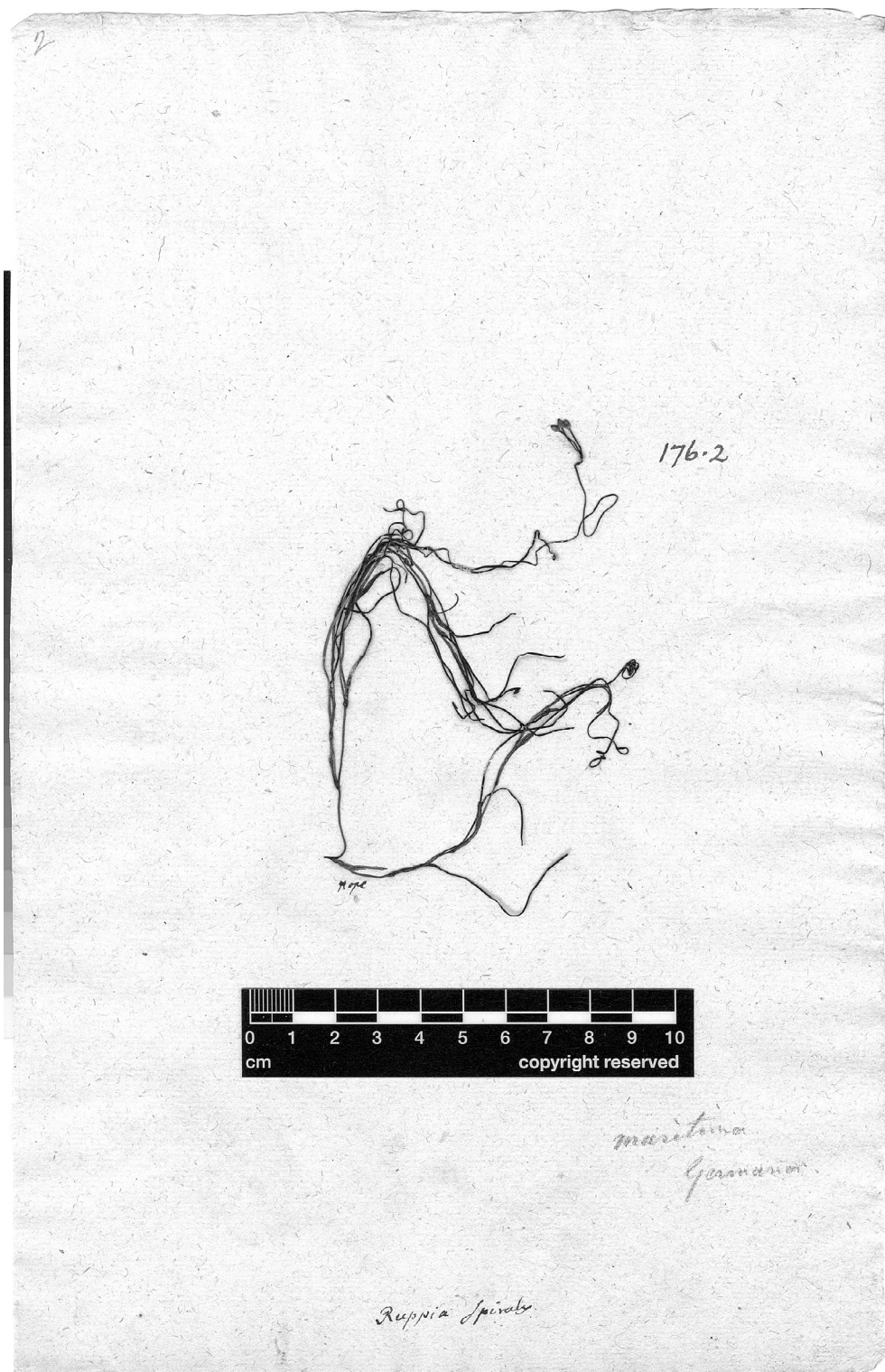
Lectotype reproduced as Fig. 1 herein.

All names listed in the synonymy of *R. maritima* L. by Hara (1983) as well as those of subordinate varieties and their synonyms are to be included here.

Ruppia spiralis L. ex Dumort., Fl. Belg.: 164. 1827 \equiv *Ruppia maritima* subsp. *spiralis* (Dumort.) Asch. & Graebn., Syn. Mitteleur. Fl. 1: 356. 1897 – **Lectotype (designated here)**: [origin unknown], Herb. Linnaeus No. 176.2 (LINN [digital image!]).

Lectotype reproduced as Fig. 2 herein.

Fig. 2. Herb. Linnaeus No. 176.2. This is designated as the lectotype of *Ruppia spiralis* L. ex Dumort.



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