A revision of the typification of some names in the seagrass genera Amphibolis, Cymodocea, Halodule and Syringodium (Cymodoceaceae)

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A revision of the typification of some names in the seagrass genera *Amphibolis*, *Cymodocea*, *Halodule* and *Syringodium* (*Cymodoceaceae*)

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Abstract: The typification of eight names of species currently included in the family *Cymodoceaceae* is revised in order to contribute to their nomenclatural stability. The previously designated lectotype of *Ruppia antarctica* Labill. (≡ *Amphibolis antarctica* (Labill.) Sond. & Asch.) is cited. Lectotypes are designated here for *Zostera nodosa* Ucria (≡ *Cymodocea nodosa* (Ucria) Asch.), *Cymodocea rotundata* Asch. & Schweinf., *Caulinia serrulata* R. Br. (≡ *Cymodocea serrulata* (R. Br.) Asch. & Magnus), *Halodule bermudensis* Hartog, *Diplanthera pinifolia* Miki (≡ *H. pinifolia* (Miki) Hartog) and *Cymodocea isoetifolia* Asch. (≡ *Syringodium isoetifolium* (Asch.) Dandy). A neotype is designated here for *Z. uninervis* Forssk. (≡ *H. uninervis* (Forssk.) Asch.) and an epitype is designated here for *Z. nodosa*.

Key words: *Amphibolis*, *Cymodocea*, *Cymodoceaceae*, epitype, *Halodule*, lectotype, neotype, nomenclature, seagrass, *Syringodium*, typification

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Introduction

The seagrasses are a successful ecological group of monocots (order *Alismatales*) widely distributed in the shallow tropical to temperate coastal environments of the world. They constitute highly productive marine habitats that perform relevant ecosystem services (Short & al. 2007; Den Hartog 2016; Larkum & al. 2018). Although differing in their specific composition and structure, seagrass meadows provide food and shelter to a rich marine biodiversity that includes fish, reptiles, mammals and invertebrates. In addition, the survival of some endangered tropical species such as sirenia (manatees and dugongs) and green sea turtles is linked to the presence of meadows of seagrasses (Short & al. 2007; Den Hartog 2016; Larkum & al. 2018).

These marine plants have evolved from four independent lineages and include around 70 species in the families *Cymodoceaceae*, *Hydrocharitaceae*, *Posidoniaceae*, *Potamogetonaceae*, *Ruppiaceae* and *Zosteraceae* (Kuo & Den Hartog 2001; Den Hartog 2016; Kuo & al. 2018; Larkum & al. 2018; Waycott & al. 2018). The *Cymodoceaceae* are a monophyletic family of dioecious, perennial seagrasses that include five genera: *Amphibolis* C. Agardh, *Cymodocea* K. D. Koenig, *Halodule* Endl., *Syringodium* Kütz. and *Thalassodendron* Hartog

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(Kuo & Den Hartog 2001; Den Hartog & Kuo 2006; Kuo 2011; Kuo & al. 2018; Waycott & al. 2018).

The genus *Amphibolis* includes two species of robust seagrasses, with branched stems ending in tufts of 6–10 leaves, endemic to southern and western temperate Australia: *A. antarctica* (Labill.) Sond. & Asch. and *A. griffithii* (J. M. Black) Hartog (Den Hartog 1970; Ducker & al. 1977; Womersley 1984; Kuo 2011; Kuo & al. 2018). These Australian seagrasses are pioneer species that occur in mixed and monospecific communities under moderate to strong swell conditions from low water mark to a depth of 35 m (Womersley 1984; Den Hartog 2016).

The genus *Cymodocea* develops herbaceous, creeping rhizomes and short, erect stems bearing 2–7 leaves. Each leaf presents a sheath and a linear blade with 7–17 longitudinal veins. The leaf sheaths leave circular scars on the stems when shed. The genus has a tropical affinity and its usual treatment includes four species: *C. angustata* Ostenf. (endemic to Western Australia), *C. nodosa* (Ucria) Asch., *C. rotundata* Asch. & Schweinf. and *C. serrulata* (R. Br.) Asch. & Magnus (Ostenfeld 1916; Den Hartog 1970; Kuo & Den Hartog 2001; Kuo & al. 2018; Larkum & al. 2018).

Cymodocea nodosa is a temperate seagrass widely distributed in the Mediterranean Sea and the Atlantic coast of Africa to Senegal, including the Canary Islands (Den Hartog 1970, 2016; Reyes & al. 1995; Green & Short 2003; Short & al. 2007). Molecular data have shown a high genetic differentiation between the southernmost Atlantic and the eastern Mediterranean populations (Alberto & al. 2008). It is a pioneer species with a mixed mode of reproduction, sexual and clonal, that grows on sandy-muddy bottoms in open coastal waters, lagoons and estuaries. It tolerates wide variations in temperature, salinity and nutrient concentration. Its growth dynamics are seasonal, showing a higher development of rhizomes and leaf biomass in summer (Cancemi & al. 2002; Agostini & al. 2003). It forms monospecific or mixed meadows, both with other seagrasses (*Posidonia oceanica* (L.) Delile, *Zostera noltei* Hornem.), or some marine algae (e.g. *Caulerpa prolifera* (Forssk.) J. V. Lamour.) (Den Hartog 1970, 2016; Short & al. 2007).

Cymodocea rotundata and *C. serrulata* are shallow-water species widespread in the tropical Indian Ocean and western Pacific usually forming patches in meadows dominated by *Thalassia hemprichii* (Ehrenb.) Asch. (*Cymodoceo-Thalassion hemprichii* Den Hartog 1977) (Den Hartog 1970, 2016; Phillips & Meñez 1988; Short & al. 2007; Kuo 2011; Kuo & al. 2018).

Halodule is a tropical genus characterized by herbaceous, monopodially branched rhizomes and short, erect shoots that bear 1–4 distichous, linear leaves showing 3 longitudinal veins. The leaf sheaths leave circular scars on the stems when shed (Den Hartog 1964, 1970, 2016). Currently, seven tropical species are usually recognized in the genus: *H. beaudettei* (Hartog) Hartog, *H. bermudensis* Hartog, *H. ciliata* (Hartog) Hartog, *H. emarginata* Hartog, *H. pinifolia* (Miki) Hartog, *H. uninervis* (Forssk.) Asch. (including *H. tridentata* (Steinh.) Endl. ex Unger) and *H. wrightii* Asch. (Den Hartog 1964, 1970; Kuo & Den Hartog 2001; Phillips & Meñez 1988; Green & Short 2003; Den Hartog & Kuo 2006; Short & al. 2007). However, the variability found in the diagnostic vegetative leaf characters and overlap between some species (*H. pinifolia*, *H. uninervis* and *H. wrightii*) shown by cpDNA data suggests the need for a revision of the taxonomy of the genus with modern criteria (Phillips 1967; Waycott & al. 2006). *Halodule bermudensis* is a rare species from Bermuda characterized by leaf blades c. 25 cm long and 0.75–1.25 mm wide and an apex with 2 well-developed lateral teeth (Den Hartog 1964). *Halodule pinifolia* occurs in the Gulf of Bengal and the western Pacific and shows leaves with a more or less serrulate, rounded apex (Miki 1932; Den Hartog 1964, 1970; Phillips & Meñez 1988). *Halodule uninervis* is a shallow-water pioneer species widely distributed in the Indo-Pacific and tolerant of fluctuations in salinity. The leaf blades are 10–15 cm long and 1.5–3.5 mm wide, have a conspicuous midrib and a variable apex showing a short, obtusely rounded median tooth and 2 lateral teeth (Den Hartog 1964, 1970; Womersley 1984; Kuo & Den Hartog 2001; Beentje 2002). The species includes two forms with wide and filiform leaves, respectively (Den Hartog 1964, 1970; Kuo & Den Hartog 2001). The latter was described as *Diplanthera tridentata* Steinheil (≡ *H. tridentata*; lectotype designated by Den Hartog [1964: 302], preserved at P [barcode P00727185]; see Steinheil [1838]) and has been recently included as an independent taxon in the *Flora of Australia* (Kuo 2011; Kuo & al. 2018), but so far has not been recognized in The Plant List (2013).

The genus *Syringodium* consists of shallow-subtidal seagrasses with creeping, herbaceous rhizomes that develop a short, erect shoot at each node bearing 2 or 3 rounded leaf blades. The flowers appear in a cymose inflorescence. The genus includes two closely related species with a remarkable biogeographical distribution: *S. isoetifolium* (Asch.) Dandy is widely distributed in the Indian Ocean and western Pacific, while *S. filiforme* Kütz. appears in the tropical western Atlantic (Den Hartog 1970; Den Hartog & Kuo 2006; Phillips & Meñez 1988). The species differ in the cross-section of the leaves: *S. isoetifolium* has a central vascular bundle surrounded by 6–8 air channels and a circle of 7–10(–15) pericentral vascular bundles narrower that the central one, whereas *S. filiforme* presents 5–8 air channels and only 2 pericentral bundles with the same diameter as the central one (Den Hartog 1970).

The present paper is a new contribution to seagrass nomenclature (see also Ferrer-Gallego & al. 2014; Ferrer-Gallego & Boisset 2015a, 2015b; Boisset & Ferrer-Gallego 2016).

Historical background and typification of the names

Amphibolis antarctica

Jacques-Julien Houtou de Labillardière (1755–1834) was a French explorer and botanist who travelled in the Near East (1786–1787) before embarking as a naturalist on the voyage commanded by D'Entrecasteaux (1791–1794) sent out to the Pacific Ocean in search of the ships of La Pérouse (Labillardière 1800). He made one of the most important Australian collections of natural history with more than 4000 plants (Labillardière 1806). At the end of the expedition, although the English took the herbarium to London as a prize of war, it was recovered a little later by Labillardière thanks to the influence of his friend Joseph Banks. It was bought later by the English botanist, Philip Barker Webb (1793–1854), who bequeathed it to the Grand Duke of Tuscany (Australian Dictionary of Biography 1967; Duiker 2003).

Labillardière (1806: 116, t. 264) described and illustrated *Ruppia antarctica* Labill. (≡ *Amphibolis antarctica*) from material collected in New Holland, "Habitat ad terrae Van-Leuwin littora" (southern Western Australia). This locality corresponds with Baie Le Grand (Esperance Bay) (Labillardière 1800; Nelson 1975). Womersley (1984: 104) cited as the "holotype" a specimen located in the herbarium FI (barcode FI012119; herbarium codes according to *Index herbariorum*; http://sweetgum.nybg.org/science/ih/), and as an isotype another specimen preserved in the herbarium P (barcode P00735051). It is interesting to note that although no specimen or gathering is indicated in the protologue, the sheet in FI includes the original handwritten annotations that appeared literally in the description in the protologue and the material seems to have been the voucher for the illustration published in the protologue (t. 264). It could be argued that, according to Art. 9.1 of the *International Code of Nomenclature for algae, fungi, and plants* (Turland & al. 2018, hereafter "*Code*"), the specimen in FI was the "one specimen or illustration … used by the author(s) when no type was indicated" and is therefore indeed the holotype. However, the existence of the duplicate specimen in P and the illustration in the protologue make it unlikely that Labillardière used only one element. Womersley's use of the term "holotype" is therefore corrected under Art. 9.10, and the specimen in FI is treated as the lectotype of the name *Ruppia antarctica*.

Ruppia antarctica Labill., Nov. Holl. Pl. 2: 116. 1806 ≡ ***Amphibolis antarctica*** (Labill.) Sond. & Asch. in Linnaea 35: 164. 1867. – Lectotype (designated by Womersley 1984: 104): Australia, Western Australia, "habitat ad terrae van-Leuwin littora" [Esperance Bay], *Labillardière s.n.* (FI [barcode FI012119]!; isolectotype: P [barcode P00735051]!).

Cymodocea nodosa

Michelangelo Aurifici (or Auriferi), better known as Bernardino da Ucria (1739–1796), was a Franciscan friar, botanist and demonstrator at the Royal Palermo Botanical Academy (Sicily, Italy) who followed the Linnaean system of classification (Stafleu & Cowan 1986). He published a rare work entitled *Plantae ad Linnaeanum opus addendae* in 1793 (Ucria 1959: 5). Stafleu & Cowan (1986) considered that the original publication was in "*Nuova raccolta di opuscoli di autori Siciliani* 6, 1788" (not seen by them) and in Roemer (1796). The 32 species that appear in Ucria's work had been previously described in Cupani's *Panphyton siculum* (Cupani 1713). Francesco Cupani (1657–1710) tried to describe the botanical and other natural riches of Sicily using a pre-Linnaean system consisting of brief descriptions accompanied by an illustration called a "polilogus" (Brullo & Pavone 1993; Priolo 1996; Massa 2009; Pulvirenti & al. 2015a, 2015b). The protologue of *Zostera nodosa* Ucria (1793; see also Ucria 1959) (≡ *Cymodocea nodosa*) contains a brief description "foliis angustis linearibus longissimis, geniculis radicantibus, caulibus sarmentosis", accompanied by a synonym "Alga gramineo folio, triphylla, sarmentis Vitis" and "Cup. Pamph" [Cupani. Panphyton]. Unfortunately, Ucria's herbarium seems to have been destroyed during the Sicilian revolution in 1820 (G. Domina, pers. comm.) and our efforts to locate other original material of *Z. nodosa* have been unsuccessful.

At the beginning of the 19th century, Koenig (1806) noted that P. Cavolini had previously found in the Bay of Naples numerous male plants and proposed the creation of the genus *Cymodocea* and the name *C. aequorea* K. D. Koenig as the type of the genus (Koenig 1806: 96, t. 7). Bornet (1864) described the morphology and anatomy of vegetative and reproductive structures (as *Phucagrostis major* Cavolini). Finally, Ascherson (1870: 4) renamed the species as *C. nodosa* (Ucria) Asch.

In conclusion, we designate as the lectotype of *Zostera nodosa* Cupani's illustration (Cupani 1713: t. 191) cited in Ucria's protologue (Ucria 1793; see also Roemer 1796). However, this (obligate) lectotype does not clearly show several of the diagnostic characters to distinguish *Cymodocea nodosa*. This species is morphologically close to *C. rotundata*, and both constitute a strongly supported clade (Petersen & al. 2014). We tried, without success, to locate a modern Sicilian gathering with recent molecular data. Therefore, a modern and complete specimen from the southeastern Aegean with available molecular data (GenBank: *rbcL*, KF488487; *matK,* KF488502; *atp1*, DQ859094; *cob*, DQ859130; *nad5*, HQ267481; *ccmB,* HQ267397) and preserved at C (barcode C10103594) is designated as the epitype. This specimen (Petersen & al. 2014) clearly represents the traditional concept and current usage of the name (Den Hartog 1970; Den Hartog & Kuo 2006).

Zostera nodosa Ucria, Nuova Racc. Opusc. Aut. Sicil. 6: 256. 1793 ≡ ***Cymodocea nodosa*** (Ucria) Asch. in Sitzungsber. Ges. Naturf. Freunde Berlin 1869: 4. 1870. – **Lectotype (designated here):** [icon] "Alga gramineo folio, triphylla, sarmentis Vitis" in Cupani, Panphyt. Sicul. 2: t. 191. 1713 [Fig. 1]. – **Epitype (designated here):** Greece, Karpathos, Lefkos, 35°35'30.9"N, 27°04'15.4"E, 31 Jul 2002, *O. Seberg & S. Diemar s.n.* (C [barcode C10103594]! [Fig. 2]).

Fig. 1. Lectotype of *Zostera nodosa* (≡ *Cymodocea nodosa*), the illustration "Alga gramineo folio, triphylla, sarmentis Vitis" in Cupani, Panphyt. Sicul. 2: t. 191. 1713. – Image by courtesy of the Catania Regional University Library, reproduced with permission.

Cymodocea rotundata

The German botanist Paul Ascherson (1834–1913) made important contributions to the taxonomy and biogeography of the marine plants (Kuo & Den Hartog 2001; Kuo & al. 2018). The protologue of *Cymodocea rotundata* (Ascherson 1871: 84) is a text in German, with comments on the original locality and the collector, G. A. Schweinfurth, but without any illustration of the taxon. Georg August Schweinfurth (1836–1925) was a German botanist, geographer and explorer, linked to the Royal Botanical Museum in Schöneberg near Berlin, who made several trips to Africa (Stafleu & Cowan 1985). By his famous book *The heart of Africa* or *Im Herzen von Afrika* (Schweinfurth 1873, 1874), it is clear that he was at Suakin, a port on the Sudanese coast of the Red Sea, at the beginning and end of his trip to Central Africa (1869–1871). A more formal diagnosis for *C. rotundata* appeared in Boissier (1882: 21–22) as "differt a specie priori [*C. nodosa*] cui simillima foliis 7–13-nervibus, carpelli carinâ grosse et acute dentatâ; flores masculi adhuc ignoti". Unfortunately, most of Ascherson's original material housed in Berlin (B) was lost during World War II (Kuo & al. 2018), although some sheets survived in other European herbaria.

The nomenclatural type of *Cymodocea rotundata* was cited by Beentje (2002: 7) as: "Type: Sudan, Suakin, *Schweinfurth* 188 (K!, holo., BM!, iso)" (see also Kuo 2011). However, the specimen at K cannot be the holotype because it cannot be shown that it was "the one specimen or illustration … used by the authors(s) when no type was indicated" (Turland & al. 2018: Art. 9.1); not only could the destroyed material in B have been used, but also the extant specimens in BM and K. Unfortunately, Beentje's statement cannot be treated, with correction under Art. 9.10, as designation of the lectotype because the requirements of Art. 7.11 were not met: the phrase "designated here" or an equivalent, required from 2001

Fig. 2. Epitype of *Zostera nodosa* (≡ *Cymodocea nodosa*) in C (barcode C10103594). – Image by courtesy of the University of Copenhagen, reproduced with permission.

onward, was not used. More recently, Kuo & al. (2018) indicated that the name does not have a designated type.

Both specimens, in BM and K, are original material and show important diagnostic features: a scarious mass of leaf sheaths at the base of each shoot; leaf scars; and leaf blade 2–4 mm wide, apex entire. Both have a label annotated "Reise nach Central Africa in Auftrage der Humboldt Stiftung [Journey to Central Africa on behalf of the Humboldt Foundation]. / No. 188 *Cymodocea rotundata* Asch. / bei Suakin 5. Sept. 68 / zwischen Suakin u[nd]. Berber ges[ammelt]. v[on]. G. Schweinfurth" [between Suakin and Berber collected by G. Schweinfurth]. The material in K (barcode K000346091) bears four plant fragments with rhizomes, roots, and shoots with leaves. It supports the traditional concept and current usage of the name *C. rotundata* (Den Hartog 1970; Phillips & Meñez 1988; Kuo & Den Hartog 2001; Beentje 2002; Kuo 2011) and we accordingly designate it as the lectotype.

Cymodocea rotundata Asch. & Schweinf. in Sitzungsber. Ges. Naturf. Freunde Berlin 1870: 84. 1871. – **Lectotype (designated here):** Sudan, "bei Suakin", 5 Sep 1868, *G. Schweinfurth 188* (K [barcode K000346091]!; isolectotype: BM [barcode BM000617168]).

Cymodocea serrulata

The British botanist Robert Brown (1773–1858) brought to England the result of his rich collections made in Australia aboard the HMS *Investigator* (1801–1803). Although most were terrestrial plants, he also noted the presence of several seagrasses on the southern coast of Australia, under the generic name *Caulinia* DC. non Willd., including *C. serrulata* R. Br. (≡ *Cymodocea serrulata*) (Brown 1810; Kuo & al. 2018). The protologue (Brown 1810: 339) has a short diagnosis "foliis linearibus apice rotundatis extrorsum serrulatis, stipulâ infrafoliaceâ truncatâ brevissimâ" followed by the comment "(M.) v.v. absque fructificatione", in which "(M.)" stands for "Oram Meridionalem Novae Hollandiae", i.e. the southern coast of New Holland, and "v.v." stands for "vidi vivam" (or vidi vivas), i.e. I have seen the living plant(s), "in earum patriâ", in their native land (Brown 1810: Praemonenda vii–viii).

Beentje (2002: 9) cited the nomenclatural type of *Caulinia serrulata* as: "Type: Australia, S. coast, *Brown 5813* (BM!, holo.)" and Kuo & al. (2018: 766) cited "Type: South coast of Australia, *R Brown Inter Austral* [sic] *5813*; holo: BM". Although this specimen in BM (barcode BM000907122) seems to be the only element on which Brown's description was based, and it could be considered as the holotype if it was "the one specimen or illustration … used by the authors(s) when no type was indicated" (Turland & al. 2018: Art. 9.1), there is the possibility that other elements were used that are no longer extant, so it seems safer to designate the specimen in BM as the lectotype (McNeill 2014). The statements of Beentje (2002) and Kuo & al. (2018) cannot be treated, with correction under Art. 9.10, as designation of the lectotype because the requirements of Art. 7.11 were not met: the phrase "designated here" or an equivalent, required from 2001 onward, was not used. The sheet in BM bears three fragments (shoots with leaves) and a relevant label: "R. Brown, Iter Australiense, 1802–5. / [Presented by direction of J. J. Bennett, 1876.] / No. 5813 / [No ticket of R. Br.'s]".

The lectotype shows some diagnostic characters (stems short, erect, with leaves and open, circular scars; leaf sheaths broadly triangular) and matches both the historical and current concepts of the name (Den Hartog 1970; Kuo & Den Hartog 2001; Beentje 2002; Kuo 2011). We therefore designate it as the lectotype of *Caulinia serrulata*.

Caulinia serrulata R. Br., Prodr. Fl. Nov. Holl.: 339. 1810 ≡ ***Cymodocea serrulata*** (R. Br.) Asch. & Magnus in Sitzungsber. Ges. Naturf. Freunde Berlin 1870: 84. 1871. – **Lectotype (designated here, or perhaps holotype):** Australia, "R. Brown Iter Australiense, 1802–5", *R. Brown 5813* (BM [barcode BM000907122]! [Fig. 3]).

Halodule bermudensis

In the protologue of *Halodule bermudensis*, Den Hartog (1964: 309) cited two gatherings of the species from Bermuda: the first one collected by P. Jespersen in Walsingham Bay in 1922 and belonging to the "Dana Expedition" (with specimens cited in C, GH and U) and the second one collected by F. S. Collins on the shore of Gibbit Island in 1913, with collector number 330 (with a specimen cited in GH). Den Hartog designated the Jespersen gathering as the "Type" but did not specify any one specimen. Under Art. 40.2 of the *Code* (Turland & al. 2018), the type was indicated, but there is no holotype; rather the specimens at C, GH and U are all syntypes.

Jespersen's specimen housed in C (barcode C10009992), bears two fragments. The specimen in U (barcode U0102514 and 2-D code U.1235397) bears six fragments. Finally, the specimen at GH (barcode GH00055019), bears a single fragment. All three sheets bear the original label of the exsiccata "Dana-Expeditionen 1922". Additionally, we have found other duplicates belonging to Jespersen's gathering in G (barcode G00168455), L (barcode L0050375), US (barcode US00324056) and S (herbarium no. S-G-10023); because these are not cited in the protologue, they are isosyntypes.

All the specimens are in a good state, but none of them presents flowers. We designate the specimen preserved in C as the lectotype of the name *Halodule bermudensis*.

Halodule bermudensis Hartog in Blumea 12: 308. 1964. – **Lectotype (designated here):** Bermuda, Walsingham Bay, 26 May 1922, *P. Jespersen s.n.* [Dana-Expeditionen 1922] (C [barcode C10009992]! [Fig. 4]; isolectotypes: G [barcode G00168455]!, GH [barcode GH00055019]!, L [barcode L0050375]!, S [herbarium no. S-G-10023]!,

Fig. 3. Lectotype of *Caulinia serrulata* (≡ *Cymodocea serrulata*) in BM (barcode BM000907122). – Image by courtesy of the Natural History Museum, London, reproduced with permission.

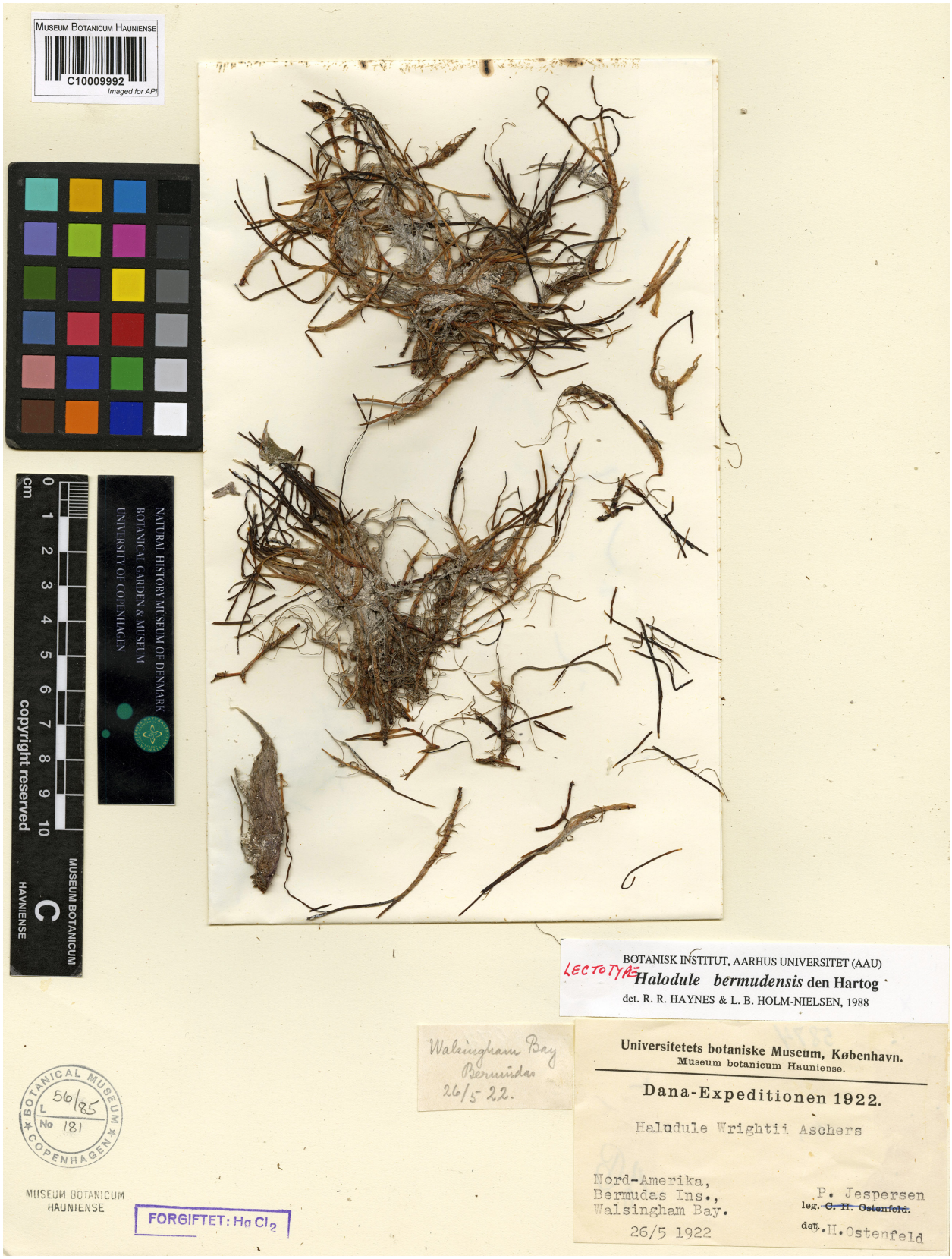

Fig. 4. Lectotype of *Halodule bermudensis* in C (barcode C10009992). – Image by courtesy of the herbarium of the University of Copenhagen, reproduced with permission.

U [barcode U0102514 and 2-D code U.1235397]!, US [barcode US00324056]!).

Halodule pinifolia

Miki (1932: 787) included in the protologue of *Diplanthera pinifolia* (≡ *Halodule pinifolia*) a brief description in Latin followed by a complete description in English, and cited three gatherings: "Riukiu-Archipelago: Prov. Riukiu. Sumuide in Hanijimura (S. Miki! 19 VII 1930); Yakena in Yonagusuku (S. Miki! 22 VII 1930); Formosa: Takao (S. Miki! 16 XII 1925)". The protologue also includes a complete illustration of this species (Miki 1932: 786, f. 9).

All specimens belonging to the three gatherings cited in the protologue are syntypes (Turland & al. 2018: Art. 9.6 and Art. 40 Note 1). In the herbarium KYO there is a specimen (barcode KYO 00072079) collected by Shigeru Miki from Yakena (Okinawa, Japan) on 22 July 1930 that consists of 26 fragments of *H. pinifolia* and an original label. We have been unable to locate any further original material in the herbarium KYO (Hidetoshi Nagamasu, pers. comm.).

Den Hartog (1964: 309) stated "As I had not the opportunity to study these plants I will refrain from choosing a lectotype". The specimen at KYO matches the traditional concept and current usage of the name *Diplanthera pinifolia* (Den Hartog 1964, 1970; Phillips & Meñez 1988) and we accordingly designate it as the lectotype.

Diplanthera pinifolia Miki in Bot. Mag. (Tokyo) 46: 787. 1932 ≡ ***Halodule pinifolia*** (Miki) Hartog in Blumea 12: 309. 1964. – **Lectotype (designated here):** Japan, Loochoo [Ryukyu Islands], insl. Utchina, Katsutimmura, Yakena, 22 Jul 1930, *S. Miki s.n.* (KYO [barcode KYO 00072079]! [Fig. 5]).

Halodule uninervis

The naturalist Pehr Forsskål (1732–1763), one of Linnaeus's most gifted pupils during his University years in Uppsala (1751–1753, 1756–1760), participated in the Danish scientific expedition to Arabia Felix, southern Arabia and Yemen (1761–1763) (Christensen 1918, 1922; Hansen 1964; Wolff 1968; Friis 1983; Hepper & Friis 1994). Unfortunately, the members of the expedition suffered from malaria and Forsskål died at the age of 31 years at Yerim, Yemen (Hepper & Friis 1994). Some years later, the botanical results of the expedition were published in the *Flora aegyptiaco-arabica* (Forsskål 1775; see also Van Gemert 2011).

Forsskål (1775: 157), in his protologue of *Zostera uninervis* Forssk. (≡ *Halodule uninervis*), gave the description "Folia brevissima, spitham. integra, plana, nervo medio obscuro, basi vaginantia. Caulis compressus, articulatus, flavus, geniculis latioribus". This was followed, at the end of the generic treatment (p. 158), by a reference to the locality "Omnes hae *Zosterae* ad littora Mochhae, gramina referentes submarina". Over a hundred years later, Ascherson (in Boissier 1882: 24) transferred the species to the genus *Halodule*, as *H. uninervis* (Forssk.) Asch.

Hepper & Friis (1994) noted the absence of a type of *Zostera uninervis*. Its absence in the Forsskål Herbarium in Copenhagen (C) was confirmed for us by Olof Ryding (pers. comm.). Accordingly, we have tried to locate a good specimen from near the type locality, near Al Mukha (Mocha), Yemen. In WAG there is a modern specimen from Assab, on the Red Sea coast of southern Eritrea, collected by de Wilde and de Wilde-Duyfjes (barcode WAG0086357 and 2-D code WAG.1411282), which, in the apparent absence of any original material, we designate as the neotype of *Zostera uninervis*. This material shows important diagnostic features and matches the traditional concept and current usage of the name (Den Hartog 1970; Beentje 2002; Den Hartog & Kuo 2006).

Zostera uninervis Forssk., Fl. Aegypt.-Arab.: 157. 1775 ≡ ***Halodule uninervis*** (Forssk.) Asch. in Boiss., Fl. Orient. 5: 24. 1882. – **Neotype (designated here):** Eritrea, Assab, Red Sea coast, 16 Jul 1965, *W. J. J. O. de Wilde and B. E. E. de Wilde-Duyfjes 7287* (WAG [barcode WAG0086357 and 2-D code WAG.1411282]! [Fig. 6]).

Syringodium isoetifolium

Ascherson (1868: 3), in the protologue of *Cymodocea isoetifolia* Asch. (≡ *Syringodium isoetifolium*), included a description in German and a reference to a gathering of this species ("Nr. 2433", in error for Nr. 2413) made by Robert Wight (1796–1872), a British military surgeon and botanist in India. Wight's personal herbarium is in K (Stafleu & Cowan 1988: 277–278).

We found in K two herbarium sheets bearing well-preserved original specimens with leaves and flowers, both sheets bearing labels "Herb. Wight. Propr. 2413 / Peninsula Ind. orientalis." and determination labels "*Cymodocea isoëtifolia* Aschs. / P. Ascherson 1[and 2]/9 [18]71." (barcodes K000356717, K000356718 and K000356719, the latter two attached to the same herbarium sheet).

Beentje (2002: 5) cited the nomenclatural type of *Cymodocea isoetifolia* as: "Type: India, ? near Madras, presumably Turicorin [Turicoreen], I., *Wight* 2413 (K!, holo.)" (see also Kuo 2011). However, the name has no holotype because Ascherson merely referred to Wight's gathering, of which clearly more than one specimen is extant in K. A lectotype may therefore be chosen. Beentje's (2002) statement cannot be treated, with correction under Art. 9.10 of the *Code* (Turland & al. 2018), as designation of the lectotype because the requirements of Art. 7.11 were not met: the phrase "designated here" or an equivalent, required from 2001 onward, was not used.

We designate as the lectotype of *Syringodium isoetifolium* the specimen with the barcode K000356719 be-

Fig. 5. Lectotype of *Diplanthera pinifolia* (≡ *Halodule pinifolia*) in KYO (barcode KYO 00072079). – Image by courtesy of Kyoto University, reproduced with permission.

Fig. 6. Neotype of *Zostera uninervis* (≡ *Halodule uninervis*) in WAG (barcode WAG0086357 and 2-D code WAG.1411282). – Image by courtesy of Naturalis, Leiden, reproduced with permission.

cause it is the most complete and informative material. The bottom right corner of the sheet bears a handwritten label "Tuticoreen May & June 1835 / *Cymodocea isoetifolia*, Asch / Herb Wight Propr" (the first line in ink, the second and third lines in pencil by a different hand).

Cymodocea isoetifolia Asch. in Sitzungsber. Ges. Naturf. Freunde Berlin 1867: 3. 1868 ["*isoëtifolia*"] ≡ ***Syringodium isoetifolium*** (Asch.) Dandy in J. Bot. 77: 116. 1939. – **Lectotype (designated here):** India, Tamil Nadu, "Tuticoreen" [Thoothukudi], "May & June" 1835, *R. Wight 2413* (K [barcode K000356719]!; isolectotypes: K [barcodes K000356717, K000356718]!).

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