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Checklist of the marine macroalgae of Vietnam

Abstract: Despite a rich seaweed flora, information about Vietnamese seaweeds is scattered throughout a large number of often regional publications and, hence, difficult to access. This paper presents an up-to-date checklist of the marine macroalgae of Vietnam, compiled by means of an exhaustive bibliographical search and revision of taxon names. A total of 827 species are reported, of which the Rhodophyta show the highest species number (412 species), followed by the Chlorophyta (180 species), Phaeophyceae (147 species) and Cyanobacteria (88 species). This species richness is comparable to that of the Philippines and considerably higher than Taiwan, Thailand or Malaysia, which indicates that Vietnam possibly represents a diversity hotspot for macroalgae. A comparison of the species composition with neighbouring countries yielded surprisingly low similarities. Rather than an indication of a biogeographical pattern, we are of the opinion that the low similarity with neighbouring countries is primarily an artifact resulting from taxonomic inconsistencies. The checklist presented here could serve as a valuable tool to reveal the seaweed diversity in Vietnam and to stimulate intraregional comparative research.

Keywords: Chlorophyta; Cyanobacteria; marine floristics; Phaeophyceae; Rhodophyta; South China Sea; Vietnam; Western Pacific Ocean.

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Introduction

Vietnam has a coastline of approximately 3260 km in length, dotted by numerous islands, islets, atolls and reefs

in approximately 1,000,000 sq km of sea area. The primarily north-south orientation of the coastline spans two climatic zones with a subtropical climate at higher latitudes and a tropical climate in the south. A diverse variety of ecosystems, ranging from extensive lagoons and mangroves to rocky shores and coral reefs, provide suitable habitats for luxuriant seaweed growth. Marine macroalgae play an important role in the everyday lives of the people of Vietnam. Several species are used as food (humans and livestock), for the extraction of agar and carrageenan, in traditional medicine or as biofertilizer (Huynh and Nguyen H. Dinh 1998, Dang et al. 2007). Yet knowledge of the marine seaweed diversity of Vietnam is scattered in the literature and largely inaccessible to phycologists as most data are published in regional papers, book chapters or reports and often in Vietnamese.

The history of seaweed exploration in Vietnam dates back to 1790, when the Portuguese Jesuit missionary and botanist João de Loureiro reported the names of 11 marine macroalgal species from Vietnam in his *Flora Cochinchinensis*. In the 19th century, several researchers such as J. Agardh (1848, 1851–1863) and De Toni (1895, 1900, 1905) included Loureiro's records in their publications, but Vietnamese macroalgal diversity remained largely unexplored. This changed in 1954, when Dawson (1954) published the very first checklist on the Vietnamese marine flora of Nha Trang Bay in the province of Khanh Hoa. Dawson reported a total of 204 species, nearly all of which were new species records for Vietnam (16 Cyanobacteria, 118 Rhodophyta, 22 Phaeophyceae and 48 Chlorophyta). His checklist represents the first report in English on the marine flora of an Asian locality. Since that time, Vietnamese phycologists have developed a clearer picture of Vietnamese seaweed flora (Pham H.H. 1969, 1985, Nguyen H. Dinh 1980, Nguyen H. Dinh et al. 1993, Nguyen H. Dai 1997, 1999, 2007, Nguyen H. Dai et al. 2000, Nguyen H. Dai and Pham H.T. 2001, 2002, 2003, Nguyen H. Dai and Le N.H. 2005, Le N.H. 2000, 2001, 2004, Le N.H. and Nguyen H. Dai 2006, Dam and Nguyen V. Tien 1996, Dam 2003, 2007, Nguyen V. Tien 1996, 2007, Pham H.T. 1996, 1999). The reports of Pham H.H. (1969) and Nguyen H. Dinh et al. (1993) in particular have contributed greatly to knowledge of the macroalgal flora along the north and the south coasts of Vietnam, respectively. Unfortunately, these lists were published in Vietnamese, and the information remained largely inaccessible to the international community.

Funding provided by the California Sea Grant College Program and several expeditions to the offshore islands of the Spratly (Truong Sa) archipelago (Dam and Nguyen V. Tien 1996, Nguyen H. Dai 1999, Pham H.T. 1999, Nguyen H. Dai and Pham H.T. 2001, Nguyen H. Dai et al. 2009) boosted diversity-oriented research on Vietnamese seaweeds in the 1990s. Even though the diversity of some macroalgal genera was explored in depth in a few publications, e.g., *Gracilaria* and *Gracilaropsis* (Nguyen H. Dinh 1992, Ohno et al. 1999, Le N.H. and Nguyen H. Dai 2010), *Eucheuma* and *Kappaphycus* (Nguyen H. Dinh and Huynh 1995), Sargassaceae (Nguyen H. Dai 1997, 2007) and Chlorophyta (Nguyen V. Tien 2007), no new attempt was made to bundle all the data on Vietnamese macroalgal diversity into a comprehensive list accessible to the world scientific community. The aim of this publication is to compile all of this information into a checklist of the marine algae of Vietnam.

Materials and methods

Geographical scope

The Vietnamese coastline (excluding islands) is approximately 3260 km long, stretching from Mong Cai in the north to Ha Tien in the south. The coastline is bordered on the northeast by the Gulf of Tonkin, on the east by the South China Sea and on the southwest by the Gulf of Thailand. The coast is physically very heterogeneous, harbouring extensive lagoons and estuaries (e.g., the Mekong Delta), as well as rocky shores with extensive coral reefs and seagrass beds. In addition to the mainland coastline, the South China Sea contains thousands of islets scattered midway between the Philippines and the Vietnamese mainland coast. Although claimed by several countries, the checklist includes algal records of the Paracel (Chinese: Xisha Islands; Vietnamese: Hoang Sa) as well as the Spratly Islands (Vietnamese: Truong Sa).

The checklist is based on an exhaustive bibliographical search. Both local reports and scientific publications were screened for species records, and the species were recorded in a database. Species are ordered alphabetically grouped as follows: Cyanobacteria, Rhodophyta, Chlorophyta and Phaeophyceae. All taxon names were revised to employ currently accepted species names following Algaebase (Guiry and Guiry 2012). References to the original publications are indicated in square brackets, and taxonomic synonyms and their references are included within round brackets. Data are presented as follows:

Current name Author [Reference # (Reference of synonym, *Synonym* Author)]. The raw data are available from the corresponding author upon request.

The distribution of the marine algal flora was assessed by grouping the 28 coastal provinces into seven coastal regions based on their meteorological and environmental conditions. The adjacent provinces of Thai Binh, Nam Dinh and Ninh Binh are pooled as species records were too scarce within these provinces. No records were available for the following provinces: Tien Giang, Ben Tre, Tra Vinh, Soc Trang, Bac Lieu and Ca Mau.

Vietnamese seaweed flora were compared with those of neighbouring countries using Sørensen's similarity index (Magurran 1988). The floristic data of the neighbouring countries were derived from Algaebase and, for Taiwan, complemented by species records from Orchid Island (Lin 2012).

Results

Cyanobacteria

Aphanocapsa litoralis Hansgirg [9, 40, 44, 52, 58]

Aphanocapsa marina Hansgirg [40, 58]

Blennothrix cantharidosma (Gomont *ex* Gomont) Anagnostidis *et* Komárek [(58 as *Hydrocoleum cantharidosmum* (Montagne) Gormont)]

Blennothrix lyngbyacea (Kützinger *ex* Gomont) Anagnostidis *et* Komárek [(11, 35, 44, 50, 52, 58 as *Hydrocoleum lyngbyaceum* Kützinger)]

Brachytrichia lloydii (P. Crouan *et* H. Crouan) P.C. Silva [(50, 52 as *Brachytrichia balani* Bornet *et* Flahault)]

Brachytrichia maculans Gomont [11, 40, 58, 59]

Brachytrichia quoyi Bornet *et* Flahault [11, 40, 44, 58]

Calothrix aeruginea (Kützinger) Thuret [11]

Calothrix aeruginosa Woronichin [58, 59]

Calothrix confervicola C. Agardh *ex* Bornet *et* Flahault [35, 58, 59]

Calothrix contarenii (Zanardini) Bornet *et* Flahault [11, 50, 58]

Calothrix crustacea Schousboe *ex* Thuret [40, 44, 58]

Calothrix nidulans Setchell *et* N.L. Gardner [50]

Calothrix parietina (Nägeli) Thuret [40, 44, 58]

Calothrix pulvinata (Mertens) C. Agardh [50]

Calothrix scopulorum (Weber *et* Mohr) C. Agardh [58]

Chamaecalyx swirenkoi (Sirsov) Komárek *et* Anagnostidis [(58 as *Dermocarpella clavata* (Geitler) J. Feldmann *et* G. Feldmann)]

Chlorogloea endophytica M. Howe [58]

- Chroococcus minor* (Kützinger) Nägeli [58]
Coleofasciculus chthonoplastes (Gomont) M. Siegesmund, J.R. Johansen et T. Friedl [(40, 50, 58 as *Microcoleus chthonoplastes* (Mertens) Zanardini)]
Cyanothrix primaria N.L. Gardner [52]
Dermocarpa acervata (Setchell et Gardner) Pham H.H. [40, 44, 58]
Dermocarpella hemisphaerica Lemmermann [58, 59]
Dermocarpella prasina (Reinsch) Komárek et Anagnostidis [50, 58]
Entophysalis conferta (Kützinger) F.E. Drouet et W.A. Daily [11, 50, 58, 59]
Entophysalis granulosa Kützinger [50]
Gloeocapsopsis crepidinum (Thuret) Geitler ex Komárek [50]
Gloeotrichia intermedia (Lemmermann) Geitler [50]
Gomphosphaeria aponina Kützinger [52]
Heteroleibleinia infixa (Frémy) Anagnostidis et Komárek [(50, 52 as *Lyngbya infixa* Frémy)]
Hormothamnion enteromorphoides Grunow [11, 35, 58]
Hormothamnion solutum Bornet et Grunow [11, 35, 40, 58, 60]
Hydrococcus rivularis Kützinger [58]
Hyella caespitosa Bornet et Flahault [58]
Leibleinia agardhii (P.L. Crouan et H.M. Crouan) Anagnostidis et Komárek [(58 as *Lyngbya agardhii* (P.L. Crouan et H.M. Crouan) Gomont)]
Leibleinia epiphytica (Hieronymus) Compère [(58 as *Lyngbya epiphytica* Hieronymus)]
Leptolyngbya rivulariarum (Gomont) Anagnostidis et Komárek [(58, 59 as *Lyngbya rivulariarum* Gomont)]
Limnococcus limneticus (Lemmermann) Komárková, Ježberová, O. Komárek et Zapomlová [(58 as *Chroococcus limneticus* Lemmermann)]
Lyngbya aestuarii Liebman ex Gomont [11, 27, 35, 40, 44, 50, 58, 59, 60]
Lyngbya confervoides C. Agardh ex Gomont [11, 35, 40, 50, 58, 59]
Lyngbya infixa Frémy [50, 52]
Lyngbya majuscula Harvey ex Gomont [11, 35, 40, 50, 52, 58, 60, 61]
Lyngbya martensiana f. *tenuivaginata* Gomont ex Forti [50]
Lyngbya martensiana Meneghini ex Gomont [9, 44, 50, 52, 58, 59]
Lyngbya meneghiniana (Kützinger) Falkenberg ex Gomont [58]
Lyngbya semiplena J. Agardh ex Gomont [35, 58]
Lyngbya sordida Gomont [58, 61]
Mastigocoleus testarum Lagerheim ex Bornet et Flahault [58]
Merismopedia glauca (Ehrenberg) Kützinger [50]
Microchaete tapahiensis Setchell [50]
Microchaete vitiensis Askenasy ex Bornet et Flahault [50]
Microcystis reinboldii (Richter) Forti [58]
Nostoc commune Vaucher ex Bornet et Flahault [58]
Oscillatoria bonnemaisonii (P.L. Crouan et H.M. Crouan) P.L. Crouan et H.M. Crouan ex Gomont [35, 58]
Oscillatoria indica P.C. Silva [(9, 52, 58 as *Oscillatoria salina* Biswas)]
Oscillatoria limosa C. Agardh ex Gomont [9, 35, 50, 52, 58, 59, 60]
Oscillatoria margaritifera Kützinger ex Gomont [11, 35, 50, 52, 58]
Oscillatoria miniata (Zanardini) Hauck ex Gomont [35, 40, 58, 60]
Oscillatoria princeps Vaucher ex Gomont [58]
Oscillatoria tenuis C. Agardh ex Gomont [35, 50, 58, 59]
Phormidesmis molle (Gomont) Turicchia, Ventura, Komárková et Komárek [(35, 43, 60 as *Phormidium molle* Gomont)]
Phormidium corallinae (Gomont ex Gomont) Anagnostidis et Komárek [(50, 52 as *Oscillatoria corallinae* (Kützinger) Gomont)]
Phormidium corium (C. Agardh) Kützinger ex Gomont [11, 40, 44, 52, 58]
Phormidium feldmannii Frémy [50]
Phormidium gracile (Rabenhorst ex Gomont) Anagnostidis [(58 as *Lyngbya gracilis* (Meneghini) Rabenhorst)]
Phormidium jadinianum Gomont [50]
Phormidium nigroviride (Thwaites ex Gomont) Anagnostidis et Komárek [(11, 50, 58 as *Oscillatoria nigroviridis* Thwaites ex Gomont)]
Phormidium nigrum (Vaucher ex Gomont) Anagnostidis et Komárek [(35, 44, 52 as *Oscillatoria nigra* Vaucher)]
Phormidium simplicissimum (Gomont) Anagnostidis et Komárek [(40, 52, 58 as *Oscillatoria simplicissima* Gomont)]
Planktolingbya limnetica (Lemmermann) J. Komárková-Legnerová et G. Cronberg [(35, 58 as *Lyngbya limnetica* Lemmermann)]
Planktothrix isothrix (Skuja) Komárek et Komárková [(58 as *Oscillatoria agardhii* Gomont)]
Porphyrosiphon luteus (Gomont) Anagnostidis et Komárek [(35, 40, 44, 50, 58 as *Lyngbya lutea* (C. Agardh) Areschoug)]
Pseudanabaena limnetica (Lemmermann) Komárek [(9, 52, 58 as *Oscillatoria limnetica* Lemmermann)]
Richelia intracellularis J. Schmidt [58]
Rivularia atra f. *hemisphaerica* (Kützinger) Kossinskaja [58]
Rivularia atra var. *confluens* Bornet [58]
Rivularia australis (Harvey) Bornet et Flahault [58]
Scytonema ocellatum Bornet et Flahault [58, 61]

Scytonematopsis pilosa (Harvey ex Bornet et Flahault) I. Umezaki et M. Watanabe [(11, 40, 44, 58, 59 as *Calothrix pilosa* Harvey)]
Spirulina major Kützing ex Gomont [58]
Spirulina subsalsa Oerstedt ex Gomont [58]
Spirulina subtilissima Kützing ex Gomont [58]
Spirulina tenerrima Kützing ex Gomont [58]
Stanieria sphaerica (Setchell et N.L. Gardner) Anagnostidis et Pantazidou [(40, 44, 58 as *Dermocarpa sphaerica* Setchell et N.L. Gardner)]
Symploca hydroides Gomont [11, 44, 58, 60]
Symploca hydroides var. *fasciculata* (Kützing) Gomont [50]
Trichocoleus tenerrimus (Gomont) Anagnostidis [(44, 50, 58 as *Microcoleus tenerrimus* Gomont)]
Trypanema endolithicum Ercegovci [52]

Rhodophyta

Acanthophora muscoides (Linnaeus) Bory [8, 9, 27, 50, 69]
Acanthophora spicifera (Vahl) Børgesen [2, 8, 11, 20, 27, 35, 40, 44, 52, 58, 59, 60, 61, 69, 76, (20, 50 as *Acanthophora orientalis* J. Agardh)]
Acrochaetium barbadense (Vickers) Børgesen [2, (11, 58 as *Acrochaetium occidentale* Børgesen)]
Acrochaetium catenulatum M. Howe [2, 58]
Acrochaetium chaetomorphae (Tak. Tanaka et Pham H.H.) Heerebout [(58, 67 as *Erythrocladia chaetomorphae* Tak. Tanaka et Pham H.H.)]
Acrochaetium colaconemoides Pham H.H. [58]
Acrochaetium erectum Børgesen [59]
Acrochaetium gracile var. *vietnamense* Pham H.H. [58, 59]
Acrochaetium liagorae Børgesen [2]
Acrochaetium microscopicum (Nägeli ex Kützing) Nägeli [(58 as *Acrochaetium crassipes* (Børgesen) Børgesen)]
Acrochaetium phuquocensis Pham H.H. [58, 59]
Acrochaetium polysporum M. Howe [(50 as *Rhodochorton polysporum* (M. Howe) Drew 1928)]
Acrochaetium pseudoerectum Pham H.H. [35, 58]
Acrochaetium pulchellum Børgesen [58]
Acrochaetium robustum Børgesen [11, 58, (40, 44 as *Audouinella robusta* (Børgesen) Garbary)]
Acrochaetium sanctaemariae (Darbishire) G. Hamel [11]
Acrochaetium sancti-thomae Børgesen [50, 58]
Acrochaetium subseriatum Børgesen [11, 35, 40, 44, 58]
Acrochaetium virgatulum (Harvey) Batters [58]
Acrochaetium yamadae (Garbary) Y. Lee et I.K. Lee [(2 as *Liagorophila endophytica* Yamada)]
Acrocystis nana Zanardini [8, 11, 40, 58, 61]
Acrosorium polyneurum Okamura [50]

Actinotrichia fragilis (Forsskål) Børgesen [2, 8, 10, 11, 40, 44, 58, 59, 60, 61, 76]
Aglaothamnion cordatum (Børgesen) Feldmann-Mazoyer [(40, 58 as *Aglaothamnion neglectum* Feldmann-Mazoyer)]
Ahnfeltia plicata (Hudson) E.M. Fries [(58 as *Gymnogongrus plicatus* (Hudson) Kützing)]
Ahnfeltiopsis chnoosporoides (Tak. Tanaka et Pham H.H.) Masuda [(58, 67 as *Gymnogongrus chnoosporoides* Tak. Tanaka et Pham H.H.)]
Ahnfeltiopsis densa (J. Agardh) P.C. Silva et DeCew [(50 as *Gymnogongrus densus* J. Agardh)]
Ahnfeltiopsis divaricata (Holmes) Masuda [(27, 50 as *Gymnogongrus divaricatus* Holmes)]
Ahnfeltiopsis flabelliformis (Harvey) Masuda [76, (11, 27, 50, 58 as *Gymnogongrus japonicus* Suringar), (11, 50, 51, 58 as *Gymnogongrus flabelliformis* Harvey)]
Ahnfeltiopsis pygmaea (J. Agardh) P.C. Silva et DeCew [76, (9, 11, 50, 58 as *Gymnogongrus pygmaeus* J. Agardh)]
Ahnfeltiopsis quinhonensis (Pham H.H.) Masuda [(58, 76 as *Gymnogongrus quinhonensis* Pham H.H.)]
Ahnfeltiopsis serenei (E.Y. Dawson) Masuda [(11, 50, 58 as *Gymnogongrus serenei* E.Y. Dawson)]
Akalaphycus setchelliae (Yamada) Huisman, I.A. Abbott et A.R. Sherwood [(38, 76 as *Stenopeltis setchelliae* (Yamada) Itono et Yoshizaki)]
Amansia rhodantha (Harvey) J. Agardh [76]
Amphiroa anceps (Lamarck) Decaisne [76, (8, 40, 44, 58, 59, 60, 61 as *Amphiroa dilatata* J.V. Lamouroux)]
Amphiroa beauvoisii J.V. Lamouroux [2, 43, (27, 50 as *Amphiroa zonata* Yendo)]
Amphiroa echigoensis Yendo [52]
Amphiroa foliacea J.V. Lamouroux [11, 40, 44, 58]
Amphiroa fragilissima (Linnaeus) J.V. Lamouroux [8, 11, 40, 44, 58, 59, 60, 69, 76]
Amphiroa valonioides Yendo [2]
Anotrichium barbatum (C. Agardh) Nägeli [(50, 52 as *Griffithsia barbata* C. Agardh)]
Anotrichium tenue (C. Agardh) Nägeli [2]
Anotrichium tenue var. *thyrsigerum* (Thwaites ex Harvey) H.S. Kim et I.K. Lee [(11, 58, 59 as *Griffithsia tenuis* C. Agardh)]
Antithamnion erucacladellum R.E. Norris [2]
Antithamnionella basispora (Tokida et Inaba) Cormaci et G. Furnari [(40, 58 as *Antithamnion basisporum* Tokida et Inaba)]
Antithamnionella graeffei (Grunow) Athanasiadis [2]
Antithamnionella spirographidis (Schiffner) E.M. Wollaston [(35, 58 as *Antithamnion spirographidis* Schiffner)]
Antrocentrum nigrescens (Harvey) Kraft et Min-Thein [(50, 58 as *Solieria mollis* (Harvey) Kylin)]

- Asparagopsis taxiformis* (Delile) Trevisan [2, 8, 9, 10, 20, 27, 40, 44, 50, 51, 54, 58, 60, 61, 76, (2, 8, 11, 51, 58, 60 as *Falkenbergia hillebrandii* (Bornet) Falkenberg)]
- Asteromenia anastomosans* (Weber Bosse) G.W. Saunders, C.E. Lane, C.W. Schneider et Kraft [(8, 40, 44, 58 as *Rhodymenia anastomosans* Weber Bosse)]
- Asteromenia peltata* (W.R. Taylor) Huisman et A.J.K. Millar [42]
- Bangia fuscopurpurea* (Dillwyn) Lyngbye [8, 10, 58]
- Bangia tanakai* Pham H.H. [58]
- Bangiopsis dumontioides* (P.L. Crouan et H.M. Crouan) V. Krishnamurthy [(11, 50, 52, 58 as *Bangiopsis humphreyi* (Collins) G. Hamel)]
- Betaphycus gelatinus* (Esper) Doty ex P.C. Silva [44, 76, (33, 47 as *Eucheuma gelatinae* (Esper) J. Agardh)]
- Bostrychia radicans* (Montagne) Montagne [11, 58]
- Bostrychia tenella* (J.V. Lamouroux) J. Agardh [8, 40, 44, 50, 58, 59, 60, (50, 69, 76 as *Eucheuma gelatinae* (Esper) J. Agardh)]
- Botryocladia leptopoda* (J. Agardh) Kylin [58]
- Botryocladia skottsbergii* (Børgesen) Levring [8]
- Branchioglossum prostratum* C.W. Schneider [2]
- Bryocladia cervicornis* (Kützinger) F. Schmitz [40, 44, 58]
- Callithamnion ramosissimum* N.L. Gardner [27, 50, 52]
- Caloglossa beccarii* (Zanardini) De Toni [15]
- Caloglossa bengalensis* (G. Martens) R.J. King et Puttock [15, (11, 50, 58 as *Caloglossa adnata* (Zanardini) De Toni)]
- Caloglossa continua* (Okamura) R.J. King et Puttock [15]
- Caloglossa leprieurii* (Montagne) G. Martens [50, 58]
- Caloglossa ogasawaraensis* Okamura [50, 58]
- Caloglossa saigonensis* Tak. Tanaka et Pham H.H. [15, 58, 67]
- Caloglossa stipitata* E. Post [58]
- Carpopeltis maillardii* (Montagne et Millardet) Chiang [21, 76]
- Catenella impudica* (Montagne) J. Agardh [58]
- Catenella nipae* Zanardini [11, 50, 52, 58, 69]
- Catenella subumbellata* C.K. Tseng [50]
- entroceras clavulatum* (C. Agardh) Montagne [2, 8, 9, 11, 40, 44, 35, 50, 58, 59, 60, 69, 76]
- Centroceras gasparrinii* (Meneghini) Kützinger [(8, 58, 60 as *Centroceras inerme* Kützinger)]
- Ceramium aduncum* Nakamura [2]
- Ceramium cimbricum* H.E. Petersen [8, (8, 10, 35, 58, 59, 60 as *Ceramium fastigiatum* Harvey)]
- Ceramium cingulatum* Weber Bosse [40, 44, 50, 58]
- Ceramium clarionense* Setchell et N.L. Gardner [11, 40, 44, 52, 58]
- Ceramium codii* (H. Richards) Mazoyer [50]
- Ceramium deslongchampsii* Chauvin ex Duby [(59 as *Ceramium diaphanum* var. *strictum* (Kützinger) Feldmann-Mazoyer)]
- Ceramium diaphanum* (Lightfoot) Roth [(50 as *Ceramium tenuissimum* (Roth) Areschoug), (40, 44, 58, 59, 60, 61 as *Ceramium gracillimum* (Kützinger) Zanardini)]
- Ceramium gracillimum* var. *byssoideum* Mazoyer [11]
- Ceramium macilentum* J. Agardh [2 (11, 35, 40, 44, 50, 52, 58, 59 as *Ceramium mazatlanense* E.Y. Dawson)]
- Ceramium maryae* Weber Bosse [11, 50, 58]
- Ceramium procumbens* Setchell et N.L. Gardner [11, 35, 50, 58]
- Ceramium tenerrimum* (G. Martens) Okamura [50]
- Ceramium vagans* P.C. Silva [2]
- Ceramium vietnamense* Pham H.H. [35, 58]
- Ceramium zcae* Setchell et N.L. Gardner [50]
- Ceratodictyon intricatum* (C. Agardh) R.E. Norris [(8, 11, 58, 69, 76 as *Gelidiopsis intricata* (C. Agardh) Vickers)]
- Ceratodictyon repens* (Kützinger) R.E. Norris [(40, 50, 58 as *Gelidiopsis repens* (Kützinger) Weber Bosse)]
- Ceratodictyon scoparium* (Montagne et Millardet) R.E. Norris [(58, 59, 76 as *Gelidiopsis scoparia* (Montagne et Millardet) De Toni)]
- Ceratodictyon spongiosum* Zanardini [2, 8, 9, 10, 11, 27, 40, 44, 50, 52, 58, 59, 60, 61, 76]
- Ceratodictyon variabile* (J. Agardh) R.E. Norris [(40, 50, 58, 61 as *Gelidiopsis gracilis* (Kützinger) Feldmann), (8, 40, 44, 58 as *Gelidiopsis variabilis* (Greville ex J. Agardh) F. Schmitz)]
- Champia parvula* (C. Agardh) Harvey [2, 8, 10, 11, 40, 44, 58, 59, 61, 76]
- Champia salicornioides* Harvey [40, 44, 58]
- Champia vieillardii* Kützinger [2, 11, 40, 58]
- Chondracanthus acicularis* (Roth) Fredericq [(50, 52 as *Gigartina acicularis* (Roth) J.V. Lamouroux)]
- Chondracanthus intermedius* (Suringar) Hommersand [76, (11, 27, 50, 58 as *Gigartina intermedia* Suringar)]
- Chondracanthus tenellus* (Harvey) Hommersand [(50 as *Gigartina tenella* Harvey)]
- Chondria armata* (Kützinger) Okamura [40, 43, 44, 76]
- Chondria baileyana* (Montagne) Harvey [11, 58]
- Chondria dangeardii* E.Y. Dawson [2, 11, 58]
- Chondria repens* Børgesen [8, 10, 11, 58]
- Chondria ryukyuensis* Yamada [76]
- Chondria simpliciuscula* Weber Bosse [2]
- Chondrophycus articulatus* (C.K. Tseng) K.W. Nam [(8, 9, 11, 50, 58, 60, 69, 81 as *Laurencia articulata* C.K. Tseng)]
- Chondrophycus cartilagineus* (Yamada) Garbary et J.T. Harper [44, (8, 10, 20, 40, 61, 81 as *Laurencia cartilaginea* Yamada)]
- Chondrophycus verticillatus* (J. Zhang et B.M. Xia) K.W. Nam [(81 as *Laurencia verticillata* J. Zhang et B.M. Xia)]
- Chondrophycus undulatus* (Yamada) Garbary et Harper [(9, 50 as *Laurencia undulata* Yamada)]

- Chroodactylon ornatum* (C. Agardh) Basson [(2, 9, 11, 27, 40, 50, 58, 59 as *Asterocytis ornata* (C. Agardh) G. Hamel), (52 as *Asterocytis ramosa* (Thwaites) Gobi ex F. Schmitz)]
- Claudea batanensis* Tak. Tanaka [8, 10, 43, 60, 61]
- Colaonema gracile* (Børgesen) Ateweberhan et Prud'homme [(11, 35, 40, 44, 58 as *Acrochaetium gracile* Børgesen)]
- Colaonema hallandicum* (Kylin) Afonso-Carillo, Sanson, Sangil et Diaz-Villa [(35, 43 as *Acrochaetium sargassi* Børgesen)]
- Colaonema hypneae* (Børgesen) A.A. Santos et C.W. NMoura [(2, 40 as *Acrochaetium hypneae* (Børgesen) Børgesen); (44, 58 as *Audouinella seriata* (Børgesen) Garbary)]
- Colaonema thuretii* (Bornet) P.W. Gabrielson [(2, 50, 52 as *Acrochaetium thuretii* (Bornet) F.S. Collins et Hervey)]
- Compsopogon caeruleus* (Balbis ex C. Agardh) Montagne [(50 as *Compsopogon oishii* Okamura)]
- Corallina officinalis* Linnaeus [9, 27, 50, 52]
- Corallina pilulifera* Postels et Ruprecht [50]
- Corallophila bella* (Setchell et N.L. Gardner) R.E. Norris [2]
- Corallophila howei* (Weber Bosse) R.E. Norris [(50, 58, 67 as *Ceramium howei* Weber Bosse)]
- Corallophila huysmansii* (Weber Bosse) R.E. Norris [2, (11, 58 as *Ceramium huysmansii* Weber Bosse)]
- Corallophila kleiwegii* Weber Bosse [(2 as *Corallophila apiculata* (Yamada) R.E. Norris)]
- Cottoniella filamentosa* (M. Howe) Børgesen [50]
- Crouania attenuata* (C. Agardh) J. Agardh [(2 as *Crouania minutissima* Yamada)]
- Cryptonemia undulata* Sonder [50]
- Dasya anastomosans* (Weber Bosse) M.J. Wynne [(8, 11, 58, 60 as *Dasyopsis pilosa* Weber Bosse)]
- Dasya baillouviana* (S.G. Gmelin) Montagne [(11, 58 as *Dasya pedicellata* (C. Agardh) C. Agardh)]
- Dasya crouaniana* J. Agardh [8, 22]
- Dasya scoparia* Harvey [8]
- Dermonema pulvinatum* (Grunow ex Holmes) Fan [2, 50]
- Dermonema virens* (J. Agardh) Pedroche et Àvila Ortíz [(11, 58, 76 as *Dermonema frappieri* (Montagne et Millardet) Børgesen), (50 as *Dermonema dichotomum* Harvey ex Heydrich)]
- Dermonema zinovae* Nguyen H. Dinh [50]
- Dichotomaria marginata* (J. Ellis et Solander) Lamarck [(40 as *Galaxaura marginata* (J. Ellis et Solander) J.V. Lamouroux), (58 as *Galaxaura clavigera* Kjellman)]
- Dichotomaria obtusata* (J. Ellis et Solander) Lamarck [(8, 9, 40, 44, 51, 58 as *Galaxaura obtusata* (J. Ellis et Solander) J.V. Lamouroux), (10, 27 as *Galaxaura robusta* Kjellman)]
- Dichotomaria papillata* (Kjellman) Kurihara et Masuda [(8 as *Galaxaura papillata* Kjellman)]
- Dictyurus occidentalis* J. Agardh [22]
- Diplothamnion jolyi* C. Hoek [2]
- Erythrocladia irregularis* Rosenvinge [58]
- Erythrotrichia carnea* (Dillwyn) J. Agardh [2, 40, 44, 58]
- Erythrotrichia parietalis* Tanaka [11, 52, 58]
- Erythrotrichia parietalis* var. *majuscula* Tak. Tanaka et Pham H.H. [52, 58, 59, 67]
- Eucheuma arnoldii* Weber Bosse [8, 39, 47, 60, 61]
- Eucheuma edule* (Kützinger) Weber Bosse [7]
- Exophyllum wentii* Weber Bosse [58]
- Galaxaura divaricata* (Linnaeus) Huisman et R.A. Townsend [(8, 10, 11, 58 as *Galaxaura fasciculata* Kjellman)]
- Galaxaura filamentosa* R.C.Y. Chou [8, 11, 44, 51, 58, 60]
- Galaxaura rugosa* (J. Ellis et Solander) J.V. Lamouroux [8, 10, 27, 58, 76, (8, 10, 41 as *Galaxaura pacifica* Tanaka), (8, 27, 58 as *Galaxaura rudis* Kjellman), (58 as *Galaxaura glabriuscula* Kjellman), (8 as *Galaxaura subverticillata*), (76 as *Galaxaura lapidescens* (J. Ellis et Solander) J.V. Lamouroux)]
- Ganonema farinosum* (J.V. Lamouroux) K.C. Fan et Y.C. Wang [2, 40, 44, 76, (8, 11, 58, 60, 61 as *Liagora farinosa* J.V. Lamouroux)]
- Ganonema pinnatum* (Harvey) Huisman [(58 as *Liagora pinnata* Harvey)]
- Ganonema samaense* (C.K. Tseng) Huisman [(2 as *Liagora samaensis* C.K. Tseng)]
- Gayliella fimbriata* (Setchell et N.L. Gardner) T.O. Cho et S.M. Boo [(11, 58, 59 as *Ceramium fimbriatum* Setchell et N.L. Gardner)]
- Gayliella flaccida* (Harvey ex Kützinger) T.O. Cho et L.J. McIvor [(2 as *Ceramium flaccidum* (Harvey ex Kützinger) Ardisson)]
- Gayliella taylorii* (E.Y. Dawson) T.O. Cho et S.M. Boo [(11, 50, 58, 59 as *Ceramium taylorii* E.Y. Dawson)]
- Gelidiella acerosa* (Forsskal) Feldmann et G. Hamel [2, 8, 9, 11, 20, 27, 40, 44, 50, 58, 59, 60, 61, 69, 76]
- Gelidiella lubrica* (Kützinger) Feldmann et G. Hamel [8, 40, 44, 58, 60]
- Gelidiella myrioclada* (Børgesen) Feldmann et G. Hamel [8, 10, 11, 44, 50, 52, 58]
- Gelidium corneum* (Hudson) J.V. Lamouroux [9, 50]
- Gelidium crinale* (Hare ex Turner) Gaillon [9, 11, 27, 40, 44, 50, 52, 58]
- Gelidium crinale* var. *perpusillum* Piccone et Grunow [11]
- Gelidium divaricatum* G. Martens [9, 11, 40, 44, 50, 52, 58]
- Gelidium fasciculatum* G. Hamel [50]
- Gelidium pulchellum* (Turner) Kützinger [11, 44, 50, 52, 58]
- Gelidium pusillum* (Stackhouse) Le Jolis [8, 9, 11, 27, 40, 44, 50, 58, 59, 69]
- Gelidium pusillum* var. *minusculum* Weber Bosse [50]
- Gelidium samoëense* Reinbold [50]

- Gelidium spathulatum* (Kützinger) Bornet [40, 44, 58]
Gelidium vietnamense Pham H.H. [58]
Gibsmithia hawaiiensis Doty [22]
Gloiopeltis furcata (Postels et Ruprecht) J. Agardh [50, (58 as *Gloiopeltis minuta* Kylin)]
Gloiopeltis tenax (Turner) Decaisne [50]
Gracilaria arcuata Zanardini [8, 20, 21, 24, 27, 40, 44, 46, 50, 57, 58, 59, 74, 76, 77]
Gracilaria articulata C.F. Chang et B.M. Xia [46, 74]
Gracilaria bangmeiana J. Zhang et I.A. Abbott [(21, 24, 44 as *Hydropuntia ramulosa* (C.F. Chang et B.M. Xia) M.J. Wynne), (50 as *Polycavernosa ramulosa* C.F. Chang et B.M. Xia)]
Gracilaria blodgettii Harvey [21, 24, 46, 50]
Gracilaria bursa-pastoris (S.G. Gmelin) P.C. Silva [46, 50, 52]
Gracilaria canaliculata Sonder [(8, 11, 20, 27, 46, 50, 58, 61, 69 as *Gracilaria crassa* Harvey ex J. Agardh)]
Gracilaria changii (B.M. Xia et I.A. Abbott) I.A. Abbott, J. Zhang et B.M. Xia [57, 69]
Gracilaria chondracantha (Kützinger) Millar [(40, 46, 74 as *Gracilaria bangmeiana* J. Zhang et I.A. Abbott)]
Gracilaria confervoides f. *ecorticata* Valerie [46, 58]
Gracilaria coronopifolia J. Agardh [8, 58, 61]
Gracilaria cuneifolia (Okamura) I.K. Lee et Kurogi [21, 23, 24]
Gracilaria firma C.F. Chang et B.M. Xia [8, 21, 24, 46, 57, 69, 74]
Gracilaria foliifera (Forsskål) Børgesen [50]
Gracilaria gigas Harvey [46, 50, 74]
Gracilaria hainanensis C.F. Chang et B.M. Xia [46, 50, 74]
Gracilaria heteroclada J. Zhang et B.M. Xia [46, 52, 57]
Gracilaria longirostris J. Zhang et Y.C. Wang [21, 23, 24]
Gracilaria mammillaris (Montagne) M.A. Howe [21, 24, 59]
Gracilaria punctata (Okamura) Yamada [27, 46, 50, 74]
Gracilaria rubra C.F. Chang et B.M. Xia [21, 23, 24]
Gracilaria salicornia (C. Agardh) E.Y. Dawson [2, 8, 21, 24, 27, 40, 44, 46, 50, 57, 69, 74, 76, (46, 50 as *Gracilaria cacalia* (J. Agardh) E.Y. Dawson)]
Gracilaria spinulosa (Okamura) C.F. Chang et B.M. Xia [21, 24, 46]
Gracilaria stellata I.A. Abbott, J. Zhang et B.M. Xia [23]
Gracilaria tenuistipitata C.F. Chang et B.M. Xia [21, 24, 27, 46, 69, 74, 76]
Gracilaria tenuistipitata var. *liui* J. Zhang et B.M. Xia [2, 21, 57, 76]
Gracilaria textorii (Suringar) De Toni [21, 24, 46, 74]
Gracilaria vermiculophylla (Ohmi) Papenfuss [74, (8, 27, 46 as *Gracilaria asiatica* J. Zhang et B.M. Xia)]
Gracilaria vieillardii P.C. Silva [74]
Gracilaria yamamotoi J. Zhang et B.M. Xia [21, 23, 24]
Gracilariopsis bailinae J. Zhang et B.M. Xia [21, 24, 74, 76]
Gracilariopsis chorda (Holmes) Ohmi [(50 as *Gracilaria chorda* Holmes)]
Gracilariopsis longissima (S.G. Gmelin) M. Steentoft, L.M. Irvine et W.F. Farnham [(11, 20, 46, 51, 58, 59 as *Gracilaria verrucosa* (Hudson) Papenfuss)]
Gracilariopsis nganii Pham H.H. [58]
Gracilariopsis nhatrangensis Le N.H. et S.-M. Lin [21, 26]
Gracilariopsis phanthietensis Pham H.H. [58]
Gracilariopsis rhodotricha E.Y. Dawson [11, 20, 46, 58]
Grateloupia asiatica Kawaguchi et H.W. Wang [76]
Grateloupia dichotoma J. Agardh [9, 50]
Grateloupia divaricata Okamura [9, 50, 58, 59]
Grateloupia filicina (J.V. Lamouroux) C. Agardh [11, 20, 27, 50, 58, 69]
Grateloupia lithophila Børgesen [9, 27, 50]
Grateloupia livida (Harvey) Yamada [50]
Grateloupia phuquocensis Tanaka et Pham H.H. [58, 59, 67]
Grateloupia porracea Kützinger [(9, 50 as *Grateloupia filicina* var. *porracea* (Kützinger) M. Howe)]
Grateloupia prolongata J. Agardh [(50 as *Grateloupia filicina* f. *prolongata* (J. Agardh) C.K. Tseng)]
Grateloupia ramosissima Okamura [11, 50, 58, 76]
Griffithsia heteromorpha Kützinger [2]
Griffithsia japonica Okamura [58]
Griffithsia metcalfii C.K. Tseng [11, 58]
Gymnogongrus griffithsiae (Turner) Martius [9, 27, 50, 58]
Gymnogongrus johnstonii (Setchell et N.L. Gardner) E.Y. Dawson [50]
Gymnothamnion elegans (Schousboe ex C. Agardh) J. Agardh [58]
Halichrysis micans (Hauptfleisch) P. Huvé et H. Huvé [(58 as *Weberella micans* Hauptfleisch)]
Haloplegma duperreyi Montagne [8]
Halymenia dilatata Zanardini [2, 8, 11, 17, 40, 44, 58, 60, 69, 76]
Halymenia floresii subsp. *harveyana* (J. Agardh) Womersley et Lewis [(21 as *Halymenia harveyana* J. Agardh)]
Halymenia floresii var. *ulvoidea* Codomier [(58 as *Halymenia ulvoidea* Zanardini)]
Halymenia maculata J. Agardh [1, 2, 8, 10, 11, 18, 40, 58]
Helminthocladia australis Harvey [38, 76]
Herposiphonia caespitosa C.K. Tseng [9, 50]
Herposiphonia crassa Hollenberg [2]
Herposiphonia delicatula Hollenberg [2]
Herposiphonia insidiosa (Greville ex J. Agardh) Falkenberg [11, 58, 59]
Herposiphonia parca Setchell [2]
Herposiphonia secunda f. *tenella* (C. Agardh) M.J. Wynne [(8, 10, 11, 35, 40, 44, 58, 61 as *Herposiphonia tenella* (C. Agardh) Ambrogn)]
Herposiphonia vietnamica Pham H.H. [35, 58, 59]
Hildenbrandia rubra (Sommerfelt) Meneghini [(11, 58, 59 as *Hildenbrandia prototypus* Nardo)]

- Hydrolithon farinosum* (J.V. Lamouroux) D. Penrose et Y.M. Chamberlain [40, (11 as *Fosliella farinosa* (J.V. Lamouroux) M. Howe), (35, 58, 59 as *Melobesia farinosa* J.V. Lamouroux)]
- Hydrolithon reinboldii* (Weber Bosse et Foslie) Foslie [11, 40, 58]
- Hydrolithon samoënsense* (Foslie) Keats et Y.M. Chamberlain [76, (11, 58 as *Lithophyllum samoënsense* Foslie)]
- Hydropuntia changii* (B.M. Xia et I.A. Abbott) M.J. Wynne [21, 24]
- Hydropuntia divergens* (B.M. Xia et I.A. Abbott) M.J. Wynne [21, 24]
- Hydropuntia edulis* (S.G. Gmelin) Gurgel et Fredericq [21, 24, 44, 76 (2, 8, 9, 27, 40, 46, 50, 57, 69, 74 as *Gracilaria edulis* (S.G. Gmelin) P.C. Silva)]
- Hydropuntia eucheumatoides* (Harvey) Gurgel et Fredericq [21, 24, 44, (2, 8, 9, 11, 40, 46, 57, 58, 68, 74, 76, 77 as *Gracilaria eucheumatoides* Harvey)]
- Hydropuntia fisheri* (B.M. Xia et I.A. Abbott) M.J. Wynne [21, 24, (57, 69 as *Gracilaria fisheri* (B.M. Xia et I.A. Abbott) I.A. Abbott, J. Zhang et B.M. Xia)]
- Hypnea alopecuroides* Kützinger [59]
- Hypnea boergesenii* Tak. Tanaka [9, 11, 20, 27, 40, 44, 50, 51, 58, 69]
- Hypnea cenomyce* J. Agardh [58]
- Hypnea charoides* J.V. Lamouroux [8, 27, 40, 44, 50]
- Hypnea charoides* var. *indica* Weber Bosse [50]
- Hypnea cornuta* (Kützinger) J. Agardh [8, 11, 27, 40, 58]
- Hypnea esperi* Bory [2, 8, 11, 27, 40, 44, 50, 52, 58, 59, 60]
- Hypnea flagelliformis* Greville ex J. Agardh [9, 27, 50]
- Hypnea hamulosa* (Esper) J.V. Lamouroux [9, 50, 52]
- Hypnea japonica* Tak. Tanaka [9, 27, 50]
- Hypnea nidulans* Setchell [8, 11, 58, 59, 60, 69]
- Hypnea pannosa* J. Agardh [2, 8, 27, 40, 44, 50, 58, 59, 67, 76]
- Hypnea spinella* (C. Agardh) Kützinger [2, 8, 58, 61, (8, 9, 11, 50, 58, 67, 69, as *Hypnea cervicornis* J. Agardh)]
- Hypnea valentiae* (Turner) Montagne [9, 11, 58, 59, 60, 69, 76]
- Hypoglossum attenuatum* N.L. Gardner [11, 58]
- Hypoglossum barbatum* Okamura [76]
- Izziella orientalis* (J. Agardh) Huisman et Schils [(11, 40, 44, 58 as *Liagora orientalis* J. Agardh)]
- Jania acutiloba* (Decaisne) J.H. Kim, Guiry et H.G. Choi [(59, 76 as *Cheilosporum acutilobum* (Decaisne) Piccone)]
- Jania adhaerens* J.V. Lamouroux [2, 8, 10, 35, 40, 44, 58, 76]
- Jania capillacea* Harvey [9, 11, 35, 40, 58, 59]
- Jania cultrata* (Harvey) J.H. Kim, Guiry et H.G. Choi [(59 as *Cheilosporum cultratum* (Harvey) Areschoug)]
- Jania decussatodichotoma* (Yendo) Yendo [11, 52, 58, 61]
- Jania longiarthra* E.Y. Dawson [9, 11, 40, 44, 58]
- Jania micrarthrodia* J.V. Lamouroux [2]
- Jania pumila* J.V. Lamouroux [2, 27, 40, 58]
- Jania rubens* (Linnaeus) J.V. Lamouroux [8, 9, 35, 40, 44, 58, 60]
- Jania spectabile* (Harvey ex Grunow) J.H. Kim, Guiry et H.G. Choi [(2, 8, 40, 44, 58, 59, 76 as *Cheilosporum spectabile* Harvey ex Grunow)]
- Jania squamata* (Linnaeus) J.H. Kim, Guiry et H.G. Choi [(50, 52 as *Corallina squamata* Linnaeus)]
- Jania unguolata* f. *brevior* (Yendo) Yendo [8, 11, 40, 44, 58, 59, 60]
- Kappaphycus alvarezii* (Doty) Doty ex P.C. Silva [76]
- Kappaphycus cottonii* (Weber Bosse) Doty ex P.C. Silva [8, 40, 47, 60, 61, 62, (7 as *Eucheuma okamurae* Yamada)]
- Kappaphycus inermis* (F. Schmitz) Doty ex Nguyen H. Dinh et Huynh Q.N. [8, 47]
- Kappaphycus striatus* (F. Schmitz) Doty ex P.C. Silva [8, 39, 61]
- Laurencia brachyclados* Pilger [9, 11, 27, 50, 58, 69]
- Laurencia caduciramulosa* Masuda et Kawaguchi [30]
- Laurencia calliclada* Masuda [29]
- Laurencia corymbosa* J. Agardh [8, 11, 20, 40, 44, 58]
- Laurencia decumbens* Kützinger [81, (11 as *Laurencia pygmaea* Weber Bosse)]
- Laurencia fasciculata* C.F. Zhang et B.M. Xia [80]
- Laurencia filiformis* (C. Agardh) Montagne [8]
- Laurencia flexilis* Setchell [21]
- Laurencia galtsoffii* M. Howe [81]
- Laurencia heteroclada* Harvey [58, 60]
- Laurencia intricata* J.V. Lamouroux [8, 27]
- Laurencia lageniformis* Masuda et Suzuki [31]
- Laurencia majuscula* (Harvey) A.H.S. Lucas [2, 81]
- Laurencia mariannensis* Yamada [81]
- Laurencia microcladia* Kützinger [8, 27, 58]
- Laurencia nangii* Masuda [76]
- Laurencia nidifica* J. Agardh [40, 58, 60, 61]
- Laurencia obtusa* (Hudson) J.V. Lamouroux [9, 10, 27, 35, 44, 58, 60, 61]
- Laurencia obtusa* var. *densa* Yamada [11]
- Laurencia pinnata* Yamada [81]
- Laurencia silvae* J. Zhang et B.M. Xia [81]
- Laurencia similis* K.W. Nam et Saito [76]
- Laurencia tenera* C.K. Tseng [11, 58]
- Laurencia tropica* Yamada [8, 10, 27, 51, 58, 76]
- Leveillea jungermannioides* (Hering et G. Martens) Harvey [2, 8, 10, 11, 27, 50, 58, 59, 60, 76]
- Liagora ceranoides* J.V. Lamouroux [2, 8, 10, 11, 58, 60, 61]
- Liagora filiformis* K.C. Fan et W.H. Li [8, 10, 38]
- Liagora hawaiiiana* Butters [8]
- Liagora japonica* Yamada [8, 10]
- Lithophyllum okamurae* Foslie [8, 9, 10, 11, 40, 44, 58]
- Lithophyllum pustulatum* (J.V. Lamouroux) Foslie [58]

- Lithophyllum pygmaeum* (Heydrich) Heydrich [40, 44, (58 as *Lithophyllum moluccense* (Foslie) Foslie)]
- Lithothamnion erubescens* f. *subflabellatum* Foslie [11]
- Lomentaria hakodatensis* Yendo [2]
- Lophosiphonia obscura* (C. Agardh) Falkenberg [11]
- Lophosiphonia prostrata* (Harvey) Falkenberg [2]
- Lophosiphonia reptabunda* (Suhr) Kylin [58]
- Martensia flabelliformis* Harvey ex J. Agardh [(22 as *Neomartensia flabelliformis* (Harvey ex J. Agardh) Yoshida et Mikami)]
- Martensia fragilis* Harvey [8]
- Mastophora pacifica* (Heydrich) Foslie [40, (11, 52, 58 as *Lithoporella pacifica* (Heydrich) Foslie)]
- Mastophora rosea* (C. Agardh) Setchell [2, 8, 10, 40, 44, 58, 60, 76]
- Melanamansia glomerata* (C. Agardh) R.E. Norris [40, 44, 56, (8, 58 as *Amansia glomerata* C. Agardh)]
- Meristotheca papulosa* (Montagne) J. Agardh [8, 42, 44]
- Mesophyllum erubescens* (Foslie) M. Lemoine [40, 44, 76, (58 as *Lithothamnion erubescens* f. *madagascarense* Foslie)]
- Mesophyllum simulans* (Foslie) M. Lemoine [(76 as *Lithothamnion simulans* (Foslie) Foslie)]
- Metagoniolithon stelliferum* (Lamarck) Ducker [(58 as *Metagoniolithon stelligerum* Weber Bosse)]
- Monostroma nitidum* Wittrock [(11, 50, 58 as *Porphyra crispata* Kjellman)]
- Montemaria horridula* (Montagne) A.B. Joly et Alveal [(58 as *Caulacanthus horridulus* Montagne)]
- Neoizziella divaricata* (C.K. Tseng) S.-M. Lin, S.-Y. Yang et Huisman [(9, 11, 42, 45, 53, 59, 61 as *Liagora divaricata* C.K. Tseng)]
- Neogoniolithon oblimans* (Heydrich) P.C. Silva [(11, 58 as *Neogoniolithon myriocarpum* (Foslie) Setchell et L.R. Mason)]
- Neogoniolithon trichotomum* (Heydrich) Setchell et L.R. Mason [(8, 9, 11, 58 as *Lithophyllum trichotomum* (Heydrich) M. Lemoine)]
- Neomonospora pedicellata* var. *tenuis* Feldmann-Mazoyer [11]
- Neosiphonia ferulacea* (Suhr ex J. Agardh) S.M. Guimarães et M.T. Fujii [(8 as *Polysiphonia ferulacea* Suhr ex J. Agardh)]
- Neosiphonia harlandii* (Harvey) M.S. Kim et I.K. Lee [(40, 44, 50, 52, 58 as *Polysiphonia harlandii* Harvey)]
- Neosiphonia poko* (Hollenberg) I.A. Abbott [2]
- Neosiphonia sparsa* (Setchell) I.A. Abbott [2]
- Neosiphonia sphaerocarpa* (Børgesen) M.S. Kim et I.K. Lee [2, (9 as *Polysiphonia sphaerocarpa* Børgesen)]
- Neosiphonia subtilissima* (Montagne) M.S. Kim et I.K. Lee [2]
- Neosiphonia tongatensis* (Harvey ex Kützinger) M.S. Kim et I.K. Lee [(11, 58, 59 as *Polysiphonia tongatensis* Harvey ex Kützinger)]
- Neosiphonia upolensis* (Grunow) M.S. Kim et S.M. Boo [8]
- Neurymenia fraxinifolia* (Mertens ex Turner) J. Agardh [58]
- Nitophyllum adhaerens* M.J. Wynne [2]
- Odonthalia corymbifera* (S.G. Gmelin) Greville [50]
- Palisada concreta* (Cribb) K.W. Nam [(28, 76 as *Laurencia concreta* Cribb)]
- Palisada intermedia* (Yamada) K.W. Nam [(50 as *Laurencia intermedia* Yamada)]
- Palisada parvipapillata* (C.K. Tseng) K.W. Nam [(2, 8, 11, 40, 50, 52, 58, 61, 81 as *Laurencia parvipapillata* C.K. Tseng)]
- Palisada perforata* (Bory) K.W. Nam [(8, 9, 11, 20, 27, 40, 50, 58, 60, 61, 69, 76 as *Laurencia papillosa* (C. Agardh) Greville), (44 as *Chondrophycus papillosus* (C. Agardh) D.J. Garbary et J.T. Harper), (8, 58 as *Laurencia perforata* (Bory) Montagne)]
- Palisada thuyoides* (Kützinger) Cassano, Senties, Gil-Rodríguez et M.T. Fujii [(11, 58 as *Laurencia paniculata* (C. Agardh) J. Agardh)]
- Palisada yamadana* (M. Howe) K.W. Nam [(2 as *Laurencia yamadana* M. Howe)]
- Parviphyucus adnatus* (E.Y. Dawson) Santelices [(11, 50, 58, 64 as *Gelidiella adnata* E.Y. Dawson)]
- Parviphyucus pannosus* (Feldmann) G. Furnari [(11, 40, 50, 58 as *Gelidiella tenuissima* Feldmann et G. Hamel)]
- Peyssonnelia calcea* Heydrich [8, 9, 11, 52, 58]
- Peyssonnelia caulifera* Okamura [8, 10, 52]
- Peyssonnelia conchicola* Piccone et Grunow [76]
- Peyssonnelia inamoena* Pilger [2]
- Peyssonnelia rubra* (Greville) J. Agardh [8, 9, 58]
- Peyssonnelia rubra* f. *orientalis* Weber Bosse [11]
- Pleonosporium borrieri* (Smith) Nägeli [58]
- Pneophyllum confervicola* (Kützinger) Y.M. Chamberlain [(35, 58 as *Heteroderma minutulum* (Foslie) Foslie), (58 as *Melobesia confervicola* (Kützinger) Foslie)]
- Polyopes ligulatus* (Harvey ex Kützinger) De Toni [58]
- Polysiphonia coacta* C.K. Tseng [9, 11, 58, 59, 61, 69]
- Polysiphonia fragilis* Suringar [8, 11, 58]
- Polysiphonia herpa* Hollenberg [8]
- Polysiphonia infestans* Harvey [8, 10]
- Polysiphonia kampsaxii* Børgesen [50, 52]
- Polysiphonia nhatrangense* Pham H.H. [9, 27, 58]
- Polysiphonia scopulorum* Harvey [2, 35, 40, 44, 58]
- Polysiphonia scopulorum* var. *villum* (J. Agardh) Hollenberg [(11, 40, 58, 59 as *Lophosiphonia villum* (J. Agardh) Setchell et N.L. Gardner)]
- Polysiphonia sertularioides* (Grateloup) J. Agardh [9, 27, 50, 52]

- Polysiphonia subtilissima* Montagne [9, 11, 27, 35, 40, 44, 50, 52, 58, 59]
Polysiphonia tapinocarpa Suringar [50]
Porphyra suborbiculata Kjellman [9, 50, 76]
Porphyra tanaka Pham H.H. [59]
Porphyra vietnamensis Tak. Tanaka et Pham H.H. [50, 58, 67, 76]
Portieria hornemannii (Lyngbye) P.C. Silva [8, 10, 44, 60, 61, 76, (58 as *Desmia hornemannii* Lyngbye)]
Portieria japonica (Harvey) P.C. Silva [8, 76]
Prionitis vietnamensis Pham H.H. [58]
Pterocladia heteroplatos (Børgesen) Umamaheswara et Kaliaperumal [(50 as *Gelidium heteroplatos* Børgesen)]
Pterocladia caerulea (Kützinger) Santelices et Hommersand [2]
Pterocladia caloglossoides (M. Howe) Santelices [(11, 40, 58, 76 as *Pterocladia parva* E.Y. Dawson)]
Pterocladia capillacea (S.G. Gmelin) Santelices et Hommersand [(58 as *Pterocladia capillacea* (S.G. Gmelin) Bornet in Bornet et Thuret), (8, 58 as *Pterocladia pinnata* (Hudson) Papenfuss)]
Pterocladia tenuis (Okamura) Shimada, Horiguchi et Masuda [(27, 50 as *Pterocladia tenuis* Okamura)]
Reinboldiella warburgii (Heydrich) Yoshida et Mikami [(50 as *Holmesia neurymenioides* (Okamura) Okamura)]
Rhodogorgon ramosissima J.N. Norris et Bucher [(43 as *Rhodogorgon caribowensis* J.N. Norris et Bucher)]
Rhodymenia coacta Okamura et Segawa [8]
Rhodymenia intricata (Okamura) Okamura [8, 50]
Rhodymenia liniformis Okamura [50]
Rodriguezella hongngai Pham H.H. [58]
Sahlingia subintegra (Rosenvinge) Kornmann [(50, 58 as *Erythrocladia subintegra* Rosenvinge)]
Schmitzia japonica (Okamura) P.C. Silva [(58 as *Bertholdia japonica* (Okamura) Segawa)]
Scinaia boergesenii C.K. Tseng [40, 43]
Solieria robusta (Greville) Kylin [50]
Sonderophycus capensis (Montagne) M.J. Wynne [(8, 9, 11, 27, 58 as *Peyssonnelia gunniana* J. Agardh)]
Spongoclonium caribaeum (Børgesen) M.J. Wynne [(11 as *Mesothamnion caribaeum* Børgesen)]
Spyridia filamentosa (Wulfen) Harvey [8, 11, 44, 50, 58, 59, 60, 76]
Spyridia hypnoides (Bory) Papenfuss [76]
Stylonema alsidii (Zanardini) K.M. Drew [2, 40, (58 as *Goniotrichum alsidii* (Zanardini) M. Howe)]
Symphyocladia marchantioides (Harvey) Falkenberg [50]
Taenioma perpusillum (J. Agardh) J. Agardh [2, 11, 40, 44, 58, 59]
Tayloriella dictyurus (J. Agardh) Kylin [50]
Titanophora weberae Børgesen [(8, 11, 44, 58, 60, 61, 76 as *Titanophora pulchra* E.Y. Dawson)]
Titanophycus validus (Harvey) Huisman, G.W. Saunders et A.R. Sherwood [(2 as *Liagora valida* Harvey)]
Tolypocladia calodictyon (Harvey ex Kützinger) P.C. Silva [58]
Tolypocladia glomerulata (C. Agardh) F. Schmitz [2, 8, 11, 35, 40, 44, 58, 59, 61, 69, 76]
Tricleocarpa cylindrica (J. Ellis et Solander) Huisman et Borowitzka [40, 44, 76, (8, 9, 11, 27, 52, 58, 60, 61 as *Galaxaura fastigiata* Decaisne)]
Tricleocarpa fragilis (Linnaeus) Huisman et R.A. Townsend [2, 40, 44, (8, 10, 11, 58 as *Galaxaura vietnamensis* E.Y. Dawson), (8, 58, 60, 61 as *Galaxaura oblongata* (J. Ellis et Solander) J.V. Lamouroux)]
Wrangelia argus (Montagne) Montagne [11, 40, 58, 61]
Wrangelia dumontii (E.Y. Dawson) I.A. Abbott [2]
Wrangelia tanegana Harvey [38]
Wurdemannia miniata (Sprengel) Feldmann et G. Hamel [8, 11, 40, 44, 58, 59, 76]
Yamadaella caenomyce (Decaisne) I.A. Abbott [2, (27 as *Liagora caenomyce* Decaisne)]
Yonagunia formosana (Okamura) Kawaguchi et Masuda [19, 76, (11, 44, 58, 61 as *Carpopeltis formosana* Okamura), (16 as *Prionitis formosana* (Okamura) Kawaguchi et Nguyen H. Dinh)]
- ## Ochrophyta-Phaeophyceae
- Acrothrix pacifica* Okamura et Yamada [50]
Asteronema breviarticulatum (J. Agardh) Ouriques et Bouzon [(2 as *Hincksia breviarticulata* (J. Agardh) P.C. Silva), (11, 52 as *Ectocarpus breviarticulatus* J. Agardh), (58, 60 as *Feldmannia breviarticulata* (J. Agardh) Pham H.H.), (76 as *Asteronema breviarticulatum* (J. Agardh) Ouriques et Bouzon)]
Canistrocarpus cervicornis (Kützinger) De Paula et De Clerck [(9, 50 as *Asteronema breviarticulatum* (J. Agardh) Ouriques et Bouzon)]
Canistrocarpus crispatus (J.V. Lamouroux) De Paula et De Clerck [(2, 42 as *Dictyota crispata* J.V. Lamouroux), (58 as *Dictyota indica* Sonder ex Kützinger)]
Chilionema ocellatum (Kützinger) Kornmann [35, 58]
Chnoospora implexa J. Agardh [9, 27, 40, 44, 50, 51, 58, 76]
Chnoospora minima (Hering) Papenfuss [9, 27, 50, 58, 59, 76]
Colpomenia bullosa (D.A. Saunders) Yamada [58]
Colpomenia sinuosa (Mertens ex Roth) Derbès et Solier [2, 9, 11, 27, 40, 44, 50, 52, 58, 59, 76]
Dictyopteris delicatula J.V. Lamouroux [44, 50, 58]

- Dictyopteris plagiogramma* (Montagne) Vickers [59]
Dictyopteris polypodioides (De Candolle) J.V. Lamouroux [(50, 58 as *Dictyopteris membranacea* (Stackhouse) Batters)]
Dictyopteris woodwardia (R. Brown ex Turner) C. Agardh [58]
Dictyota adnata Zanardini [(27, 58, 67 as *Dictyota submaritima* Tak. Tanaka et Pham H.H.)]
Dictyota bartayresiana J.V. Lamouroux [40, 58, 59, (9, 11, 27, 50, 52, 58 as *Dictyota patens* J. Agardh)]
Dictyota ceylanica var. *anastomosans* Yamada [9, 27, 58, 69]
Dictyota ceylanica var. *rotundata* Weber Bosse [60]
Dictyota ciliolata Sonder ex Kützinger [42, (9, 50 as *Dictyota ciliata* J.V. Lamouroux), (58, 69 as *Dictyota beccariana* Zanardini)]
Dictyota dichotoma (Hudson) J.V. Lamouroux [11, 40, 44, 50, 58, 59, 69, 76]
Dictyota friabilis Setchell [2, 9, 11, 44, 50, 52, 58, 76]
Dictyota implexa (Desfontaines) J.V. Lamouroux [(35, 50, 76 as *Dictyota linearis* (C. Agardh) Greville), (9, 10, 27, 40, 44, 58, 59, 60, 61 as *Dictyota divaricata* J.V. Lamouroux)]
Dictyota mertensii (Martius) Kützinger [(9, 50, 76 as *Dictyota dentata* J.V. Lamouroux)]
Dictyota pinnatifida Kützinger [9, 50]
Dictyota polyclada Sonder ex Kützinger [(50 as *Pachydictyon polycladum* (Sonder ex Kützinger) Womersley)]
Dictyota spinulosa J.D. Hooker et Arnott [76]
Distromium decumbens (Okamura) Levring [(58 as *Chlanidophora repens* (Okamura) Okamura)]
Ectocarpus siliculosus f. *sporangioramosus* A.D. Zinova et Nguyen H. Dinh [50]
Ectocarpus siliculosus var. *dasycaulus* (Kuckuck) Gallardo [(50, 52 as *Ectocarpus siliculosus* (Dillwyn) Lyngbye)]
Ectocarpus vungtauensis Pham H.H. [58]
Feldmannia enhali Børgesen [58]
Feldmannia filifera (Børgesen) Pham H.H. [58]
Feldmannia indica (Sonder) Womersley et A. Bailey [(2 as *Hinckesia indica* (Sonder) J. Tanaka), (50, 52 as *Giffordia indica* (Sonder) Papenfuss et Chihara)]
Feldmannia irregularis (Kützinger) G. Hamel [35, 40, 44, 58, 59, 60, (11 as *Ectocarpus irregularis* Kützinger)]
Feldmannia zeylanica (Børgesen) P.C. Silva [(59 as *Ectocarpus zeylanicus* Børgesen)]
Hapalospongion schmidtii (Weber Bosse) P.C. Silva [(11, 58 as *Mesospora schmidtii* Weber Bosse)]
Hinckesia mitchelliae (Harvey) P.C. Silva [2, (11 as *Ectocarpus mitchelliae* Harvey), (44, 50, 52, 58 as *Giffordia mitchelliae* (Harvey) G. Hamel)]
Hormophysa cuneiformis (J.F. Gmelin) P.C. Silva [76, (34, 37, 40, 58, 59, 69 as *Hormophysa articulata* Kützinger)]
Hydroclathrus clathratus (C. Agardh) M. Howe [2, 11, 27, 40, 44, 50, 52, 58, 60, 76]
Hydroclathrus tenuis C.K. Tseng et Lu B.R. [38, 70]
Kuetzingiella elachistaeformis (Heydrich) M. Balakrishnan et Kinkar [2, (35, 58 as *Feldmannia elachistaeformis* (Heydrich) Pham H.H.)]
Lobophora variegata (J.V. Lamouroux) Womersley ex E.C. Oliveira [2, 9, 10, 44, 50, 52, 58, 59, 76, (11 as *Pocockiella variegata* (J.V. Lamouroux) Papenfuss)]
Myrionema strangulans Greville [58]
Nemacystus decipiens (Suringar) Kuckuck [9, 50]
Neoralfsia expansa (J. Agardh) P.E. Lim et H. Kawai ex Kraft [(35, 58, 59 as *Ralfsia expansa* (J. Agardh) J. Agardh)]
Padina antillarum (Kützinger) Piccone [(27, 50, 69 as *Padina tetrastromatica* Hauck)]
Padina australis Hauck [2, 9, 27, 40, 44, 50, 51, 52, 58, 59, 60, 61, 76]
Padina australis var. *cuneata* Tak. Tanaka et K. Nozawa [59]
Padina boryana Thivy [9, 40, 44, 58, 69, 76, (11 as *Padina commersonii* Bory), (50 as *Dilophus radicans* Okamura)]
Padina gymnospora (Kützinger) Sonder [27, 58, (9, 50, 52 as *Padina crassa* Yamada)]
Padina minor Yamada [76]
Petalonia fascia (O.F. Müller) Kuntze [50, 52]
Petroderma vietnamensis Pham H.H. [58]
Pylaiella littoralis (Linnaeus) Kjellman [58]
Ralfsia fungiformis (Gunnerus) Setchell et N.L. Gardner [50]
Ralfsia verrucosa (Areschoug) Areschoug [27]
Rosenvingea fastigiata (Zanardini) Børgesen [11, 50]
Rosenvingea intricata (J. Agardh) Børgesen [50, 58]
Rosenvingea nhatrangensis E.Y. Dawson [11, 58, 76]
Rosenvingea orientalis (J. Agardh) Børgesen [11, 58, 76]
Sargassum aemulum var. *carpophylloides* Grunow [34, 37]
Sargassum aemulum var. *jouanii* Grunow [34, 37]
Sargassum angustifolium C. Agardh [34, 37, 50, 63]
Sargassum aquifolium (Turner) C. Agardh [(2, 11, 34, 37, 40, 44, 58, 63, 65, 76, 79 as *Sargassum crassifolium* J. Agardh), (9, 34, 37, 58 as *Sargassum binderi* Sonder ex J. Agardh), (34, 37, 58 as *Sargassum heterocystum* Montagne), (27, 34, 37, 59 as *Sargassum echinocarpum* J. Agardh)]
Sargassum armatum J. Agardh [58]
Sargassum assimile Harvey [34, 37, 51, 58]
Sargassum baccularia (Mertens) C. Agardh [34, 37, 52, 58, 63]
Sargassum bangmeianae Nguyen H. Dinh et Huynh Q.N. [49]
Sargassum baoreni Nguyen H. Dinh et Huynh Q.N. [49]
Sargassum bicornis J. Agardh [34, 37, 58]
Sargassum brevifolium var. *pergracilis* Greville [58]
Sargassum bulbiferum Yoshida [37, 43]
Sargassum buunii Nguyen H. Dinh et Huynh Q.N. [49]

- Sargassum capillare* Kützting [(34, 37, 58 as *Sargassum gracile* Greville)]
- Sargassum carpophyllum* J. Agardh [9, 34, 37, 58]
- Sargassum carpophyllum* var. *honomense* Nguyen H. Dinh et Huynh Q.N. [48]
- Sargassum carpophyllum* var. *nhatrangense* (Pham H.H.) Ajisaka [4, 37, (34, 58 as *Sargassum piluliferum* var. *nhatrangense* Pham H.H.)]
- Sargassum cinereum* J. Agardh [34, 37, 50, 59, 63]
- Sargassum confusum* C. Agardh [34, 58]
- Sargassum congkinhii* Pham H.H. [32, 34, 37, 58]
- Sargassum cornutifructum* Nguyen H. Dinh et Huynh Q.N. [48]
- Sargassum cotoense* Nguyen H. Dai [34, 36, 37]
- Sargassum cymosum* C. Agardh [34, 37, 50, 63]
- Sargassum denticarpum* Ajisaka [3, 76]
- Sargassum distichum* Sonder [(34, 37, 58 as *Sargassum aemulum* Sonder)]
- Sargassum duplicatum* Bory [37, (8 as *Sargassum brevifolium* Kützting)]
- Sargassum emarginatum* C.K. Tseng et Lu B.R. [75]
- Sargassum feldmannii* Pham H.H. [34, 37, 58, 63]
- Sargassum flavicans* (Mertens) C. Agardh [34, 37, 44, 51, 58]
- Sargassum glaucescens* J. Agardh [27, 34, 37, 50, 58, 63, 71]
- Sargassum gracillimum* Reinbold [9, 27, 34, 37, 50, 52, 63]
- Sargassum graminifolium* C. Agardh [27, 34, 37, 50, 63]
- Sargassum hemiphyllum* (Turner) C. Agardh [34, 50, 58, 63]
- Sargassum hemiphyllum* var. *chinense* J. Agardh [5, 37, 78]
- Sargassum henslowianum* C. Agardh [34, 37, 40, 44, 50, 52, 55, 58, 63]
- Sargassum henslowianum* var. *bellonae* Grunow [34, 37]
- Sargassum herklotsii* Setchell [9, 34, 37, 50, 63]
- Sargassum hieuii* Nguyen H. Dinh et Huynh Q.N. [49]
- Sargassum ilicifolium* (Turner) C. Agardh [34, 37, 58], (34, 37, 51, 58 as *Sargassum cristaeifolium* C. Agardh), (11, 34, 37, 58, 73 as *Sargassum sandei* Reinbold), (9, 34, 37, 40, 44, 50, 52, 58, 63, 76 as *Sargassum duplicatum* Bory), (34, 37, 40 as *Sargassum berberifolium* J. Agardh), (37 as *Sargassum turbinatiform* C.K. Tseng et Lu B.R.)]
- Sargassum ilicifolioides* C.K. Tseng et Lu B.R. [72]
- Sargassum incanum* Grunow [34, 37, 50, 63]
- Sargassum kuetzingii* Setchell [27, 34, 37, 58]
- Sargassum longifructum* C.K. Tseng et Lu B.R. [3, 34, 37, 69]
- Sargassum mcclurei* f. *duplicatum* A.D. Zinova et Nguyen H. Dinh [50, 52, 76]
- Sargassum mcclurei* Setchell [2, 11, 32, 34, 44, 52, 58, 63, 65, 66, 76, 79]
- Sargassum microcystum* J. Agardh [34, 37, 58, 69]
- Sargassum miyabei* Yendo [(32, 34, 58 as *Sargassum kjellmanianum* Yendo)]
- Sargassum namoense* Nguyen H. Dai [37, 42]
- Sargassum natans* (Linnaeus) Gaillon [(34, 58 as *Sargassum bacciferum* (Turner) C. Agardh)]
- Sargassum oligocystum* Montagne [2, 27, 37, 40, 44, 69, 76]
- Sargassum paniculatum* J. Agardh [27, 34, 37, 50, 63]
- Sargassum parvifolium* (Turner) C. Agardh [34, 37, 58]
- Sargassum parvivesiculosum* C.K. Tseng et Lu B.R. [71]
- Sargassum phamhoangii* Nguyen H. Dai [34, 36, 37]
- Sargassum phyllocystum* C.K. Tseng et Lu B.R. [75]
- Sargassum piluliferum* (Turner) C. Agardh [50, 63, 73, 78]
- Sargassum piluliferum* var. *serratifolium* (Turner) C. Agardh [5, 37]
- Sargassum polycystum* C. Agardh [2, 6, 11, 14, 27, 32, 34, 37, 40, 44, 50, 58, 59, 63, 65, 66, 69, 76, 79]
- Sargassum polycystum* var. *onustum* J. Agardh [34, 37]
- Sargassum polyporum* Montagne [27, 34, 50, 63]
- Sargassum quinhonense* Nguyen H. Dai [34, 36, 37, 65, 66, 76, 79]
- Sargassum segii* Yoshida [(52 as *Sargassum racemosum* Yamada et Segi)]
- Sargassum serratum* Nguyen H. Dai [37, 41, 44]
- Sargassum siliquosum* J. Agardh [27, 34, 37, 50, 52, 59, 63,]
- Sargassum subtilissimum* C.K. Tseng et Lu B.R. [71]
- Sargassum swartzii* C. Agardh [9, 34, 37, 50, 58, 59, 63, 76]
- Sargassum tenerrimum* J. Agardh [34, 37, 50, 58, 63]
- Sargassum tsengii* Nguyen H. Dinh et Huynh Q.N. [49]
- Sargassum turbinarioides* Grunow [10, 34, 58, 60]
- Sargassum vachellianum* Greville [34, 37, 50, 63]
- Sargassum vietnamense* A.D. Zinova et Nguyen H. Dinh [9, 34, 37, 50, 52, 63]
- Sargassum virgatum* C. Agardh [34, 37, 50, 63]
- Scytosiphon lomentaria* (Lyngbye) Link [50]
- Spatoglossum stipitatum* (Tak. Tanaka et K. Nozawa) Bittner et al. [(2, 58 as *Zonaria stipitata* Tak. Tanaka et K. Nozawa)]
- Spatoglossum vietnamense* Pham H.H. [40, 44, 58, 76]
- Sphacelaria carolinensis* Trono [14]
- Sphacelaria ceylanica* Sauvageau [58]
- Sphacelaria novae-hollandiae* Sonder [2, 11, 14, 58]
- Sphacelaria rigidula* Kützting [2, 14, (50 as *Sphacelaria variabilis* Sauvageau), (9, 11, 27, 50, 52, 58, 59 as *Sphacelaria furcigera* Kützting)]
- Sphacelaria solitaria* (Pringsheim) Kylin [(40, 44 as *Sphacelaria divaricata* Montagne)]
- Sphacelaria tribuloides* Meneghini [2, 11, 14, 40, 44, 58, 59]
- Stypopodium zonale* (J.V. Lamouroux) Papenfuss [58]
- Turbinaria conoides* (J. Agardh) Kützting [34, 37, 40, 44, 58, 76]
- Turbinaria decurrens* Bory [34, 37, 40, 44, 58, 59, 66, 69]
- Turbinaria gracilis* Sonder [34, 37, 58]
- Turbinaria ornata* (Turner) J. Agardh [2, 9, 10, 11, 27, 34, 37, 40, 44, 50, 58, 60, 61, 69, 76]

Turbinaria ornata var. *prolifera* Pham H.H. [34, 37, 58]
Turbinaria parvifolia C.K. Tseng et Lu B.R. [70]

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Acetabularia caliculus J.V. Lamouroux [11, 50, 53, 58, 76]
Acetabularia major G. Martens [53, 59]
Anadyomene plicata C. Agardh [40, 44, 53, 58, 76]
Anadyomene wrightii Harvey ex J.E. Gray [2, 11, 27, 40, 53, 58, 76]
Avrainvillea amadelpha (Montagne) A. Gepp et E. Gepp [76]
Avrainvillea erecta (Berkeley) A. Gepp et E. Gepp [11, 44, 53, 58, 69, 76]
Avrainvillea lacerata Harvey ex J. Agardh [53, 58]
Avrainvillea obscura (C. Agardh) J. Agardh [76, (21 as *Avrainvillea capituliformis* T. Tanaka)]
Boergesenia forbesii (Harvey) Feldmann [10, 11, 40, 44, 53, 58, 60, 61, 76]
Boodlea coacta (Dickie) G. Murray et De Toni [53, 76]
Boodlea composita (Harvey) F. Brand [2, 10, 11, 40, 44, 50, 60, 61, 76, (27, 53, 58, 59 as *Boodlea siamensis* Reinbold)]
Boodlea struveoides M. Howe [53, 58]
Bornetella nitida Munier-Chalmas ex Sonder [76]
Bornetella oligospora Solms-Laubach [11, 44, 53, 58]
Bornetella sphaerica (Zanardini) Solms-Laubach [11, 40, 44, 53, 58, 76]
Bryopsis hypnoides J.V. Lamouroux [10, 50, 53, 60]
Bryopsis indica A. Gepp et E.S. Gepp [44, 50, 53, 58]
Bryopsis pennata J.V. Lamouroux [11, 40, 44, 51, 53, 58]
Bryopsis pennata var. *secunda* (Harvey) Collins et Hervey [(10, 76 as *Bryopsis harveyana* J. Agardh)]
Bryopsis plumosa (Hudson) C. Agardh [50, 53, 58, 76]
Bryopsis pseudoplumosa V.J. Chapman [50, 53]
Caulerpa ashmeadii Harvey [50, 53]
Caulerpa brachypus Harvey [44, 53, 58, 61]
Caulerpa corynephora Montagne [(58 as *Caulerpa racemosa* var. *corynephora* (Montagne) Weber Bosse)]
Caulerpa cupressoides (Vahl) C. Agardh [10, 44, 53, 60, 61, 69, 76]
Caulerpa cupressoides var. *lycopodium* Weber Bosse [41]
Caulerpa cupressoides var. *mamillosa* (Montagne) Weber Bosse [41]
Caulerpa cupressoides var. *urvilleana* (Montagne) L.J. Hodgson, Pham H.T., Lewmanomont et McDermid [(22 as *Caulerpa urvilleana* Montagne)]
Caulerpa fastigiata Montagne [11, 53, 58, 76]
Caulerpa freycinetii C. Agardh [(53, 60 as *Caulerpa freycinetii* var. *typica* Weber Bosse)]
Caulerpa lentillifera J. Agardh [40, 44, 53, 58, 76]

Caulerpa macrophysa (Sonder ex Kützing) G. Murray [(2, 11, 53 as *Caulerpa racemosa* var. *macrophysa* (Sonder ex Kützing) W.R. Taylor)]
Caulerpa mexicana f. *vietnamica* Pham H.H. [53, 58]
Caulerpa mexicana Sonder ex Kützing [44, 53, (43 as *Caulerpa crassifolia* (C. Agardh) J. Agardh)]
Caulerpa microphysa (Weber Bosse) Feldmann [10, 53, 58]
Caulerpa nummularia Harvey ex J. Agardh (22)
Caulerpa peltata J.V. Lamouroux [27, 50, 53, 60 (58, 76 as *Caulerpa racemosa* var. *peltata* (J.V. Lamouroux) Eubank), (76 *Caulerpa racemosa* var. *laetevirens* (Montagne) Weber Bosse)]
Caulerpa peltata var. *macrodisca* (Decaisne) Weber Bosse [(10, 44, 53, 58, 60, 61, 69 as *Caulerpa macrodisca* Decaisne)]
Caulerpa racemosa (Forsskål) J. Agardh [9, 27, 40, 44, 50, 53, 58, 60, 61]
Caulerpa racemosa f. *vietnamensis* A.D. Zinova et Nguyen H. Dinh [27, 50, 53]
Caulerpa racemosa var. *lamourouxii* (Turner) Weber Bosse (76)
Caulerpa racemosa var. *macrophysa* (Sonder ex Kützing) W.R. Taylor [(76 as *Caulerpa racemosa* f. *macrophysa* (Sonder ex Kützing) Weber Bosse)]
Caulerpa racemosa var. *occidentalis* (J. Agardh) Børgesen [53, 58, 59]
Caulerpa scalpelliformis (R. Brown ex Turner) C. Agardh [50, 53]
Caulerpa serrulata (Forsskål) J. Agardh [2, 11, 27, 40, 44, 53, 58, 69, (10 as *Caulerpa freycinetii* C. Agardh)]
Caulerpa serrulata f. *lata* (Weber Bosse) C.K. Tseng [41, 76]
Caulerpa serrulata var. *boryana* (J. Agardh) Gilbert [76]
Caulerpa sertularioides (S.G. Gmelin) M. Howe [44, 53, 58, 61]
Caulerpa sertularioides f. *longipes* (J. Agardh) Collins [76]
Caulerpa taxifolia (Vahl) C. Agardh [27, 40, 44, 50, 53, 58, 59, 60, 61, 69, 76]
Caulerpa verticillata f. *charoides* Weber Bosse [76]
Caulerpa verticillata J. Agardh [2, 11, 50, 53, 58, 59]
Caulerpa webbiana f. *tomentella* (Harvey ex J. Agardh) Weber Bosse [10, 41]
Caulerpa webbiana Montagne [44, 53, 60]
Caulerpella ambigua (Okamura) Prud'homme et Lokhorst [11, 53, 58, (53, 58 as *Caulerpa vickersiae* Børgesen)]
Chaetomorpha aerea (Dillwyn) Kützing [50, 53, 58]
Chaetomorpha antennina (Bory) Kützing [9, 11, 27, 50, 51, 58, 69, 76, (53, 59 as *Chaetomorpha media* (C. Agardh) Kützing)]
Chaetomorpha capillaris (Kützing) Børgesen [50, 52, 53, 58]
Chaetomorpha gracilis Kützing [53, 58]
Chaetomorpha indica (Kützing) Kützing [11, 53, 58]

- Chaetomorpha javanica* Kützing [11, 53, 58]
Chaetomorpha linum (O.F. Müller) Kützing [35, 50, 53, 58 (2, 9, 10, 11, 27, 40, 44, 69, 76 as *Chaetomorpha crassa* (C. Agardh) Kützing)]
Chaetomorpha pachynema (Montagne) Kützing [53]
Chaetomorpha spiralis Okamura [9, 50, 53]
Chlorodesmis hildebrandtii A. Gepp et E. Gepp [11, 27, 52, 53, 58, 59, 61]
Cladophora adhaerens Harvey [10]
Cladophora albida (Nees) Kützing [11, 40, 44, 50, 53, 58]
Cladophora catenata (Linnaeus) Kützing [(35, 50, 58 as *Cladophora fuliginosa* Kützing)]
Cladophora coelothrix Kützing [(53, 58 as *Cladophoropsis modonensis* (Kützing) Reinbold), (53, 58 as *Cladophoropsis modonensis* (Kützing) Reinbold)]
Cladophora crispula Vickers [10, 35, 50, 52, 53, 58]
Cladophora flexuosa (O.F. Müller) Kützing [(53, 58 as *Cladophora gracilis* (Griffiths) Kützing)]
Cladophora glomerata (Linnaeus) Kützing [52, 53, 58]
Cladophora herpestica (Montagne) Kützing [(11, 53, 58, 76 as *Cladophoropsis herpestica* (Montagne) M. Howe)]
Cladophora laetevirens (Dillwyn) Kützing [35, 50, 52, 53, 58]
Cladophora papenfussii Pham H.H. [53, 58]
Cladophora patentiramea (Montagne) Kützing [10, 35, 50, 53, 58]
Cladophora pellucida (Hudson) Kützing [50, 53]
Cladophora perpusilla Skottsberg et Levring [11, 53]
Cladophora prolifera (Roth) Kützing [(40, 44, 50, 53, 58, 69 as *Cladophora rugulosa* G. Martens)]
Cladophora ryukyuensis Sakai et Yoshida [(50, 53 as *Cladophora fastigiata* Harvey)]
Cladophora sakaii I.A. Abbott [(50, 53 as *Cladophora densa* Harvey)]
Cladophora sericea (Hudson) Kützing [(53, 58 as *Cladophora glaucescens* (A.W. Griffiths ex Harvey) Harvey)]
Cladophora socialis Kützing [2, 35, 53, 58, (11 as *Cladophora patentiramea* f. *longiarticulata* Reinbold)]
Cladophora stimpsonii Harvey [53]
Cladophora vagabunda (Linnaeus) C. Hoek [2, (11 as *Cladophora inserta* f. *ungulata* (Brand) Setchell), (50, 53, 58 as *Cladophora inserta* f. *ungulata* (Brand) Setchell), (50, 53 as *Cladophora uncinella* Harvey), (40, 44, 53, 58, 59 as *Cladophora inserta* Dickie)]
Cladophoropsis adhaerens Pham H.H. [53, 58]
Cladophoropsis fasciculata (Kjellman) Wille [(10, 52, 53, 58 as *Cladophoropsis sundanensis* Reinbold)]
Cladophoropsis membranacea (Hofman ex C. Agardh) Børgesen [2, 9, 11, 50, 53, 58]
Cladophoropsis vaucheriiformis (Areschoug) Papenfuss [53]
Codium adhaerens C. Agardh [51, 52, 53, 58, 69]
Codium arabicum Kützing [9, 10, 27, 40, 44, 50, 53, 58, 60, 61, 76]
Codium cylindricum Holmes [53, 58]
Codium duthieae P.C. Silva [50, 53]
Codium formosanum Yamada [53, 58, 59]
Codium geppiorum O.C. Schmidt [11, 44, 58, 69, 76, (53, 60, 61 as *Codium geppii* O.C. Schmidt)]
Codium isthmocladum Vickers [(59 as *Codium pilgerii* O.C. Schmidt)]
Codium repens P.L. Crouan et H.M. Crouan [27, 50, 52, 53]
Codium tenue (Kützing) Kützing [9, 10, 27, 53, 59]
Codium tomentosum Stackhouse [53, 58, 59]
Codium tunue Kützing [58]
Derbesia attenuata E.Y. Dawson [2, 11, 53, 58]
Derbesia marina (Lyngbye) Solier [52, 53]
Dictyosphaeria cavernosa (Forsskål) Børgesen [2, 10, 11, 44, 53, 58, 60, 61, 76]
Dictyosphaeria spinifera C.K. Tseng et C.F. Chang [50, 53]
Dictyosphaeria versluysii Weber Bosse [2, 11, 40, 44, 60, 61, 76, (53, 58 as *Dictyosphaeria setchellii* Børgesen)]
Gayralia oxysperma (Kützing) K.L. Vinogradova ex Scagel, R.F., Gabrielson, P.W., Garbary, D.J., Golden, L., Hawkes, M.W., Lindstrom, S.C., Oliveira, J.C. et Widdowson, T.B. [(50, 52, 53 as *Monostroma oxyspermum* (Kützing) Doty)]
Geppella prolifera C.K. Tseng et M.L. Dong [13]
Gomontia arrhiza Hariot [53, 58]
Halicystis pyriformis Levring [11, 53, 58]
Halimeda cuneata f. *digitata* E.S. Barton [58]
Halimeda cuneata Hering [10, 40, 44, 53]
Halimeda cylindracea Decaisne [60, 61]
Halimeda discoidea Decaisne [2, 10, 44, 51, 53, 58, 61, 76]
Halimeda gracilis Harvey ex J. Agardh [11, 53]
Halimeda incrassata (J. Ellis) J.V. Lamouroux [10, 53, 58, 60, 61]
Halimeda macroloba Decaisne [12, 53, 76]
Halimeda micronesica Yamada [41, 53, 60]
Halimeda opuntia (Linnaeus) J.V. Lamouroux [2, 10, 11, 12, 40, 44, 53, 58, 60, 61, 76]
Halimeda taenicola W.R. Taylor [12]
Halimeda tuna (J. Ellis et Solander) J.V. Lamouroux [10, 44, 53, 58, 60]
Halimeda velasquezii W.R. Taylor [12, 76]
Halimeda xishaensis C.K. Tseng et M.L. Dong [12]
Microdictyon japonicum Setchell [2, 76]
Microdictyon nigrescens (Yamada) Setchell [50, 53]
Microdictyon okamurae Setchell [53, 58]
Microdictyon vanbosseae Setchell [53]
Monostroma nitidum Wittrock [53, 58]
Neomeris annulata Dickie [2, 10, 11, 40, 44, 53, 58, 60, 61, 76]
Neomeris bilimbata J.T. Koster [53, 58]
Neomeris vanbosseae M. Howe [2, 9, 44, 53, 58, 69]

Ostreobium quekettii Bornet et Flahault [(11 as *Ostreobium reineckeii* Bornet)]

Parvocaulis clavatus (Yamada) S. Berger, U. Fettweiss, S. Gleissberg, L.B. Liddle, U. Richter, H. Sawitzky et Zuccarello [(53, 58, 76 as *Acetabularia clavata* Yamada)]

Parvocaulis parvulus (Solms-Laubach) S. Berger, U. Fettweiss, S. Gleissberg, L.B. Liddle, U. Richter, H. Sawitzky et Zuccarello (40, 44, 76, (11, 53, 58 as *Acetabularia moebii* Solms-Laubach))

Parvocaulis pusillus (M. Howe) S. Berger, U. Fettweiss, S. Gleissberg, L.B. Liddle, U. Richter, H. Sawitzky et Zuccarello [(53, 58 as *Acetabularia pusilla* (M. Howe)] Collins)

Penicillus sibogae A. Gepp et E. Gepp (53, 58)

Phyllocladion anastomosans (Harvey) Kraft et M.J. Wynne [(11, 40, 44, 50, 53, 58, 76, (50, 53 as *Struvea tenuis* Zanardini), (53, 58 as *Struvea delicatula* Kützinger)]

Pseudobryopsis hainanensis C.K. Tseng [(21 as *Trichosolen hainanensis* (C.K. Tseng) W.R. Taylor)]

Pseudochlorodesmis furcellata (Zanardini) Børgesen (11, 53, 58)

Rhipidosiphon javensis Montagne [76, (9, 11, 53, 58 as *Udotea javensis* (Montagne) A. Gepp et E. Gepp)]

Rhipiliopsis echinocaulos (A.B. Cribb) Farghaly [13]

Rhizoclonium grande Børgesen [50, 53, 58]

Rhizoclonium riparium (Roth) Harvey [9, 27, 50, 53, 58, (9, 11, 35, 50, 53, 58, 59 as *Rhizoclonium kernerii* Stockmayer)]

Rhizoclonium riparium var. *implexum* (Dillwyn) Rosenvinge [(35, 40, 44, 50, 52, 53, 58, 59 as *Rhizoclonium kochianum* Kützinger)]

Rhizoclonium tortuosum (Dillwyn) Kützinger [50, 53]

Trichosolen mucronatus (Børgesen) W.R. Taylor [(11, 53, 58 as *Pseudobryopsis mucronata* Børgesen)]

Trichosolen parvus (E.Y. Dawson) W.R. Taylor [(11, 53, 58 as *Pseudobryopsis parva* E.Y. Dawson)]

Tydemanina expeditionis Weber Bosse [7, 10, 43, 53, 60]

Udotea argentea Zanardini [53, 58, 61]

Udotea flabellum (J. Ellis et Solander) M. Howe [7, 41, 53]

Udotea orientalis A. Gepp et E. Gepp [53, 76]

Udotea velutina C.K. Tseng et M.L. Dong [7, 53]

Ulothrix flacca (Dillwyn) Thuret [53]

Ulothrix subflaccida Wille [58]

Ulva chaetomorphoides (Børgesen) Hayden, Blomster, Maggs, P.C. Silva, M.J. Stanhope et J.R. Waaland [(50, 52, 53, 58 as *Enteromorpha chaetomorphoides* Børgesen)]

Ulva clathrata (Roth) C. Agardh [(11, 27, 35, 40, 44, 50, 53, 58, 59, 60 as *Enteromorpha clathrata* (Roth) Greville), including f. *pumilla*]

Ulva compressa Linnaeus [(50, 53, 76 as *Enteromorpha compressa* (Linnaeus) Nees)]

Ulva conglobata Kjellman [9, 44, 50, 52, 53]

Ulva flexuosa subsp. *pilifera* (Kützinger) M.J. Wynne [50, 53]

Ulva flexuosa Wulfen [(11, 27, 52, 53, 58, 59, as *Enteromorpha tubulosa* (Kützinger) Kützinger), (27, 50, 52, 53, 58 as *Enteromorpha flexuosa* (Wulfen) J. Agardh)]

Ulva intestinalis Linnaeus [(11, 27, 44, 53, 58, 59 as *Enteromorpha intestinalis* (Linnaeus) Nees)]

Ulva kylinii (Bliding) Hayden, Blomster, Maggs, P.C. Silva, M.J. Stanhope et J.R. Waaland [(11, 35, 40, 44, 50, 53, 58, 69 as *Enteromorpha kylinii* Bliding)]

Ulva lactuca Linnaeus [2, 40, 44, 50, 53, 58, 76, (9, 50, 53 as *Ulva fenestrata* Postels et Ruprecht), (53, 58 as *Ulva fasciata* Delile)]

Ulva papenfussii Pham H.H. [40, 44, 53, 58]

Ulva prolifera O.F. Müller [(27, 50, 52, 53, 76 as *Enteromorpha prolifera* (O.F. Müller) J. Agardh)]

Ulva ralfsii (Harvey) Le Jolis [(10, 35, 53, 58 as *Enteromorpha ralfsii* Harvey)]

Ulva reticulata Forsskål [2, 40, 44, 53, 58, 76]

Ulva spinulosa Okamura et Segawa [50, 53]

Ulva stipitata Areschoug [(50, 53, as *Enteromorpha stipitata* var. *catbaensis* A.D. Zinova et Nguyen H. Dinh, a variety not formally transferred yet to *Ulva*)]

Ulva torta (Mertens) Trevisan [(50, 52, 53 as *Enteromorpha torta* (Mertens) Reinbold)]

Ulvella lens P.L. Crouan et H.M. Crouan [53, 58]

Ulvella viridis (Reinke) R. Nielsen, C.J. O'Kelly et B. Wysor [(11, 53, 58 as *Entocladia viridis* Reinke)]

Valonia aegagropila C. Agardh [9, 10, 11, 44, 50, 53, 58, 76]

Valonia fastigiata Harvey ex J. Agardh [40, 44, 53, 58, 76]

Valonia macrophysa Kützinger [50, 52, 53]

Valonia utricularis (Roth) C. Agardh [10, 53, 58, 60, 61, 76]

Valonia ventricosa J. Agardh [11, 44, 53, 58, 60, (76 as *Ventricaria ventricosa* (J. Agardh) J.L. Olsen et J.A. West)]

Valoniopsis pachynema (G. Martens) Børgesen [50, 53, 58, 59, 69]

Vaucheria piloboloides Thuret [50]

Notes

Sargassum nigrifolium Yendo, *S. nipponicum* Yendo, *S. patens* var. *vietnamese* nom. nud., *S. tortile* C. Agardh, *S. tosaense* Yendo were removed from the Vietnamese flora on the authority of Yoshida (2002a). *Sargassum polycystum* var. *longicaule* was removed on the authority of Nguyen H. Dai (1997, 2007).

The following species are not included in the checklist because they have not been formally described: *Ceramium phuquocense* nom. nud. [59], *Gigartina vietnamensis* nom. nud. [50], *Solieria fastigiata* nom. nud. [45, 69], *Caulerpa minuta* nom. nud. [21] and *Chaetomorpha patentiramea* nom. nud. [9].

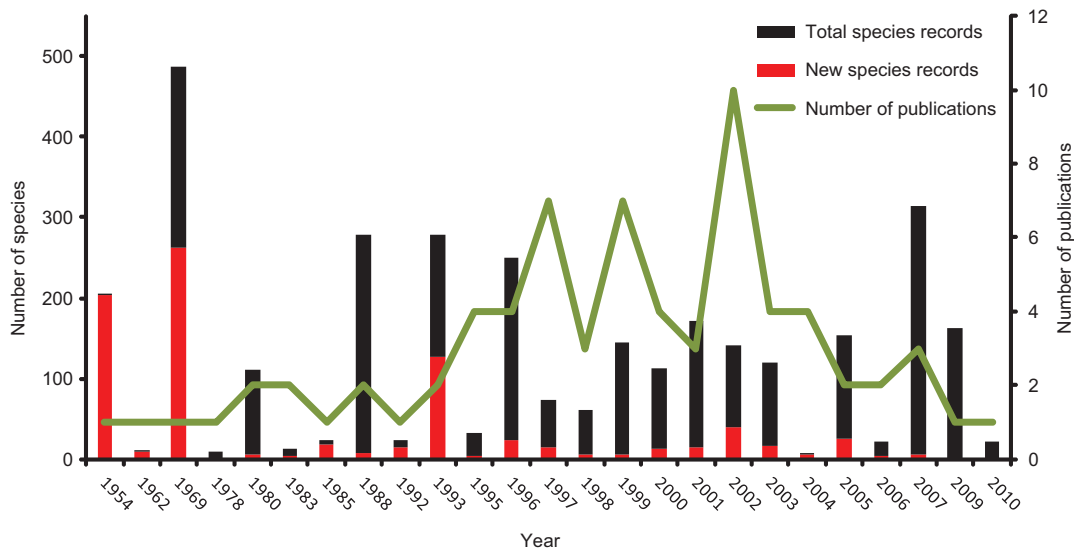


Figure 1 Numbers of publications on Vietnamese seaweeds (green line, right axis) and numbers of new algal records reported (bar chart, left axis) by year between 1954 and 2010.

Diversity of marine macroalgae in Vietnam

The present checklist contains a total of 827 species (180 Chlorophyta, 147 Phaeophyceae, 412 Rhodophyta and 88 Cyanobacteria) compiled from all earlier species records in both international and Vietnamese publications. This work represents the most inclusive list of Vietnamese flora to date, including 623 species more than in Dawson's first list (Dawson 1954), and 157 species more than reported on Algaebase (Guiry and Guiry 2012). This checklist offers an up-to-date overview of Vietnamese algal flora and considerably improves its accessibility to the international community. Importantly, the checklist provides currently accepted species names for Vietnamese seaweeds. Continuous taxonomic refinement means that a considerable

proportion (>one third) of taxon names listed in earlier publications, such as Dawson (1954), Pham H.H. (1969) and Nguyen H. Dinh et al. (1993), are no longer considered currently accepted.

The bulk of new records of seaweeds from Vietnam were published in a few publications only (e.g., Dawson 1954, Pham H.H. 1969 and Nguyen H. Dinh et al. 1993). Despite an increase in the number of algal publications from the 1990s onward, the discovery rate of new records seems to diminish (Figures 1 and 2). From this, the question arises whether we are getting close to documenting most of the Vietnamese seaweed diversity. Previous diversity estimates resulted in a figure of nearly 1000 seaweed species for the Vietnamese coast (Huynh and Nguyen H. Dinh 1998, Dang et al. 2007). In contrast, Algaebase reports only 670 taxa (Guiry and Guiry 2012), but this figure is only indicative as a number of publications were not included yet (e.g., Pham H.H. 1985, Nguyen H. Dinh et al. 1993, Nguyen H. Dai 1997, Nguyen H. Dai et al. 2000, Nguyen H. Dai and Pham H.T. 2003, Le N.H. 2000, 2001, 2004, Dam 2003, Le N.H. and Nguyen H. Dai 2006, Nguyen V. Tien 2007).

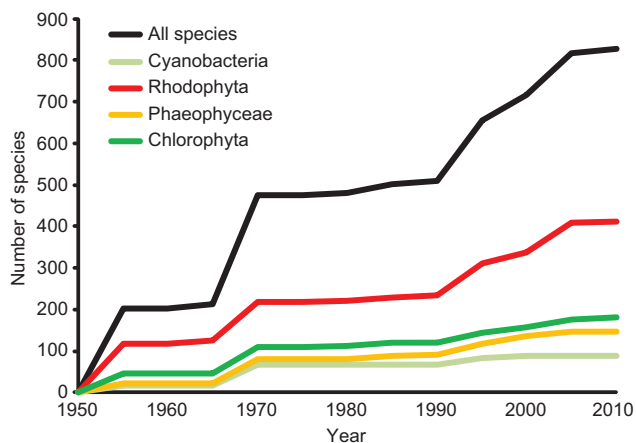


Figure 2 Cumulative curve of new species records from Vietnam.

Distribution of seaweeds along the Vietnamese coast

Locality data have been included in the database of Vietnamese seaweeds, enabling us, to some extent, to analyse biogeographic and richness patterns (Figure 3). Of the 20 studied provinces, 12 have over 100 species, of which two are northern provinces (Quang Ninh, Hai Phong), seven are

central provinces (Thanh Hoa, Quang Tri, Da Nang, Quang Ngai, Khanh Hoa, Ninh Thuan, Binh Thuan) and two are southern provinces (Ba Ria - Vung Tau, Kien Giang). Totals of 60 and 197 species are reported from the offshore Paracel and Spratly islands, respectively. The greatest species number (418) has been reported for the Khanh Hoa province, where half of the total number of species in Vietnam have been found. In general, the highest marine macroalgal diversity has been recorded for the South Central Coast region. The differences in species diversity among the provinces and regions are most likely influenced by differences in research efforts. The South Central region has traditionally been the most extensively investigated region. At least one-third of the publications on Vietnam's seaweed

flora focus on the Khanh Hoa province or its vicinity. This region was popular with visiting international phycologists (e.g., Dawson 1954, Abbott et al. 2002, Tsutsui et al. 2005). However, the high diversity might be sustained by the habitat heterogeneity of this region, or by increased primary productivity caused by local upwelling.

Diversity of marine macroalgae in Vietnam compared to neighbouring countries

The diversity of the Vietnamese seaweeds was compared with those of a number of neighbouring countries (Malaysia, Philippines, Taiwan and Thailand). The Philippines

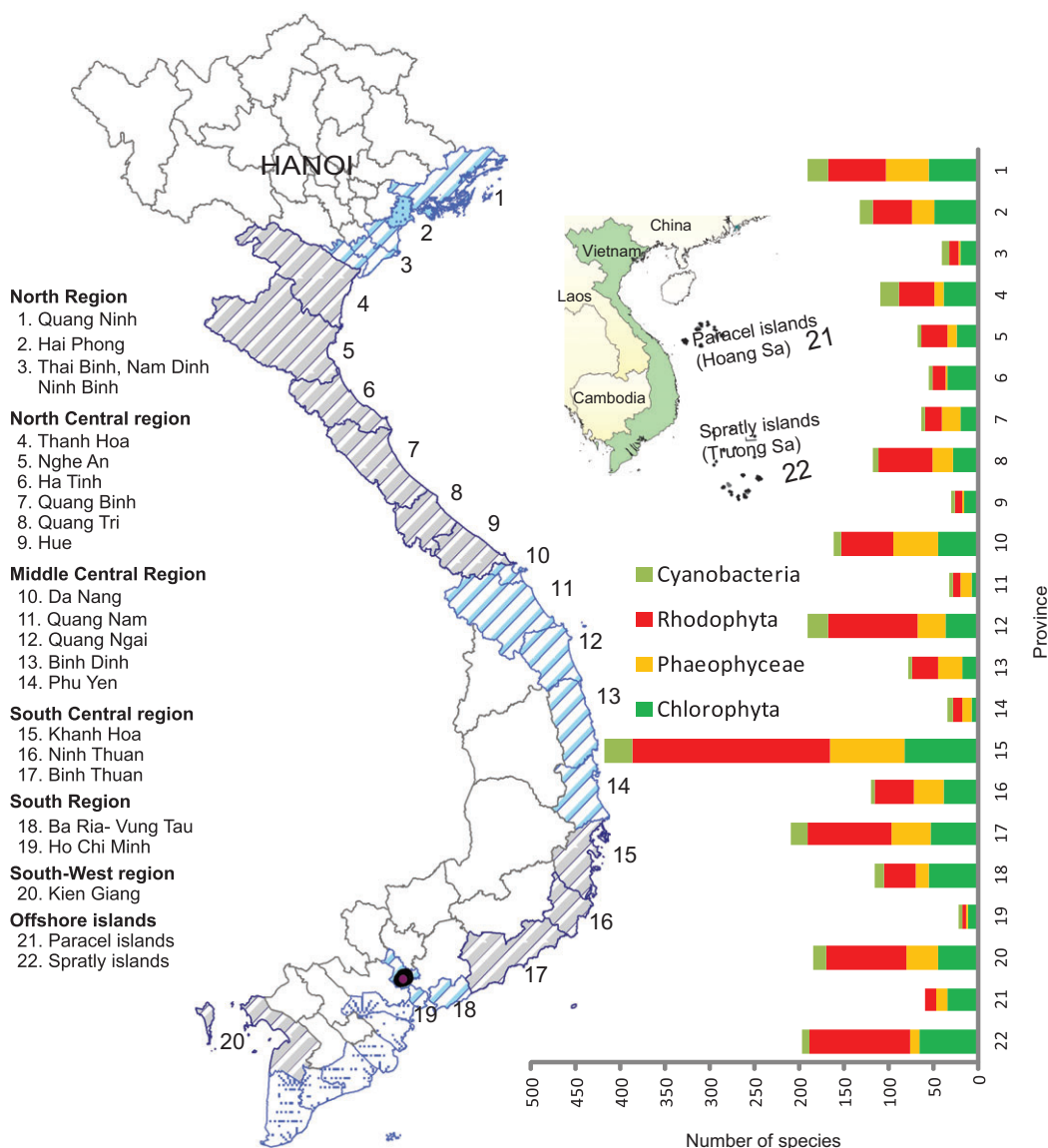


Figure 3 Distribution of seaweeds by province along the coast of Vietnam.

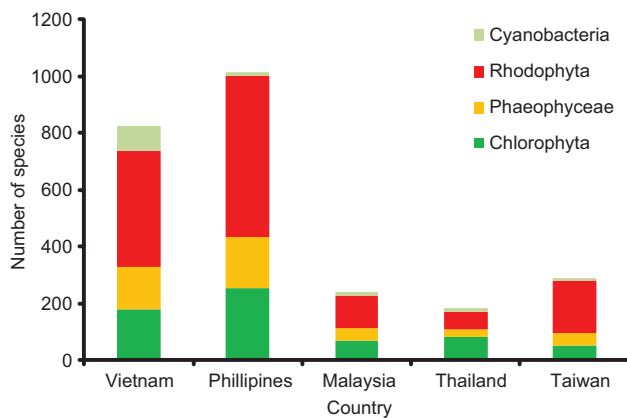


Figure 4 Numbers of species of seaweeds in Vietnam and neighbouring countries.

appear to be the most diverse country with a staggering total of 1011 species, whereas Vietnam harbours a comparable 827 species (Figure 4). Sørensen similarity indexes are low ($C_s < 0.5$; Table 1). These low values are counterintuitive. Within similar climatic zones and in the absence of major dispersal barriers, marine biodiversity is expected to be much more homogenous (see Spalding et al. 2007). Even though we cannot rule out the existence of a biogeographical pattern making the Vietnamese seaweed flora highly distinct, we are of the opinion that the low similarity with neighbouring countries is primarily an artifact resulting from taxonomic inconsistencies. The checklist presented here could serve as a valuable

Table 1 Comparison of Vietnamese seaweed flora with neighbouring countries.

Neighbouring country	Vietnam ($N_a=827$)		
	N_b	N_{a+b}	C_s
Philippines	1011	295	0.319
Malaysia	241	107	0.200
Thailand	182	93	0.184
Taiwan	288	112	0.201

N_b , number of individuals in the neighbouring country; N_{a+b} , the number of taxa shared with Vietnam; Sørensen similarity index: $C_s = (2N_{a+b}) / (N_a + N_b)$.

tool, listing the Vietnamese seaweed diversity and stimulating intraregional comparative research. It may then become clear that many local endemics have a much wider distribution.

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