

A historical account of biodiversity studies on Philippine seaweeds (1800–1999)

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Abstract—A historical account of seaweed biodiversity studies in the Philippines is reviewed starting from its early beginnings (1750) until the end of the 20th century (1999). It is said that the birth of Philippine phycology started with the publication of the book “Flora de Filipinas” by the resident Augustinian monk, Fr. Blanco. Oceanographic expeditions that passed by the Philippine archipelago during the latter half of the 19th century, in particular, the Dutch Siboga Expedition, contributed significantly to the country’s seaweed biodiversity data through the monographs and other comprehensive taxonomic and morphological literatures written on the marine algae that were collected. During the Commonwealth period, duplicate herbarium specimens of marine algae that were sent to herbaria abroad by two American botanists, E.D. Merrill and H.H. Bartlett, were later published on by noted phycologists, namely, M. A. Howe, W. R. Taylor, W. J. Gilbert, R. C.-Y. Chou, and C. K. Tseng. The “Father of Philippine Phycology”, G. T. Velasquez, is said to have catalysed studies on Philippine algae starting in the late 50’s especially for Filipinos. The success brought about by seaweed farming in the Philippines heightened interest on the marine benthic algae, such that, in 1970–1989, there was a surge of taxonomic/floristic/monographic/morphological publications on seaweeds written mostly by Filipino authors. In 1987, 879 binomials of marine benthic algae was compiled by Silva et al. This number is updated to 949 in this paper and a checklist of the binomials is included, as well. During the last decade of the 20th century, seaweed research trend shifted to the more applied aspects. Most taxonomic studies not only focused on the commercial species but also included aspects of their population biology, seasonality, phycocolloid yield and quality.

Key words: checklist, historical review, Philippine biodiversity, seaweeds

Introduction

Sources of information on the following account of the early history of Philippine phycology with emphasis on marine algae until 1970 came primarily from Velasquez (1962), Velasquez et al. (1972), Cordero (1972) and Silva et al. (1987). Others details were obtained from the seaweed database of SICEN (Seaweed Information Center) of the Marine Science Institute, C.S., University of the Philippines), created by this author though a grant from the International Development Research Center of Canada (IDRC) in 1987–1994.

The scope of this historical review focuses on published information related to diversity studies on Philippine marine benthic algae with a cut-off date of 1999. The ‘Literature cited’ section of this review includes, not only the cited literature in the text but also, all published documents bearing information on the diversity of Philippine marine benthic algae (for instance, foreign studies include Philippine data). This author wishes to apologize for the literature (on the topic mentioned) that may have been missed out in the compilation.

~1800–1900

It is interesting to note that the specimen of the present day species known as *Gracilaria salicornia* (C. Agardh) Dawson is based on the very first reported collection of marine algae from the Philippine waters. Collection was done by A. von Chamisso, a botanist of the Romanzoff Exploring Expedition (1817–1818), when their Russian ship Rurik was forced to seek shelter in the Manila harbor during a heavy storm in the Pacific. A. C. Agardh (1820) described and illustrated Chamisso’s collected material (type specimen) and named it *Sphaerococcus salicornia*, which was later re-named by Greville (1830) as *Corallopsis salicornia* (C. Agardh) Greville in his monographic treatment of the genus *Corallopsis*. Meanwhile, Ruprecht (1851) commented that “Chamisso himself was not sure of the locality from which he obtained the specimen”. This notion was verified more than a century later, when Dawson, in 1953, collected a similar material along the Manila Harbor. Internal examination of the specimen led Dawson to conclude that his material was a topotype of Chamisso’s material. He, then transferred *Corallopsis salicornia* to *Gracilaria salicornia* (C. Agardh) Dawson, as reported in his 1954 publication of the Pacific marine algae.

The birth of Philippine phycology as a science is thought to have begun in 1837 through the pioneering work of the resident Augustinian monk, Father M. Blanco when he published his book, 'Flora de Filipinas'. The book included descriptions and geographic distribution of the Philippine vascular plants and algae. Two more editions of the book followed: one in 1845, and another in 1877–1883; the latter edition was completed through the efforts of Fathers Ignacio Mercado and Antonio Llanos. Although considered significant contributions, there were no specimens extant representing the described species and the published descriptions were inadequate (Merrill 1918 in Robbins 1958). There were many misidentifications and duplication of scientific names probably due to the dearth of botanical references and phyco-logical taxonomists, and unavailability of these to the authors at that time.

In 1844, another noteworthy contribution to Philippine algal diversity came out in a publication by Montagne. He described the few, but important collection of marine algae made by the English naturalist, Hugh Cumming, during the latter's 3-year exploration of the Philippine archipelago that

began after his arrival in Manila in October 1836. The materials were deposited in Kew Herbarium in England. It was from this collection that Decaisne (1842) based his description of the species, *Galaxaura fastigiata* and *Liagora caenomyce*.

Further knowledge on Philippine marine algae was provided by collections of foreign oceanographic expeditions conducted during the last half of the 19th century. Table 1 summarizes relevant details about these expeditions and their contributions to Philippine phycology.

The Dutch Siboga Expedition in 1899 (Table 1) is considered to be the most important. In the beginning of the 20th century, outputs from this expedition resulted in a surge of monographic and comprehensive taxonomic and morphological literatures on the algae that were collected. Published were monographs on the genus *Halimeda* (Barton 1901), the Codiaceae (A. and E. S. Gepp 1911), and the Corallinaceae (Weber van Bosse and Foslie 1904), and on all the other algal taxa published in four parts by Weber van Bosse in the following years: 1913, 1921, 1923, and 1928.

Table 1. Listing of expeditions that included the Philippines in their itinerary for seaweed collection before 1900.

Year	Expedition name	Place of collection in the Philippines	Collector	Outputs reported by	Remarks on the outputs of the expedition
1851	U.S. Exploring Expedition	Morongas Is.; Northeastern coast of Jolo (southern Philippines)	Under the command of Charles Wilkes	Bailey & Harvey (1851)	Two listings came up: the first was a short list of marine algae (which included <i>Dictyota dichotoma</i>), and a second and longer list that included the diatoms.
1861	Preussische Expedition nach Ost-Asien	Manila, Zamboanga	Edward von Martens (zoologist)	George von Martens 1868 (father of E. Martens)	G. Martens made a comprehensive listing of all algal species so far reported from Tropical Asia and Tropical Pacific at that time and their corresponding geographic distribution. He also evaluated the identity of the algal species reported by Fr. Blanco.
1874–1875	Challenger Expedition	Gigantes Is. (Iloilo), Mactan I. (Cebu), Zamboanga	H. N. Moseley (naturalist)	Dickie 1874a, 1876a, b, 1877)	Dickie made listings of Philippine algae collected by H. N. Moseley in the expedition.
1884	Vettor Pisani (Italian circumnavigation of the ship)	Ticao I. (Masbate), Cavite	Cesare Marcacci (lieutenant on board)	Piccone 1886, 1889	Piccone reported new species collected during the expedition.
1899	Siboga Expedition (to the Indonesian region)	Sulu Archipelago	Phycologists on board	Barton 1901 (Halimeda), Gepp & Gepp 1911 (Codiaceae), Foslie 1904, Weber van Bosse 1904 (Corallinaceae), Weber van Bosse 1913, 1921, 1923, 1928 (all groups)	The expedition produced significant and the most number of comprehensive and useful taxonomic references: monographs of various taxonomic taxa (<i>Halimeda</i> , Codiaceae, Corallinaceae), as well as detailed taxonomic treatments of the entire phycological harvest

~1900–1950

During the Commonwealth period of Philippine history, two American botanists that were connected with the Department of Botany of the University of the Philippines played a major role in the advancement of Philippine phycology. One was the foremost botanist, Elmer D. Merrill, who was, then, appointed Botanist of the Bureau of Science in Manila (1906–1923), and at the same time, part time Professor and Lecturer at the Department of Botany University of the Philippines (1912–1923). Although primarily interested in vascular plants, Merrill influenced the Bureau of Science to assemble a large collection of algae. His students, likewise, added substantially to the collection which they used for their research and for herbarium purposes. In 1911–1913, Merrill sent duplicates of these for study to M. A. Howe of the New York Botanical Gardens and to W.A. Setchell of the University of California, Berkeley. M. A. Howe (1932) later came up with a publication describing the marine algae of Panay and Negros (Central Visayas region). On the other hand, in 1951, the Chlorophyceae and Phaeophyceae specimens sent to Setchell were loaned to W.R. Taylor of the University of Michigan. Taylor and his students ultimately published on them using additional load of algal materials sent in 1935–1936 and in 1940–1941 by another American botanist, H. H. Bartlett (then Chairman of its Department of Botany, University of Michigan in Ann Arbor). In his capacity as an exchange professor of the Department of Botany, University of the Philippines in 1935–1936, H. H. Bartlett made massive collection of plants including algae throughout the Philippine archipelago. When he returned to the Philippines in 1940–1941, under the auspices of the U.S. Department of Agriculture, additional algal collections were done in Mindanao. On both occasions, duplicates of the algal collection were sent to the University of Michigan where W. R. Taylor and his students studied and significantly published on them. Numerous papers carry citations of such collections notably on the following taxa: *Codium* (Tseng and Gilbert 1942), *Galaxaura* (Chou 1945–1947), Chlorophyceae (Gilbert 1942, 1943, 1947), *Turbinaria* (Taylor 1964, 1966a), Chlorophyceae and Phaeophyceae (Taylor 1966b), *Cladophoropsis* (Taylor 1961), *Halimeda* (Taylor 1962), etc.

The practice of sending duplicate herbarium specimens to other herbaria abroad proved useful because, when World War II came in 1945, buildings that kept the Philippine copies were burned down. After the war, it was through the efforts of Gregorio T. Velasquez, Professor of Botany, University of the Philippines who obtained his doctorate at the University of Michigan in 1939, that collection and archiving of Philippine algae were again revived. He made extensive collections of freshwater and marine algae all over the Philippine archipelago. Although his primary interest was on the Cyanophyceae, he was the “leader and catalyst” (Silva et al. 1987) on all aspects of the study on Philippine phycology

that had profound influence on his students, colleagues, friends, and other acquaintances. This earned him the title, ‘Father of Philippine Phycology’, not formally or officially given, but as a fitting tribute to a man for his significant contribution to this field of science in the country. His publication, “Bluegreen Algae of the Philippines” (Velasquez 1962) which includes descriptions, geographical and ecological distributions of 162 species and varieties of cyanophytes, is considered the most comprehensive study and the best reference on this group. His algal collections are presently deposited in the G. T. Velasquez Phycological Herbarium of the Marine Science Institute, C.S., University of the Philippines, an original project conceived by his former student, Gavino C. Trono Jr., now Professor Emeritus of the Marine Science Institute, University of the Philippines.

~1950–1969

From 1952 onwards, academic studies on algae were encouraged not only in the University of the Philippines, but also in other institutions and universities in Manila. Several graduate students worked on both freshwater and marine algae for their masteral thesis. Notable publications resulted from this endeavor such as the taxonomic account of the marine algae of Hundred Islands, Pangasinan by Meñez (1961) and Domantay (1961, 1962); the latter added information on their spatial distribution. Interest on seaweed utilization surfaced around this time as evidenced by the study of Galutira and Velasquez (1963) which focused on the edible seaweeds of Ilocos Norte. Meanwhile, quite a number of foreign publications included Philippine seaweed species or the Philippines as a geographic location on their floristic, morphological, or systematic treatments of various seaweed taxa or groups (e.g. Gilbert 1961, Silva 1962, Moul 1964, Taylor 1966a, b, Ducker 1966, Tanaka 1967, Papenfuss 1967, Hollenberg 1968a, b, c, d, Saito 1968, 1969, Gilbert and Doty 1969).

~1970–1989

The success brought about by seaweed farming in the Philippines starting in the late 60’s to early 70’s heightened interest on the marine benthic algae. Before 1970, there were only about 15–40 taxonomic/floristic papers on Philippine marine algae that came out every decade; the majority of which were written by foreign authors. However, in 1970–1979 and 1980–1989, a surge in the taxonomic/floristic type of publications on seaweeds, numbering to about 80 and 100 per decade emerged, respectively. Topics varied from floristic reports, systematics, with detailed descriptions or illustrations, or reports of new species, or new records for the country, about 60% of which were contributed by Filipino authors. Significant number were the works of Gavino C. Trono Jr., Professor of Botany at the University of the Philippines and former student of G. T. Velasquez and Maxwell S. Doty

(Professor of Botany, University of Hawaii), and Paciente Cordero Jr., Curator of the Philippine National Museum at that time, and their students.

Published were checklists or descriptive taxonomic treatments of marine algae from various parts of the archipelago including areas in the following regions (refer to Fig. 1).

Northern Luzon: Batan Is. (Cordero 1976b, 1977a, b, 1978c), Ilocos Norte (Cordero 1983a, Hurtado-Ponce 1983a, Hurtado-Ponce and Modelo 1983, Marcos-Anggarayngay 1983, 1984a, b), Bolinao, Pangasinan (Saraya and Trono 1979, 1982).

Southern Luzon: Mindoro (Trono 1973c, Trono and Biña 1973, Trono and de Lara 1981), Batangas (Cornejo and Velasquez 1972), Marinduque (Trono 1978).

Central Philippines: Dumaguete (Reyes 1972), Siquijor (Reyes 1976, 1978), Panay (Cordero 1987a), Aklan (Cordero 1978b), Masbate (Cordero 1984b), Central Visayas (Meñez and Calumpang 1981).

Southwestern Philippines: Bugsuk, Palawan (Trono and Ang 1982), Palawan (Cordero 1984a, Cordero and Modelo

1989).

Eastern Philippines: Bulusan, Sorsogon (Trono 1975, 1976), Catanduanes (Trono and Young 1977, Trono and Tuason 1978), Leyte (Cordero 1973b).

Southern Philippines: Sulu archipelago (Trono 1972b, c, 1973b, 1974c), etc.

Other publications were monographic in treatment of the following taxa: *Acetabularia* (Trono et al. 1978), *Caulerpa* (Cordero 1976b, 1977c, 1978a, Meñez and Calumpang 1982), Corallinaceae (Trono et al. 1985), *Ectocarpus* (Trono and Santos-Maranan 1974), *Galaxaura* (Trono and Santiago 1970; Cordero 1976c), *Gracilaria* (Trono et al. 1983), *Halimeda* (Cordero and Tanaka 1972), *Jania* (Cadano and Trono 1987), *Porphyra* (Cordero 1974b, 1979c), and the red algae (Cordero 1977b). Quite a number provided morphological descriptions and geographical distributional data on certain taxa such as, *Actinotrichia* (Cordero 1975a, b), *Codium* (Cordero 1979a, b), etc. The remainder of the taxonomic types of publication during this period dealt with new records of seaweed species collected from the country (refer to Cordero 1976b, 1980a, 1981a, c, Fortes and Trono 1979, etc.; or have proposed species new to science, i.e., by Cordero 1976d on *Porphyra marcosii*, by Ganzon-Fortes 1982 on *Laurencia tranoi*, by Trono et al. 1978 on *Acetabularia roxasii*, among others).

In 1972, Velasquez, Trono and Doty came out with a comprehensive and uncritical listing of both marine and fresh water algae collected from Philippine waters. Their data were collated from earlier publications with a cut-off date of 1971. 850 binomials resulted, each provided with information on their Philippine distribution and corresponding citation of the author/s who made the report. Twenty binomials from the list, however, are considered erroneous because the species were part of the collection of the Siboga Expedition from Indonesian waters (Silva et al. 1987).

In 1987, a catalog of the marine benthic algae of the Philippines authored by P. C. Silva, E. G. Meñez, and R. L. Moe was published. This was a comprehensive compilation of all marine benthic algae from literature available to the authors. This included 879 binomials +96 varieties and forms. Of the 55 *Sargassum* included, only 28 species appeared to have reliable identities (Trono 1999). The catalog made a systematic presentation of the distribution sites of each included species entry and the corresponding citation of the author/s who made the report, but also added pertinent comprehensive taxonomic and nomenclatural information very useful for related studies on marine algae, i.e., taxonomic classification, taxonomic and nomenclatural synonyms, authority for synonymy, troublesome nomenclature situations involving binomials of a species, etc.

Other noteworthy publications during these two decades concerned the identity of the farmed and wild eucaumatoid seaweed varieties, numbering to about 28, according to Doty

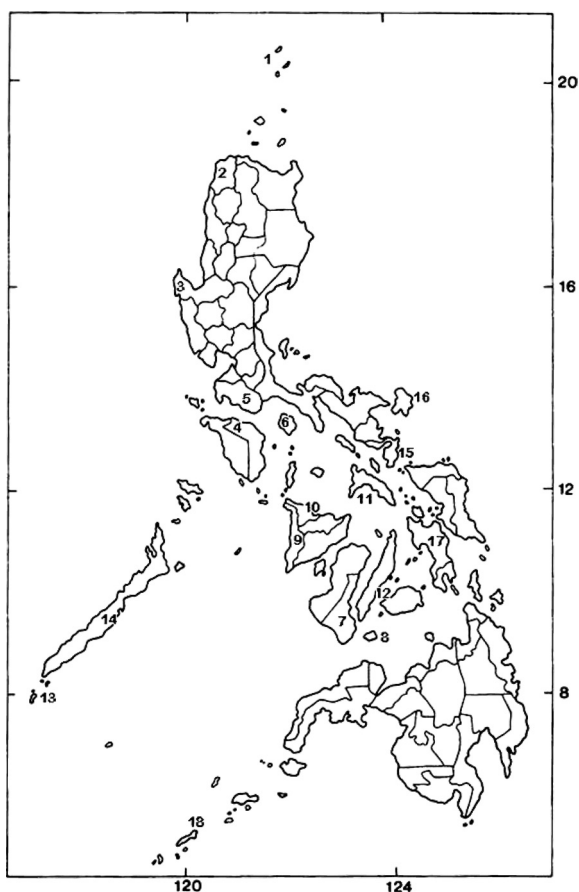


Fig. 1. Map of the Philippines. Numbers designate the province/collection sites of cited authors: 1 Batanes; 2 Ilocos Nortes; 3 Bolinao, Pangasinan; 4 Mindoro; 5 Batangas; 6 Marinduque; 7 Dumaguete; 8 Siquijor; 9 Panay; 10 Aklan; 11 Masbate; 12 Central Visayas; 13 Bugsuk, Palawan; 14 Palawan; 15 Bulusan, Sorsogon; 16 Catanduanes; 17 Leyte; 18 Sulu Archipelago.

and Alvarez (1975). The doctoral student of Dr. M. S. Doty, Gerry Kraft, was tasked to solve the problem. After extensive morphological examination, G. Kraft (1970a) placed these into four species, namely: *Eucheuma muricatum* (= *E. spinosum*), *E. striatum*, *E. cottonii*, and *E. serra*). During the course of his study, he discovered a new eucheumatoid species, *Eucheuma procrusteanum* (Kraft 1970b), and a new record for the country, *E. arnoldii* (Kraft 1972). One and a half decades later, chemical characterization of the phycocolloids extracted from these eucheumatoids (Doty and Aguilar-Santos 1978, Aguilar-Santos 1980, 1989) coupled with detailed morphological studies on their reproductive structures led Doty (1985, 1988) and Doty and Norris (1985) to split the eucheumatoid species into three genera: *Eucheuma*, *Kappaphycus* and *Betaphycus*; the latter two were newly erected genera.

When *Eucheuma* seaweed (commercially known as “cottonii” and “spinosum”) became one of the top fishery export products of the Philippines during this period, the trend of Philippine seaweed research added to its interest, if not shifted its interest to the more practical aspects. The surge in publications were not only of the taxonomic, morphological, and floristics types, but a great deal were on the ecology, phenology, reproductive biology, chemistry (natural products and methodologies), culture, socio-economics of seaweed farming, etc. There was also a surge of interest in exploring other high value seaweeds for economic purposes, such as *Gracilaria*, *Caulerpa*, *Gelidiella*, and *Laurencia*. (Note: Close to 500 publications on the subject are in the SICEN database and will not be included in the bibliographic citations of this historical review.)

Moreover, useful references for Philippine seaweed identification came out through the publication of illustrated books on Philippine seaweeds with useful dichotomous keys by Trono and Ganzon-Fortes (1980, 1988) and Trono (1986).

This decade, likewise, marks the birth of a publication which came out in a series of volumes (Abbott and Norris 1985, Abbott 1988, 1992, 1994, 1995) that aims to resolve problems dealing with the taxonomy of economically important species of seaweeds. Spearheaded by its editor, Isabella A. Abbott, Professor of the University of Hawaii, the various chapters have already contributed to the identification and clarification on the taxonomic confusion involving such genera as *Eucheuma*, *Gracilaria*, *Sargassum*, *Laurencia*, *Hypnea*, *Halymenia*, *Gelidiella*, *Gelidium*, etc. Important taxonomic results involving Philippine materials were made on the eucheumatoid species (Doty 1985, 1988, 1995, Doty and Norris 1985), and *Sargassum* (Trono 1992b, 1994), among others.

Bibliographic listing of the publications during the period are included in the ‘References’ section of this report.

~1990–1999

As seaweed research trend shifted to the more applied aspects, the hundreds of publications on Philippine seaweeds that surfaced in the 90’s, included only a small percentage dealing with the taxonomic or floristic types similar to those published in the 70’s and the 80’s. To the latter types belong the works of Trono and Ohno (1992) documenting the seaweeds of Bolinao, Pangasinan, and that of Hurtado et al. (1992) reporting on the seaweeds of Panay Is. where photographs of each species is presented. Trono (1997), likewise, published a useful reference, a book entitled, “Field Guide and Atlas of the Seaweed Resources of the Philippines,” with 222 described species, 168 of which are provided with colored photographs. Each species is provided with information on their distribution within the country, the natural products that could be extracted from them, their utilization as human food, and their industrial or medical application.

Quite a number of papers reported species that are new to science which type materials were collected from Philippine waters (Yamamoto and Trono 1994, West and Calumpong 1996, Modelo et al. 1998, Kraft et al. 1999). Moreover, West and Calumpong (1990) and Kraft et al. (1999) added to the list of seaweed species that are new records for the country. Table 2 gives an updated checklist of the marine benthic algae of the Philippines that have been reported until 1999. Only binomials (total of 879) included in Silva et al. (1987) are in the list. The few that they have missed out during their compilation are now included, plus those species new to science which has the Philippines as type locality, and reported species that are new records for the country. Literature sources for the new list have a cut-off date of 1999, the same as this historical review. The list is comprehensive rather than selective, in order to avoid the difficulty of having to assess each reported species for its worthiness of inclusion. When possible, nomenclatural changes in certain binomials, which sources of information are published within the review period, are considered in the list. For instance, the old name ‘*Amansia glomerata*’ is now listed as ‘*Melanamansia glomerata*’. Misspelled binomial, ‘*Spathoglossum pacificum*’ by Cordero (1986) is corrected in the list, and is now listed as ‘*Spatoglossum pacificum*’. This binomial is retained in the list, although, it has now been reported as a synonym of ‘*Dictyopteris pacificum*’ by Hwang et al. (2004).

During this period, most taxonomic studies not only focused on the commercial species of macro algae but also included aspects of their population biology, seasonality, phycocolloid yield and quality. Worth mentioning are the works on *Gracilaria* by Trono (1992b, c), Critchley (1993) and Abbott (1994), Tseng and Xia (1999); on *Sargassum* by Chiang et al. (1992), Largo and Ohno (1992), Trono (1992b, c, 1994), Philipps (1995), Calumpong et al. (1999), Hurtado and Ragaza (1999), on *Eucheuma/Kappaphycus* (Trono

Table 2. Checklist of seaweeds reported from the Philippines before year 2000. Only binomials are listed except when genus is a new record for the country. Varieties and forms are not included. (See text for more explanation.)

Summary: total=949; Cyanobacteria=61; Rhodophyta=522; Ochrophyta=154; Chlorophyta=212

CYANOBACTERIA	<i>Sirocoleum kurzii</i>	<i>Bostrychia tenella</i>	<i>Champia japonica</i>
<i>Anabaena pseudoscillatoria</i>	<i>Symploca howei</i>	<i>Botryocarpa prolifera</i>	<i>Champia parvula</i>
<i>Anacystis aeruginosa</i>	<i>Symploca hydroides</i>	<i>Botryocladia botryoides</i>	<i>Champia salicornoides</i>
<i>Brachytrichia maculans</i>	<i>Symploca laeteviridis</i>	<i>Botryocladia leptopoda</i>	<i>Champia spathulata</i>
<i>Brachytrichia quoyi</i>		<i>Botryocladia pyriformis</i>	<i>Champia vieillardii</i>
<i>Calothrix aeruginea</i>	RHODOPHYTA	<i>Botryocladia skottsbergii</i>	<i>Cheilosporum cultratum</i>
<i>Calothrix confervicola</i>	<i>Acanthophora aokii</i>	<i>Botryocladia uvarioides</i>	<i>Cheilosporum jungermanniioides</i>
<i>Calothrix contarenii</i>	<i>Acanthophora muscoides</i>	<i>Callophycus serratus</i>	<i>Cheilosporum sagittatum</i>
<i>Calothrix crustacea</i>	<i>Acanthophora spicifera</i>	<i>Callophyllis adhaerens</i>	<i>Chondria armata</i>
<i>Calothrix epiphytica</i>	<i>Acrochaetium gracile</i>	<i>Callophyllis adnata</i>	<i>Chondria crassicaulis</i>
<i>Calothrix parietina</i>	<i>Acrochaetium hallandicum</i>	<i>Callophyllis okamuriae</i>	<i>Chondria curvilineata</i>
<i>Calothrix pilosa</i>	<i>Acrochaetium hancockii</i>	<i>Caloglossa adnata</i>	<i>Chondria dasyphylla</i>
<i>Calothrix robusta</i>	<i>Acrochaetium liagorae</i>	<i>Caloglossa leprieurii</i>	<i>Chondria polyrhiza</i>
<i>Calothrix scopulorum</i>	<i>Acrochaetium nitidulum</i>	<i>Caloglossa ogasawaraensis</i>	<i>Chondria repens</i>
<i>Calothrix viguieri</i>	<i>Acrochaetium papenfussii</i>	<i>Carpopeltis affinis</i>	<i>Chondria sedifolia</i>
<i>Dichothrix gypsophila</i>	<i>Acrochaetium robustum</i>	<i>Carpopeltis angusta</i>	<i>Chondria seticulosa</i>
<i>Entophysalis conferta</i>	<i>Acrochaetium seriatum</i>	<i>Carpopeltis articulata</i>	<i>Chondria sibogae</i>
<i>Hormothamnium solutum</i>	<i>Acrochaetium sinicola</i>	<i>Carpopeltis capitellata</i>	<i>Chroodactylon ornatum</i>
<i>Hydrocoleum cantharidosmum</i>	<i>Acrochaetium trichogleoeae</i>	<i>Carpopeltis crispata</i>	<i>Chrysemenia kaernbachii</i>
<i>Hydrocoleum comoides</i>	<i>Acrochaetium tuticorinense</i>	<i>Carpopeltis divaricata</i>	<i>Claudea batanensis</i>
<i>Hydrocoleum glutinosum</i>	<i>Acrocystis nana</i>	<i>Carpopeltis formosana</i>	<i>Claudea multifida</i>
<i>Hydrocoleum lyngbyaceum</i>	<i>Acrothamnion preissii</i>	<i>Carpopeltis maillardii</i>	<i>Coelothrix irregularis</i>
<i>Lyngbya aestuarii</i>	<i>Actinotrichia fragilis</i>	<i>Carpopeltis prolifera</i>	<i>Corallina frondescens</i>
<i>Lyngbya confervoides</i>	<i>Ahnfeltia concinna</i>	<i>Catenella caespitosa</i>	<i>Cottoniella filamentosa</i>
<i>Lyngbya estuarii</i>	<i>Ahnfeltia furcellata</i>	<i>Catenella impudica</i>	<i>Crouania attenuata</i>
<i>Lyngbya ferruginea</i>	<i>Alsidium pusillum</i>	<i>Catenella nipae</i>	<i>Crouania minutissima</i>
<i>Lyngbya infixa</i>	<i>Amphiroa anastomosans</i>	<i>Caulacanthus ustulatus</i>	<i>Cryptonemia crenulata</i>
<i>Lyngbya lutea</i>	<i>Amphiroa anceps</i>	<i>Centroceras apiculatum</i>	<i>Cryptonemia denticulata</i>
<i>Lyngbya majuscula</i>	<i>Amphiroa annulata</i>	<i>Centroceras clavulatum</i>	<i>Cryptonemia luxurians</i>
<i>Lyngbya martensiana</i>	<i>Amphiroa beauvoisii</i>	<i>Centroceras minutum</i>	<i>Cryptonemia schmitziana</i>
<i>Lyngbya mesotricha</i>	<i>Amphiroa cumingii</i>	<i>Ceramiella procumbens</i>	<i>Cubiculosporum koronicarpis</i>
<i>Lyngbya rosea</i>	<i>Amphiroa dimorpha</i>	<i>Ceramium affine</i>	<i>Dasya adhaerens</i>
<i>Lyngbya semiplena</i>	<i>Amphiroa ephedraea</i>	<i>Ceramium cruciatum</i>	<i>Dasya baillouviana</i>
<i>Lyngbya sordida</i>	<i>Amphiroa foliacea</i>	<i>Ceramium equisitoides</i>	<i>Dasya mollis</i>
<i>Microcoleus acutissimus</i>	<i>Amphiroa fragilissima</i>	<i>Ceramium fastigiatum</i>	<i>Dasya ocellata</i>
<i>Microcoleus tenerimus</i>	<i>Amphiroa hancockii</i>	<i>Ceramium flaccidum</i>	<i>Dasya punicea</i>
<i>Nodularia</i> sp.	<i>Amphiroa pacifica</i>	<i>Ceramium gracillimum</i>	<i>Dasya sessilis</i>
<i>Oscillatoria bonnemaisonii</i>	<i>Amphiroa rigida</i>	<i>Ceramium loueiri</i>	<i>Dasyphylla plumarioides</i>
<i>Oscillatoria corallinae</i>	<i>Amphiroa subcylindrica</i>	<i>Ceramium luetzelburgii</i>	<i>Dermonema frappieri</i>
<i>Oscillatoria curviceps</i>	<i>Amphiroa tribulus</i>	<i>Ceramium marshallense</i>	<i>Dicranema revolutum</i>
<i>Oscillatoria margaritifera</i>	<i>Amphiroa valonioides</i>	<i>Ceramium maryae</i>	<i>Digenea simplex</i>
<i>Oscillatoria nigroviridis</i>	<i>Amphiroa zonata</i>	<i>Ceramium mazatlanense</i>	<i>Dudresnaya</i> sp.
<i>Oscillatoria sancta</i>	<i>Anotrichium tenue</i>	<i>Ceramium multijugum</i>	<i>Enantiocladia okamuriae</i>
<i>Oscillatoria subbrevis</i>	<i>Antithamnion antillanum</i>	<i>Ceramium nitens</i>	<i>Endosiphonia spinuligera</i>
<i>Phormidium ambiguum</i>	<i>Antithamnion lherminieri</i>	<i>Ceramium personatum</i>	<i>Erythrocladia irregularis</i>
<i>Phormidium crosbyanum</i>	<i>Asparagopsis taxiformis</i>	<i>Ceramium serpens</i>	<i>Erythrocladia pinnata</i>
<i>Phormidium laysanense</i>	<i>Balliella subcorticata</i>	<i>Ceramium sinicola</i>	<i>Erythrocolon podagricum</i>
<i>Phormidium penicillatum</i>	<i>Bangia atropurpurea</i>	<i>Ceramium taylorii</i>	<i>Erythrotrichia bangioides</i>
<i>Phormidium persicinum</i>	<i>Bangia yamadae</i>	<i>Ceramium tenerimum</i>	<i>Erythrotrichia biseriata</i>
<i>Phormidium submembranaceum</i>	<i>Beckerella scalaramosa</i>	<i>Ceramium tenuissimum</i>	<i>Erythrotrichia parietalis</i>
<i>Phormidium tinctorium</i>	<i>Betaphycus philippinensis</i>	<i>Ceramium vagans</i>	<i>Eucheuma amakusaensis</i>
<i>Phormidium valderiae</i>	<i>Bostrychia binderi</i>	<i>Ceramium zacaе</i>	<i>Eucheuma arnoldii</i>
<i>Rivularia bullata</i>	<i>Bostrychia calliptera</i>	<i>Ceratodictyon spongiosum</i>	<i>Eucheuma crassum</i>
<i>Rivularia mesenterica</i>	<i>Bostrychia intricata</i>	<i>Chamaedoris orientalis</i>	<i>Eucheuma crustiforme</i>
<i>Rivularia nitida</i>	<i>Bostrychia kelanensis</i>	<i>Champia bifida</i>	<i>Eucheuma denticulatum</i>
<i>Rivularia polyotis</i>	<i>Bostrychia moritziana</i>	<i>Champia caespitosa</i>	= <i>E. spinosum</i>
<i>Schizothrix mexicana</i>	<i>Bostrychia radicans</i>	<i>Champia compressa</i>	= <i>E. muricatum</i>
<i>Scytonema hofman-bangii</i>	<i>Bostrychia simpliciuscula</i>	<i>Champia disticha</i>	<i>Eucheuma edule</i>

Table 2. (Continued).

<i>Eucheuma horridum</i>	<i>Gracilaria gigas</i>	<i>Hydrolithon reinboldii</i>	<i>Laurencia implicata</i>
<i>Eucheuma isiforme</i>	<i>Gracilaria incurvata</i>	<i>Hydropuntia edulis</i>	<i>Laurencia intermedia</i>
<i>Eucheuma leeuwenii</i>	<i>Gracilaria manilaensis</i>	(= <i>Gracilaria edulis</i>)	<i>Laurencia japonica</i>
<i>Eucheuma okamurae</i>	<i>Gracilaria minor</i>	<i>Hydropuntia eucheumatoides</i>	<i>Laurencia majuscula</i>
<i>Eucheuma serra</i>	<i>Gracilaria papenfussii</i>	(= <i>Gracilaria eucheumoides</i>)	<i>Laurencia mariannensis</i>
<i>Eupogodon antillarum</i>	<i>Gracilaria punctata</i>	<i>Hydropuntia urvillei</i>	<i>Laurencia nidifica</i>
<i>Eupogodon pilosus</i>	<i>Gracilaria salicornia</i>	(= <i>Gracilaria urvillei</i>)	<i>Laurencia nipponica</i>
<i>Euptilota</i> sp.	<i>Gracilaria spinigera</i>	<i>Hymenocladia dactyloides</i>	<i>Laurencia obtusa</i>
<i>Exophyllum wentii</i>	<i>Gracilaria spinulosa</i>	<i>Hypnea boergesenii</i>	<i>Laurencia okamurae</i>
<i>Falkenbergia hillebrandii</i>	<i>Gracilaria sullivani</i>	<i>Hypnea cenomyce</i>	<i>Laurencia palisada</i>
<i>Fauchea leptophylla</i>	<i>Gracilaria tenuistipitata</i>	<i>Hypnea cervicornis</i>	<i>Laurencia papillosa</i>
<i>Fosliella farinosa</i>	<i>Gracilaria textorii</i>	<i>Hypnea charoides</i>	<i>Laurencia parvipapillata</i>
<i>Galaxaura apiculata</i>	<i>Gracilaria turgida</i>	<i>Hypnea cornuta</i>	<i>Laurencia patentiramea</i>
<i>Galaxaura arborea</i>	<i>Gracilaria venezuelensis</i>	<i>Hypnea divaricata</i>	<i>Laurencia pinnata</i>
<i>Galaxaura contigua</i>	<i>Gracilaria vieillardii</i>	<i>Hypnea musciformis</i>	<i>Laurencia pinnatifida</i>
<i>Galaxaura falcata</i>	<i>Gracilariopsis baiinae</i>	<i>Hypnea nidulans</i>	<i>Laurencia poiteaui</i>
<i>Galaxaura fasciculata</i>	(= <i>Gracilaria heteroclada</i>)	<i>Hypnea pannosa</i>	<i>Laurencia subsimplex</i>
<i>Galaxaura filamentosa</i>	<i>Grateloupia conferta</i>	<i>Hypnea saidana</i>	<i>Laurencia surculigera</i>
<i>Galaxaura kjellmanii</i>	<i>Grateloupia dichotoma</i>	<i>Hypnea spinella</i>	<i>Laurencia tronoi</i>
<i>Galaxaura marginata</i>	<i>Grateloupia divaricata</i>	<i>Hypnea valentiae</i>	<i>Laurencia tropica</i>
<i>Galaxaura oblongata</i>	<i>Grateloupia doryphora</i>	<i>Hypoglossium serrulatum</i>	<i>Laurencia undulata</i>
<i>Galaxaura obtusata</i>	<i>Grateloupia filicina</i>	<i>Hypoglossium attenuatum</i>	<i>Laurencia venusta</i>
<i>Galaxaura rugosa</i>	<i>Grateloupia ramosissima</i>	<i>Hypoglossium heterocystideum</i>	<i>Laurencia yamadana</i>
<i>Galaxaura striata</i>	<i>Griffithsia ovalis</i>	<i>Hypoglossium spathulatum</i>	<i>Leathesia difformis</i>
<i>Galaxaura subfruticulosa</i>	<i>Griffithsia rhizophora</i>	<i>Jania adhaerens</i>	<i>Lenormandiopsis lorentzii</i>
<i>Galaxaura subverticillata</i>	<i>Griffithsia subcylindrica</i>	<i>Jania capillacea</i>	<i>Levillea jungermannioides</i>
<i>Gardnerula corymbosa</i>	<i>Gymnogongrus dilatatus</i>	<i>Jania decussato-dichotoma</i>	<i>Liagora boergesenii</i>
<i>Gelidiella acerosa</i>	<i>Gymnogongrus divaricatus</i>	<i>Jania longiarthra</i>	<i>Liagora canariensis</i>
<i>Gelidiella adnata</i>	<i>Gymnogongrus flabelliformis</i>	<i>Jania micrarthra</i>	<i>Liagora ceranoides</i>
<i>Gelidiella taylorii</i>	<i>Gymnogongrus pygmaeus</i>	<i>Jania pacifica</i>	<i>Liagora divaricata</i>
<i>Gelidiopsis intricata</i>	<i>Gymnothamnion elegans</i>	<i>Jania pumila</i>	<i>Liagora farinosa</i>
<i>Gelidiopsis repens</i>	<i>Haliptilon cubense</i>	<i>Jania rubens</i>	<i>Liagora hawaiiiana</i>
<i>Gelidiopsis variabilis</i>	<i>Haloplegma duperreyi</i>	<i>Jania tenella</i>	<i>Liagora japonica</i>
<i>Gelidium amansii</i>	<i>Halymenia acuminata</i>	<i>Jania unguata</i>	<i>Liagora orientalis</i>
<i>Gelidium capense</i>	<i>Halymenia dilatata</i>	<i>Kallymenia callophyloides</i>	<i>Liagora robusta</i>
<i>Gelidium coulteri</i>	<i>Halymenia durvillei</i>	<i>Kallymenia denticulata</i>	<i>Liagora segawae</i>
<i>Gelidium crinale</i>	<i>Halymenia floresia</i>	<i>Kallymenia pacifica</i>	<i>Liagora setchellii</i>
<i>Gelidium divaricatum</i>	<i>Halymenia formosa</i>	<i>Kallymenia perforata</i>	<i>Liagora tenuis</i>
<i>Gelidium isabelae</i>	<i>Halymenia harveyana</i>	<i>Kallymenia rosea</i>	<i>Liagora valida</i>
<i>Gelidium kintaroi</i>	<i>Halymenia japonica?</i>	<i>Kallymenia sessilis</i>	<i>Liagoropsis schrammii</i>
<i>Gelidium pulchellum</i>	<i>Halymenia maculata</i>	<i>Kappaphycus alvarezii</i>	<i>Lithophyllum byssoides</i>
<i>Gelidium pusillum</i>	<i>Halymenia microcarpa</i>	<i>Kappaphycus cottonii</i>	<i>Lithophyllum moluccense</i>
<i>Gelidium rigens</i>	<i>Halymenia stipitata</i>	<i>Kappaphycus procrusteanum</i>	<i>Lithophyllum pallescens</i>
<i>Gigartina tenella</i>	<i>Helminthocladia australis</i>	<i>Kappaphycus striatum</i>	<i>Lithoporella indica</i>
<i>Gloiocladia ramellifera</i>	<i>Herposiphonia crassa</i>	<i>Laurencia brongniartii</i>	<i>Lithoporella melobesioides</i>
<i>Gloiopeltis complanata</i>	<i>Herposiphonia delicatula</i>	<i>Laurencia capituliformis</i>	<i>Lophocladia lallemandi</i>
<i>Gloiopeltis tenax</i>	<i>Herposiphonia dendroidea</i>	<i>Laurencia caraibica</i>	<i>Lophosiphonia cristata</i>
<i>Goniotrichum alsidii</i>	<i>Herposiphonia nuda</i>	<i>Laurencia carolinensis</i>	<i>Martensia australis</i>
<i>Gordoniella yonakuniensis</i>	<i>Herposiphonia obscura</i>	<i>Laurencia cartilaginea</i>	<i>Martensia flabelliformis</i>
<i>Gracilaria arcuata</i>	<i>Herposiphonia pacifica</i>	<i>Laurencia ceylanica</i>	<i>Martensia fragilis</i>
<i>Gracilaria blodgettii</i>	<i>Herposiphonia parca</i>	<i>Laurencia chondrioides</i>	<i>Martensia martensii</i>
<i>Gracilaria bursa-pastoris</i>	<i>Herposiphonia plumula</i>	<i>Laurencia clavata</i>	= <i>Opephyllum martensii</i>
<i>Gracilaria canaliculata</i>	<i>Herposiphonia secunda</i>	<i>Laurencia columellaris</i>	<i>Martensia speciosa</i>
<i>Gracilaria changii</i>	<i>Herposiphonia subdisticha</i>	<i>Laurencia composita</i>	<i>Mastophora rosea</i>
<i>Gracilaria coronopifolia</i>	<i>Herposiphonia tenella</i>	<i>Laurencia corallopsis</i>	<i>Melanamansia glomerata</i>
<i>Gracilaria cylindrica</i>	<i>Herposiphonia trichia</i>	<i>Laurencia decumbens</i>	= <i>Amansia glomerata</i>
<i>Gracilaria damaecornis</i>	<i>Heterosiphonia crispella</i>	<i>Laurencia distichophylla</i>	<i>Melanamansia pumila</i>
<i>Gracilaria disticha</i>	<i>Heterosiphonia muelleri</i>	<i>Laurencia flexilis</i>	<i>Meristoheca coacta</i>
<i>Gracilaria firma</i>	<i>Hormothamnium</i>	<i>Laurencia forsteri</i>	<i>Meristoheca papulosa</i>
<i>Gracilaria foliifera</i>	<i>enteromorphoides</i>	<i>Laurencia glandulifera</i>	<i>Mesophyllum erubescens</i>

Table 2. (Continued).

<i>Mesophyllum imbricatum</i>	<i>Portieria hornemanni</i>	OCHROPHYTA	<i>Padina tetrastomatica</i>
<i>Mesophyllum pulchrum</i>	<i>Portieria japonica</i>	<i>Chnoospora implexa</i>	<i>Phaeophila dendroides</i>
<i>Mesophyllum siamense</i>	<i>Prionitis cornea</i>	<i>Chnoospora minima</i>	<i>Ralfsia fungiformis</i>
<i>Mesophyllum simulans</i>	<i>Prionitis formosana</i>	<i>Chnoospora pannosa</i>	<i>Sargassum abbotiae</i>
<i>Microcladia elegans</i>	<i>Pterocladia caloglossoides</i>	<i>Colpomenia sinuosa</i>	<i>Sargassum aemulum</i>
<i>Microcladia glandulosa</i>	<i>Pterocladia capillacea</i>	<i>Cystoseira hakodatensis</i>	<i>Sargassum agardhianum</i>
<i>Neogoniolithon frutescens</i>	<i>Pterocladia densa</i>	<i>Dictyopteris camiguinensis</i>	<i>Sargassum angii</i>
<i>Neogoniolithon megalocystum</i>	<i>Pterocladia nana</i>	<i>Dictyopteris delicatula</i>	<i>Sargassum baccularia</i>
<i>Neurymenia fraxinifolia</i>	<i>Ptilothamnion cladophorae</i>	<i>Dictyopteris divaricata</i>	<i>Sargassum balingasayense</i>
<i>Palmaria palmata</i>	<i>Renouxia antillana</i>	<i>Dictyopteris jamaicensis</i>	<i>Sargassum bataanense</i>
<i>Peyssonnelia calcea</i>	<i>Rhodopeltis borealis</i>	<i>Dictyopteris polypodioides</i>	<i>Sargassum belangeri</i>
<i>Peyssonnelia conchicola</i>	<i>Rhodopeltis gracilis</i>	<i>Dictyopteris repens</i>	<i>Sargassum berberifolium</i>
<i>Peyssonnelia distenta</i>	<i>Rhodorus marinus</i>	<i>Dictyopteris undulata</i>	<i>Sargassum bifforme</i>
<i>Peyssonnelia evae</i>	<i>Rhodymenia californica</i>	<i>Dictyota bartayresiana</i>	<i>Sargassum binderi</i>
<i>Peyssonnelia foveolata</i>	<i>Rhodymenia coacta</i>	<i>Dictyota bidentata</i>	<i>Sargassum cervicorne</i>
<i>Peyssonnelia indica</i>	<i>Rhodymenia decumbens</i>	<i>Dictyota cervicornis</i>	<i>Sargassum cinctum</i>
<i>Peyssonnelia luzonensis</i>	<i>Rhodymenia intricata</i>	<i>Dictyota ceylanica</i>	<i>Sargassum confusum</i>
<i>Peyssonnelia mariti</i>	<i>Rosenvingea intricata</i>	<i>Dictyota ciliolata</i>	<i>Sargassum conderoi</i>
<i>Peyssonnelia obscura</i>	<i>Rosenvingea orientalis</i>	<i>Dictyota dentata</i>	<i>Sargassum crassifolium</i>
<i>Peyssonnelia rubra</i>	<i>Sarcodia montagneana</i>	<i>Dictyota dichotoma</i>	<i>Sargassum cristaefolium</i>
<i>Peyssonnelia squamaria</i>	<i>Sarconema filiforme</i>	<i>Dictyota divaricata</i>	<i>Sargassum currimaoense</i>
<i>Phyllophora submaritima</i>	<i>Scinaia aborealis</i>	<i>Dictyota friabilis</i>	<i>Sargassum cystocarpum</i>
<i>Phymatholithon calcareum</i>	<i>Scinaia hormoides</i>	<i>Dictyota indica</i>	<i>Sargassum cystophyllum</i>
<i>Phymatholithon purpureum</i>	<i>Scinaia japonica</i>	<i>Dictyota lata</i>	<i>Sargassum dotyi</i>
<i>Pleonosporium globuliferum</i>	<i>Scinaia latifrons</i>	<i>Dictyota linearis</i>	<i>Sargassum droserifolium</i>
<i>Plocamium costatum</i>	<i>Scinaia moniliformis</i>	<i>Dictyota major</i>	<i>Sargassum duplicatum</i>
<i>Plocamium patens</i>	<i>Scinaia tsinglanensis</i>	<i>Dictyota mertensii</i>	<i>Sargassum elongatum</i>
<i>Plocamium telfairiae</i>	<i>Sebdenia flabellata</i>	<i>Dictyota patens</i>	<i>Sargassum esperi</i>
<i>Polycavernosa debilis</i>	<i>Sebdenia limensis</i>	<i>Dilophus okamurae</i>	<i>Sargassum feldmannii</i>
<i>Polycavernosa vanbosseae</i>	<i>Sebdenia yamadae</i>	<i>Feldmannia columellaris</i>	<i>Sargassum filicinum</i>
<i>Polysiphonia apiculata</i>	<i>Solieria dura</i>	<i>Feldmannia formosana</i>	<i>Sargassum filifolium</i>
<i>Polysiphonia beaudettei</i>	<i>Solieria pacifica</i>	<i>Feldmannia indica</i>	<i>Sargassum filiforme</i>
<i>Polysiphonia ferulacea</i>	<i>Sporolithon erythraeum</i>	<i>Feldmannia irregularis</i>	<i>Sargassum fluitans</i>
<i>Polysiphonia flabelluta</i>	<i>Sporolithon schmidtii</i>	<i>Hincksia breviarticulata</i>	<i>Sargassum fulvellum</i>
<i>Polysiphonia forfex</i>	<i>Sporolithon sibogae</i>	<i>Hincksia mitchelliae</i>	<i>Sargassum furcatum</i>
<i>Polysiphonia fragilis</i>	<i>Sporolithon timorense</i>	<i>Hincksia rallsiae</i>	<i>Sargassum gaudichaudii</i>
<i>Polysiphonia gorgoniae</i>	<i>Spyridia filamentosa</i>	<i>Hormophysa cuneiformis</i>	<i>Sargassum giganteifolium</i>
<i>Polysiphonia hawaiiensis</i>	<i>Spyridia velasquezii</i>	<i>Hydroclathrus clathratus</i>	<i>Sargassum gracile</i>
<i>Polysiphonia howei</i>	<i>Taenioma perpusillum</i>	<i>Hydroclathrus tenuis</i>	<i>Sargassum gracillimum</i>
<i>Polysiphonia mollis</i>	<i>Tapeinodasya bornetii</i>	<i>Lobophora variegata</i>	<i>Sargassum granuliferum</i>
<i>Polysiphonia pacifica</i>	<i>Thamnoclonium procumbens</i>	<i>Lomentaria articulata</i>	<i>Sargassum hemiphyllum</i>
<i>Polysiphonia poko</i>	<i>Thamnoclonium treubii</i>	<i>Lomentaria baileyana</i>	<i>Sargassum heterocystum</i>
<i>Polysiphonia savatieri</i>	<i>Titanophora incrustans</i>	<i>Lomentaria hakodatensis</i>	<i>Sargassum ilicifolium</i>
<i>Polysiphonia scopulorum</i>	<i>Titanophora weberae</i>	<i>Lomentaria pinnata</i>	<i>Sargassum kushimotense</i>
<i>Polysiphonia setacea</i>	<i>Tolypiocladia calodictyon</i>	<i>Mesospora negrosensis</i>	<i>Sargassum latifolium</i>
<i>Polysiphonia sparsa</i>	<i>Tolypiocladia condensata</i>	<i>Myagropsis myagroides</i>	<i>Sargassum microcystum</i>
<i>Polysiphonia sphaerocarpa</i>	<i>Tolypiocladia glomerulata</i>	(= <i>Cystophyllum</i>	<i>Sargassum microphyllum</i>
<i>Polysiphonia subtilissima</i>	<i>Trichogloea requienii</i>	<i>sisymbrioides</i>)	<i>Sargassum miyabei</i>
<i>Polysiphonia tepida</i>	<i>Vanvoorstia spectabilis</i>	<i>Ostreobium quekettii</i>	<i>Sargassum myriocystum</i>
<i>Polysiphonia triton</i>	<i>Vidalia obtusiloba</i>	<i>Padina arborescens</i>	<i>Sargassum natans</i>
<i>Polysiphonia tsudana</i>	<i>Wrangelia argus</i>	<i>Padina australis</i>	<i>Sargassum nigrifolium</i>
<i>Polysiphonia upolensis</i>	<i>Wrangelia bicuspidata</i>	<i>Padina boryana</i>	<i>Sargassum ohnoi</i>
<i>Polystrata dura</i>	<i>Wrangelia penicillata</i>	<i>Padina crassa</i>	<i>Sargassum oligocystum</i>
<i>Porolithon onkodes</i>	<i>Wrangelia plumosa</i>	<i>Padina distromatica</i>	<i>Sargassum oocyste</i>
<i>Porphyra atropurpurea</i>	<i>Wrangelia velutina</i>	<i>Padina fraseri</i>	<i>Sargassum paniculatum</i>
<i>Porphyra crispata</i>	<i>Wurdemannia miniata</i>	<i>Padina gymnospora</i>	<i>Sargassum parvifolium</i>
<i>Porphyra denticulata</i>	<i>Yamadaella caenomyces</i>	<i>Padina japonica</i>	<i>Sargassum philippinense</i>
<i>Porphyra marcosii</i>	<i>Zellera tawallina</i>	<i>Padina minor</i>	<i>Sargassum piluliferum</i>
<i>Porphyra suborbiculata</i>		<i>Padina pavonica</i>	<i>Sargassum polyceratium</i>
<i>Porphyra variegata</i>		<i>Padina sanctae-crusis</i>	<i>Sargassum polycystum</i>

Table 2. (Continued).

<i>Sargassum pteropleuron</i>	<i>Avrainvillea nigricans</i>	<i>Cladophora aokii</i>	<i>Enteromorpha flexuosa</i>
<i>Sargassum sagamianum</i>	<i>Avrainvillea obscura</i>	<i>Cladophora catenata</i>	<i>Enteromorpha intestinalis</i>
<i>Sargassum samarense</i>	<i>Boergesenia forbesii</i>	<i>Cladophora conferta</i>	<i>Enteromorpha kylinii</i>
<i>Sargassum sandei</i>	<i>Boodlea coacta</i>	<i>Cladophora crispula</i>	<i>Enteromorpha lingulata</i>
<i>Sargassum serratifolium</i>	<i>Boodlea composita</i>	<i>Cladophora crucigera</i>	<i>Enteromorpha prolifera</i>
<i>Sargassum siliquosum</i>	<i>Boodlea montagnei</i>	<i>Cladophora crystallina</i>	<i>Enteromorpha ramulosa</i>
<i>Sargassum spinifex</i>	<i>Boodlea struveoides</i>	<i>Cladophora cymopolia</i>	<i>Ernodesmis verticillata</i>
<i>Sargassum subspathulatum</i>	<i>Boodleopsis pusilla</i>	<i>Cladophora dalmatica</i>	<i>Halicoryne wrightii</i>
<i>Sargassum sullivani</i>	<i>Boodleopsis verticillata</i>	<i>Cladophora filipendula</i>	<i>Halimeda bikinensis</i>
<i>Sargassum tenerrimum</i>	<i>Bornetella nitida</i>	<i>Cladophora inserta</i>	<i>Halimeda copiosa</i>
<i>Sargassum turbinarioides</i>	<i>Bornetella oligospora</i>	<i>Cladophora japonica</i>	<i>Halimeda cuneata</i>
<i>Sargassum umezakii</i>	<i>Bornetella ovalis</i>	<i>Cladophora laetevirens</i>	<i>Halimeda cylindracea</i>
<i>Sargassum velasquezii</i>	<i>Bornetella sphaerica</i>	<i>Cladophora liebetruthii</i>	<i>Halimeda discoidea</i>
<i>Sargassum vulgare</i>	<i>Bryopsis corticulans</i>	<i>Cladophora pellucida</i>	<i>Halimeda fragilis</i>
<i>Sargassum yendoii</i>	<i>Bryopsis indica</i>	<i>Cladophora prolifera</i>	<i>Halimeda gigas</i>
<i>Sargassum yoshidae</i>	<i>Bryopsis pennata</i>	<i>Cladophora quisumbingii</i>	<i>Halimeda gracilis</i>
<i>Spatoglossum asperum</i>	<i>Bryopsis plumosa</i>	<i>Cladophora rupestris</i>	<i>Halimeda incrassata</i>
<i>Spatoglossum pacificum</i>	<i>Caulerpa ambigua</i>	<i>Cladophora sakaii</i>	<i>Halimeda lacunalis</i>
<i>Spatoglossum variabile</i>	<i>Caulerpa arenicola</i>	<i>Cladophora sericea</i>	<i>Halimeda macroloba</i>
<i>Sphacelaria mucifera</i>	<i>Caulerpa brachypus</i>	<i>Cladophora sibogae</i>	<i>Halimeda macrophysa</i>
<i>Sphacelaria novae-hollandiae</i>	<i>Caulerpa cupressoides</i>	<i>Cladophora vagabunda</i>	<i>Halimeda micronesica</i>
<i>Sphacelaria rigidula</i>	<i>Caulerpa elongata</i>	<i>Cladophora wrightiana</i>	<i>Halimeda opuntia</i>
<i>Sphacelaria tribuloides</i>	<i>Caulerpa fastigiata</i>	<i>Cladophoropsis dichotoma</i>	<i>Halimeda renschii</i>
<i>Stypopodium flabelliforme</i>	<i>Caulerpa fergusonii</i>	<i>Cladophoropsis fasciculata</i>	<i>Halimeda simulans</i>
<i>Stypopodium lobatum</i>	<i>Caulerpa filicoides</i>	<i>Cladophoropsis gracillima</i>	<i>Halimeda stuposa</i>
<i>Turbinaria condensata</i>	<i>Caulerpa lentillifera</i>	<i>Cladophoropsis membranacea</i>	<i>Halimeda taenicola</i>
<i>Turbinaria conoides</i>	<i>Caulerpa lessonii</i>	<i>Cladophoropsis neocaledonica</i>	<i>Halimeda tuna</i>
<i>Turbinaria decurrens</i>	<i>Caulerpa mexicana</i>	<i>Cladophoropsis philippinensis</i>	<i>Halimeda velasquezii</i>
<i>Turbinaria denudata</i>	<i>Caulerpa microphysa</i>	<i>Cladophoropsis sundanensis</i>	<i>Microdictyon agardhianum</i>
<i>Turbinaria filamentosa</i>	<i>Caulerpa parvifolia</i>	<i>Cladophoropsis</i>	<i>Microdictyon boergesenii</i>
<i>Turbinaria luzonensis</i>	<i>Caulerpa peltata</i>	<i>vaucheriaeformis</i>	<i>Microdictyon clathratum</i>
<i>Turbinaria murrayana</i>	<i>Caulerpa prolifera</i>	<i>Cladophoropsis zollingeri</i>	<i>Microdictyon curtissiae</i>
<i>Turbinaria ornata</i>	<i>Caulerpa racemosa</i>	<i>Codium arabicum</i>	<i>Microdictyon japonicum</i>
<i>Turbinaria trialata</i>	<i>Caulerpa reyesii</i>	<i>Codium bartlettii</i>	<i>Microdictyon okamurae</i>
<i>Turbinaria turbinata</i>	<i>Caulerpa selago</i>	<i>Codium contractum</i>	<i>Monostroma latissimum</i>
<i>Turbinaria vulgaris</i>	<i>Caulerpa serrulata</i>	<i>Codium cylindricum</i>	<i>Monostroma nitidum</i>
<i>Zonaria diesingiana</i>	<i>Caulerpa sertularioides</i>	<i>Codium spongiosum</i>	<i>Monostroma oxyspermum</i>
	<i>Caulerpa subserrata</i>	(= <i>C. difforme</i>)	<i>Neomeris annulata</i>
CHLOROPHYTA	<i>Caulerpa taxifolia</i>	<i>Codium edule</i>	<i>Neomeris vanbosseae</i>
<i>Acetabularia calyculus</i>	<i>Caulerpa urvilliana</i>	<i>Codium papillatum</i>	<i>Pedobesia ryukyuensis</i>
<i>Acetabularia clavata</i>	<i>Caulerpa verticillata</i>	(= <i>C. elongatum</i>)	<i>Rhizophlopsis carolyinae</i>
<i>Acetabularia crenulata</i>	<i>Caulerpa vesiculifera</i>	<i>Codium fragile</i>	<i>Rhizoclonium africanum</i>
<i>Acetabularia dentata</i>	<i>Caulerpa webbiana</i>	<i>Codium geppii</i>	<i>Rhizoclonium grande</i>
<i>Acetabularia exigua</i>	<i>Chaetomorpha aerea</i>	<i>Codium intricatum</i>	<i>Rhizoclonium kernerii</i>
<i>Acetabularia major</i>	<i>Chaetomorpha antennina</i>	<i>Codium muelleri</i>	<i>Rhizoclonium kochianum</i>
<i>Acetabularia minutissima</i>	<i>Chaetomorpha brachygona</i>	<i>Codium ovale</i>	<i>Rhizoclonium riparium</i>
<i>Acetabularia moebii</i>	<i>Chaetomorpha crassa</i>	<i>Codium papillatum</i>	<i>Rhizoclonium setaceum</i>
<i>Acetabularia parvula</i>	<i>Chaetomorpha gracilis</i>	<i>Codium platyclados</i>	<i>Spirulina major</i>
<i>Acetabularia ryukyuensis</i>	<i>Chaetomorpha inflata</i>	<i>Codium pugniforme</i>	<i>Struvea anastomosans</i>
= <i>A. roxasii</i>	<i>Chaetomorpha kellersii</i>	<i>Codium tenue</i>	<i>Struvea ramosa</i>
<i>Acetabularia velasquezii</i>	<i>Chaetomorpha ligustica</i>	<i>Codium tomentosum</i>	<i>Tydemania expeditionis</i>
<i>Anadyomene brownii</i>	<i>Chaetomorpha linum</i>	<i>Cymopolia vanbosseae</i>	<i>Udotea argentea</i>
<i>Anadyomene esepata</i>	<i>Chaetomorpha spiralis</i>	<i>Dasycladus vermicularis</i>	<i>Udotea flabellum</i>
<i>Anadyomene leclancheri</i>	<i>Chlorocladus australasicus</i>	<i>Derbesia attenuata</i>	<i>Udotea geppii</i>
<i>Anadyomene plicata</i>	<i>Chlorocladus philippinensis</i>	<i>Derbesia marina</i>	<i>Udotea glaucescens</i>
<i>Anadyomene stellata</i>	<i>Chlorodesmis caespitosa</i>	<i>Dictyosphaeria cavernosa</i>	<i>Udotea indica</i>
<i>Anadyomene wrightii</i>	<i>Chlorodesmis fastigiata</i>	<i>Dictyosphaeria intermedia</i>	<i>Udotea javensis</i>
<i>Avrainvillea erecta</i>	<i>Chlorodesmis hildebrandtii</i>	<i>Dictyosphaeria ocellata</i>	<i>Udotea occidentalis</i>
<i>Avrainvillea lacerata</i>	<i>Chlorodesmis major</i>	<i>Dictyosphaeria versluisii</i>	<i>Udotea orientalis</i>
<i>Avrainvillea longicaulis</i>	<i>Cladophora albida</i>	<i>Enteromorpha compressa</i>	<i>Ulva compressa</i>

Table 2. (Continued).

<i>Ulva fasciata</i>	<i>Ulva pertusa</i>	<i>Valonia aegagropila</i>	<i>Valonia utricularis</i>
<i>Ulva intestinalis</i>	<i>Ulva reticulata</i>	<i>Valonia confervoides</i>	<i>Valonia ventricosa</i>
<i>Ulva lactuca</i>	<i>Ulva rigida</i>	<i>Valonia fastigiata</i>	<i>Valoniopsis pachynema</i>
<i>Ulva latissima</i>	<i>Ulva umbilicalis</i>	<i>Valonia macrophysa</i>	

1992a), and *Porphyra* (Masuda et al. 1991).

A great advancement in biodiversity studies on marine benthic algae started to emerge in this era for Philippine materials. Molecular genetics become a tool that gives light to complex taxonomic problems involving the identity and phylogenetic affinities of various taxa. The works of Kapraun et al. (1996) on *Gracilaria*, and Fredericq et al. (1999) on the Solieriaceae are pioneering for Philippine species.

In the coming 21st century, with the advancement and refinement of methodologies involved in molecular genetic studies, though we have and will significantly benefit from the knowledge gained from the results, there should be an awareness that the correctness of these relies on the correct identification of specimens being used for analysis.

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