

**CHECKLIST AND BIBLIOGRAPHY  
OF THE MARINE BENTHIC ALGAE  
FROM ISLANDS AND ATOLLS  
WITHIN YAP STATE,  
FEDERATED STATES OF MICRONESIA**

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**Checklist and Bibliography  
of the Marine Benthic Algae  
from Islands and Atolls within Yap State,  
Federated States of Micronesia**

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## INTRODUCTION

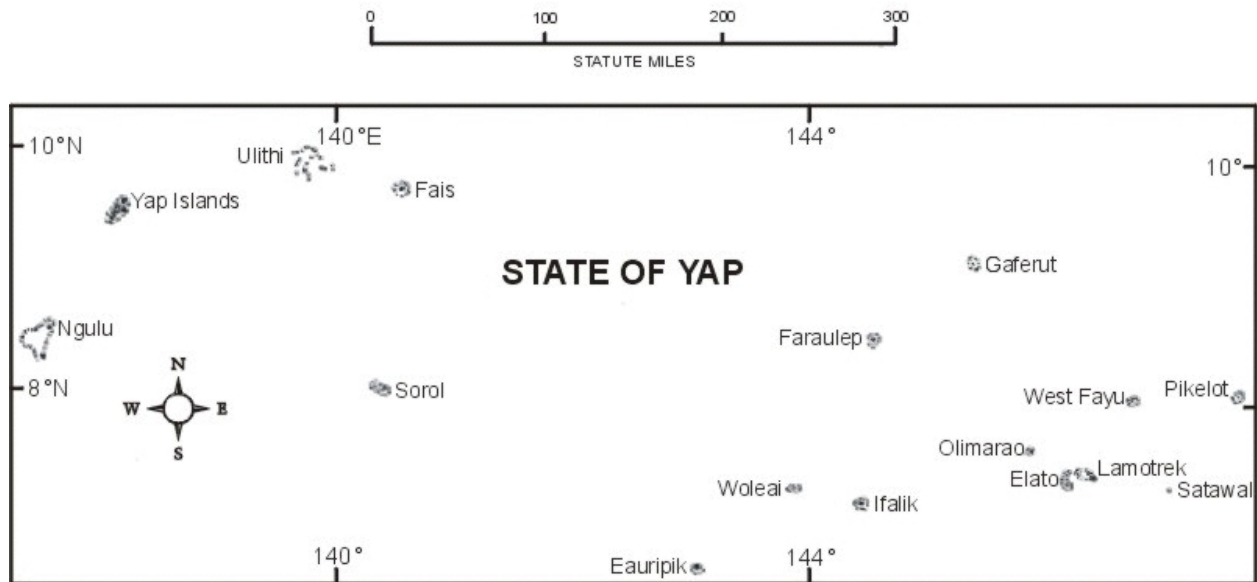
The checklist of marine benthic algae from Yap and the atolls of Ulithi, Ifalik and Sorol within Yap State (Figure 1) is based on the compilation from past references (Tsuda and Wray, 1977; Tsuda, 1978, 1981) and subsequent phycological studies conducted within Yap State, Federated States of Micronesia. Floristic studies on the marine benthic algae within Yap State were initiated by Reinbold (1901), Okamura (1904, 1916) and Tokida (1939). Schmidt (1928) included species from Yap in his compilation of 484 species of marine benthic algae from the tropical western Pacific Ocean. Abbott (1961) recorded 85 species of marine benthic algae from Ifalik (Ifaluk) Atoll. Trono (1968, 1969, 1971) published his Ph.D. dissertation studies on the marine benthic algae of the Caroline Islands which included algae from Yap, Ifalik Atoll and Sorol Atoll. Tsuda and Belk (1972) recorded 23 species of marine benthic algae from Yap not previously reported in the literature.

Other studies targeted selected genera which included species from Yap and adjacent atolls, i.e., *Caulerpa* (Taylor, 1975, 1977), *Polysiphonia* (Hollenberg, 1968a), *Herposiphonia* (Hollenberg, 1968b), *Ulva* (Tsuda, 1982), *Sargassum* (DeWreede, 1973; Tsuda, 1976, 1988), *Rhipilia* (Gilbert, 1978), *Avrainvillea* (Olsen-Stojkovich, 1985), *Gracilaria* (Tsuda, 1985; Meneses and Abbott, 1987) and *Trichosolen* [= *Pseudobryopsis*] (Enomoto et al., 1987). Lassuy (1980) reported the algae present within the territorial habitat of the damselfish, *Hemiglyphidodon plagiometopon*, at Tamil Harbor, Yap.

Twenty new species records of marine benthic algae for Yap State are included in five technical reports by faculty, staff and graduate students of the University of Guam Marine Laboratory applicable to Yap and Ulithi Atoll, i.e., sewer outfall site at Donitsch Island, Yap (Amesbury et al., 1976), dock site at Colonia, Yap (Amesbury et al., 1977), potential sewer outfall sites at Balabat and Pelak in Yap, and at Falalop Islet in Ulithi Atoll (Tsuda et al., 1978), Yap reef flat and lagoonal holes (Hedlund and Tsuda, 1978; Tsuda, 1978) and dredging site at Yyin in Yap (Amesbury and Tsuda, 2002). Although few algal voucher specimens are available from these studies, the algal studies reported in the technical reports provide quantitative information on the marine benthic algae within each of the study sites. The "Yap Island Coastal Resource Inventory" by Orcutt et al. (1989) included 34 species of marine benthic algae observed and identified at 24 of the Yap Coastal Resource Inventory stations by a University of Guam Marine Laboratory algal team during an economic algal survey of Yap lagoon (Tsuda et al., 1987).

The seagrasses constitute a significant component of the marine flora within Yap lagoon (Volkens, 1901; den Hartog, 1970; Tsuda et al., 1977; Kock and Tsuda, 1978; McMillan et al., 1982; McMillan, 1983; Bridges and McMillan, 1986; and Tsuda and Kamura, 1990). The seven species found in Yap are *Syringodium isoetifolium* (Ascherson) Dandy, *Cymodocea rotundata* Ehrenberg & Hemprich ex Ascherson, *Cymodocea serrulata* (R. Brown) Ascherson and Magnus, *Enhalus acoroides* (Linnaeus f.) Royle, *Thalassia hemprichii* (Ehrenberg) Ascherson, *Halophila minor* (Zollinger) den Hartog and *Halophila ovalis* (R. Brown) Hooker f.

# FEDERATED STATES OF MICRONESIA



**Figure 1. Map of Yap State, Federated States of Micronesia (Adapted from Motteler, 1986).**

The classification system follows Silva et al. (1996), and synonymies are according to Silva et al. (1987) and Silva et al. (1996). The two species described as new based on the type specimens from Yap and Ifalik Atoll, respectively, are designated in boldface. Species reported by Abbott (1961), Trono (1968, 1969, 1971), Hollenberg (1968a, 1968b), Taylor (1977), Tsuda et al. (1978) and Olsen-Stojkovich (1985) from the outer islands (atolls) of Yap State, i.e., Ifalik Atoll, Sorol Atoll and Ulithi Atoll, are listed with their respective atolls. All other collections were made from Yap.

I acknowledge Barry D. Smith, University of Guam Marine Laboratory, for his assistance with the graphics. The report was printed with funds provided by the Marine Resources Pacific Consortium (MAREPAC).



## SPECIES AND REFERENCES

### Division CYANOPHYTA (Blue-Green Algae/Cyanobacteria)

#### Class Cyanophyceae

#### Order Oscillatoriales

##### Family Oscillatoriaceae

*Lyngbya majuscula* (Dillwyn) Harvey. YAP: Reinbold (1901), Okamura (1904), Tokida (1939), Trono (1968); Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Lassuy (1980) and Orcutt et al. (1989) as *Microcoleus lyngbyaceus* (Kützing) P. Crouan & H. Crouan. ULITHI: Tsuda et al. (1978) as *Microcoleus lyngbyaceus*.

##### Family Phormidiaceae

*Spirulina subsalsa* Oersted. YAP: Tsuda and Belk (1972).

##### Family Schizothrichaceae

*Schizothrix calcicola* (C. Agardh) Gomont. YAP: Trono (1968), Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989). IFALIK: Trono (1968). ULITHI: Tsuda et al. (1978).

*Schizothrix mexicana* Gomont. YAP: Tsuda and Belk (1972), Hedlund and Tsuda (1978), Tsuda et al. (1978). ULITHI: Tsuda et al. (1978).

#### Order Nostocales

##### Family Nostocaceae

*Hormothamnium enteromorphoides* Grunow. YAP: Tsuda et al. (1978) and Orcutt et al. (1989) as *Hormothamnium enteromorphoides* Grunow.

*Hormothamnium solutum* Bornet & Flahault. YAP: Tsuda and Belk (1972) as *Hormothamnium solutum* Bornet & Flahault.

##### Family Rivulariaceae

*Calothrix confervicola* (Dillwyn) C. Agardh. YAP: Tsuda and Belk (1972).

*Calothrix crustacea* Thuret. YAP: Amesbury et al. (1976, 1977), Lassuy (1980).

*Calothrix pilosa* Harvey. YAP: Tsuda and Belk (1972).

*Dichothrix penicillata* Zanardini. YAP: Okamura (1904), Tokida (1939).

## Order Stigonematales

### Family Mastigocladaceae

*Brachytrichia quoyi* (C. Agardh) Bornet & Flahault. YAP: Amesbury et al. (1978).

## Division CHLOROPHYTA (Green Algae)

### Class Chlorophyceae

#### Order Ctenocladales

### Family Ulvellaceae

*Ulvella lens* P. Crouan and H. Crouan. IFALIK: Abbott (1961).

#### Order Ulvales

### Family Ulvaceae

*Enteromorpha clathrata* (Roth) Greville. YAP: Tsuda (1978), Lassuy (1980). ULITHI:  
Tsuda et al. (1978).

*Enteromorpha kylinii* Bliding. YAP: Tsuda and Belk (1972).

*Enteromorpha lingulata* J. Agardh. IFALIK: Abbott (1961).

*Enteromorpha torta* (Mertens) Reinbold. IFALIK: Abbott (1961).

*Ulva lactuca* Linnaeus. YAP: Tsuda (1978), Tsuda et al. (1978), Tsuda (1982).

#### Order Cladophorales

### Family Anadyomenaceae

*Anadyomene wrightii* Harvey ex Gray. YAP: Okamura (1916), Schmidt (1928), Tokida  
(1939), Amesbury et al. (1976, 1977). IFALIK: Abbott (1961).

*Microdictyon okamurai* Setchell. IFALIK: Abbott (1961), Trono (1968).

*Microdictyon pseudohapteron* A.Gepp & E. Gepp. YAP: Okamura (1916), Schmidt (1928),  
Tokida (1939).

### Family Cladophoraceae

*Chaetomorpha antennina* (Bory de Saint-Vincent) Kützing. IFALIK: Abbott (1961).

*Chaetomorpha crassa* (C. Agardh) Kützing. YAP: Tsuda and Belk (1972).

*Chaetomorpha linum* (O.F. Müller) Kützing. YAP: Reinbold (1901).

*Cladodophora catenata* (Linnaeus) Kützing [= *Cladophora fuliginosa* Kützing]. IFALIK: Abbott (1961) as *C. fuliginosa*.  
*Rhizoclonium samoense* Setchell. IFALIK: Abbott (1961).

### Family Siphonocladaceae

*Boergesenia forbesii* (Harvey) Feldmann. YAP: Tsuda (1978), Tsuda et al. (1978).  
ULITHI: Tsuda et al. (1978).  
*Boodlea coacta* (Dickie) Murray & DeToni. YAP: Okamura (1904, 1916), Schmidt (1928),  
Tokida (1939).  
*Boodlea composita* (Harvey) Brand [= *Boodlea siamensis* Reinbold]. YAP: Tokida (1939)  
as *B. siamensis*, Amesbury et al. (1976, 1977), Tsuda et al. (1978). IFALIK: Abbott  
(1961). ULITHI: Tsuda et al. (1978).  
*Boodlea vanbosseae* Reinbold. YAP: Okamura (1916), Tokida (1939).  
*Cladophoropsis* sp. ULITHI: Tsuda et al. (1978).  
*Dictyosphaeria cavernosa* (Forsskål) Børgesen [= *Dictyosphaeria favulosa* (C. Agardh)  
Decaisne ex Endlicher]. YAP: Okamura (1904, 1916) and Schmidt (1928) as *D.*  
*favulosa*, Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al.  
(1978). IFALIK: Abbott (1961), Trono (1968). ULITHI: Tsuda et al. (1978).  
*Dictyosphaeria versluysii* Weber-van Bosse. YAP: Tokida (1939), Tsuda and Belk (1972),  
Orcutt et al. (1989). IFALIK: Abbott (1961).  
*Siphonocladus* sp. YAP: Okamura (1904), Tokida (1939).  
*Struvea anastomosans* (Harvey) Piccone & Grunow ex Piccone [= *Struvea delicatula*  
Kützing]. YAP: Okamura (1904) and Tokida (1939) as *S. delicatula*.  
*Struvea tenuis* Zanardini. YAP: Okamura (1904), Schmidt (1928), Tokida (1939).  
*Ventricaria ventricosa* (J. Agardh) Olsen & West [= *Valonia ventricosa* J. Agardh]. YAP:  
Trono (1968), Amesbury et al. (1976) and Hedlund and Tsuda (1978), Tsuda et al.  
(1978), Orcutt et al. (1989). IFALIK: Abbott (1961). ULITHI: Tsuda et al. (1978).  
All as *Valonia ventricosa*.

### Family Valoniaceae

*Valonia aegagropila* C. Agardh. YAP: Tsuda (1977). IFALIK: Abbott (1961).  
*Valonia fastigiata* Harvey ex J. Agardh. YAP: Hedlund and Tsuda (1978), Tsuda (1978),  
Tsuda et al. (1978), Orcutt et al. (1989). ULITHI: Tsuda et al. (1978).  
*Valonia utricularis* (Roth) C. Agardh. IFALIK: Abbott (1961).

## Order Bryopsidales

### Family Bryopsidaceae

*Bryopsis pennata* Lamouroux. YAP: Tsuda and Belk (1972), Tsuda et al. (1978), Lassuy  
(1980).

*Pseudodichotomosiphon constricta* Yamada. IFALIK: Abbott (1961).  
*Trichosolen* sp. [= *Pseudobryopsis* sp.]. YAP: Enomoto et al. (1987) as *Pseudobryopsis* sp.

## Family Caulerpaceae

- Caulerpa antoensis* Yamada. YAP: Amesbury et al. (1977). IFALIK: Abbott (1961), Trono (1968), Taylor (1977).  
*Caulerpa bikinensis* Taylor. IFALIK: Abbott (1961).  
*Caulerpa brachypus* Harvey. YAP: Trono (1968), Taylor (1977), Amesbury et al. (1977).  
*Caulerpa cupressoides* (Vahl) C. Agardh. YAP: Trono (1968), Taylor (1977), Tsuda et al. (1978), Orcutt et al. (1989). IFALIK: Trono (1968), Taylor (1977). SOROL: Trono (1968), Taylor (1977).  
*Caulerpa elongata* Weber-van Bosse. YAP: Tsuda and Belk (1972), Taylor (1977).  
*Caulerpa filicoides* Yamada. YAP: Amesbury et al. (1976).  
*Caulerpa lentillifera* J. Agardh. YAP: Okamura (1904), Tokida (1939).  
*Caulerpa lessonii* Bory de Saint-Vincent. YAP: Taylor (1977).  
*Caulerpa mexicana* Sonder ex Kützing. YAP: Taylor (1975).  
*Caulerpa peltata* Lamouroux. YAP: Reinbold (1901), Schmidt (1928), Tokida (1939).  
*Caulerpa racemosa* (Forsskål) J. Agardh. YAP: Reinbold (1901), Okamura (1904, 1916), Schmidt (1928), Tokida (1939), Trono (1968), Amesbury et al. (1976, 1977), Taylor (1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Lassuy (1980), Orcutt et al. (1989), Amesbury and Tsuda (2002).  
*Caulerpa serrulata* (Forsskål) J. Agardh [= *Caulerpa boryana* J. Agardh and *Caulerpa freycinetii* C. Agardh]. YAP: Okamura (1904) and Schmidt (1928) as *C. freycinetii*, Trono (1968), Taylor (1977), Tsuda et al. (1978), Orcutt et al. (1989). IFALIK: Abbott (1961), Trono (1968). SOROL: Trono (1968).  
*Caulerpa sertularioides* (Gmelin) Howe. YAP: Trono (1968), Amesbury et al. (1976, 1977), Tsuda et al. (1978).  
*Caulerpa taxifolia* (Vahl) C. Agardh. YAP: Trono (1968), Amesbury et al. (1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989).  
*Caulerpa urvilleana* Montagne. YAP: Trono (1968), Taylor (1977), Hedlund and Tsuda (1978), Tsuda et al. (1978). IFALIK: Abbott (1961), Trono (1968), Taylor (1977). SOROL: Trono (1968). ULITHI: Tsuda et al. (1978).  
*Caulerpa verticillata* J. Agardh. YAP: Amesbury et al. (1977).  
*Caulerpa webbiana* Montagne [= *Caulerpa pickeringii* Harvey & Bailey]. YAP: Trono (1968) as *C. pickeringii*, Amesbury et al. (1976), Hedlund and Tsuda (1978).  
*Caulerpella ambigua* (Okamura) Prud'homme van Reine & Lokhorst [= *Caulerpa ambigua* Okamura and *Caulerpa vickersiae* Børgesen]. IFALIK: Abbott (1961) as *Caulerpa ambigua*.

## Family Codiaceae

*Codium arabicum* Kützing. SOROL: Trono (1968).

*Codium edule* P. Silva. SOROL: Trono (1968).

*Codium geppiorum* O. Schmidt [= *Codium geppii* O. Schmidt]. YAP: Amesbury et al. (1977) as *C. geppii*.

## Family Dichotomosiphonaceae

*Dichotomosiphon* sp. IFALIK: Abbott (1961).

## Family Halimedaceae

*Halimeda copiosa* Goreau & Graham [= *Halimeda hederacea* (Barton) Colinvaux and *Halimeda opuntia* (Linnaeus) Lamouroux form *hederacea* Barton]. IFALIK: Abbott (1961) as *H. opuntia* f. *hederacea*.

*Halimeda cuneata* Hering. YAP: Okamura (1916), Schmidt (1928), Tokida (1939).

*Halimeda discoidea* Decaisne. YAP: Trono (1968), Amesbury et al. (1976, 1977), Tsuda et al. (1978), Orcutt et al. (1989). IFALIK: Trono (1968). ULITHI: Tsuda et al. (1978).

*Halimeda fragilis* W.R. Taylor. IFALIK: Abbott (1961), Trono (1968).

*Halimeda gigas* W.R. Taylor. YAP: Tsuda and Belk (1972), Hedlund and Tsuda (1978), Orcutt et al. (1989).

*Halimeda gracilis* Harvey ex J. Agardh. IFALIK: Abbott (1961).

*Halimeda incrassata* (Ellis) Lamouroux [= *Halimeda tridens* (Ellis & Solander) Lamouroux]. YAP: Trono (1968), Amesbury et al. (1976, 1977), Tsuda et al. (1978), Orcutt et al. (1989). IFALIK: Abbott (1961) as *H. tridens*, Trono (1968).

*Halimeda lacunalis* W.R. Taylor. IFALIK: Abbott (1961).

*Halimeda macroloba* Decaisne. YAP: Reinbold (1901), Okamura (1904), Schmidt (1928), Tokida (1939), Trono (1968), Amesbury et al. (1976, 1977), Tsuda et al. (1978), Orcutt et al. (1989), Amesbury and Tsuda (2002).

*Halimeda macrophysa* Askenasy. YAP: Amesbury et al. (1976, 1977), Orcutt et al. (1989).

*Halimeda micronesica* Yamada. IFALIK: Abbott (1961), Trono (1968).

*Halimeda opuntia* (Linnaeus) Lamouroux [= *Halimeda cordata* J. Agardh]. YAP: Reinbold (1901) and Okamura (1904) as *H. cordata*; Schmidt (1928), Tokida (1939), Trono (1968), Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989), Amesbury and Tsuda (2002). IFALIK: Abbott (1961), Trono (1968). SOROL: Trono (1968). ULITHI: Tsuda et al. (1978).

*Halimeda simulans* Howe. YAP: Tsuda and Belk (1972), Amesbury and Tsuda (2002).

*Halimeda stuposa* W.R. Taylor. IFALIK: Abbott (1961), Trono (1968).

*Halimeda taenicola* W.R. Taylor. YAP: Tsuda et al. (1978). IFALIK: Abbott (1961), Trono (1968).

*Halimeda tuna* (Ellis & Solander) Lamouroux. YAP: Tokida (1939), Trono (1968).

## Family Udoteaceae

- Avrainvillea erecta* (Berkeley) A.Gepp & E. Gepp [*Avrainvillea papuana* (Zanardini) G. Murray & Boodle]. YAP: Reinbold (1901) as *A. papuana*.
- Avrainvillea hollenbergii* Trono (1971) from Ifalik. IFALIK: Trono (1968) as *Avrainvillea* sp.
- Avrainvillea lacerata* Harvey ex J. Agardh. YAP: Tsuda and Belk (1972), Amesbury et al. (1977), Olsen-Stojkovich (1985).
- Avrainvillea nigricans* Decaisne. IFALIK: Trono (1968), Olsen-Stojkovich (1985).
- Avrainvillea obscura* (C. Agardh) J. Agardh. YAP: Amesbury et al. (1976, 1977), Tsuda et al. (1978), Olsen-Stojkovich (1985), Orcutt et al. (1989).
- Chlorodesmis fastigiata* (C. Agardh) Ducker [= *Chlorodesmis comosa* Harvey & Bailey]. YAP: Hedlund and Tsuda (1978), Tsuda (1978), Orcutt et al. (1989). ULITHI: Tsuda et al. (1978).
- Chlorodesmis hildebrandtii* A.Gepp & E. Gepp. YAP: Trono (1968).
- Rhipilia diaphana* Taylor. IFALIK: Abbott (1961).
- Rhipilia geppii* Taylor. IFALIK: Abbott (1961).
- Rhipilia orientalis* A. Gepp & E. Gepp. YAP: Amesbury et al. (1976). IFALIK: Abbott (1961).
- Rhipilia sinuosa* Gilbert. YAP: Gilbert (1978),
- Tydemanis expeditionis* Weber-van Bosse. YAP: Schmidt (1928), Tokida (1939), Trono (1968), Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989).
- Udotea argentea* Zanardini. IFALIK: Abbott (1961).
- Udotea indica* A. Gepp & E. Gepp. IFALIK: Abbott (1961).
- Udotea orientalis* A. Gepp & E. Gepp. IFALIK: Abbott (1961).

## Order Dasycladales

### Family Dasycladaceae

- Bornetella sphaerica* (Zanardini) Solms-Laubach. YAP: Trono (1968).
- Neomeris annulata* Dickie. YAP: Amesbury et al. (1976), Tsuda et al. (1978). IFALIK: Abbott (1961). ULITHI: Tsuda et al. (1978).
- Neomeris dumetosa* Lamouroux. YAP: Okamura (1904), Tokida (1939).
- Neomeris van-bosseae* Howe. YAP: Tsuda and Belk (1972), Amesbury et al. (1977), Orcutt et al. (1989). IFALIK: Abbott (1961).

### Family Polyphysaceae

- Acetabularia clavata* Yamada. SOROL: Trono (1968).
- Acetabularia exigua* Solms-Laubach. SOROL: Trono (1968).

*Acetabularia parvula* Solms-Laubach [= *A. moebii* Solms-Laubach]. YAP: Lassuy (1980) as *A. moebii*. IFALIK: Abbott (1961).  
*Halicoryne wrightii* Harvey. IFALIK: Abbott (1961).

**Division PHAEOPHYTA (Brown Algae)**  
**Class Phaeophyceae**

**Order Ectocarpales**

**Family Ectocarpaceae**

*Feldmannia indica* (Sonder) Womersley & Bailey [= *Ectocarpus indicus* Sonder]. YAP: Tsuda and Belk (1972) as *Ectocarpus indicus*, Amesbury et al. (1976).  
*Hincksia mitchelliae* (Harvey) P. Silva [= *Ectocarpus mitchelliae* Harvey and *Giffordia mitchelliae* (Harvey) G. Hamel]. IFALIK: Abbott (1961) as *Ectocarpus mitchelliae*.

**Order Sphacelariales**

**Family Sphacelariaceae**

*Sphacelaria tribuloides* Meneghini. YAP: Reinbold (1901), Schmidt (1928), Tokida (1939), Amesbury et al. (1976).

**Order Dictyotales**

**Family Dictyotaceae**

*Dictyota acutiloba* J. Agardh. YAP: Tsuda and Belk (1972) and Amesbury et al. (1976, 1977) as *Dictyota cervicornis* Kützinger.  
*Dictyota bartayresiana* Lamouroux [= *Dictyota bartayresii* Lamouroux]. YAP: Hedlund and Tsuda (1978), Tsuda (1978) and Tsuda et al. (1978) as *D. bartayresii*; Amesbury and Tsuda (2002). ULITHI: Tsuda et al. (1978) as *D. bartayresii*.  
*Dictyota ceylanica* Kützinger [*Dictyota dichotoma* (Hudson) Lamouroux = *Dictyota divaricata* Lamouroux]. YAP: Okamura (1904), Tokida (1939), Trono (1969) and Tsuda et al. (1978) as *D. divaricata*.  
*Dictyota dichotoma* (Hudson) Lamouroux [= *Dictyota apiculata* J. Agardh]. YAP: Tsuda and Belk (1972), Amesbury et al. (1976, 1977) and Orcutt et al. (1989) as *D. apiculata*.  
*Dictyota friabilis* Setchell. YAP: Trono (1969), Amesbury et al. (1976), Orcutt et al. (1989). ULITHI: Tsuda et al. (1978).

- Lobophora variegata* (Lamouroux) Womersley ex Oliveira [= *Gymnosorus variegatus* (Lamouroux) J. Agardh and *Pocockiella variegata* (Lamouroux) Papenfuss]. YAP: Okamura (1916), Schmidt (1928) and Tokida (1939) as *Gymnosorus corallis* (C. Agardh) J. Agardh, Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Lassuy (1980), Orcutt et al. (1989). IFALIK: Abbott (1961) as *Pocockiella variegata*. ULITHI: Tsuda et al. (1978).
- Padina boryana* Thivy in Taylor [= *Padina tenuis* (C. Agardh) Bory]. YAP: Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978) and Orcutt et al. (1989) as *P. tenuis*.
- Padina minor* Yamada. YAP: Tsuda and Belk (1972), Orcutt et al. (1989). ULITHI: Tsuda et al. (1978).
- Padina pavonica* (Linnaeus) Thivy [= *Padina pavonia* Linnaeus]. YAP: Reinbold (1901), Okamura (1904, 1916) and Tokida (1939) as *P. pavonia*.
- Styopodium* sp. YAP: Reinbold (1901)

## Order Scytosiphonales

### Family Scytosiphonaceae

- Colpomenia sinuosa* (Mertens ex Roth) Derbès & Solier. YAP: Okamura (1904), Schmidt (1928), Tokida (1939).
- Hydroclathrus clathratus* (C. Agardh) Howe [= *Hydroclathrus cancellatus* Bory de Saint-Vincent]. YAP: Reinbold (1901), Okamura (1904), Schmidt (1928) and Tokida (1939) as *H. cancellatus*, Trono (1969), Amesbury et al. (1976, 1977), Tsuda et al. (1978).
- Rosenvingea intricata* (J. Agardh) Børgesen [= *Asperococcus intricatus* J. Agardh]. YAP: Okamura (1904) and Tokida (1939) as *Asperococcus intricatus*, Amesbury et al. (1976, 1977).

## Order Fucales

### Family Sargassaceae

- Sargassum crassifolium* J. Agardh. ULITHI: DeWreede (1973) as *Sargassum cristaefolium* C. Agardh, Tsuda (1976).
- Sargassum cristaefolium* C. Agardh. YAP: Reinbold (1901) as *Sargassum duplicatum* J. Agardh.
- Sargassum polycystum* C. Agardh. YAP: DeWreede (1973) as *Sargassum granuliferum*, Tsuda (1977, 1988).
- Turbinaria ornata* (Turner) J. Agardh. YAP: Reinbold (1901), Okamura (1904) as *Turbinaria* sp., Tokida (1939), Trono (1969), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989).



**Division RHODOPHYTA (Red Algae)**  
**Class Rhodophyceae**

**Subclass Bangiophycidae**

**Order Porphyridiales**

**Family Porphyridiaceae**

- Chroodactylon ornatum* (C. Agardh) Basson [= *Asterocytis ornata* (C. Agardh) G. Hamel].  
IFALIK: Abbott (1961) as *Asterocytis ornata*.  
*Stylonema alsidii* (Zanardini) K. Drew [= *Goniotrichum elegans* (Chauvin) Zanardini].  
IFALIK: Abbott (1961) as *Goniotrichum elegans*.

**Order Erythropeltiales**

**Family Erythrotrichiaceae**

- Erythrotrichia carnea* (Dillwyn) J. Agardh. IFALIK: Abbott (1961).

**Subclass Florideophycidae**

**Order Acrochaetiales**

**Family Acrochaetiaceae**

- Acrochaetium* sp. YAP: Lassuy (1980).

**Order Nemaliales**

**Family Galaxauraceae**

- Actinotrichia fragilis* (Forsskål) Børgesen [= *Actinotrichia rigida* (Lamouroux) Decaisne].  
YAP: Okamura (1904), Schmidt (1928) and Tokida (1939) as *A. rigida*; Trono  
(1969); Tsuda et al. (1978); Orcutt et al. (1989).  
*Galaxaura filamentosa* R. Chou. YAP: Trono (1968). IFALIK: Abbott (1961).  
*Galaxaura marginata* (Ellis & Solander) Lamouroux. YAP: Amesbury et al. (1977).  
*Tricheocarpa cylindrica* (Ellis & Solander) Huisman & Borowitzka (= *Galaxaura fastigiata*  
Decaisne]. IFALIK: Abbott (1961) as *Galaxaura fastigiata*.  
*Tricheocarpa fragilis* (Linnaeus) Huisman & Townsend [= *Galaxaura oblongata* (Ellis &  
Solander) Lamouroux]. YAP: Amesbury et al. (1977) as *Galaxaura* cf. *oblongata*.

## Family Liagoraceae

*Liagora ceranoides* Lamouroux. IFALIK: Abbott (1961).

*Liagora kahukuana* Abbott. IFALIK: Abbott (1961).

## Order Gelidiales

### Family Gelidiaceae

*Gelidium divaricatum* G. Martens. ULITHI: Tsuda et al. (1978).

*Gelidium pulchellum* (Turner) Kützinger. YAP: Tsuda and Belk (1972).

*Gelidium pusillum* (Stackhouse) Le Jolis. YAP: Reinbold (1901), Okamura (1916), Schmidt (1928), Tokida (1939), Tsuda et al. (1978), Lassuy (1980). ULITHI: Tsuda et al. (1978).

*Pterocladia caloglossoides* (Howe) Dawson [= *Pterocladia parva* Dawson]. ULITHI: Tsuda et al. (1978) as *P. parva*.

### Family Wurdemanniaceae (After Taylor, 1960)

*Wurdemannia miniata* (Sprengel) J. Feldmann & G. Hamel. IFALIK: Abbott (1961).

## Order Gracilariales

### Family Gracilariaceae

*Gracilaria canaliculata* Sonder [= *Gracilaria crassa* Harvey]. YAP: Amesbury et al. (1976, 1977) as *G. crassa*.

*Gracilaria eucheumoides* Harvey. YAP: Tsuda (1978), Meneses and Abbott (1987).

*Gracilaria hauckii* P. Silva [= *Gracilaria radicans* Hauck]. YAP: Tokida (1939) as *G. radicans*.

*Gracilaria salicornia* (C. Agardh) Dawson [= *Corallopsis cacalia* J. Agardh, *Corallopsis minor* (Sonder) J. Agardh and *Gracilaria cacalia* (J. Agardh) Dawson]. YAP: Reinbold (1901) as *Corallopsis minor*, Okamura (1904) as *Corallopsis cacalia*, Tokida (1939) as *Corallopsis cacalia* and *C. minor*, Amesbury et al. (1976, 1977), Tsuda et al. (1978), Tsuda (1985), Tsuda et al. (1987), Meneses and Abbott (1987), Orcutt et al. (1989).

*Gracilaria tsudae* (Abbott & Meneses) Abbott [= *Polycavernosa tsudae* Abbott & Meneses]. YAP: Tsuda et al. (1987) as *Gracilaria* sp., Meneses and Abbott (1987), Orcutt et al. (1989) as *Gracilaria* sp.

## Order Bonnemaisoniales

### Family Bonnemaisoniaceae

*Asparagopsis taxiformis* (Delile) Trevisan. YAP: Trono (1969). ULITHI: Tsuda et al. (1978).

## Order Cryptonemiales

### Family Halymeniaceae

*Halymenia durvillaei* Bory. YAP: Trono (1969), Hedlund and Tsuda (1978).

*Halymenia floresia* (Clemente y Rubio) C. Agardh. YAP: Trono (1969).

*Halymenia lacerata* Sonder. YAP: Okamura (1916), Schmidt (1928), Tokida (1939).

### Family Peyssonneliaceae

*Peyssonnelia rubra* (Greville) J. Agardh. YAP: Reinbold (1901) as *Peyssonnelia* sp., Hedlund and Tsuda (1978), Tsuda (1978).

### Family Rhizophyllidaceae

*Portieria hornemannii* (Lyngbye) P. Silva [= *Chondrococcus hornemannii* (Lyngbye) Schmitz and *Desmia hornemannii* Lyngbye]. YAP: Okamura (1916), Schmidt (1928) and Tokida (1939) as *Chondrococcus hornemannii*; Trono (1969) as *Desmia hornemannii*.

## Order Corallinales

### Family Corallinaceae

*Amphiroa foliacea* Lamouroux. YAP: Trono (1969), Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978).

*Amphiroa fragilissima* (Linnaeus) Lamouroux. YAP: Reinbold (1901), Trono (1969), Amesbury et al. (1976, 1977), Hedlund and Tsuda (1978), Tsuda et al. (1978), Orcutt et al. (1989). ULITHI: Tsuda et al. (1978).

*Hydrolithon farinosum* (Lamouroux) Penrose & Y.M. Chamberlain [= *Fosliella farinosa* (Lamouroux) Howe]. IFALIK: Abbott (1961) as *Fosliella farinosa*.

*Hydrolithon gardineri* (Foslie) Verheij & Prud'homme van Reine [= *Porolithon gardineri* (Foslie) Foslie]. IFALIK: Abbott (1961) as *Porolithon gardineri*.

*Hydrolithon onkodes* (Heydrich) Penrose & Woelkerling [= *Porolithon onkodes* Foslie], YAP: Tsuda et al. (1978) as *Porolithon onkodes*. IFALIK: Abbott (1961) as *P. onkodes*.

*Hydrolithon* sp. [= *Porolithon aequinoctiale* (Foslie) Foslie]. IFALIK: Abbott (1961) as *Porolithon aequinoctiale*.  
*Jania capillacea* Harvey. YAP: Trono (1969), Hedlund and Tsuda (1978), Tsuda et al. (1978), Lassuy (1980). IFALIK: Trono (1969). ULITHI: Tsuda et al. (1978).  
*Jania decussatodichotoma* (Yendo) Yendo. YAP: Trono (1969). SOROL: Trono (1969).  
*Jania tenella* (Kützinger) Grunow. YAP: Trono (1969). ULITHI: Tsuda (1978).  
*Jania unguolata* (Yendo) Yendo. YAP: Trono (1969). SOROL: Trono (1969).  
*Mastophora rosea* (C. Agardh) Setchell. YAP: Tsuda et al. (1978).  
*Metagoniolithon radiatum* (Lamarck) Ducker [= *Metagoniolithon charoides* (Lamouroux) Weber-van Bosse]. YAP: Amesbury et al. (1976) as *M. charoides*.  
*Metagoniolithon* sp. YAP: Tsuda and Belk (1972).  
*Neogoniolithon brassica-florida* (Harvey) Setchell & Mason [= *Goniolithon frutescens* Foslie and *Neogoniolithon frutescens* (Foslie) Setchell & Mason]. IFALIK: Abbott (1961) as *Goniolithon frutescens*.

### Order Gigartinales

#### Family Hypneaceae

*Hypnea musciformis* (Wulfen) Lamouroux. YAP: Hedlund and Tsuda (1978) and Orcutt et al. (1989) as *H. esperi*. SOROL: Trono (1969) as *H. esperi*.  
*Hypnea nidulans* Setchell. IFALIK: Abbott (1961).  
*Hypnea pannosa* J. Agardh. YAP: Trono (1969), Orcutt et al. (1989).  
*Hypnea spinella* (C. Agardh) Kützinger. IFALIK: Abbott (1961).  
*Hypnea valentiae* (Turner) Montagne. YAP: Trono (1969).

### Order Rhodymeniales

#### Family Champiaceae

*Champia parvula* (C. Agardh) Harvey. YAP: Schmidt (1928), Tokida (1939), Amesbury et al. (1977).  
*Chylocladia rigens* (C. Agardh) J. Agardh. YAP: Reinbold (1901).

#### Family Rhodymeniaceae

*Ceratodictyon spongiosum* Zanardini. YAP: Trono (1969), Amesbury and Tsuda (2002).  
*Coelothrix irregularis* (Harvey) Børgesen. YAP: Trono (1969).  
*Gelidiopsis intricata* (C. Agardh) Vickers [*Gelidium intricatum* (C. Agardh) Kützinger]. YAP: Reinbold (1901) as *Gelidium intricatum*, Amesbury et al. (1977), Hedlund and Tsuda (1978), Lassuy (1980), Orcutt et al. (1989). SOROL: Trono (1969).  
*Gelidiopsis pannosa* (Grunow) Schmitz. YAP: Okamura (1916), Schmidt (1928), Tokida (1939).

*Leptofauchea anastomosans* (Weber-van Bosse) R. Norris & Aken. YAP: Hedlund and Tsuda (1978) as ?*Rhodymenia anastomosans* Weber-van Bosse, Tsuda (1978) as *Rhodymenia* sp. IFALIK: Abbott (1961) as *Rhodymenia* sp.

## Order Ceramiales

### Family Ceramiaceae

*Anotrichium tenue* (C. Agardh) Nägeli [= *Griffithsia tenuis* C. Agardh]. IFALIK: Abbott (1961) as *Griffithsia tenuis*.

*Antithamnion* sp. IFALIK: Abbott (1961). ULITHI: Tsuda et al. (1978).

*Callithamnion* sp. YAP: Lassuy (1980).

*Centroceras clavulatum* (C. Agardh) Montagne [= *Ceramium clavulatum* C. Agardh]. YAP: Reinbold (1901), Okamura (1916) and Tokida (1939) as *Ceramium clavulatum*; Trono (1969), Amesbury et al. (1977), Lassuy (1980). IFALIK: Abbott (1961). SOROL: Trono (1969).

*Centroceras minutum* Yamada. IFALIK: Abbott (1961).

*Ceramium fimbriatum* Setchell & Gardner. YAP: Lassuy (1980).

*Ceramium flaccidum* (Harvey ex Kützing) Ardisone [= *Ceramium byssoideum* Harvey, *Ceramium gracillimum* (Kützing) Zanardini and *Ceramium transversale* Collins & Hervey]. YAP: Lassuy (1980) as *C. gracillimum*.

*Ceramium macilentum* J. Agardh [= *Ceramium mazatlanense* Dawson]. YAP: Lassuy (1980) as *C. mazatlanense*.

*Ceramium vagans* P. Silva [= *Ceramium vagabundum* Dawson]. YAP: Trono (1969) as *C. vagabunde*.

*Corallophila huysmansii* (Weber-van Bosse) R. Norris [= *Ceramium huysmansii* Weber-van Bosse]. YAP: Lassuy (1980) as *Ceramium huysmansii*.

*Dasyphila plumarioides* Yendo. YAP: Hedlund and Tsuda (1978), Tsuda (1978).

*Griffithsia rhizophora* Grunow ex Weber-van Bosse. IFALIK: Abbott (1961).

*Haloplegma duperreyi* Montagne. IFALIK: Abbott (1961).

*Monosporus* sp. (= *Neomonosporus* sp.). YAP: Lassuy (1980) as *Neomonosporus* sp.

*Spyridia biannulata* J. Agardh. YAP: Reinbold (1901).

*Spyridia filamentosa* (Wulfen) Harvey. YAP: Okamura (1904), Schmidt (1928), Tokida (1939), Amesbury et al. (1976, 1977).

### Family Dasyaceae

*Dasya adhaerens* Yamada. IFALIK: Abbott (1961).

*Heterosiphonia crispella* (C. Agardh) Wynne [= *Heterosiphonia wurdemanii* (J. Bailey ex Harvey) Falkenberg]. YAP: Amesbury et al. (1977) as *Heterosiphonia* sp. IFALIK: Abbott (1961) as *H. wurdemanii*.

## Family Delesseriaceae

- Hypoglossum attenuatum* Gardner. YAP: Tsuda et al. (1978). ULITHI: Tsuda et al. (1978).  
*Hypoglossum minimum* Yamada. IFALIK: Abbott (1961).  
*Martensia fragilis* Harvey [*Hemitrema fragilis* (Harvey) Dawson]. YAP: Amesbury et al. (1976) as *Hemitrema fragilis*.

## Family Rhodomelaceae

- Acanthophora spicifera* (Vahl) Børgesen [= *Acanthophora orientalis* J. Agardh]. YAP: Tokida (1939) as *A. orientalis*, Amesbury et al. (1976, 1977).  
*Chondria* sp. YAP: Amesbury et al. (1977).  
*Chondrophyllum papilloso* (C. Agardh) Garbary & Harper [= *Laurencia papilloso* (C. Agardh) Greville]. YAP: Reinbold (1901), Tokida (1939), Trono (1969), Amesbury et al. (1977), Tsuda et al. (1978). All as *Laurencia papilloso*.  
*Herposiphonia delicatula* Hollenberg. YAP: Hollenberg (1968b), Trono (1969).  
*Herposiphonia dendroidea* Hollenberg. IFALIK: Hollenberg (1968b), Trono (1969). SOROL: Trono (1969).  
*Herposiphonia pacifica* Hollenberg. IFALIK: Hollenberg (1968b), Trono (1969). SOROL: Hollenberg (1968b), Trono (1969).  
*Herposiphonia parca* Setchell. YAP: Hollenberg (1968b), Trono (1969). SOROL: Hollenberg (1968b).  
*Herposiphonia secunda* (C. Agardh) Ambronn [= *Herposiphonia tenella* (C. Agardh) Nägeli]. YAP: Reinbold (1901), Schmidt (1928), Tokida (1939). IFALIK: Abbott (1961) as *H. tenella*.  
***Herposiphonia trichia* Hollenberg (1968b) from Yap.** YAP: Trono (1969).  
*Laurencia cartilaginea* Yamada. YAP: Tsuda (1978).  
*Laurencia majuscula* (Harvey) Lucas. YAP: Tsuda and Belk (1972).  
*Laurencia mariannensis* Yamada. IFALIK: Abbott (1961).  
*Laurencia parvipapillata* Tseng. YAP: Tsuda (1978), Orcutt et al. (1989).  
*Laurencia perforata* (Bory de Saint-Vincent) Montagne. YAP: Reinbold (1901). IFALIK: Abbott (1961).  
*Laurencia yamadana* Howe. YAP: Trono (1969).  
*Leveillea jungermannioides* (Hering & Martens) Harvey. IFALIK: Abbott (1961). ULITHI: Tsuda et al. (1978).  
*Melanamansia glomerata* (C. Agardh) R.E. Norris [= *Amansia glomerata* C. Agardh]. YAP: Tsuda (1978) as *Amansia glomerata*.  
*Polysiphonia apiculata* Hollenberg. YAP: Hollenberg (1968a), Trono (1969).  
*Polysiphonia delicatula* Hollenberg. IFALIK: Trono (1969).  
*Polysiphonia howei* Hollenberg. YAP: Amesbury et al. (1977).  
*Polysiphonia poko* Hollenberg. SOROL: Trono (1969).  
*Polysiphonia scopulorum* Harvey. YAP: Tsuda and Belk (1972), Lassuy (1980). IFALIK: Hollenberg (1968a).

*Polysiphonia subtilisima* Montagne. IFALIK: Abbott (1961).  
*Polysiphonia tepida* Hollenberg. YAP: Amesbury et al. (1976, 1977), Lassuy (1980).  
*Polysiphonia upolensis* Grunow. SOROL: Trono (1969).  
*Tolypocladia glomerulata* (C. Agardh) Schmitz [= *Roschera glomerulata* (C. Agardh) Weber-van Bosse]. YAP: Okamura (1904), Tokida (1939) as *Roschera glomerulata*, Amesbury and Tsuda (2002). ULITHI: Tsuda et al. (1978).  
*Womersleyella setacea* (Hollenberg) R. Norris [= *Polysiphonia setacea* Hollenberg], YAP: Hollenberg (1968a) and Trono (1969) as *Polysiphonia setacea*.

## DISCUSSION

The 224 species of marine benthic algae (106 genera) from Yap State consist of 11 species (7 genera) of Cyanophyta, 92 species (33 genera) of Chlorophyta, 20 species (12 genera) of Phaeophyta and 101 species (54 genera) of Rhodophyta (Table 1). Two species, *Herposiphonia trichia* Hollenberg (1968a) and *Avrainvillea hollenbergii* Trono (1971), were described as new based on the type specimens from Yap and Ifalik Atoll, respectively.

Aside from the 161 species reported around the islands of Yap, marine benthic algae have been reported from only three atolls within Yap State, i.e., Ifalik (81 species), Ulithi (31 species) and Sorol (16 species).

**Table 1. Number of species reported from Yap, Ifalik, Sorol and Ulithi.**

Island and Atoll	Number of Algal Species				Total
	Cyanophyta	Chlorophyta	Phaeophyta	Rhodophyta	
Yap	11	61	18	71	161
Ifalik	1	43	2	35	81
Sorol	0	7	0	9	16
Ulithi	3	12	5	11	31
<b>Yap State</b>	<b>11</b>	<b>92</b>	<b>20</b>	<b>101</b>	<b>224</b>

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