

**NICHE BREADTH, GEOGRAPHIC RANGE,
AND EXTINCTION OF CARIBBEAN REEF-ASSOCIATED
CHEILOSTOME BRYOZOA AND SCLERACTINIA**

**IMPORTANCE DE LA NICHE, REPARTITION GEOGRAPHIQUE
ET EXTINCTION DES CORAUX ET BRYOZOAIRES CHEILOSTOMES
ASSOCIES AUX RECIFS CORALLIENS DE LA MER DES ANTILLES**

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ABSTRACT

Scleractinian coral species living on Caribbean coral reefs tolerate a rather narrow range of environmental conditions, with many species occurring only on reefs. In contrast, reef-associated species of cheilostome bryozoans tolerate a much wider range of conditions, and few, if any species are restricted to reefs. In accord with these ecological differences, Caribbean reef-associated cheilostome species are more widely distributed geographically than Caribbean corals. More than 15% of the cheilostomes are completely circumtropical, whereas none of the corals are.

Given such striking differences in geographic range, cheilostome species should be less likely to go extinct than scleractinian species. This prediction is supported by the differential evolutionary responses of the two groups to uplift of the Isthmus of Panama. About half of the Caribbean reef-associated corals and cheilostomes occur as fossils older than the separation of the Atlantic and Pacific Oceans more than three million years ago. During subsequent fluctuations in sea level and temperature, many corals went extinct, so that the modern eastern Pacific reef fauna consists entirely of western Pacific species. Cheilostomes did not suffer comparable mass extinction, and nearly half of the Caribbean reef-associated species also occur in the eastern Pacific.

RESUME

Les espèces de coraux vivant actuellement sur les récifs coralliens des Antilles ont une répartition très étroite en ce qui concerne leurs conditions de vie. Par contre, les espèces de cheilostomes, associées avec des récifs coralliens, sont très résistantes et, parmi eux, très peu ne sont limitées qu'au milieu récifal. Compte tenu de ces différences écologiques, les cheilostomes antillais récifaux ont une répartition géographique beaucoup plus large que les coraux antillais. Plus de 15 % des bryozoaires sont circumtropicaux, tandis qu'il n'y a pas une seule espèce, parmi les coraux, qui ait une telle répartition.

Etant donné les nettes différences dans les répartitions géographiques parmi les coraux et les cheilostomes, les espèces de Cheilostomes devraient être moins susceptibles que les coraux de disparaître. Cette supposition est confirmée par l'histoire de l'évolution de chaque groupe pendant la formation de l'isthme de Panama. A peu près la moitié des espèces de coraux récifaux et de cheilostomes ont une répartition stratigraphique plus ancienne que la formation de l'isthme de Panama, il y a trois millions d'années. Pendant les changements du niveau de la mer et de température qui suivirent la formation de l'isthme, beaucoup d'espèces de coraux disparurent alors que la faune actuelle du Pacifique Est est formée presque entièrement d'espèces connues dans l'Ouest du Pacifique. Les cheilostomes n'ont pas été touchés de cette manière et presque la moitié des espèces récifales antillaises actuelles sont connues aussi dans le Pacifique Est.

INTRODUCTION

Distributions of marine species can be explained by vicariance events or by the dispersal abilities and ecological requirements of individual organisms. Of these three general kinds of constraints on distribution, vicariance has more to do with the spatial relationships, movements, and interconnections of habitats, continents, and oceans than with the biology of organisms (Nelson and Platnick, 1981). Moreover, dispersal is primarily an indirect statistical or epiphenomenal consequence of characteristics of the larval or other dispersible stage in the life history of a species. Larvae that require a long time to develop among the plankton are more likely to be dispersed far away from their parents than those that are brooded to maturity, but this is not a necessary consequence of such differences, nor does it imply selection for increased or decreased dispersal (Strathmann, 1980).

In contrast, ecological requirements or tolerances of individuals directly constrain their presence or absence in a particular place and may also limit species' distributions on a broader scale. Among molluscs, for example, species that can survive in numerous habitats, termed eurytopic species, tend also to be widely distributed geographically (Jackson, 1974). In contrast, stenotopic species, meaning those that can survive in few habitats within a region, tend to be narrowly distributed geographically. These differences may have significant evolutionary consequences. Among both clams and snails, widely distributed species are less likely to go extinct or to speciate than more narrowly distributed species of the same clade (Jackson, 1974; Scheltema, 1977; Hansen, 1980; Koch, 1980; Jablonski and Valentine, 1981).

There are also differences in the range of habitats occupied by the majority of species between different higher taxa. For example, scleractinian coral species found on coral reefs are generally restricted to a rather narrow range of environmental conditions, including warm temperatures, clear, well-illuminated waters of normal oceanic salinities, and stable hard substrata for attachment and growth to maturity (Wells, 1957). Thus most reef-coral species are commonly found only on reefs. In contrast, species of cheilostome bryozoans found on coral reefs also flourish in a wide range of other habitats, and few if any species are restricted to reefs.

In this paper we compare the variety of habitats occupied by corals and cheilostomes that live on Caribbean coral reefs and relate these to the species' geographical ranges. Results are comparable to those observed previously for molluscs. Cheilostomes are on average much more widely distributed geographically than corals, and those species occurring in many habitats are more widely distributed than species limited to reefs. These patterns are reflected in striking differences in apparent rates of regional extinction among these two groups on opposite sides of the Isthmus of Panama.

FAUNAS AND METHODS

The faunas we have used include species of cheilostome bryozoans (Class Gymnolaemata: Order

Cheilostomata) and scleractinian corals (Class Anthozoa: Order Scleractinia) from Caribbean reef substrata shallower than 100 meters. The cheilostomes are from our own collections in Jamaica, Belize, and Venezuela (Jackson, 1984; Winston, 1984; Gleason and Jackson, in prep.; Winston and Jackson, unpubl. data). Of the more than 100 cheilostome species found, the taxonomy of the 65 in Appendix 1 is sufficiently well defined for analyses of their distributions. All have been examined using scanning electron microscopy; in most cases we have compared our material with museum specimens from the Caribbean and other regions.

The list of corals (Appendix 2) comes from the recent exhaustive survey of Cuban reefs by Zlatarski and Estalella (1982) supplemented by data from Belize (Cairns, 1982) and Jamaica (Wells, 1973a, b), and more recent information kindly provided by Drs. Cairns and Zlatarski. The 62 species listed are sufficiently well known for analyses of distributions, although major problems still plague the taxonomy of *Porites* and *Agaricia*. In the case of *Agaricia* we have followed Zlatarski's highly lumped taxonomy because of the absence of reliable skeletal criteria for separation of what is almost certainly a much larger complex of species.

Habitat or niche breadth of cheilostomes was measured by scoring their occurrence in three broadly defined environments: on reefs; in water deeper than 100 meters, which is at or below the deepest extension of hermatypic coral reefs (Lang et al., 1975; Reed, 1985); and on ephemeral or unstable substrata including mollusc shells, hydroid colonies, sea grasses, and algae. These data are from our own surveys and those cited in Appendix 1. Reliable comparable data are not generally available for the corals; they were therefore scored as containing or not containing zooxanthellae. Zooxanthellate corals are generally limited to well-illuminated, open-reef habitats whereas those lacking zooxanthellae may be cryptic, typically occur over a wider depth range than species with zooxanthellae, and are not necessarily associated with reefs (Wells, 1973a, b; Zibrowius 1980; Schumacher and Zibrowius, 1985).

Geographic ranges of coral and cheilostome species were based on their occurrence in three other tropical regions: eastern Atlantic (Azores, Canary Islands, Mediterranean, West Africa), Indo-west Pacific (Red Sea, Indian Ocean, western Pacific Ocean), and eastern Pacific (Hawaii, Galapagos, and the mainland American coast). We interpreted these data conservatively; all questionable occurrences were excluded.

Statistical comparisons were made using contingency-table, difference-in-median, and rank-correlation procedures appropriate for ordinal data (Siegel, 1956).

RESULTS

Cheilostome Distributions

Most reef-associated cheilostomes also occur in other habitats (Table 1). Of the 65 species in Appendix 1, more than 75% also occur deeper than 100 meters or on ephemeral substrata, and more than 25% occur in both situations. These Caribbean species are also widely distributed geographically (Table 1). Almost two thirds

occur in at least one of the three other tropical regions. Nearly half are present in the eastern Pacific and about one third in the eastern Atlantic or Indo-west Pacific. Moreover, 11 out of 65 (17%) occur in all three regions and so are completely circumtropical.

The numbers of additional habitats (0,1,2) and geographic regions (0,1,2,3) occupied are not independent (3x4 contingency table, chi square=21.8, P=0.002), and are positively correlated (Spearman rank correlation, r=0.48, P<0.001).

TABLE 1. Habitat and geographic distributions of 65 cheilostome species living on Caribbean coral reefs. Habitats: 0=occurrence only on reefs, 1=occurrence deeper than 100 meters or on ephemeral substrata, 2=occurrence in both non-reefal environments. Geographic range: occurrence in 0, 1, 2, or 3 other regions besides the Caribbean. Data from Appendix 1.

Habitat Distribution	Geographic Range				Total
	0	1	2	3	
0	9	6	0	0	15
1	13	7	9	3	32
2	3	3	4	8	18
Total	25	16	13	11	65

Coral Distributions

Caribbean corals tend to be limited to the western Atlantic (Table 2). Less than 20% of the species in Appendix 2 occur in the eastern Atlantic and less than 5% in the Indo-west Pacific or eastern Pacific. None are circumtropical.

There is a significant difference in the geographic distributions of corals with and without zooxanthellae (Table 2, 2x3 contingency table, chi square=19.8, P<0.001). The median number of additional regions inhabited is zero for corals with zooxanthellae and one for those without (Mann-Whitney U Test, z=1.90, P=0.03). If, as is generally assumed, these predominantly shallow-water species lacking zooxanthellae occur in a wider range of habitats than those with zooxanthellae, then the relation between habitat breadth and geographic range for the corals is qualitatively comparable to that of the cheilostomes.

TABLE 2. Geographic distributions of Caribbean reef-associated corals. Geographic ranges as in Table 1; data from Appendix 2.

Coral Group	Geographic Range				Total
	0	1	2	3	
Zooxanthellate	44	7	0	0	51
Azooxanthellate	6	1	4	0	11
Total Corals	50	8	4	0	62

Cheilostomes Versus Corals

Distributions of Caribbean reef-associated cheilostomes and corals are very different in

both pattern and extent. The strongest affinities of the cheilostomes are to the eastern Pacific, whereas those of the corals are to the eastern Atlantic (Table 3, 2x3 contingency table, chi square=8.09, P=0.02). The geographic ranges of the two groups are also different (Tables 1 and 2, 2x4 contingency table, chi square=26.8, P<0.001); the median number of additional regions inhabited by the cheilostomes is one, whereas that for the corals is zero (Mann-Whitney U Test, z=4.76, P<0.001). These differences disappear, however, if we contrast only the ahermatypic corals with the cheilostomes (2x4 contingency table, chi square=4.57, P>0.20). Ahermatypes also show no particular affinity to any of the other three geographic regions (Table 3).

TABLE 3. Comparison of geographic distributions of Caribbean reef-associated cheilostomes and corals. Data are numbers of Caribbean species also found in each of the three other tropical regions.

Group	Geographic Region		
	Eastern Atlantic	Eastern Pacific	Indo-west Pacific
Cheilostomes	23	30	22
Zooxanthellate Corals	7	0	0
Azooxanthellate Corals	4	3	2
Total Corals	11	3	2

DISCUSSION

The identification of both coral and cheilostome species is commonly based on morphological features of their skeletons. Behavioral or reproductive data are only rarely used to confirm species distinctiveness (Lang, 1971, 1984; Wells, 1973a; Winston, 1978, 1982). Alternative techniques such as electrophoresis have hardly been tried and have had no real impact to date. Thus it is probable that several of the species in Appendices 1 and 2 may be subdivided as new data become available. However, there is no reason to believe that cheilostomes are any more lumped than corals, and the differences in distributions between coral and cheilostome species are so enormous that we are confident they will survive any future taxonomic perturbations.

Why are there such striking differences in the breadth and pattern of distributions between Caribbean corals and cheilostomes? Differences in larval dispersal are unlikely to be important (reviewed in Jackson, in press). All of the cheilostomes in Appendix 1 brood embryos which are released as larvae unable to drift for more than a few hours to a day before settlement. The corals in Appendix 2 include both brooders and broadcasters (Szwant-Froelich, in press). Larvae of broadcasting species probably disperse farther than those of brooding corals, but it is extremely unlikely that the larvae of any of the corals or bryozoans considered here could survive more than a fraction of the journey across the Atlantic or eastern Pacific barrier. Indeed,

there is no difference in the median geographic range of brooding and broadcasting species in either group (Jackson, in press). Thus the only explanation for their widespread distributions is some form of sessile dispersal, of which rafting on natural objects (pumice, trees, kelp, seeds, etc.) is the most probable explanation (Jokiel, 1984; Jackson, in press). Such material is more abundant than is generally appreciated; e.g., drifted pumice is often abundant in the soil of Pacific atolls (Wiens, 1962), and is commonly encrusted by bryozoans and corals (Jokiel, 1984; R. Olson, personal communication).

Chances of successful rafting depend on at least three factors: probability of recruitment onto floating material, ability to grow to reproductive maturity before the substratum sinks or is destroyed, and recruitment onto new substrata by larvae or clonal fragments within the newly colonized area. Since most reef-associated cheilostomes also occur on ephemeral substrata such as shells or algae, they can also settle on drifting natural objects, or onto vegetation that subsequently may be torn loose. They may also survive if sunk in depths of a few hundred meters, and thus may be dispersed from one place to another over several generations. In addition, most reef-associated cheilostomes reach sexual maturity within a few months, and almost all in less than one year (Winston and Jackson, 1984, unpubl. data). In all these characteristics, cheilostomes are very similar to clonal ascidians which are also commonly distributed half way around the world (Kott, 1974).

These events are far less likely for corals, especially those with zooxanthellae. Even on pumice, the most common corals are highly opportunistic species like *Pocillopora damicornis* (Jokiel, 1984) whose larvae are probably also capable of exceptionally long-distance dispersal (Richmond, 1985). Moreover, no zooxanthellate corals can survive at depths below about 100 meters, and they also require several years to reach sexual maturity (Kojis and Quinn, 1981a, b, 1982, 1985; Harriot, 1983; Babcock, 1984; Szant-Froelich, 1985). Corals that normally lack zooxanthellae are generally smaller, and may be more likely to be carried about on substrata such as rocks caught in the holdfasts of drifting kelps (Gerrodette, 1981). Insufficient data are available for their ages of first reproduction, but they are unlikely to reproduce as early as cheilostomes (data on colder water species reviewed in Fadlallah, 1983). Thus both the broad habitat tolerance and early reproductive maturity of reef-associated cheilostomes should greatly increase their chances of successful dispersal by rafting compared to zooxanthellate corals, and chances for corals lacking zooxanthellae should lie somewhere in between. For these organisms, apparently, constraints on dispersal are determined primarily by the ecological requirements and biology of the post-larval stage.

The greater niche breadth and geographic range of reef-associated cheilostome species should render them evolutionarily more conservative than reef-associated corals (c.f. Jackson 1974, 1977). In widely distributed species there is less chance of reproductive isolation of populations, with the possibility of subsequent speciation. There is also less chance of extinction through total obliteration of an

habitat than for narrowly distributed species. Reliable species-level rates of evolution are not available for either group. Nevertheless, considerable evidence strongly suggests that evolutionary patterns are as predicted, at least for the coral and cheilostome faunas on opposite sides of the Isthmus of Panama.

Many, perhaps half, of the cheilostome and coral species in Appendices 1 and 2 are described from fossil deposits in the Caribbean and Central America that predate the separation of the Caribbean and eastern Pacific by the emergence of the Isthmus of Panama roughly 3 million years ago (Canu and Bassler, 1919, 1923, 1928b; Woodring, 1966, 1970; Frost, 1977). Thus their presence or absence on either side of the Isthmus needs to be explained in terms of events subsequent to their separation rather than as a simple problem of dispersal (Lagaaij and Cook, 1973). As summarized by Glynn and Wellington (1983), the late Pliocene and Pleistocene were times of great fluctuations in both sea level and sea temperatures in the tropical Americas. During this period large numbers of coral genera became extinct in both the Caribbean and eastern Pacific (Frost, 1972, 1977; Glynn and Wellington, 1983), and the coral faunas of the two regions have diverged so markedly that today the strongest species-level and generic affinities of eastern Pacific zooxanthellate corals are with the western Pacific. The same is true, although to a lesser extent, for corals without zooxanthellae (Glynn and Wellington, 1983; Wells, 1983).

In striking contrast, there is no indication of mass extinction of cheilostomes over the same period. Nearly half of the Caribbean species occur on both sides of the Isthmus, a pattern already pointed out by Cheetham and Sandberg (1964) for Bryozoa from the Gulf of Mexico. Even if future work were to reveal significant trans-Isthmian divergence in reproductive behavior or electrophoretic distance in all these species, comparable to those in sea urchins (Lessios, 1981, 1984), similarities in cheilostome faunas across the Isthmus would still vastly exceed those in corals.

These observations contradict the vicariance notion that the modern eastern Pacific fauna is a legacy of a pre-Pliocene trans-American fauna whose geological record has somehow been tectonically erased, as was suggested for reef corals by Heck and McCoy (1978). Cheilostomes living in the eastern Pacific do show strong affinities to those living in the Caribbean, but the corals clearly do not.

Similar correlation of niche breadth, geographic range, and evolution occur among arborescent cheilostomes from environments other than corals reefs (Winston and Cheetham, 1984). Since the Eocene, species of *Nellia* capable of living in many environments and on many kinds of substrata have been widely distributed geographically, and evolutionarily persistent. In contrast, species of the related genus *Poricellaria* have been generally more stenotopic, less widely distributed, and shorter lived.

In summary, at least in the Americas, there seems little doubt that cheilostomes are evolutionarily more conservative than the corals upon which they commonly dwell. Proximately this is because cheilostomes tend to be more widely distributed than corals; ultimately, we believe, it is because they can live in a greater variety of environments. Their coral substrata changed

but the cheilostomes did not, because their broad ecological tolerances preadapted them for the change.

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- Appendix 1. Geographic and habitat distributions of 65 species of Caribbean reef-associated cheilostome bryozoans. EA=eastern Atlantic, EP=eastern Pacific, IP=Indo-west Pacific, D=depths >100 meters, E=ephemeral substrata, C&B=Canu & Bassler. References: Banta and Carson, 1977; Canu and Bassler, 1928a,b, 1929; Cook, 1964a,b, 1968; Dumont, 1981; Gleason and Jackson, in prep; Gordon, 1984; Harmer, 1926, 1957; Hayward and Cook, 1983; Hayward and Ryland, 1979; Hincks, 1881; Lagaaij, 1963; Long and Rucker, 1970; Marcus, 1938, 1939, 1949, 1955; Maturo, 1968; Moyano, 1983; Osburn, 1914, 1940, 1950, 1952; Powell, 1971; Powell and Cook, 1967; Ryland and Hayward, 1977; Smitt, 1873; D. Soule and J. Soule, 1964, 1973; J. Soule, 1959, 1961; Wass and Yoo, 1983; Winston, 1982, 1984; Winston and Jackson, 1984, unpubl. data.
- Aimulosia palliolata (C & B), 1928 [EP,D,E]
Antropora typica (C & B), 1928 [D]
Arthropoma cecilii (Audouin), 1826 [EA,EP,IP,D,E]
Arthropoma punctigerium (MacGillivray), 1883 [IP]
Calypotoecia insidiosa Winston, 1984
Canda simplex Busk, 1884
Celleporaria albirostris (Smitt), 1873 [EP,E]
Celleporaria aperta (Hincks), 1882 [EA,IP,D]
Chorizopora brongniartii (Audouin), 1826 [EA,EP,IP,D,E]
Cleidochasma contractum (Waters), 1899 [EA,EP,D,E]
Cleidochasma porcellanum (Busk), 1860 [EA,EP,IP,D,E]
Coleopora americana Osburn, 1940
Coleopora ?corderoi Marcus, 1949
?Cranosina coronata (Hincks), 1881 [IP]
Crassimarginatella tuberosa (C & B), 1928 [EA,D,E]
Crepidacantha poissoni teres (Audouin), 1826 [EA,EP,IP,D,E]
Crepidacantha longiseta C & B, 1928 [D,E]
Crepidacantha setigera (Smitt), 1873 [EA,EP,E]
Cribilaria flabellifera (Kirkpatrick), 1888 [EA,EP,IP,D,E]
Cribilaria radiata (Moll), 1803 [EA,IP,D,E]
Drepanophora tuberculatum (Osburn), 1914 [Ea,EP,E]
Escharina pesanseri (Smitt), 1873 [EA,EP,IP,D,E]
Escharina porosa (Smitt), 1873 [EA,EP,D,E]
Exechonella antillea (Osburn), 1927 [EA,EP,IP,E]
Floridinella typica C & B, 1928 [D,E]
Gemelliporida belikana Winston, 1984 [E]
Gemelliporida magniporosa (C & B), 1923 [D,E]
Gemelliporida c.f. typica (C & B), 1927 [D]
Gephyrophora rubra Osburn, 1940 [E]
Halophila johnstoniae Gray, 1843 [IP]
Hippopleurifera belizae Winston, 1984
Hippopodina feegeensis (Busk), 1884 [EP,IP,D,E]
Hippoporella gorgonensis Hastings, 1930 [EA,EP,D]
Hippoporina pertusa (Esper), 1796 [EA,EP,E]
Labioporella granulosa (C & B), 1928
Margaretta buski Harmer, 1957 [IP]
Microporella mayensis Winston, 1984 [E]
Microporella umbracula (Audouin), 1826 [EP,E]

Mollia patellaria (Moll), 1803 [EA,IP,D]
Parasmittina areolata (C & B), 1927 [EP]
Parasmittina serrula Soule & Soule, 1973 [EP,IP,E]
Parasmittina ?uncinata Soule & Soule, 1973 [EP,E]
Parellisina curvirostris (Hincks), 1862 [EA,EP,IP,D,E]
Parellisina latirostris Osburn, 1940 [E]
Petraliella bisinuata (Smitt), 1873 [IP]
Reptadeonella bipartita (C & B), 1928
Reptadeonella costulata (C & B), 1928 [E]
Reptadeonella sp. [E]
Retevirgula tubulata (Hastings), 1930 [EP,D,E]
Rhynchozoon spicatum Osburn, 1952 [EP,E]
Rhynchozoon verruculatum (Smitt), 1873 [E]
Semihawswellia sinuosa C & B, 1928 [D]
Smittina kukuilua Soule & Soule, 1973 [EP,E]
Smittina ophidiana Waters, 1879 [EA,E]
Smittipora leviseni (C & B), 1928 [EA,EP,E]
Smittipora acutirostris (C & B), 1928 [D]
Steginoporella sp. (see Winston 1984, Fig.20)
Steginoporella magnilabris (Busk), 1834 [EA,EP,IP,D]
Stylopoma spongites (Pallas), 1766 [EP,E]
Synnotum aegyptiacum (Audouin), 1826 [EA,EP,IP,E]
Trematoecia aviculifera (C & B), 1923 [E]
Trematoecia turrita (Smitt), 1873 [EP,IP,E]
Tremogasterina mucronata (Smitt), 1873 [E]
Tremogasterina truncatorostris C & B, 1923
Trypostega venusta (Norman), 1864 [EA,EP,IP,D,E]

Appendix 2. Geographic distribution and trophic status of 62 species of Caribbean reef-associated corals. EA=eastern Atlantic, EP=eastern Pacific, IP=Indo-west Pacific, Z=zooxanthellate, A=azooxanthellate. E&S=Ellis & Solander, ME&H=Milne Edwards & Haime. References: Cairns, 1982; Chevalier, 1954, 1966; Durham, 1947, 1966; Durham and Barnard, 1952; Glynn and Wellington, 1983; Laborel, 1969, 1970, 1974; Weisbord, 1973; Wells, 1973a,b, 1983; Zlatarski and Estalella, 1982.

Acropora cervicornis (Lamarck), 1816 [Z]
Acropora palmata (Lamarck), 1816 [Z]
Acropora prolifera (Lamarck), 1816 [Z]
Agaricia agaricites f. bifaciata Zlatarski, 1982 [Z]
Agaricia agaricites f. massiva Zlatarski, 1982 [Z]
Agaricia agaricites f. unifaciata Zlatarski, 1982 [Z]
Astrangia solitaria (Lesueur), 1817 [A]
Caryophylla smithi(?=clavus) Stokes and Broderip, 1828 [EA,IP,A]
Cladocora arbuscula (Lesueur), 1821 [Z]
Coenocyathus hartschi Wells, 1947 [A]
Collangia immersa Pourtales, 1871 [A]
Collangia simplex Pourtales, 1871 [A]
Colpophyllia natans (Houttuyn), 1772 [Z]
Dendrogyra cylindricus Ehrenberg, 1834 [Z]
Dichocoenia stokesi ME & H, 1848 [Z]
Diploria clivosa (E & S), 1786 [EA,Z]
Diploria labyrinthiformis (Linnaeus), 1758 [Z]
Diploria strigosa (Dana), 1848 [Z]
Eusmilia fastigiata (Pallas), 1766 [Z]
Eusmilia guacanayabensis Zlatarski, 1982 [Z]
Favia fragum (Esper), 1797 [EA, Z]
Gardineria minor Wells, 1973 [A]
Guynia annulata Wells, 1973 [EA, A]
Helioseris cucullata (E & S), 1786 [Z]
Isophyllastrea rigida (Dana), 1848 [Z]
Isophyllia sinuosa (E & S), 1786 [Z]
Madracis asperula ME & H, 1850 [EA,EP,A]

Madracis decactis (Lyman), 1859 [EA,Z]
Madracis formosa Wells, 1973 [Z/A?]
Madracis mirabilis (Duchassaing and Michelotti), 1860 [Z]
Madracis pharensis (Heller), 1868 [EA,EP,Z/A]
Madracis senaria Wells, 1973 [Z/A?]
Manacina areolata (Linnaeus), 1758 [Z]
Meandrina meandrites (Linnaeus), 1758 [Z]
Meandrina memorialis Wells, 1973 [Z]
Meandrina brasiliensis (ME & H), 1848 [Z]
Montastrea annularis (E & S), 1786 [Z]
Montastrea cavernosa (Linnaeus), 1767 [EA,Z]
Mussa angulosa (Pallas), 1766 [Z]
Mycetophyllia aliciae Wells, 1973 [Z]
Mycetophyllia danaana ME & H, 1849 [Z]
Mycetophyllia ferox Wells, 1973 [Z]
Mycetophyllia hydrophorida Zlatarski, 1982 [Z]
Mycetophyllia lamarckiana ME & H, 1848 [Z]
Mycetophyllia reesi Wells, 1973 [Z]
Oculina banksi ME & H, 1848 [Z/A?]
Oculina diffusa Lamarck, 1816 [Z]
Phyllangia americana ME & H, 1849 [A]
Porites astreoides Lamarck, 1816 [Z]
Porites branneri Rathbun, 1887 [Z]
Porites divaricata Lesueur, 1820 [Z]
Porites furcata Lamarck, 1816 [Z]
Porites porites (Pallas), 1766 [Z]
Scolymia cubensis (ME & H), 1849 [Z]
Scolymia lacera (Pallas), 1766 [Z]
Scolymia wellsii Laborel, 1967 [Z]
Siderastrea radians (Pallas), 1766 [EA,Z]
Siderastrea siderea (E & S), 1786 [EA,Z]
Solenastrea bournoni ME & H, 1849 [Z]
Solenastrea hyades (Dana), 1846 [Z]
Stephanocoenia intersepta (Esper), 1795 [Z]
Tubastrea coccinea Lesson, 1829 [EP,IP,A]