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A checklist of the Medusae (Hydrozoa, Scyphozoa and Cubozoa) of Mexico

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Abstract

A list of 169 medusae species in 45 families recorded in Mexican waters is presented for the first time. 86 species (50.8%) were found in the Pacific Ocean, 75 species (44.3%) in the Gulf of Mexico, and 88 (52%) in the Mexican Caribbean Sea. Only 17 species (10%) were common to the three regions. The superclass Hydrozoa, the most diverse one, is represented by 151 species (89%), the Scyphozoa by 16 species (9.5%) and the Cubozoa by 3 (1.8%). Among the Hydrozoa, up to 6 new species have been described from Mexican waters. It is expected that the number of species will grow as surveys that include the hydroid stages and their laboratory-released medusae, as well as benthic and deep-living medusofauna are undertaken in both the Atlantic and the Pacific coasts of Mexico.

Key words: Cnidaria, Hydrozoa, Cubozoa, Scyphozoa, checklist, México

Introduction

Most of the surveys on medusae developed in Mexican waters have dealt with selected taxa (i.e. Alvarez-Silva 1999; Gómez-Aguirre 1986, 1991 a). Comparatively, few studies have been conducted on the ecology, distribution, and taxonomy of these cnidarians in general (Segura-Puertas 1984, 1992; Segura-Puertas & Ordóñez-López 1994; Suárez-Morales *et al*.1999 a). Works with a wide geographic coverage of Mexican coastal, oceanic or neritic waters are necessary in order to have comprehensive information about the medusan fauna of the Mexican seas. The current information on Mexican medusae is frac-

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tional. Up to now, more than 100 years after the first records were published of medusae collected in Mexico, there have been no attempts to build a faunistic inventory of the Mexican medusae. From the analysis of published and unpublished literature generated on both coasts of Mexico we provide the first list of species of medusae of Mexico. We cover all of the environments surveyed for medusae (estuarine environments, reef areas and neritic and oceanic waters). In order to make this faunistic analysis we have divided Mexican waters into three main areas: (P) the Mexican Pacific (including the Gulf of California), (G) the Gulf of Mexico, and (C) the Mexican Caribbean. Our account of the literature follows the same scheme.

Mexican Pacific

The earliest survey of Mexican Pacific medusae was by Maas (1897) from samples obtained during the "Albatross" expedition in the Gulf of California. Studies on neritic and oceanic waters of the Mexican Pacific include those of Agassiz and Mayer (1902), Mayer (1910), Foerster (1923), Bigelow (1909), Kramp (1959a, 1965, 1968), Alvariño (1972, 1976), Fernández-Alvarez (1981), Segura-Puertas (1984), and Vargas-Hernández and Ochoa-Figueroa (1990). Larson (1990) revised the literature on scyphomedusae and cubomedusae distributed from Alaska to Chile thus including some sites in Mexican waters. Additional works dealing with the medusae of Baja California and the Gulf of California have been published by Maas (1897), Bigelow (1940), Alvariño (1969, 1999), and Fernández-Alamo (1989). The estuarine medusan fauna of the Mexican Pacific has been poorly studied. The contributions by Gómez-Aguirre (1991 b) and Alvarez-Silva (1999) are two of the few works published in this transitional environment.

Gulf of Mexico

The medusan fauna of the northern waters of the Gulf of Mexico (Texas mainly) has been relatively well studied (Hedgpeth 1954; Guest 1959; Moore 1962; Hoese *et al*. 1964; Phillips & Burke 1970). The first surveys including Mexican waters were those by Phillips (1972) and Alvariño (1972). After a two-decade hiatus, Correia-Valenca (1992) made a new contribution determining 9 new records in the southern Gulf of Mexico. Segura-Puertas (1992) and Segura-Puertas and Ordóñez-López (1994) increased the number of species known in the area by adding new records from the Yucatan Shelf. The medusan fauna from different coastal lagoons of the Gulf has been surveyed by Signoret (1969), Canudas-González (1979), Vargas-Hernández (1984), Gómez-Aguirre (1980, 1986,1991 a) and Gómez-Aguirre and Uribe-Ortega (1980).

Mexican Caribbean

Phillips (1972) in his survey on cnidarians of the Gulf of Mexico, included three sites in the Mexican Caribbean. Almost two decades later, interest in medusan fauna of this area restarted covering both the neritic and the oceanic environments (Segura-Puertas 1991, 1992; Segura-Puertas & Ordóñez-López 1994; Suárez-Morales *et al.* 1999 a). The coastal and estuarine systems were also studied (Collado *et al*. 1988; Zamponi *et al*. 1990, 1999; Zamponi & Suárez-Morales 1991; Suárez-Morales *et al*. 1995, 1997; Segura-Puertas & Damas-Romero 1997). The reef medusae of this area, representing part of the second largest coral reef barrier has been studied as well (Suárez-Morales *et al.* 1999 b; Ramos-Viera 2001).

TABLE 1. List of the Medusae recorded in Mexican waters. Taxonomic arrangement and nomenclature follows Kramp (1961), Bouillon (1999) and Bouillon & Boero (2000). P: Mexican Pacific; G: Gulf of México; C: Mexican Caribbean.

Superclass Hydrozoa Owen, 1843

Class Hydroidomedusa Claus, 1877

Subclass Anthomedusae Haeckel, 1879

Family Bougainvillidae Lütken, 1850

Bougainvillia caroliniensis (McCrady, 1859). **G, C.** 11, 29, 31
B. frondosa Mayer, 1900. **P, G.** 13, 18 a, 29
B. fulva Agassiz and Mayer, 1899. **P.** 7, 15, 27
B. muscus Allman, 1863. **P, G, C.** 11, 18 a, 37
B. niobe Mayer,1894. **G.** 33
B.platygaster (Haeckel, 1879). **G, C.** 11, 25, 29
Chiarella centripetalis Mass, 1897. **P.** 3, 8, 15, 22, 23
Lizzia alvarinoae Segura-Puertas, 1980. **P, G, C.** 27, 28, 29, 31
L. ferrari Segura-Puertas, 1980. **P.** 12, 27
L. gracilis (Mayer, 1900). **P.** 27
Thamnostoma alexandri (Mayer, 1904). **P.** 15
T. tetrellum (Haeckel, 1879). **G, C.** 28, 29, 31

Family Clavidae McCrady, 1859

Oceania armata Kölliker, 1853. **G, C.** 11, 31
Turritopsis nutricola McCrady, 1859. **G.** 29

Family Cytaeididae L. Agassiz, 1862

Cytaeis tetrastyla Eschscholtz, 1829. **P, G, C.** 11, 25, 27, 29, 31, 35, 37

Family Hydractiniidae L. Agassiz, 1862
Hydractinia apicata Kramp, 1959. **P.** 27
H. borealis (Mayer, 1900). **C.** 30
H. carnea M. Sars, 1846. **C.** 26, 30
H. minima (Trinci, 1903). **C.** 29, 31, 36
H. minuta (Mayer, 1900). **C.** 26, 29
H. simplex Kramp, 1928. **P.** 27

Family Bythotiaridae Mass, 1905
Bythotiara depressa Naumov, 1960. **G, C.** 25, 29, 31, 37
Calycopsis simulans (Bigelow, 1909). **C.** 25
Heterotyara anonyma Maas, 1905. **P.** 6

Family Niobiidae Petersen, 1979
Niobia dendrotentaculata Mayer, 1900. **G, C.** 11, 29

Family Pandeidae Haeckel, 1879
Amphinema australis (Mayer, 1900). **P.** 7, 15, 22
A. dinema (Péron and Lesueur, 1810). **C.** 26, 29, 36, 37
A. rugosum Mayer, 1900. **G, C.** 26, 29, 31, 36, 37
A. turrida (Mayer, 1900). **P, G.** 7, 11, 15, 22
Halitholus intermedius (Browne, 1902). **P, G.** 11, 14
H. pauper Hartlaub, 1913. **P.** 27
Leuckartiara gardineri Browne, 1916. **G.** 11
L. octonna (Fleming, 1823). **P, G.** 3, 11, 12, 14
L. zacae Bigelow, 1840. **P, G.** 4 , 11, 14, 27
Merga violacea (Agassiz and Mayer, 1900). **P, G.** 7, 11, 15, 22
Neoturris fontata (H. B. Bigelow, 1913). **P.** 12, 15
N. papua (Lesson, 1843). **P.** 4
N. pelagica (Agassiz and Mayer, 1902). **P.** 15
Pandea conica (Quoy and Gaimard, 1827). **P.** 13
Stomotoca atra L. Agassiz, 1862. **G.** 11
S. pterophylla Haeckel, 1879. **P. G. C**. 11, 12, 14, 15, 25, 37

Family Proboscidactylidae Hand and Hendrickson, 1950
Proboscidactyla ornata (McCrady, 1859). **P.** 3, 7, 15, 27

Family Protiaridae Haekel, 1879
Halitiara formosa Fewkes, 1882. **G. C.** 29, 36

Family Polyorchidae Agassiz, 1862
Polyorchis karafutoensis Kishinouye, 1910. **G.** 11
P. penicillatus (Eschscholtz, 1829). **P.** 12, 22

Family Cladonematidae Gegenbaur, 1857
Cladonema radiatum Dujardin, 1843. **C.** 30, 31

Family Corynidae Johnston, 1836
Dipurena brownei (Bigelow, 1909). **P.** 7,15
D. halterata McCrady, 1859. **C.** 26, 29,30
D. ophiogaster Haeckel, 1879. **P. C.** 13, 22, 26
D. reesi Vannucci, 1956. **P.** 13
Sarsia angulata (Mayer, 1900). **C.** 26, 30
S. eximia (Allman, 1859). **P. C.** 13, 26
S. gemmifera Forbes, 1848. **G. C.** 11, 29
S. gracilis Browne, 1902. **C.** 35, 41
S. prolifera Forbes, 1848. **C.** 26, 36
S. resplendens Bigelow, 1909. **P.** 7, 15, 22

Family Corymorphidae Allman, 1872
Euphysora furcata Kramp, 1948. **G. C.** 29, 31
E. gigantea Kramp, 1957. **P.** 6
E. gracilis (Brooks, 1882). **G. C.** 11, 25, 29, 31, 37
Vannuccia cargoi (Vargas-Hernández and Ochoa-Figueroa, 1990). **P.** 39
V. forbesii (Mayer, 1894). **G. C.** 11, 26, 29, 31, 35, 37

Family Euphysidae Haeckel, 1879
Euphysilla pyramidata Kramp, 1955. **P. G.** 11, 27
Euphysa aurata Forbes, 1846. **C.** 41

Family Pennariidae McCrady, 1859
Pennaria vitrea Agassiz and Mayer, 1899. **G.** 11
P. disticha Goldfuss, 1820. **C.** 36

Family Tubulariidae Fleming, 1828
Ectopleura dumortieri (van Beneden, 1844). **P.** 15, 21, 22
E. sacculifera Kramp, 1948. **P.**13, 27

Family Zancleidae Russell, 1953
Zanclea costata Gegenbaur, 1857. **P. C.** 7, 5, 26, 27, 29, 31, 36, 37
Z. dubia Kramp,1959. **G.** 11

Subclass Leptomedusae Haeckel, 1879

Family Aequoridae Eschscholtz, 1829

Aequorea coerulescens (Brandt, 1838). **P.** 12
A. floridana (L. Agassiz, 1862). **C.** 30
A. globosa Eschscholtz, 1829. **G.** 11
A. macrodactyla (Brandt, 1834). **G. C.** 29, 31
Zigocanna vagans Bigelow, 1912. **G. C.** 11

Family Blackfordiidae Bouillon, 1984

Blackfordia virginica Mayer, 1910. **P. G.** 2, 33

Family Dipleurosomatidae Russell, 1953

Dichotomia cannoides Brooks, 1903. **G. C.** 25
Dipleurosoma collapsum (Mayer, 1900). **C.** 29

Family Eirenidae Haeckel, 1879

Eirene lactea (Mayer, 1900). **C.** 26, 30, 35
E. pyramidalis (L. Agassiz, 1862). **G. C.** 9, 30, 34
E. tenuis (Browne, 1905). **C.** 30
Eutima gracilis (Brooks, 1882). **G.** 29
E. levuka (Agassiz and Mayer, 1899). **P.** 15
E. mira McCrady, 1859. **G. C.** 29, 35
Eutonina scintillans (Bigelow, 1909). **P.** 7, 15, 22
Helgicirrha medusifera (Bigelow, 1909). **P.** 7, 15, 22
H. shulzei Hartlaub, 1909. **C.** 35, 41
Irenium alabiatum Zamponi, Suárez-Morales and Gasca, 1999. **C.** 42
I. labiatum Zamponi, Suárez-Morales and Gasca, 1999. **C.** 42
Phialopsis diegensis Torrey, 1909. **P.** 3, 27

Family Laodiceidae Agassiz, 1862

Laodicea minuscula Vanucci, 1957. **G.** 31
L.undulata (Forbes and Goodsir, 1851). **G. C.** 11, 26, 29, 31, 37
Staurodiscus tetrastaurus Haeckel, 1879. **C.** 30, 37
Staurophora mertensii Brandt, 1834. **P.** 3

Family Loveneliidae Russell, 1953

Eucheilota comata (Bigelow, 1909). **P.** 7, 15, 20, 22, 27
E. duodecimalis A. Agassiz, 1862. **P. G. C.** 15, 22, 29, 31, 34
E. menoni Kramp, 1959. **P.** 27
E. paradoxica Mayer, 1900. **G. C.** 26, 29, 31, 35

Family Malagazziidae Bouillon, 1984
Octophialucium aphrodite Bigelow, 1919. **G.** 9
O. bigelowi Kramp, 1955. **P.** 7, 5, 22
O. medium Kramp, 1955. **C.** 29

Family Melicertidae Agassiz, 1862
Melicertum georgicum A. Agassiz, 1862. **P.** 13
Netocertoides brachiatus Mayer, 1900. **G. C.** 29, 31

Family Orchistomatidae Bouillon, 1984
Orchistoma pileus (Lesson, 1843). **G. C.** 25, 29, 31

Family Tiarannidae Russell, 1940
Chromatonema erythrogonon Bigelow, 1909. **P.** 8
C. rubrum Fewkes, 1882. **C.** 31
Modeeria rotunda (Quoy and Gaimard, 1827). **C.** 41

Family Campanulariidae Johnston, 1836
Clytia discoida (Mayer, 1900). **P. G. C.** 7, 15, 26, 29, 30, 35, 41
C. folleata (McCrady, 1859). **C.** 26, 30, 36
C. gelatinosa (Mayer, 1900). **C.** 34
C. hemisphaerica (Linnaeus, 1767). **G. C.** 11, 26
C. lomae (Torrey, 1909). **P.** 13
C. mccrady (Brooks, 1888). **G. C.** 29, 31, 34, 36, 37
C. simplex (Browne, 1902). **P. C.** 27, 29, 31
C. uchidai Kramp, 1961. **P.** 13
Obelia Péron and Lesueur, 1810
Obelia spp. **P. G. C.** 3, 18a, 26, 29, 30, 31, 35, 36, 37

Subclass Limnomedusae Kramp, 1938

Family Olindiidae Haeckel, 1879
Cubaia aphrodite Mayer, 1894. **C.** 26, 30, 36
Gossea brachymera Bigelow, 1909. **P. G.** 7, 11, 15, 22
Olindias tenuis (Fewkes, 1882). **C.** 30, 35
Scolionema suvaense (Agassiz and Mayer, 1899). **C.** 29
Vallentinia gabriellae (Mendes, 1948). **C.** 26, 30

Subclass Narcomedusae Haeckel, 1879

Family Aeginidae Gegenbaur, 1857. emend. Maas, 1904

Aegina citrea Eschscholtz, 1829. **P. G. C.** 6, 25, 29, 31, 37

Aeginura beebei Bigelow, 1940. **P.** 14

A. grimaldi Maas, 1904. **G.** 25

Solmundella bitentaculata (Quoy and Gaimard, 1833*)*. **P. G. C.** 3, 5, 11, 12, 14, 15, 21, 25, 27, 29, 31, 35, 36, 37

Aeginidae *incertae sedis*:

Tetraotoporpae siaankanensis Zamponi and Suárez-Morales, 1991 (not valid species Bouillon and Boero, 2000). **C.** 40

Family Cuninidae Bigelow, 1913

Cunina fowleri (Browne, 1906). **G.** 25

C. frugifera Kramp, 1948. **P.** 27

C. globosa Eschscholtz, 1829. **P.** 3, 7, 15

C. octonaria McCrady, 1859. **P. G. C.** 11, 14, 15, 18a, 25, 27, 29, 31, 36

C. peregrina Bigelow, 1909. **P.** 7, 12, 15, 27

C. tenella (Bigelow, 1909). **P.** 7, 15, 22, 27

Solmisus incisa (Fewkes, 1886). **G.** 25

Family Solmarisidae Haeckel, 1879

Pegantha clara R.P. Bigelow, 1909. **P.** 27

P. martagon Haeckel, 1879. **P. C.** 27, 31

P. triloba Haeckel, 1879. **P. C.** 14, 27, 29, 31

Subclass Trachymedusae Haeckel, 1879

Family Geryonidae Eschscholtz, 1829

Geryonia proboscidalis (Förskal, 1775). **P. C.** 1, 15, 27, 29, 31

Liriope tetraphylla (Chamisso and Eysenhardt, 1821). **P. G. C.** 3, 4, 5, 6, 9, 11, 12, 14, 15, 18a, 25, 26, 27, 29, 31, 35, 36, 37

Family Halicreatidae Fewkes, 1886

Halicreas minimum Fewkes, 1882. **P. G. C.** 6, 25

Family Rhopalonematidae Russell, 1953

Aglantha digitale (O.F.Müller, 1776). **P.** 7

A. elata (Haeckel, 1879). **P.** 13

Aglaura hemistoma Péron and Lesueur, 1810. **P. G. C.** 3, 4, 5, 6, 11, 12, 14, 15, 25, 26, 27, 29, 30, 31, 36, 37

Amphogona apicata Kramp, 1957. **P.** 14, 27

A. apsteini (Vanhöffen, 1902). **P. C.** 7, 15, 24
Colobonema sericeum Vanhöffen, 1902. **P. G.** 3, 4, 6, 25
C. typicum Maas, 1897. **P.** 23
Crossota rufobrunea (Kramp, 1913). **P.** 6
Pantachogon haeckeli Maas, 1893. **G. C.** 25
Rhopalonema funerarium Vanhoeffen, 1902. **G.** 11
R. velatum Gegenbaur, 1857. **P. G. C.** 3, 4, 5, 6, 11, 12, 14, 25, 27, 29, 31, 36, 37
Sminthea eurygaster Gegenbaur, 1857. **P. C.** 27, 29, 31

Superclass Cubozoa Werner, 1975

Family Carybdeidae Gegenbaur, 1856
Carybdea alata Reynaud, 1830. **C.** 37
C. marsupialis (Linné, 1758). **C.** 36, 37

Family Chyrodropidae Haeckel, 1892
Chiropsalmus quadrumanus (Müller, 1859). **G.** 17

Superclass Scyphozoa Goette, 1887

Subclass Scyphomedusae Lankester, 1877
Family Atollidae Bigelow, 1913
Atolla vanhoeffeni Russell, 1857. **G. C.** 25
A. wyvillei Haeckel, 1880. **P.** 3

Family Linuchidae Haeckel, 1879
Linuche unguiculata Swartz, 1788. **C.** 26, 29, 37

Family Nausithoidae Bigelow, 1913
Nausithoe atlantica Broch, 1914. **G.** 11
N. punctata Kölliker, 1853. **P. G. C.** 4, 11, 25, 27, 29, 31, 37
N. rubra Vanhöffen, 1902. **C.** 31
Family Periphyllidae Haeckel, 1880
Periphyllopsis braueri Vanhöffen, 1902. **G.** 25
Periphylla periphylla Péron and Lesueur, 1810. **P. G.** 8, 25

Family Pelagiidae Gegenbaur, 1856
Pelagia noctiluca Péron and Lesueur, 1810. **P. G. C.** 5, 14, 18a, 25, 27, 29, 31
Chrysaora quinquecirra Desor, 1848. **G.** 38
C. plocamia (Lesson, 1830). **G.** 33

Family Ulmaridae Haeckel, 1879.
Aurelia aurita Linné, 1758. **P. G. C.** 9, 16, 25, 32, 33
Deepstaria enigmatica Russell, 1967. **G.** 25

Family Cassiopeidae L. Agassiz, 1862
Cassiopea frondosa (Pallas, 1774). **C.** 10, 30, 41
C. xamachana R.P.Bigelow, 1892. **C.** 10, 30, 41

Family Rhizostomatidae Cuvier, 1799
Stomolophus meleagris L. Agassiz, 1862. **P. G.** 16, 18 b

Key for numerical references:
1. Agassiz and Mayer 1902; 2. Alvarez-Silva 1999; 3. Alvariño 1969; 4. Alvariño 1972; 5. Alvariño 1976; 6. Alvariño 1999; 7. Bigelow 1909; 8. Bigelow 1940; 9. Canudas-González 1979; 10. Collado *et al*. 1988; 11. Correia 1992; 12. Fernández-Alamo 1989; 13. Fernández-Alamo 1998; 14. Fernández-Alvarez 1981; 15. Foerster 1923; 16. Gómez-Aguirre 1980; 17. Gómez-Aguirre 1986; 18 a. Gómez-Aguirre 1991 a; 18 b. Gómez-Aguirre 1991 b; 19. Gómez-Aguirre and Uribe-Ortega 1980; 20. Kramp 1959; 21. Kramp 1965; 22. Kramp 1968; 23. Maas 1897; 24. Mayer 1910; 25. Phillips 1972; 26. Ramos-Viera 2001; 27. Segura-Puertas 1984; 28. Segura-Puertas 1991; 29. Segura-Puertas 1992; 30. Segura-Puertas and Damas-Romero 1997; 31. Segura-Puertas and Ordoñez-López 1994; 32. Segura-Puertas *et al*. 2002; 33. Signoret 1969 ; 34. Suárez-Morales *et al*. 1995 ; 35. Suárez-Morales *et al*. 1997 ; 36. Suárez-Morales *et al*. 1999a ; 37. Suárez-Morales *et al*. 1999b; 38. Vargas-Hernández 1984; 39. Vargas-Hernández and Ochoa-Figueroa 1990; 40. Zamponi and Suárez, 1991; 41. Zamponi *et al*. 1990; 42. Zamponi *et al*. 1999.

Comments

Overall, the analysis of these surveys has yielded a record of 169 species of medusae included in 3 superclasses, 6 subclasses, 45 families, and up to 90 genera (Table 1). These groupings and their classification follow the systematic arrangement proposed by Kramp (1961), Bouillon (1999) and Bouillon and Boero (2000). Of the 169 species, up to 150 (88.7%) belong to the superclass Hydrozoa, 16 (9.5%) to Scyphozoa, and 3 species (1.8%) are Cubozoa. The 6 new species described from Mexican material belong to the Hydrozoa. At the levels of family and genus, the hydrozoan subclass, Anthomedusae, is the most diverse group, with 17 families and 31 genera, followed by the Leptomedusae with 11 families and 23 genera. The most diverse non-Hydrozoan medusae are the Scyphozoa, represented by 8 families and 11 genera. Overall, the anthomedusan family Pandeidae is the most rich in species, with 16 species, followed by Bougainvillidae, Eirenidae, and Rhopalonematidae, each with 12 species.

In the Mexican Pacific waters up to 86 species (50.8%) have been recorded, 75 (44.3%) in the Mexican part of the Gulf of Mexico, and 88 (52%) in the Mexican Caribbean. Of the total number of species, 47 (27.8%) have been recorded only in the Mexican Pacific, 38 (22.4%) in the Mexican Caribbean, and 22 (13%) in the Gulf of Mexico. These three areas share only 17 species (10%).

Most of the species recorded are coastal-neritic forms; relatively few species are truly oceanic or estuarine. This could be related to relatively stronger sampling efforts in the coastal and shelf areas. Of the 169 species recorded, 144 (82.5%) are epipelagic, and only 25 (14.8%) are meso or bathypelagic. According to Angel (1994), the mesopelagic layers are highly diverse environments for different zooplankton taxa; the medusae are probably not an exception and it is expected that new taxa and new records will arise from samples collected in deep waters of the Mexican seas.

According to Van der Spoel (1996) there are no true equatorial species of Hydroidomedusae, thus suggesting that this was not a centre of origin of medusae as has been hypothesized for other taxa (see Van der Spoel & Pierrot-Bults 1979). The main area of origin of the current tropical-subtropical medusan fauna is located around the Indo-Malayan zone; this fauna having dispersed to other tropical areas during the post-Cretaceous period. The Indo-Malayan seas have yielded a large number of species, mainly of epipelagic taxa with indirect development and neritic distribution such as the Anthomedusae and Leptomedusae (see Bouillon 1978 a, b, c). The same pattern is supported by our data showing the Anthomedusae and Leptomedusae as the most diverse taxa in Mexican waters, and also by the higher number of exclusive species in the Mexican Pacific. This could be related to the fact that the Eastern Tropical Pacific and, prior to the Miocene, the Northwestern Tropical Atlantic, were areas of secondary invasion of pelagic medusae from the Indo-Malayan centre of diversity (see van der Spoel 1996).

However, a higher species count in the Indo-Malayan area could also be related to the inclusion of bottom-living polyp forms and to relatively intense sampling efforts. It is important to emphasize the importance of studying both hydroid and medusa stages. Boero and Bouillon (1993) analyzing the complete hydromedusan fauna from the Mediterranean Sea, recorded 346 species. In a previous work, Kramp (1959b) considering only the medusa stage, found in the same region 65 species. Therefore it is necessary to study the hydroids and link the two stages. Future biodiversity work in Mexican waters should include surveys of the hydroid stages and their laboratory-released medusae. Most probably, these efforts will modify the number of hydroidomedusae species in the area either recording new, previously unobserved taxa or reconsidering the taxonomic status of several species. Also, the medusae dwelling in deep oceanic layers (over 300-400m) have not been surveyed at all in Mexico; it is expected that these environments harbour a large number of species as well.

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