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AN ANNOTATED CHECKLIST OF DINOFLAGELLATES (DINOPHYCEAE) FROM THE MEXICAN PACIFIC

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ABSTRACT

An annotated checklist of about 605 principally free-living dinoflagellate species and infraspecific taxa from 91 genera reported from the Mexican Pacific is presented on the basis of published literature, some theses, unpublished reports, and original data. Literature references from 1878 to 2005 (in total, 311) are included in the bibliography, and taxonomic notes in regard to some taxa are given, where appropriate. The presence of illustrations divided into three categories (line drawings, light micrographs and scanning electronic micrographs) in the cited works is indicated as well as the known distribution of the taxa in the Mexican Pacific. The nomenclature is brought up to date, and 193 species and infraspecific taxa are accompanied with original comments. Four new combinations are proposed: *Histioneis pieltainii* (B. F. Osorio) Okolodkov comb. nov., *Latifascia subantarctica* (Balech) Okolodkov comb. nov., *Peridiniella globosa* (P. A. Dang.) Okolodkov comb. nov. and *Protoperidinium curtipes* (Jörg.) Balech f. *asymmetricum* (Matzen.) Okolodkov comb. nov. Twenty-nine nomina nuda were revealed. The leading genera are *Protoperidinium* (111 species), *Ceratium* (63), *Dinophysis* (41), *Gonyaulax* (25), *Oxytoxum* (22), *Gymnodinium* (22), *Prorocentrum* (21), *Alexandrium* (17), *Ornithocercus* (12) and *Amphidinium* (12). To discover the true dinoflagellate species diversity in the Mexican Pacific, more studies on the athecate Gymnodiniales species, benthic and epiphytic dinoflagellates, the “*Diplopsalis* group”, the genus *Protoperidinium* and recently described genera of the family Podolampadaceae, are needed.

Key words: checklist, Dinoflagellata, dinoflagellates, Dinophyceae, Mexican Pacific, Mexico, North Pacific, taxonomy.

RESUMEN

Se presenta una lista taxonómica con anotaciones de aproximadamente 605 especies y taxones infraespecíficos de dinoflagelados principalmente de vida libre comprendidos en 91 géneros que han sido reportados para el Pacífico Mexicano en la literatura publicada, algunas tesis, reportes no publicados y datos originales. Las referencias de la literatura entre 1878 y 2005 (en total, 311) están incluidas en la bibliografía, y en las notas taxonómicas concernientes a los taxa proporcionados, donde se consideró apropiado. La presencia de ilustraciones está dividida en tres categorías (dibujos, fotografías en microscopio óptico, y fotografías en microscopio electrónico de barrido) y se indica la distribución de los taxa en el Pacífico Mexicano. La nomenclatura y 193 especies y taxa infraespecíficos. Cuatro nuevas combinaciones: *Histioneis pieltainii* (B. F. Osorio) Okolodkov comb. nov., *Latifascia subantarctica* (Balech) Okolodkov comb. nov., *Peridiniella globosa* (P. A. Dang.) Okolodkov comb. nov. y *Protoperidinium curtipes* (Jörg.) Balech f. *asymmetricum* (Matzen.) Okolodkov comb. nov. Veintinueve nomina nuda son revelados. Los géneros mas importantes son *Protoperidinium* (111 especies), *Ceratium* (63), *Dinophysis* (41), *Gonyaulax* (25), *Oxytoxum* (22), *Gymnodinium* (22), *Prorocentrum* (21), *Alexandrium* (17), *Ornithocercus* (12) y *Amphidinium* (12). Para conocer la diversidad real de las especies de dinoflagelados en el Pacífico Mexicano, se necesitan hacer más estudios sobre las especies atecados de los Gymnodiniales, los dinoflagelados bentónicos y epifíticos, el “grupo *Diplopsalis*”, el género *Protoperidinium* y los géneros recientemente descritos de la familia Podolampadaceae.

Palabras clave: lista florística, Dinoflagellata, dinoflagelados, Dinophyceae, Pacífico Mexicano, México, Pacífico Norte, taxonomía.

INTRODUCTION

The coastline of the Mexican Pacific extends approximately 8,475 km between 14°30' N and 32°30' N and 92° W and 117° W. This region is influenced by the California Current in its northwestern part, and by the Pacific North Equatorial Current, the Pacific Equatorial Countercurrent and the Coastal Costa Rica Current in the southeastern part, and lies within the limits of the tropical zone in a broad sense. The surface tropical waters have temperatures greater than 25° C and salinity usually less than 34 (Pacheco-Sandoval, 1991). These waters are carried by the Pacific Equatorial Countercurrent, and the northern limit of their distribution approximately corresponds to 15° N. Surface subtropical waters, characterized by a salinity of 35 to 36 and a temperature from 15 to 30° C, can be found only in the Gulf of California (Roden & Groves, 1959). Surface waters of the California Current with a temperature of approximately 20° C and a salinity of 34.6 enter the Mexican Pacific from the north and form a part of the Pacific North Equatorial

Current, which is also formed by surface waters of the tropical East Pacific. In June-July, the Coastal Costa Rica Current can reach as far as Cabo Corrientes, Jalisco. In August-December and April-May, it reaches the Gulf of Tehuantepec and then goes offshore. In January-March, the current does not reach the Gulf of Tehuantepec, but goes west directly from Costa Rica, between 9° N and 12° N (Pacheco-Sandoval, 1991).

The first publication referring to the dinoflagellate species reported from the Mexican Pacific is that of Streets (1878). The next one, about dinoflagellates from the states of Oaxaca and Chiapas, with the description of new species, appeared in 1942 (Osorio-Tafall, 1942). Another article by Osorio-Tafall (1943) contains some dinoflagellates species names from the Sea of Cortes. Gilbert & Allen (1943) analyzed the phytoplankton samples collected during two surveys in the Gulf of California in 1939 and 1940 and identified 24 dinoflagellate species. Graham (1943) described *Gymnodinium catenatum* from the Gulf of California. Only three works date back to the 1950-1960s (Klement, 1964; Barreiro-Güemes, 1967; Round, 1967). A dozen works, which include dinoflagellate species names, were published in the 1970s. Beginning in the 1980s, regular studies on dinoflagellates have been carried out in the Gulf of California. The history of phytoplankton studies in Mexico in general is described by Hernández-Becerril (1993, 2003). Some theses include data that have never been published. On the other hand, many articles contain secondarily published data. In the last few years many abstracts with some new records have been published. In our opinion, there is no discriminative difference between the data published in peer reviewed journals, theses and abstracts; therefore, we considered them all. In total, 311 publications that contain species names of the dinoflagellates found in the Mexican Pacific were analyzed.

The aim of the present study was to unite all the available dinoflagellate data reported from the Mexican Pacific. This type of study, but only for the Gulf of California and the Magdalena-Almejas Lagoon System in Baja California Sur, and without any critical comments, was done by Hernández-Becerril (1987c) and Gárate-Lizárraga & Verdugo-Díaz (2001). Especially in view of the growing problem of red tides and the problem of aquatic non-indigenous species in the study area, updated information, based on all the records of dinoflagellates from the Mexican Pacific, is urgently needed.

RESULTS

About 311 publications, abstracts, theses and reports on the phytoplankton, dinoflagellates and toxicity were analyzed. Genera and species within them are ordered alphabetically. Latin names of the taxa are updated, and only the names of the

synonyms given in the original publications on the Mexican Pacific are also presented. The nomenclatural and taxonomic synonyms are separated. The works where the species are illustrated are marked with asterisks: an asterisk (*) meaning line drawings, two asterisks (**) meaning light micrographs, and three asterisks indicating (***) scanning electron micrographs. No difference is indicated between the authors' original illustrations and those taken from the works by other authors (usually concerning line drawings). The words “also as” before a taxonomic name mean that the taxon was reported under more than one name in the same publication. When the name of the same author is spelled differently in various publications, the spelling is unified. Spanish double surnames are written with a dash regardless of their spelling in the original publications.

The present list does not pretend to be a checklist in a strict sense, and to check identifications of dinoflagellates made by other authors was impossible. Furthermore, the illustrations are comparatively rare. Abbreviations of authors of scientific names are used according to Brummitt & Powell (1992) unless they are not listed in the book. The original comments are given for 194 species and infraspecific taxa. Some names of the taxa were found to be a *nomen nudum*. Sometimes, specimens were tentatively identified to a species or generic level using the Latin abbreviations *aff.* or *cf.*, and in this case the taxonomic names are given. The obvious orthographic errors in the names of the taxa are corrected unless there are several of them in one word and the interpretation may be different from ours. Critical comments are given only for several taxa, mainly to clarify their nomenclature or to give our opinion in especially difficult cases. The checklist is not only a compilation, but presents a multi-year work of both authors with the samples taken from coastal waters of all the maritime states of the Mexican Pacific but Sonora in different seasons (in total, we analyzed about 600 samples taken with a water bottle and a net of mesh size 20 to 40 μm).

The geographic distribution within the Mexican Pacific is based on the published and unpublished records. Geographic names are abbreviated as follows: MP - Mexican Pacific (when the location is not indicated); BCP - Baja California Peninsula, GC - Gulf of California, B.C.S. - Baja California Sur, B.C. - Baja California, Son. - Sonora, Sin. - Sinaloa, Nay. - Nayarit, Jal. - Jalisco, Col. - Colima, Mich. - Michoacán, Gro. - Guerrero, Oax. - Oaxaca, Chis. - Chiapas (Fig. 1). For some relatively rare taxa, the original dimensions are given. If the records have not been previously published, they are referred to as “this study” after the author's name, and the name of the location within a Mexican maritime state is specified; the Gulf of Tehuantepec is abbreviated as GT in the text (Fig. 2 and 3). Dinoflagellates recorded from the Mexican Pacific comprise about 605 species and infraspecific taxa, not taking into account the taxa identified to genus. Twenty-nine *nomina nuda* were revealed.

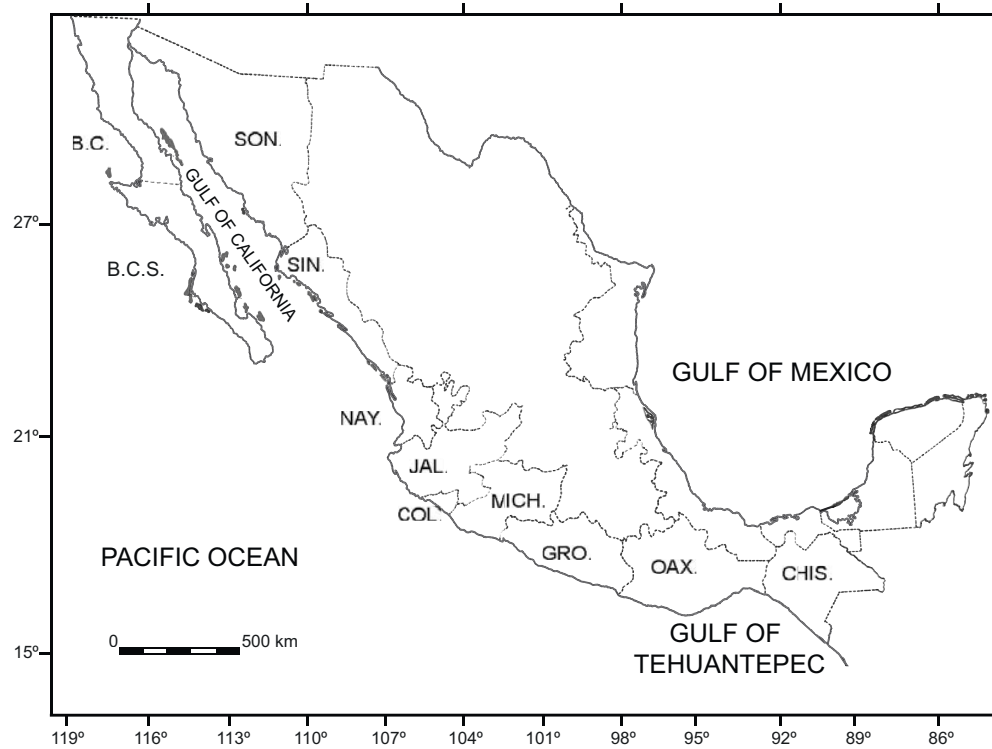


Fig. 1. A map of the Mexican Pacific (B.C.S. - Baja California Sur, B.C. - Baja California, Son. - Sonora, Sin. - Sinaloa, Nay. - Nayarit, Jal. - Jalisco, Col. - Colima, Mich. - Michoacán, Gro. - Guerrero, Oax. - Oaxaca, Chis. - Chiapas).

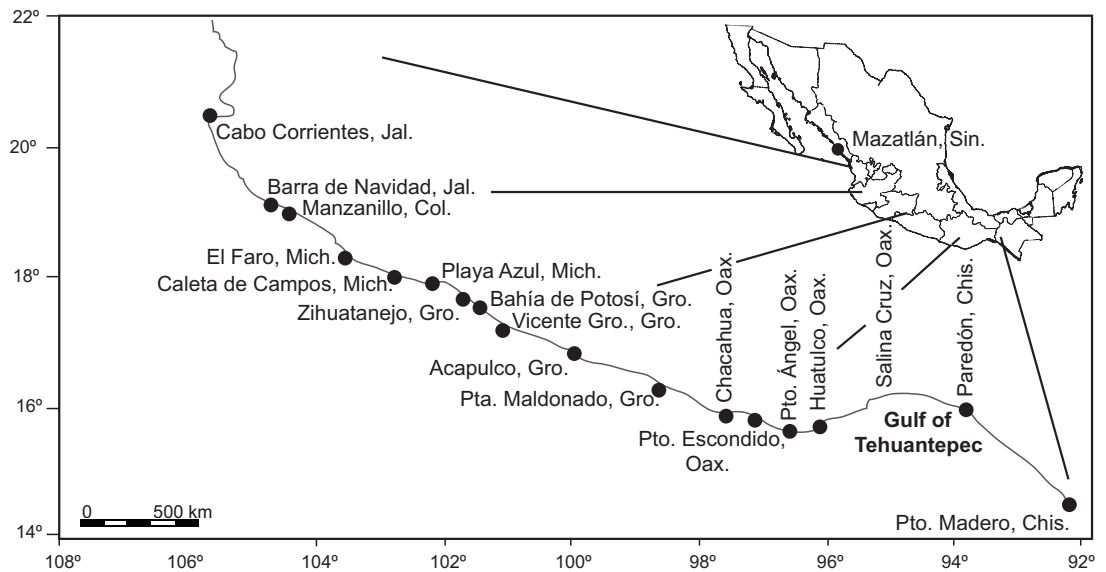


Fig. 2. Sampling sites in the southeastern Mexican Pacific.

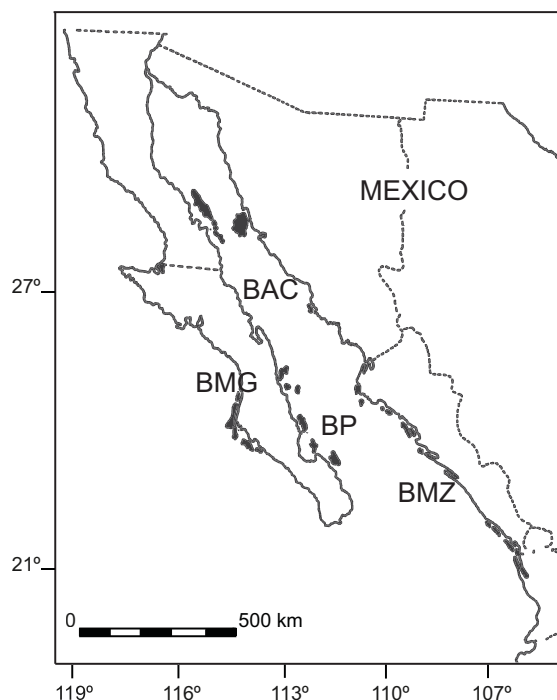


Fig. 3. Sampling sites in the northwestern Mexican Pacific (BAC - Bahía Concepción, BMG Bahía Magdalena, BMZ - Bahía Mazatlán, BP - Bahía de La Paz).

According to Sournia (1973, 1978, 1982, 1990), some species and infraspecific taxa originally described under the International Code of Zoological Nomenclature given in the checklist lack a Latin diagnosis. Under the current International Code of Botanical Nomenclature (Saint Louis 1999 Code), Chapter IV, Section 2, Article 45.4, “any of its names need satisfy only the requirements of the pertinent non-botanical Code for status equivalent to valid publication under the present Code” (Greuter et al., 2000). Therefore, we considered it superfluous to give Latin diagnoses for these taxa.

A list of species and infraspecific taxa

Acanthogonyaulax spinifera (J. Murray & Whitting) H. W. Graham, 1942: 53, fig. 64, 65.

Nom. syn.: *Gonyaulax ceratocoroides* (J. Murray & Whitting) Kofoid, 1910: 182. Hernández-Becerril, 1988b***, c** ***; Martínez-López, 1993b; Licea-Durán et al., 1995; W of B.C.S., GC.

Note: *A. spinifera* can be easily confused with the species of the genus *Ceratocorys* F. Stein. However, while *Ceratocorys* has 5 precingular plates, *A. spinifera* has 6 or 7 precingulars, although interpretation of small precingulars and anterior sulcal plates is confused (Steidinger & Tangen, 1997).

Achomosphaera sp. Evitt, 1963: 163.

Peña-Manjarrez et al., 2005** (as cysts); W of B.C.

Note: The genus *Achomosphaera* Evitt includes chorate dinoflagellate cyst species and it is morphologically similar to the genus *Spiniferites* Mantell, which is known as cysts of the genus *Gonyaulax* Diesing. The vegetative cell affinity of *Achomosphaera* in the work by Peña-Manjarrez et al. (2005) is still unknown (F. Marret, pers. comm.).

Achradina pulchra Lohmann, 1902; 1920: 138, fig. 42a.

Hernández-Becerril & Bravo-Sierra, 2004a***; GT.

Actiniscus pentasterias (Ehrenb.) Ehrenb., 1843(?): 103.

Martínez-López & Verdugo-Díaz, 2000; Hernández-Becerril & Bravo-Sierra, 2004a** ***; Gárate-Lizárraga (this study); W of B.C. and B.C.S., GC (Bahía de La Paz, B.C.S.); GT.

Akashiwo sanguinea (Hirasaka) G. Hansen & Moestrup in Daugbjerg, G. Hansen, Larsen & Moestrup, 2000: 308, fig. 2F, G.

Nom. syn.: *Gymnodinium sanguineum* Hirasaka, 1922: 162.

Tax. syn.: *G. splendens* M. Lebour, 1925: 43, pl. 5, fig. 1; *G. nelsonii* G. W. Martin, 1929: 14, pl. 3, fig. 25, 26.

Kiefer & Lasker, 1975; Blasco, 1977; Valero-Gamboa, 1980; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, c*, 1986, 1987b, c; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985; Cortés-Altamirano, 1987** ***, 1995, 2002** ***; Cortés-Altamirano & Núñez-Pastén, 1991**, 1992*; Gárate-Lizárraga, 1992, 1995*, 1996, 2005**; Orellana-Cepeda et al., 1993; Verdugo-Díaz, 1993, 1997; Martínez-López & Gárate-Lizárraga, 1994; Turrubiates-Morales, 1994; Cortés-Altamirano et al., 1995a**, b, c, 1996, 1999, 2002, 2004b; Licea-Durán et al., 1995, 1999; Núñez-Moreno, 1996; Ochoa et al., 1996, 1997, 1998, 2002; Cortés-Altamirano & Alonso-Rodríguez, 1997**; Gárate-Lizárraga & Siqueiros-Beltrones, 1998, 2003; Gómez-Aguirre, 1998, 2003; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999**; Herrera-Silveira, 1999**; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga et al., 2000, 2001a, c; Herrera-Galindo, 2000a (as *G. aff. sanguineum*), 2002 (as *G. aff. sanguineum*); Gárate-Lizárraga & Verdugo-Díaz, 2001; Alonso-Rodríguez,

2003* **; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Bustillos-Guzmán et al., 2004; Hernández-Becerril et al., 2004b; Morquecho-Escamilla & Lechuga-Devéze, 2004; Sierra-Beltrán et al., 2004; García-Hernández et al., 2005; Peña-Manjarrez et al., 2005; Okolodkov (this study); W of B.C., GC (B.C.S., Son., Sin., Nay.), Jal., Col., Mich. (El Faro), Gro., Oax.

Note: The cells of *A. sanguinea* fixed with Lugol's solution maintain their shape and proportions. This species was observed in a sample taken from Acapulco, Gro., in May 2003, during a *Gymnodinium catenatum* bloom. Dimensions: 51-58 µm long, 39-48 µm wide, ca. 25 µm deep.

Alexandrium acatenella (Whedon & Kof.) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 19.

Nom. syn.: *Gonyaulax acatenella* Whedon & Kof., 1936: 31, fig. 8-13.

Cortés-Altamirano & Rojas-Trejo, 1982; Pastén-Miranda, 1983; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Altamirano & Pastén-Miranda, 1985; Priego-Martínez, 1985; Sin., Jal.

Alexandrium affine (H. Inoue & Fukuyo in Fukuyo, K. Yoshida & H. Inoue) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 38, ex Balech, 1995: 55.

Gárate-Lizárraga et al., 2001e, 2002c, 2003b, 2004b, c, 2005a, d; Band-Schmidt et al., 2002, 2003a, b; Band-Schmidt, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2003 (also cysts), 2004** (cysts); Alonso-Rodríguez et al., 2004b**; Morquecho-Escamilla, 2004 (also cysts); Gárate-Lizárraga, 2005**; GC (B.C.S.).

Alexandrium catenella (Whedon & Kof.) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 2.

Nom. syn.: *Gonyaulax catenella* Whedon & Kof., 1936: 25, fig. 1-7; *Protogonyaulax catenella* (Whedon & Kof.) F. J. R. Taylor, 1979: 51.

Gilbert & Allen, 1943; Osorio-Tafall, 1943; Klement, 1964* (as *Gonyaulax catenella*?); Round, 1967; Gómez-Aguirre, 1972; De la Garza-Aguilar, 1983; Pastén-Miranda, 1983; Cortés-Altamirano & Pastén-Miranda, 1984; Rojas-Trejo, 1984; Priego-Martínez, 1985; Brinton et al., 1986; Hernández-Becerril, 1987c, 1988c**; Gárate-Lizárraga, 1988**, 1995, 1996, 2005, this study; Muñoz-Cabrera, 1989; Gárate-Lizárraga et al., 1990, 1995, 2001a, 2002a, 2004c; Saldate-Castañeda et al., 1991; Lechuga-Devéze et al., 1993, 2000; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995**; Ochoa et al., 1996, 2002; Verdugo-Díaz, 1997; Cortés-Altamirano & Hernández-Becerril, 1998*; Lechuga-Devéze & Morquecho-Escamilla, 1998; Sierra-Beltrán et al., 1998, 2004; Herrera-Silveira, 1999; Ronsón-Paulin, 1999; Morquecho-Escamilla et al., 2000a; Morquecho-Escamilla & Lechuga-Devéze, 2001; Cortés-Altamirano, 2002**; Esqueda-Lara, 2003; Esqueda-Lara et al., 2003; Ochoa,

2003a, b; Alonso-Rodríguez et al., 2004b; Band-Schmidt et al., 2005; W of B.C.S., GC (B.C.S., B.C., Son, Sin.), Jal., Col., Oax.

Note: A colony illustrated by Klement (1964) may be *Alexandrium affine* judging from the shape, proportions and size of the cells. On the other hand, *A. affine* lacks the antapical spines mentioned by Klement. Round (1967) erroneously considered *Gonyaulax catenella* to be synonymous to *Gymnodinium catenata*.

Alexandrium cohorticula (Balech) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 5.

Okolodkov et al., 2003; Mich. (Caleta de Campos), Gro. (Zihuatanejo).

Note: Our cells were 37.5 µm long, 42.5 µm wide and 37.5 µm deep.

Alexandrium compressum (Fukuyo, K. Yoshida & H. Inoue) Balech, 1995: 51, pl. 12, fig. 1-9.

Alonso-Rodríguez et al., 2004b**; Gárate-Lizárraga, 2005**; B.C.S.

Alexandrium digitale Ochoa, 2003a: 507, nomen nudum; Ochoa, 2003b: 11, nomen nudum.

Alexandrium fraterculus (Balech) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 4.

Nom. syn.: *Gonyaulax fratercula* Balech, 1964: 31, pl. 4, fig. 47-58.

León-Álvarez, 1983; GC, Jal.

Alexandrium kutnerae (Balech) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 8A-C.

Okolodkov (this study); Oax. (San Agustínillo, between Pto. Escondido and Pto. Ángel).

Alexandrium leei Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 37, fig. 9A-C.

Okolodkov (this study); Mich. (El Faro).

Note: The only cell we observed is 59 µm long and 55 µm wide. The hypotheca is asymmetric, with the left lobule larger; the first apical plate (1') is not connected directly with the pore plate (Po), a ventral pore on the 1' plate connecting by a long groove with the forth apical plate (4').

Alexandrium margalefi Balech, 1994 (Trans. Am. Microsc. Soc. 113, 2): 220, fig. 12-15.

Band-Schmidt et al., 2002, 2003b; Morquecho-Escamilla & Lechuga-Devéze, 2003**; Morquecho-Escamilla, 2004** (also cysts); GC (B.C.S.).

Alexandrium minutum Halim, 1960: 101, fig. 1a-g.

Góngora-González et al., 1999; Morquecho-Escamilla et al., 2000a; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001; Gárate-Lizárraga et al., 2002a; Alonso-Rodríguez et al., 2004b; Okolodkov (this study); GC (B.C.S.).

Alexandrium monilatum (J. F. Howell) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 34, fig. 3.

Nom. syn.: *Gonyaulax monilata* J. F. Howell, 1953: 153, fig. 1-5.

González-Villalobos, 1971*; De la Garza-Aguilar, 1983; León-Álvarez, 1983; Hernández-Becerril, 1987c; Gárate-Lizárraga, 1995, 2005; Licea-Durán et al., 1995; Ochoa et al., 1996, 1998, 2002; Ronsón-Paulin, 1999; Gárate-Lizárraga et al., 2001a, 2002a, 2004c; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Ochoa, 2003a, b; Okolodkov (this study); W of B.C., GC (B.C.S., Son., Sin.), Jal., Gro.

Alexandrium ostenfeldii (Paulsen) Balech & Tangen, 1985: 338, fig. 3, 4, 5A-D.

Nom. syn.: *Goniodoma ostenfeldii* Paulsen, 1907: 20, fig. 2a-g.

Ceballos-Corona, 1988; Mich.

Alexandrium peruvianum (Balech & B. R. Mendiola) Balech & Tangen, 1985: 342.

Gómez-Aguirre, 1996; Okolodkov et al., 2003; Sin.

Alexandrium polyedra Ochoa, 2003a: 507, nomen nudum; Ochoa, 2003b: 11, nomen nudum.

Alexandrium polygramma Ochoa, 2003a: 507, nomen nudum; Ochoa, 2003b: 11, nomen nudum.

Alexandrium pseudogonyaulax (Biecheler) T. Horig., 1983 ex Yuki & Fukuyo, 1992: 398.

Góngora-González et al., 1999; Morquecho-Escamilla et al., 2000a; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001, 2004**; Alonso-Rodríguez et al., 2004b; Morquecho-Escamilla, 2004** (also cysts); Okolodkov (this study); GC (B.C.S.), Mich. (Playa Azul).

Alexandrium tamarense (M. Lebour) Balech, 1985 (Toxic Dinofl. 3rd Int. Conf.): 38, fig. 20.

Nom. syn.: *Gonyaulax tamarensis* M. Lebour, 1925: 95, illust. 14, 1a-1d.

Verdugo-Díaz, 1997 (as *A. cf. tamarense*); Okolodkov (this study); GC (B.C.S., Sin. - Mazatlán), Gro. (Acapulco), Oax. (Pto. Escondido, San Agustínillo).

Alexandrium tamiyavanichii Balech, 1994 (Trans. Am. Microsc. Soc. 113, 2): 217, fig. 1-6.

Sierra-Beltrán et al., 1998, 2004; Gárate-Lizárraga et al., 2004c; Gárate-Lizárraga, 2005; Núñez-Vázquez, 2005; GC (B.C.S.).

Alexandrium triacantha Ochoa, 2003a: 507, nomen nudum; Ochoa, 2003b: 11, nomen nudum.

Alexandrium verior Ochoa, 2003a: 507, nomen nudum; Ochoa, 2003b: 11, nomen nudum.

Alexandrium sp.

Alonso-Rodríguez et al., 2004b**; GC (B.C.S.).

Amoebophrya ceratii (Koeppen) Cachon, 1964: 70, pl. 1, fig. 6, pl. 2, fig. 7-11, pl. 13, fig. 12-16.

Gárate-Lizárraga & Siqueiros-Beltrones, 2003**; Gárate-Lizárraga, 2005**; Gárate-Lizárraga & Muñetón-Gómez, 2005b**; Okolodkov (this study); W of B.C.; Mich. (El Faro).

Note: We observed *A. ceratii* in *Ceratium furca* which produced red tides and also in a few specimens of *C. macroceros*, *Blepharocysta splendormaris*, *Gonyaulax polygramma* and *Protoperidinium steinii*. *Amoebophrya* sp. was found in the Guaymas Basin (Son.) hydrothermal vent environment (Edgcomb et al., 2002).

Amphidinium accusticum Castro-Sánchez, 1998: 39, 53, 55, 67, 69, nomen nudum.

Note: Possibly an error for *Amphidinium acutissimum*; however, it repeatedly appears on five pages.

Amphidinium acutissimum J. Schill., 1933: 277, fig. 263a, b.

Meave del Castillo & Hernández-Becerril, 1998; W of BCP (B.C.S., B.C.), Oax.

Amphidinium acutum Lohmann, 1920: 140, fig. 43.

Meave del Castillo & Hernández-Becerril, 1998; Oax.

Amphidinium carterae Hulburt, 1957: 199, pl. 1, fig. 1.

Tax. syn.: *A. klebsii* Carter, 1937: 58, pl. 8, fig. 12-15; non *A. klebsii* Kof. & Swezy, 1921: 144. fig. U14, emend. F. J. R. Taylor, 1971: 129, fig. 1.

Hernández-Becerril, 1983, 1985a, 1986 (as *A. cf. klebsii*), 1987c; González-López, 1994, 2000; Licea-Durán et al., 1995; Núñez-Vázquez et al., 2000; Núñez-Vázquez

et al., 2003; Núñez-Vázquez, 2005**; Gárate-Lizárraga (this study); W of B.C., GC (Bahía de La Paz, B.C.S.).

Amphidinium crassum Lohmann, 1908: 252 ff., pl. 17, fig. 16.

Rojas-Trejo, 1984; Priego-Martínez, 1985; Verdugo-Díaz, 1997; B.C.S., Sin.

Amphidinium fusiforme G. W. Martin, 1929 (Bot. Gaz. 87, 4): 556, fig. 4-11. Valero-Gamboa, 1980. GC.

Amphidinium globosum Schröd., 1911: 651, fig. 16.

Martínez-Hernández & Hernández-Campos, 1991; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GT.

Amphidinium lanceolatum Schröd., 1911: 650, fig. 15.

Rojas-Trejo, 1984; Priego-Martínez, 1985; Sin.

Amphidium operculatum Clap. & J. Lachm., 1859: 410, pl. 20, fig. 9, 10.

Núñez-Vázquez, 2005**; GC (B.C.S.)

Amphidinium cf. *pacificum* Kof. & Swezy, 1921: 149, fig. U24, pl. 2, fig. 13.

Hernández-Becerril, 1983, 1985a; GC.

Amphidinium schroederi J. Schill., 1928 (Arch. Protistenk. 62, 1): 134, fig. 10.

Hernández-Becerril, 1983 (as *A. cf. schoederi*), 1985a (as *A. choederi*); Rojas-Trejo, 1984 (as *A. schroederi*?); Priego-Martínez, 1985; Sin.

Amphidinium sphenoides A. Wulff, 1916: 105, pl. 1, fig. 9a, b.

Hernández-Becerril, 1983 (as cf. *A. sphenoides*), 1985a; Rojas-Trejo, 1984; Priego-Martínez, 1985; Sin.

Amphidinium turbo Kof. & Swezy, 1921: 155, Fig. U16, pl. 9, fig. 98.

Rojas-Trejo, 1984 (as *A. turbo*?); Caballasi-Flores, 1985; Licea-Durán et al., 1995**; GC, Sin.

Amphilothus sp.

Cortés-Altamirano & Pastén-Miranda, 1982a; Pastén-Miranda, 1983; Priego-Martínez, 1985; Sin.

Amphisolenia asymmetrica Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 196, pl. 13, fig. 76.

González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Hernández-Becerril et al., 2003; GC.

Amphisolenia bidentata Schröd., 1900 (Mitt. Zool. Stat. Neapel 14): 20, 35, pl. 1, fig. 16a, c.

González-Villalobos, 1971**; Hernández-Becerril, 1987c, 1988a**, b***, c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988*, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990, 1998; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; W of B.C.S., Son., Sin., Jal., Col., Mich., Oax.

Amphisolenia globifera F. Stein, 1883: 24, pl. 21, fig. 9, 10.

Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Oax.

Amphisolenia lemmermannii Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 199, pl. 14, fig. 88, 89.

Hernández-Becerril, 1988c**; González-López, 1994, 2000; Licea-Durán et al., 1995*; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Okolodkov (this study); GC, Jal., Col., Gro. (Zihuatanejo).

Amphisolenia palaeotheroides Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 199, pl. 14, fig. 84.

Hernández-Becerril, 1988c**; Hernández-Becerril et al., 2003; W of B.C.S.

Amphisolenia palmata F. Stein, 1883: 24, pl. 21, fig. 11-15.

Esqueda-Lara, 2003**; Esqueda-Lara et al., 2003; Hernández-Becerril et al., 2004a; Jal.

Amphisolenia rectangulata Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 200, pl. 14, fig. 83.

Hernández-Becerril & Meave del Castillo, 1994; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.), Oax.

Amphisolenia schroederi Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 201, pl. 13, fig. 81.

Esqueda-Lara, 2003; Jal.

Amphisolenia truncata Kof. & J. R. Michener, 1911: 294.

Esqueda-Lara, 2003**; Esqueda-Lara et al., 2003; Hernández-Becerril et al., 2004a; Jal.

Amylax triacantha (Jörg.) Sournia, 1984: 350.

Nom. syn.: *Gonyaulax triacantha* Jörg., 1899: 39.

Caballasi-Flores, 1985; Flores-Granados, 1986; Cortés-Altamirano & Núñez-Pastén, 1992*; Cortés-Altamirano, 1995; Cortés-Altamirano et al., 1995c, 1999, 2000; Gárate-Lizárraga et al., 1995; Licea-Durán et al., 1995; Cortés-Altamirano & Hernández-Becerril, 1998*; Gómez-Aguirre, 1998; Herrera-Silveira, 1999; Góngora-González, 2001; Ochoa et al., 2002; Alonso-Rodríguez, 2003* **; Ochoa, 2003a; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Gárate-Lizárraga, 2005; W of B.C.S., GC (B.C.S., Son., Sin.).

Note: Alonso-Rodríguez & Ochoa (2004) believe that all previous records of *A. triacantha* (e.g., Cortés-Altamirano et al., 1995c, 1999), which caused a red tide in Mazatlán Bay in 1990, are misidentifications of *Peridinium quinquecorne*. Our examination of the cells from this area showed the presence of *A. triacantha*. The cells were 45-49 µm long (49-57 µm with spines), 39-41 µm wide and 27-29 µm deep. Recent plankton samples observed from Bahía de La Paz revealed the presence of *A. triacantha* (Gárate-Lizárraga, 2005). We have already discussed the presence of this Arctic-boreal species in Mazatlán Bay, but it still remains an enigma (Okolodkov, 1996, 1999a; Okolodkov & Dodge, 1996). Herrera-Silveira (1999) refers to the occurrence of toxic red tides caused by this species, which we consider undocumented and so incorrect. Ochoa (2003a, b) published the name *Alexandrium triacanta*, which is illegitimate, referring to *Gonyaulax triacantha* as its synonym, without indication of the author, year and place of publication.

Asterodinium spinosum Sournia, 1972: 152, fig. 5.

Hernández-Becerril & Bravo-Sierra, 2004a**; Mich.

Balechina coerulea (Dogiel) F. J. R. Taylor, 1976: 113, pl. 37, fig. 443, pl. 40, fig. 481.

Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); Okolodkov (this study); W of B.C.A., GC (Bahía de La Paz, B.C.S.), Jal., Gro. (Acapulco), Oax.

Note: The only identified cell from Oaxaca was 121 µm long and 55 µm wide.

Blepharocysta paulsenii J. Schill., 1937: 478, fig. 552a-i.

Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.).

Blepharocysta splendormaris (Ehrenb.) Ehrenb., 1873: 4.

Ceballos-Corona, 1988; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga (this study); W of B.C.S. (Bahía Magdalena), GC (Bahía de La Paz, B.C.S.; B.C.), Mich., Gro. (Acapulco), Oax.

Boreadinium pisiforme J. D. Dodge & Hermes, 1981: 22, fig. 9-14.

Okolodkov et al., 2003 ; Sin. (Mazatlán).

Note: The only studied cell was 43 μm long, 41 μm wide and 38 μm deep. We failed to count the number of the precingular plates. Abé (1981) illustrates six plates in *B. breve* (T. H. Abé) Sournia. Dodge & Hermes (1981) and Dodge & Toriumi (1993) mention seven plates for the genus *Boreadinium* J. D. Dodge & Hermes. Our specimen had 4 apical plates, which is characteristic only of the genus *Boreadinium*, according to the authors of the last two publications mentioned, and in some cases of the genus *Oblea* Balech ex Loeb. & A. R. Loeb., according to Sournia (1986), who gives 3 or 4 apical plates for this genus. Thus, the data on the epitheca pattern of the two genera under discussion are confusing. Furthermore, we could not find significant differences between *B. pisiforme* and *B. breve*, apart from the number of the precingular plates (7 in the former and 6 in the latter), that results from infraspecific variation similar to what we observed in *Diplopsalopsis bomba*. The presence of only one antapical plate in our specimen clearly points to the genus *Boreadinium*.

Brachyadinium capitatum F. J. R. Taylor, 1963: 75, pl. 7, fig. 1-3.

Hernández-Becerril & Bravo-Sierra, 2000, 2004; W of B.C.S.

Calciodinellum operosum Deflandre emend. Montresor, Janofske & Willems, 1997: 123, fig. 10-13, 19.

Hernández-Becerril & Bravo-Sierra, 2004a***; GT.

Centrodinium complanatum (Cleve) Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 186.

Okolodkov et al., 2003; Sin. (Mazatlán), Gro. (Zihuatanejo).

Note: Although we reported the occurrence of *Centrodinium complanatum* from the waters of Guerrero state, our cells are also similar in morphology to the specimens illustrated by Böhm (1933) and Schiller (1937) under the name of *C. pulchrum* and to those illustrated by Balech (1962) as *C. eminens pulchrum*, the latter two names being synonyms. However, our cells correspond well to the specimen of *C. complanatum* as pictured by Rampi (1939). In his later work, Rampi (1951) described and illustrated both *C. complanatum* and *C. eminens* f. *pulchrum*. Because our cells

were intermediate forms between the two species, we consider them to represent morphological variations of the same species, and in this case the name of *C. complanatum* has priority as that validly was published 30 years before *C. pulchrum*. Some cells formed chains which have not been previously reported.

Centrodinium pulchrum Böhm, 1933 (Bot. Arch. 35, 4): 404, fig. 8.

Nom. syn.: *Centrodinium eminens* Böhm f. *pulchrum* (Böhm) J. Schill., 1937: 434, fig. 474.

Hernández-Becerril & Bravo-Sierra, 2000; Hernández-Becerril & León-Álvarez, 2002; Gro.

Ceratium arietinum Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 13, pl. 7, fig. 3 (*C. tripos* var. *arietinum*), var. *arietinum*.

Barreiro-Güemes, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1972; Hernández-Becerril, 1985c*, 1987c, 1988a; Colombo-Rivas, 1986; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995**; Herrera-Galindo, 2002 (as *C. aff. arietinum*); Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S., GC (B.C., Son., Sin.), Jal., Mich., Oax.

Ceratium arietinum var. *bucephalum* (Cleve) Sournia, 1966: 1982.

Nom. syn.: *C. bucephalum* (Cleve) Cleve, 1901 (K. Sv. Vet.-Akad. Handl. 35, 5): 14; Tax. syn.: *C. bucephalum* var. *heterocamptum* Jörg., 1899: 44, pl. 2, fig. 11.

Barreiro-Güemes, 1967* **; González-Villalobos, 1971; Santoyo-Reyes, 1972; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC (Son., Sin.).

Ceratium armatum Martínez-López, 1993b: 84, nomen nudum.

Note: It is possible that the author confused the name of this taxon with *Ceratocorys armata*. Also, see *Ceratium massiliense* var. *armatum*.

Ceratium axiale Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 170, pl. 4, fig. 26.

Martínez-López, 1993b; Martínez-López & Verdugo-Díaz, 2000; W of B.C.S.

Ceratium azoricum Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 13, pl. 7, fig. 6, 7 (*C. (tripos* var.) *azoricum*).

Round, 1967; Estrada & Blasco, 1979; Lapota & Losee, 1984; Hernández-Becerril, 1985c, 1987c, 1988a, 1989; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988* **; Gárate-Lizárraga et al., 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López

& Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC (B.C.S., B.C.), Mich., Oax.

Ceratium balechii Meave, Okolodkov & Zamudio in Meave del Castillo, Zamudio-Reséndiz, Okolodkov & Salgado-Ugarte, 2003: 83, fig. 11a-c, f. *balechii*.

Nom. syn.: *Ceratium divaricatum* var. *balechii* (Meave, Okolodkov & Zamudio) Hernández-Becerril in Hernández-Becerril & Alonso-Rodríguez, 2004a, b: fig. 2f-j, non 3m, n;

Tax. syn.: *Ceratium dens* auct., non Ostenf. & J. Schmidt: Cortés-Altamirano & Hernández-Becerril, 1998: 68, fig. 23; Pech-Pacheco et al., 1999: fig. 1, 3a, 7; Cortés-Altamirano & Núñez-Pastén, 2000: 309, fig. 3; *C. tripos* var. *ponticum* auct., non Jörg.: Licea-Durán et al., 1995: 49, pl. 5, fig. 6a-c.

Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971*; Blasco, 1977, 1978; Packard et al., 1978; Estrada & Blasco, 1979; Morey-Gaines, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987c, 1988a; Priego-Martínez, 1985**; Santamaría del Ángel, 1986; Cortés-Altamirano, 1987***, 1995, 2002; Cortés-Altamirano & Núñez-Pastén, 1991***, 1992, 2000a***; Gárate-Lizárraga, 1992, 2005**; Cortés-Altamirano et al., 1993, 1995c, 1996, 1999, 2002*, 2004b; Verdugo-Díaz, 1993; Gárate-Lizárraga et al., 1995, 2000; Licea-Durán et al., 1995* ***; Ochoa et al., 1996, 1998, 2002; Cortés-Altamirano & Alonso-Rodríguez, 1997** ***; Cortés-Altamirano & Hernández-Becerril, 1998*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Gómez-Aguirre, 1998; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999; Lechuga-Devéze et al., 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002 (as *C. aff. dens*); Zamudio-Reséndiz et al., 2002 (as *C. mexicanum*); Alonso-Rodríguez, 2003* **; Alonso-Rodríguez & Páez-Osuna, 2003; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Meave del Castillo et al., 2003* ***, 2005b (as f. *belechii*); Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Hernández-Becerril & Alonso-Rodríguez, 2004a, b** ***; Hernández-Becerril et al., 2004b; Peña-Manjarrez et al., 2005; Sosa et al., 2005; W of BCP, GC (B.C., Sin., Nay.), Jal., Col., Mich., Gro., Oax.

Note: Herrera-Silveira (1999) and Hernández-Becerril et al. (2004b) relate the occurrence of toxins in bivalves and intoxication of humans with this species, which we consider undocumented and incorrect. The name of *Ceratium mexicanum* published by Zamudio-Reséndiz et al. (2002) should be considered a nomen nudum because it was not validly published, and it is synonymous to *C. balechii* (see the note for *C. mexicanum*). We consider *C. divaricatum* var. *balechii* and *C. balechii* nomenclatural synonyms. As to *C. balechii* and *C. divaricatum* var. *divaricatum*, we recommend retaining them as separate species for two main reasons. First, in

C. balechii the antapical horns are directed posterior-laterally; in *C. divaricatum* var. *divaricatum* they are usually directed anterior-laterally, sometimes laterally but never posterior-laterally. Second, geographic ranges of these two taxa do not overlap.

Ceratium balechii f. *longum* Zamudio & Meave in Meave del Castillo, Zamudio-Reséndiz, Okolodkov & Salgado-Ugarte, 2003: 84, fig. 11d-f, 12, 13, 14(?). Meave del Castillo et al., 2003* ***, 2005b (as f. *lunga*); GC (Sin., Nay.), Jal., Gro., Oax.

Ceratium belone Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 13, pl. 7, fig. 13. González-Villalobos, 1971*; Lapota & Losee, 1984; Rojas-Trejo, 1984; Cortés-Lara, 1985; Hernández-Becerril, 1985c*, 1987c, 1989**; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Gárate-Lizárraga, 1988, 1992, this study; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993a, b; Verdugo-Díaz, 1997; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Esqueda-Lara, 2003; W of B.C.S., GC (Bahía de La Paz, B.C.S.; B.C., Son., Sin.), Jal., Col., Gro. (Acapulco).

Ceratium biceps Clap. & J. Lachm., 1859: 400, pl. 19, fig. 8. González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Ochoa, 2003a; W of BCP, GC (B.C.S.).

Note: According to Schiller (1937), *C. biceps* Clap. & J. Lachm., 1859, is synonymous to *C. furca*, and a later homonym *C. biceps* Kof., 1908 is synonymous to *C. extensum* f. *strictum* (Okamura & Nishikawa) Steem. Niels. Most probably, González-López (1994, 2000) is referring to *C. biceps* Clap. & J. Lachm., because she uses this name in her earlier work (González-López & Siqueiros-Beltrones, 1990). Martínez-López & Verdugo-Díaz (2000) do not give the authorship for *C. biceps*. In the present article, in order to avoid confusion, we preferred not to put *C. biceps* Clap. & J. Lachm. as a synonym to *C. furca*. Moreover, we consider them different species.

Ceratium cf. *brachyceros* Daday, 1907: 245, fig. A. Martínez-López, 1993b; Martínez-López & Verdugo-Díaz, 2000; W of B.C.S.

Ceratium breve (Ostenf. & J. Schmidt) Schröd., 1906: 358, var. *breve*. Klement, 1964**; Barreiro-Güemes, 1967* **; González-Villalobos, 1971*; Hernández-Becerril, 1983, 1985a, 1987c, 1988a; Lapota & Losee, 1984; Rojas-Trejo,

1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Brinton et al., 1986; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Gaxiola-Castro et al., 1987; Ceballos-Corona, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S., GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Ceratium breve var. *curvulum* (J. Schmidt) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 41, fig. 85.
Ceballos-Corona, 1988; Mich.

Ceratium breve var. *parallelum* (J. Schmidt) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 41, pl. 4, fig. 86.
García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Hernández-Becerril, 1988a** ***, 1989** ***; González-López & Siqueiros-Beltrones, 1990; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Varona-Cordero & Gutiérrez-Mendieta, 2003; W of BCP, GC (B.C.S.), Mich., Oax., Chis.

Ceratium breve var. *schmidtii* (Jörg.) Sournia, 1966: 1981.
Nom. syn.: *C. schmidtii* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 50, pl. 5, fig. 110, 111.
González-Villalobos, 1971*; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Licea-Durán et al., 1995* **; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Son., Sin., Jal., Col., Mich., Oax.

Ceratium candelabrum (Ehrenb.) F. Stein, 1883: pl. 15, fig. 15, 16, var. *candelabrum*.
Gilbert & Allen, 1943; Barreiro-Güemes, 1967* **; González-Villalobos, 1971; Santoyo-Reyes, 1972; León-Álvarez, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985**; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c, 1988a; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993a, b; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; W of BCP, GC (B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Ceratium candelabrum var. *commune* Böhm, 1931 (Bot. Arch. 31, 3-4): 351, fig. 1, 2.

Klement, 1964; GC.

Ceratium candelabrum var. *curvatulum* Jörg., 1920: 15, fig. 6.

Klement, 1964**; GC.

Ceratium candelabrum var. *depressum* (Pouchet) Jörg., 1920: 12, fig. 5, 6.

Tax. syn.: *C. candelabrum* var. *dilatatum* (Gourret) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 16, fig. 4, 5, 22; *C. candelabrum* f. *curvatulum* Jörg. pro parte.

Klement, 1964; Round, 1967; Hernández-Becerril, 1985c*, 1987c, 1989**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988*, 1992; Gárate-Lizárraga et al., 1990; Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., B.C., GC, Mich.

Ceratium carriense Gourret, 1883: 38, pl. 4, fig. 57, var. *carriense*.

Balech, 1959a; Round, 1967; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990, 2000; González-López & Siqueiros-Beltrones, 1990, 1998; Martínez-López, 1993b; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002 (as *C. aff. carriense*); Esqueda-Lara, 2003; W of B.C.S. and B.C., GC, Jal., Col., Mich., Oax.

Ceratium carriense var. *volans* (Cleve) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 26, fig. 148a, b, 149a, b.

Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, this study; GC (Bahía de La Paz, B.C.S.), Mich.

Ceratium cephalotum (Lemmerm.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 10, pl. 1, fig. 10.

Balech, 1959a; Round, 1967; Hernández-Becerril, 1987c; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995*; W of B.C.S. and B.C., GC.

Ceratium concilians Jörg., 1920: 72, fig. 69.

Round, 1967; González-Villalobos, 1971*; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995*; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; W of B.C.S., GC, Son., Sin., Jal., Mich.

Ceratium contortum (Gourret) Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 14, pl. 7, fig. 10, var. *contortum*.

Balech, 1959a; Round, 1967; González-Villalobos, 1971*; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Hernández-Becerril, 1989** ***; González-López & Siqueiros-Beltrones, 1990 (also as *C. cf. contortum*); Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of B.C.S. and B.C., GC (B.C.S., Son., Sin.), Jal., Mich.

Ceratium contortum var. *karstenii* (Pavill.) Sournia, 1966: 1981.

Nom. syn.: *C. karstenii* Pavill., 1907, pro parte: 152.

Tax. syn.: *C. schrankii* Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 306, pl. 28, fig. 29a-31.

Klement, 1964; Barreiro-Güemes, 1967; Semina & Tarkhova, 1972 (probably, as *C. karsteni*); León-Álvarez, 1983; Lapota & Losee, 1984; Hernández-Becerril, 1985c, 1987c, 1988a, 1989; Ortega-Banuel, 1985*; García-Pamanes, 1987; Hernández-Cachou, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b (also as *C. schrankii*); González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002 (as *C. aff. karsteni*); W of B.C.S., B.C., Son., Jal., Mich., Oax.

Note: According to Schiller (1937), *C. schrankii* Kof. is synonymous to *C. karstenii* Pavill., which in turn, according Sournia (1968), is synonymous to *C. contortum* (Gourret) Cleve var. *karstenii* (Pavill.) Sournia.

Ceratium contortum var. *longinum* (G. Karst.) Sournia, 1966: 1981.

Ceballos-Corona, 1988; Mich.

Ceratium contortum var. *robustum* (G. Karst.) Sournia, 1966: 1981.

Gárate-Lizárraga, 1988**; Hernández-Becerril, 1989**; Gárate-Lizárraga et al., 1990; Licea-Durán et al., 1995; Esqueda-Lara, 2003; GC, Jal., Col.

Ceratium contortum f. *subcontortum* (Schröd.) Steem. Niels., 1934: 23, fig. 52.

Hernández-Becerril, 1988a**; Meave del Castillo & Hernández-Becerril, 1998; Oax.

Ceratium contrarium (Gourret) Pavill., 1905: 53, pl. 2, fig. 1.

Nom. syn.: *C. trichoceros* var. *contrarium* (Gourret) J. Schill., 1937: 431.

Klement, 1964; Hernández-Becerril, 1985c*, 1987c, 1989**; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995*; Esqueda-Lara, 2003; Ochoa, 2003a; W of B.C.S., B.C., Jal., Col., Mich.

Note: Klement (1964) illustrated *C. contrarium* under the name of *C. trichoceros* var. *contrarium* because his cell clearly has an oblique posterior side of the hypotheca, which is characteristic of *C. contrarium* (Sournia, 1968). However, if we apply the criteria given by Balech (1988a), the cell illustrated by Klement (1964) remains unidentifiable because it combines the features of both species considered discriminative by Balech: a slender cell body characteristic of *C. trichoceros*, and slightly diverged antapical horns undulating closer to their bases, which is typical of *C. contrarium*. Moreover, after Balech (1988a), who refers to the ICBN, *C. flagelliferum* Cleve has priority over *C. contrarium*, but the former has not been used by taxonomists during the last fifty years; he included parts of *Ceratium flagelliferum* in his *C. contrarium*. We could not distinguish between *C. contrarium* and *C. trichoceros* and believe that they belong to the same species. However, to avoid more confusion in records of these two species, we prefer to place them under two different names as they appear in literature.

Ceratium declinatum (G. Karst.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): pl. 4, fig. 87-89, var. *declinatum*.

Round, 1967; Nienhuis, 1979, 1982; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga et al., 2000; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC (B.C.S.), Jal., Col., Mich., Oax.

Ceratium declinatum var. *angusticornum* (N. Peters) F. J. R. Taylor, 1976: 83, pl. 16, fig. 164.

Ceballos-Corona, 1988; Mich.

Note: The combination is illegitimate because there is no reference to the basionym (Sournia, 1973, 1978; M. Elbrächter, pers. comm.).

Ceratium declinatum f. *normale* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): fig. 87-89.

García-Pamanes, 1987; Hernández-Becerril, 1988a**, 1989**; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; GC, Oax.

Ceratium deflexum (Kof.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 64, pl. 7, fig. 138.

Round, 1967; González-Villalobos, 1971*; Signoret & Santoyo-Reyes, 1980 (as *C. deflexum*?); García-Pamanes, 1987; Hernández-Becerril, 1987c, 1989**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993; Licea-Durán et al., 1995* **; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002**; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Varona-Cordero & Gutiérrez-Mendieta, 2003; W of BCP, GC (Son., Sin., Nay.), Jal., Col., Mich., Oax., Chis.

Ceratium digitatum F. Schütt, 1895: pl. 12, fig. 42.

Balech, 1959a; Round, 1967; Hernández-Becerril, 1987c, 1988a*; Ceballos-Corona, 1988; González-López, 1994, 2000; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; Gárate-Lizárraga (this study); W of B.C.S. and B.C., GC, Jal., Mich., Gro. (Acapulco).

Ceratium divaricatum Kof., 1908 (Univ. Cal. Publ. Zool. 4, 6): 380, fig. 31.

Santamaría del Ángel, 1986; Hernández-Becerril, 1989** ***; González-López, 1994, 2000; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.; B.C.), Jal., Col.

Note: Hernández-Becerril & Alonso-Rodríguez (2004a, b) suggest that *C. balechii* described by us (Meave del Castillo et al., 2003) should be a synonym of *C. divaricatum*. They also accept that the specimens from the south MP can be classified as *C. divaricatum* var. *balechii* (in their first work, the combination is not valid because it was not published properly). Although the two species have reduced antapical horns and a shorter right antapical horn, we consider them different. In *C. balechii*, the right antapical horn is directed laterally-posteriorly, while in *C. divaricatum* it is most often laterally-anteriorly and sometimes laterally (Kofoid, 1908). Schiller (1937) does not exclude that *C. divaricatum* is synonymous to *C. porrectum*. Also see the note for *C. balechii*.

Ceratium ehrenbergii Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 171, pl. 2, fig. 16.

Martínez-López, 1993b; W of B.C.S.

Ceratium euarquatatum Jörg., 1920: 56, fig. 54.

Balech, 1959a; Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971; Hernández-Becerril, 1987c, 1989**; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993a, b; Licea-Durán et al., 1995**;

Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga et al., 2000; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC (Son., Sin.), Jal., Col.

Ceratium extensum (Gourret) Cleve, 1900 (Göt. K. Vet. Vitterh o Samh. Handl. 4, 3): 215, f. *extensum*.

Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971*; Gómez-Aguirre & Santoyo-Reyes, 1975; Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; García-Pamanes & Villavicencio-Garayzar, 1982; Pastén-Miranda, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Cortés-Altamirano & Pastén-Miranda, 1985; Hernández-Becerril, 1985c*, 1987c, 1988a, 1989**; Priego-Martínez, 1985; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; Licea-Durán et al., 1995; Núñez-Moreno, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Ceratium falcatifforme Jörg., 1920: 40, fig. 29.

Balech, 1959a; Estrada & Blasco, 1979; Santamaría del Ángel, 1986; Hernández-Becerril, 1988a, 1989**; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Góngora-González, 2001; Frausto-Sotelo, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; W of BCP, GC (B.C.S., B.C., Nay.), Oax.

Ceratium falcatum (Kof.) Jörg., 1920: 39, fig. 28.

Balech, 1959a; Santoyo-Reyes, 1971, 1972; Gómez-Aguirre & Santoyo-Reyes, 1975; Pastén-Miranda & Robles-Mungaray, 1982; Pastén-Miranda, 1983; Cortés-Altamirano & Pastén-Miranda, 1984; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Hernández-Becerril, 1985c*, 1987c; Priego-Martínez, 1985**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990, 2005d; Cortés-Altamirano et al., 1993; Licea-Durán et al., 1995* **; Verdugo-Díaz, 1997; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Gómez-Aguirre et al., 1999; Ochoa & Sierra-Beltrán, 1999; Figueroa-Torres & Zepeda, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002*; Cortés-Lara et al., 2003; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Ochoa, 2003a; Varona-Cordero & Gutiérrez-Mendieta, 2003; Peña-Manjarrez et al., 2005; W of BCP, GC, Son., Nay., Jal., Col., Mich., Oax., Chis.

Ceratium filicorne Steem. Niels., 1934: 19, fig. 39.
Ceballos-Corona, 1988; Mich.

Ceratium furca (Ehrenb.) Clap. & J. Lachm., 1859: pl. 19, fig. 5, var. *furca*.
Gilbert & Allen, 1943; Klement, 1964; Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1971, 1972; Smayda, 1975; Blasco, 1977, 1978; Gilmartin & Revelante, 1978; Packard et al., 1978; Estrada & Blasco, 1979; Nienhuis, 1979, 1982; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; Otero-Dávalos, 1981; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1984, 1985; García-Pamanes, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987b, c, 1988a, 1989**; León-Álvarez, 1983; Pastén-Miranda, 1983; Cortés-Altamirano, 1984, 1995, 2002**; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Nienhuis & Guerrero, 1985; Ortega-Banuel, 1985*; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Gaxiola-Castro et al., 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1991, 1992, 2005**; Hernández-Cachou, 1988; Gárate-Lizárraga et al., 1990, 1995, 2000, 2001a, c, 2004b, c, 2005a, d; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano & Núñez-Pastén, 1991, 1992; Cortés-Altamirano et al., 1993, 1995b, c, 1996, 1999, 2004b; Lechuga-Devéze et al., 1993, 2000; Martínez-López, 1993b; Orellana-Cepeda et al., 1993; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995, 1999; Morquecho-Escamilla, 1996; Núñez-Moreno, 1996; Castro-Sánchez, 1998; Cortés-Altamirano & Hernández-Becerril, 1998*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998, 2003**; Gómez-Aguirre, 1998, 2003*; Lechuga-Devéze & Morquecho-Escamilla, 1998; Meave del Castillo & Hernández-Becerril, 1998, 2002; Ochoa et al., 1998, 2002; Gómez-Aguirre et al., 1999**, 2003; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999; Herrera-Galindo, 2000a; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Morales-Blake et al., 2001; Muñetón-Gómez et al., 2001; Figueroa-Torres et al., 2002; Herrera-Galindo, 2002**; Palomares-García et al., 2002; Alonso-Rodríguez, 2003* **, 2004; Esqueda-Lara, 2003; Alonso-Rodríguez et al., 2004b* **, Bustillos-Guzmán et al., 2004; Frausto-Sotelo, 2004**; Gárate-Lizárraga & Martínez-López, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; Orellana-Cepeda et al., 2004; Verdugo-Díaz, 2004; Meave del Castillo & Zamudio-Reséndiz, 2005; Orellana-Cepeda et al., 2005; Peña-Manjarrez et al., 2005**; Villalejo-Fuerte et al., 2005; Zepeda-Esquivel et al., 2005; W of BCP, GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Note: Herrera-Silveira (1999) refers to the occurrence of toxic red tides caused by this species, which we consider undocumented and so incorrect. None of the *Ceratium*

species is known to be toxic. Fish mortalities have been documented (Orellana-Cepeda et al., 2002).

Ceratium furca var. *eugrammum* (Ehrenb.) J. Schill., 1937: 368, fig. 405a.

Ceratium incisum auct., non Jörg.: Licea-Durán et al., 1995: pl. 3, fig. 5. Barreiro-Güemes, 1967*; Gómez-Aguirre & Santoyo-Reyes, 1975; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980; Hernández-Becerril, 1987c, 1988a; Ceballos-Corona, 1988; Licea-Durán et al., 1995* ***; Meave del Castillo & Hernández-Becerril, 1998; GC, Jal., Col., Mich., Oax.

Note: Licea-Durán et al. (1995: pl. 3, fig. 5) obviously pictured *C. furca* var. *eugrammum* under the name of *C. incisum*; this can be seen by the relative length of the epitheca and hypotheca in relation to the cell width and the shape of the epitheca (e.g., see Sournia, 1968; Balech, 1988a).

Ceratium furca var. *hircus* (Schröd.) Margalef, 1961 ex Sournia, 1973: 9.

Nom. syn.: *C. hircus* Schröd., 1909: 213, fig. 2.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1985, 1992b; Pastén-Miranda, 1983; Rojas-Trejo, 1984; Priego-Martínez, 1985; García-Pamanes, 1987; Hernández-Becerril, 1987c; Cortés-Altamirano & Núñez-Pastén, 1992; Licea-Durán et al., 1995** ***; Santoyo-Reyes et al., 1999; Varona-Cordero & Gutiérrez-Mendieta, 2003; GC (B.C.S., Son., Sin.), Jal., Chis.

Ceratium fusus (Ehrenb.) Dujard., 1841: 271, var. *fuscus*.

Gilbert & Allen, 1943; Barreiro-Güemes, 1967*; González-Villalobos, 1971*; Santoyo-Reyes, 1971, 1972; Smayda, 1975; Blasco, 1977; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Nienhuis, 1979, 1982; Santoyo-Reyes & Signoret, 1979; Cortés-Altamirano & Pastén-Miranda, 1982b; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987c, 1988a, 1989**; León-Álvarez, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Nienhuis & Guerrero, 1985, 1986; Ortega-Banuel, 1985*; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Gárate-Lizárraga, 1988, 1992, 2005; Gárate-Lizárraga et al., 1990, 2000, 2005d; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano et al., 1993; Lechuga-Devéze et al., 1993, 2000; Martínez-López, 1993a, b; Verdugo-Díaz, 1993, 1997; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Núñez-Moreno, 1996; Castro-Sánchez, 1998; Gárate-Lizárraga & Siqueiros-Beltrones, 1998, 2003; Lechuga-Devéze & Morquecho-Escamilla, 1998; Meave del Castillo & Hernández-

Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Herrera-Galindo, 2000a; Martínez-López & Verdugo-Díaz, 2000; Venrick, 2000; Figueroa-Torres & Zepeda-Esquivel, 2001**; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002*; Ochoa et al., 2002; Palomares-García et al., 2002; Gómez-Aguirre et al., 2003; Ochoa, 2003b; Morquecho-Escamilla & Lechuga-Devéze, 2004; Peña-Manjarrez et al., 2005; Villalejo-Fuerte et al., 2005; W of BCP, GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Oax.

Ceratium fusus var. *seta* (Ehrenb.) Sournia, 1966: 1981.
Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Hernández-Becerril, 1989**;
González-López, 1994, 2000; Licea-Durán et al., 1995**; Meave del Castillo &
Hernández-Becerril, 1998; Herrera-Galindo, 2002; Esqueda-Lara, 2003; Varona-
Cordero & Gutiérrez-Mendieta, 2003; GC, B.C., Jal., Col., Mich., Oax., Chis.

Ceratium fusus var. *schuettii* Lemmerm., 1899: 367.
Ceballos-Corona, 1988; Esqueda-Lara, 2003; Jal., Col., Mich.

Ceratium geniculatum (Lemmerm.) Cleve, 1900 (Göt. K. Vet. Vitterh o Samh.
Handl. 4, 3): 221.
Round, 1967; Hernández-Becerril, 1987c, 1989**; Martínez-López, 1993b;
González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-
Díaz, 2000; Ochoa, 2003a; Meave del Castillo & Zamudio-Reséndiz, 2005; W of
B.C.S., GC (B.C.S.).

Ceratium gibberum Gourret, 1883: 34, pl. 2, fig. 33-35, var. *gibberum*.
Lapota & Losee, 1984; Brinton et al., 1986; Hernández-Becerril, 1987c; González-
López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Verdugo-Díaz, G.
1993; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Gárate-
Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC, B.C.S.

Ceratium gibberum var. *dispar* (Pouchet) Sournia, 1966: 1981.
Klement, 1964**; Round, 1967; Hernández-Becerril, 1985c*, 1987c, 1988a**,
1989***; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; Licea-
Durán et al., 1995*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-
Beltrán, 1999; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W
of B.C.S., GC (B.C.S.), Jal., Col.

Ceratium gibberum var. *subaequale* Jörg., 1920: 70: fig. 68.
Klement, 1964; Ceballos-Corona, 1988; Hernández-Becerril, 1987c, 1988a, 1989**;
Licea-Durán et al., 1995*; Meave del Castillo & Hernández-Becerril, 1998;
Esqueda-Lara, 2003; GC, Jal., Col., Mich.

Ceratium gravidum Gourret, 1883: 58, pl. 1, fig. 15, var. *gravidum*.
Balech, 1959a; Round, 1967; Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971; Hernández-Becerril, 1987c, 1988b***, 1989**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988*; this study; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993a, b; González-López, 1994, 2000; Licea-Durán et al., 1995*; Martínez-López & Verdugo-Díaz, 2000; W of B.C.S. and B.C., GC (Bahía de La Paz, Son., Sin.), Mich., Oax.

Ceratium gravidum var. *angustum* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 10, fig. 11.
Gárate-Lizárraga (this study); GC (B.C.S. - Bahía de La Paz).

Ceratium hexacanthum Gourret, 1883: 36, pl. 3, fig. 49, var. *hexacanthum*.
Tax. syn.: *C. reticulatum* (Pouchet) Cleve, 1903: 342; non *C. reticulatum* Imhof, 1883.
Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971*; Nienhuis, 1979; Lapota & Losee, 1984; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Gárate-Lizárraga et al., 1990, 2000; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-Beltrán, 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC (Son., Sin.), Mich.

Ceratium hexacanthum var. *contortum* Lemmerm., 1899: 347, pl. 2, fig. 20, 21.
Barreiro-Güemes, 1967; Hernández-Becerril, 1989** ***; Licea-Durán et al., 1995; Esqueda-Lara, 2003; GC, Jal., Col.

Ceratium hexacanthum f. *spirale* (Kof.) J. Schill., 1937: 422.
Klement, 1964**; Gárate-Lizárraga, 1988**; GC.

Ceratium hirundinella (O. F. Müll.) Dujard., 1841: 377.
Valero-Gamboa, 1980; GC.

Note: It is a freshwater species, common in pond and lakes of the temperate zone (Popovský & Pfister, 1990). In Mexico, it has been reported from freshwater environments in the Federal District, the state of Mexico, the states of Guanajuato, Jalisco, Michoacan, Morelos, Oaxaca, Puebla, Tamaulipas and Veracruz (Figueroa-Torres & Moreno-Ruíz, 2003).

Ceratium horridum (Cleve) Gran, 1902: 54, var. *horridum*.
Round, 1967; Hernández-Becerril, 1983, 1985c*, 1987b, c, 1988a, 1989**; Lapota

& Losee, 1984; Brinton et al., 1986; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Esqueda-Lara et al., 2002; Esqueda-Lara, 2003; Villalejo-Fuerte et al., 2005; W of BCP, B.C., GC (B.C.S.), Jal., Col., Mich., Oax.

Ceratium horridum f. *claviger* (Kof.) Sournia, 1968: 480.

Nom. syn.: *C. claviger* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 170, pl. 4, fig. 27.

Gaxiola-Castro et al., 1987; Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Ceratium horridum var. *molle* Böhm, 1931 (Bot. Arch. 31, 3-4): 365.

Tax. syn.: *C. mollis* Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 304, pl. 27, fig. 26.

Round, 1967; González-Villalobos, 1971; Hernández-Becerril, 1985a, 1987c; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995**; GC (B.C.S., Son., Sin.), Mich.

Ceratium horridum Gran var. *tenue* (Ostenf. & J. Schmidt) Jörg., 1920: 97.

Nom. syn.: *Ceratium tenue* Ostenf. & J. Schmidt, 1901: 166, fig. 18, var. *tenue*. Balech, 1959a; Hernández-Becerril, 1989; González-López, 1994, 2000; Licea-Durán et al., 1995; W of BCP, GC.

Note: The nomenclature of this taxon is very confusing. According to Balech (1988a), *C. tenue* and *C. horridum* are different species, and *C. buceros* is synonymous to *C. tenue* var. *buceros* Balech, 1988. Sournia (1966, 1968) includes some varieties of *C. tenue* in with *C. horridum* var. *buceros* and *C. buceros* f. *tenue* in with *C. horridum* var. *horridum*. Schiller (1937) considers *C. tenue* as a synonym to *C. buceros*, considering the latter as a separate species. A thorough examination of the original sources is needed to make any conclusion between this range of species and varieties.

Ceratium humile Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 40, fig. 82, 83. Hernández-Becerril, 1989**; González-López, 1994, 2000; Licea-Durán et al., 1995; Ochoa, 2003a; GC.

Ceratium incisum (G. Karst.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 19, fig. 29, 30.

Lapota & Losee, 1984; Hernández-Becerril, 1987c, 1988a, 1989**; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Ochoa, 2003a; W of B.C.S., GC, B.C.S., Jal., Col.

Ceratium inflatum (Kof.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 25, pl. 3, fig. 45, 46, 48a (as *C. pennatum*), f. *inflatum*.

Nom. syn.: *C. nipponicum* Okamura, 1912; *C. pennatum* f. *inflata* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 172, pl. 2, pl. 13.

Balech, 1959a; Round, 1967; Gilmartin & Revelante, 1978 (as *C. pennatum*); Valero-Gamboa, 1980; Flores-Granados, 1986; Hernández-Becerril, 1987c; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994 (also as *C. pennatum*); Licea-Durán et al., 1995**; Verdugo-Díaz, 1997; Martínez-López & Verdugo-Díaz, 2000; Palomares-García et al., 2002; Esqueda-Lara, 2003; Ochoa, 2003a; W of B.C.S. and B.C., GC (B.C.S.), Jal., Col.

Note: Indication of *C. pennatum* without the name of infraspecific taxon is a source of confusion because different varieties and forms of *C. pennatum* in the old literature are presently considered to be different species: *C. inflatum* f. *inflatum*, *C. inflatum* f. *falcatum*, *C. longirostrum* and *C. falcatum*.

Ceratium inflatum f. *falcatum* N. Peters, 1934: 36.

Ceballos-Corona, 1988; Mich.

Ceratium kofoidii Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 23, pl. 2, fig. 38, 39.

Tax. syn.: *C. boehmii* H. W. Graham & Bronik., 1944: 22, fig. 12.

Gilbert & Allen, 1943; González-Villalobos, 1971*; Estrada & Blasco, 1979; Hernández-Becerril, 1983, 1985a, 1987c, 1989**; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985**; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b (also as *C. boehmii*); Verdugo-Díaz, 1993, 1997; González-López, 1994, 2000; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Castro-Sánchez, 1998; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Esqueda-Lara, 2003; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Ochoa, 2003a; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin.), Jal., Col., Mich., Oax.

Ceratium lanceolatum Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 172, pl. 3, fig. 17.

Hernández-Becerril, 1988a**; Martínez-López, 1993b; W of B.C.S., Mich.

Ceratium limulus (Gourret ex C. H. G. Plate) Gourret, 1883: 33, pl. 1, fig. 7. Barreiro-Güemes, 1967; Round, 1967; Hernández-Becerril, 1987c, 1988a**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1992; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995**; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Okolodkov (this study) ; W of BCP, GC, Col., Mich., Gro. (Zihuatanejo).

Ceratium lineatum (Ehrenb.) Cleve, 1899: 36.

Barreiro-Güemes, 1967* **; Round, 1967; Valero-Gamboa, 1980; León-Álvarez, 1983; Pastén-Miranda, 1983; Cortés-Altamirano & Pastén-Miranda, 1984; Lapota & Losee, 1984; Cortés-Lara, 1985; Flores-Granados, 1986; Hernández-Becerril, 1987c, 1988a, 1989**; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Castro-Sánchez, 1998 (as *C. cf. lineatum*); Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Cohen-Fernández, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Peña-Manjarrez et al., 2005; Villalejo-Fuerte et al., 2005; W of B.C.S. and B.C., GC (B.C.S., Son.), Jal., Col.

Ceratium longirostrum Gourret, 1883: 55, pl. 4, fig. 65.

Tax. syn.: *C. pennatum* f. *propria* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 172, pl. 2, fig. 12; *C. pennatum* var. *scapiforme* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 27, fig. 47a-d, non *C. scapiforme* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 173, pl. 3, fig. 23.

Balech, 1959a; Round, 1967; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1984, 1985; Pastén-Miranda, 1983; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Hernández-Becerril, 1985c*, 1987c, 1989; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995**; Núñez-Moreno, 1996; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; Villalejo-Fuerte et al., 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Sin., Nay.), Jal., Col., Mich., Oax., Chis.

Ceratium longissimum (Schröd.) Kof. ex Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 82.

González-Villalobos, 1971; Cortés-Altamirano & Pastén-Miranda, 1982a, b; Pastén-Miranda, 1983; Priego-Martínez, 1985; García-Pamanes, 1987; Hernández-Becerril, 1987c; Martínez-López, 1993b; Licea-Durán et al., 1995*; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; W of B.C.S., GC (Son., Sin.), Jal., Col., Oax.

Ceratium lunula (Schimper ex G. Karst.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 51, pl. 5, fig. 112-115, var. *lunula*.

González-Villalobos, 1971*; Cortés-Altamirano & Pastén-Miranda, 1982a; Pastén-Miranda, 1983; Lapota & Losee, 1984; Priego-Martínez, 1985**; Flores-Granados, 1986 (as *C. lunula*?); García-Pamanes, 1987; Hernández-Becerril, 1987c, 1989; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; W of BCP, GC (Son., Sin., Nay.), Jal., Col.

Ceratium lunula f. *brachyceros* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 52, fig. 114, 115 (?).

Ceballos-Corona, 1988; Mich.

Ceratium lunula f. *megaceros* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 51, fig. 112a, b (?).

Round, 1967; González-López, 1994, 2000; Licea-Durán et al., 1995; GC (B.C.S.).

Ceratium lunula var. *robustum* F. J. R. Taylor, 1976: 86, 200, pl. 18, fig. 183. Barreiro-Güemes, 1967; González-Villalobos, 1971; González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC (B.C.S., Son., Sin.).

Ceratium macroceros (Ehrenb.) Vanhöffen, 1897: 310, 382, pl. 5, fig. 10, var. *macroceros*.

Gilbert & Allen, 1943; Klement, 1964**; Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1972; Nienhuis, 1979; Cortés-Altamirano & Pastén-Miranda, 1982a, 1985; García-Pamanes & Villavicencio-Garayzar, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987b, c, 1988a; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985**; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988; Hernández-Cachou, 1988; Hernández-

Becerril, 1989; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993a, b; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996; Núñez-Moreno, 1996; Verdugo-Díaz, 1997; Gárate-Lizárraga & Siqueiros-Beltrones, 1998, 2003; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Góngora-González, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2004; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Ceratium macroceros var. *gallicum* (Kof.) Sournia, 1966: 1982.

Klement, 1964; Barreiro-Güemes, 1967; González-Villalobos, 1971; Hernández-Becerril, 1983, 1985a, c*, 1988a, 1987c, 1989**; Nienhuis & Guerrero, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990, 2000; Licea-Durán et al., 1995**; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of B.C., GC (B.C.S., B.C., Son., Sin.), Jal., Col., Mich.

Ceratium massiliense (Gourret) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 66, pl. 7, fig. 140-143, pl. 8, fig. 144-146, var. *massiliense*.

Klement, 1964**; Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971* (also as *C. ostenfeldii*); Semina & Tarkhova, 1972; Hernández-Becerril, 1983, 1985a, c*, 1987c, 1988a, 1989**; Lapota & Losee, 1984; Rojas-Trejo, 1984; Priego-Martínez, 1985**; Nienhuis & Guerrero, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990, 2000; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Licea-Durán et al., 1995*; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin.), Jal., Col., Mich., Oax., Chis.

Ceratium massiliense var. *armatum* (G. Karst.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 67, fig. 146.

Ceballos-Corona, 1988; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; W of B.C.S., GC, Mich.

Ceratium mexicanum Zamudio-Reséndiz, Guerra-Martínez, Okolodkov, Sánchez-Robles & Meave del Castillo, 2002: P-55, nomen nudum.

Ceratium minutum Jörg., 1920: 34, fig. 21-23.

Santamaría del Ángel, 1986; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995***; W of B.C.S., GC (B.C.S., B.C.).

Ceratium paradoxides Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 15, pl. 7, fig. 4. Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; W of B.C.S., GC, Col., Oax.

Ceratium pavillardii Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 74, pl. 9, fig. 157, 158.

Nom. syn.: *C. vultur* var. *pavillardii* (Jörg.) H. W. Graham & Bronik., 1944: 41, fig. 23C.

González-Villalobos, 1971; Rojas-Trejo, 1984; Gárate-Lizárraga, 1988**; Hernández-Becerril, 1989**; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Ochoa, 2003a; GC (Son., Sin.), Jal.

Ceratium pentagonum Gourret, 1883: 45, pl. 4, fig. 58, 59, var. *pentagonum*.

Gilbert & Allen, 1943; Barreiro-Güemes, 1967; González-Villalobos, 1971; Santoyo-Reyes, 1971; Gilmartin & Revelante, 1978; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980; Cortés-Altamirano & Pastén-Miranda, 1982a; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, 1986, 1987c; León-Álvarez, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985; García-Pamanes, 1987; Ceballos-Corona, 1988; Hernández-Cachou, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Gómez-Aguirre et al., 1999; Martínez-López & Verdugo-Díaz, 2000; Venrick, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Gómez-Aguirre, 2003; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (B.C.S., Son., Sin., Nay.), Jal., Mich., Oax.

Ceratium pentagonum subsp. *pacificum* H. W. Graham & Bronik., 1944: 20, fig. 10C, D, I, J.

Round, 1967; Ceballos-Corona, 1988; González-López, 1994, 2000; GC, Mich.

Ceratium pentagonum var. *robustum* (Cleve) Jörg., 1920: 26, fig. 17a, b, non 1911.

Ceratium candelabrum var. *depressum* auct., non Jörg.: Licea-Durán et al., 1995: pl. 1, fig. 6, pl. 17, fig. 9.

Klement, 1964; Barreiro-Güemes, 1967**; Hernández-Becerril, 1987c, 1988a; Gárate-Lizárraga, 1992; Licea-Durán et al., 1995* **; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-Beltrán, 1999; GC, Mich.

Ceratium pentagonum var. *subrobustum* Jörg., 1920: 26, fig. 15.

Nom. syn.: *C. subrobustum* (Jörg.) Steem. Niels., 1934: 11, fig. 13.

Barreiro-Güemes, 1967; Round, 1967; Rojas-Trejo, 1984; Hernández-Becerril, 1985c*, 1987c, 1989**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995*; Esqueda-Lara, 2003; GC (B.C., Sin.), Jal., Col., Mich.

Ceratium pentagonum var. *tenerum* Jörg., 1920: 26, fig. 16a, b.

Klement, 1964; Barreiro-Güemes, 1967*; Hernández-Becerril, 1985c*, 1987c, 1988a, 1989; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; B.C., Mich.

Ceratium petersii Steem. Niels., 1934: 20, fig. 44.

Licea-Durán et al., 1995***; Gárate-Lizárraga (this study); GC, Bahía de La Paz, B.C.S.

Ceratium platycorne Daday, 1888: 101, pl. 3, fig. 1, 2.

Round, 1967; Hernández-Becerril, 1987c; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Okolodkov (this study); W of B.C.S., GC, Gro. (Zihuatanejo), Oax. (Huatulco).

Ceratium porrectum (G. Karst.) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 34, pl. 3, fig. 63, 64 (incl. f. *megasomum*).

Nom. syn.: *C. tripos porrectum* G. Karst., 1907: pl. 51, fig. 6.

Gárate-Lizárraga, 1988*; Hernández-Becerril, 1988a; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; GC, Col., Mich., Oax.

Ceratium praelongum (Lemmerm.) Kof., 1907 (Zool. Anz., 32, 1): 182 ex Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 9, pl. 1, fig. 9.

Balech, 1959a; Round, 1967; Hernández-Becerril, 1987c, 1988a**; Ceballos-Corona, 1988; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Ochoa, 2003a; Gárate-Lizárraga (this study), Okolodkov (this study); W of B.C.S. and B.C., GC (B.C.S.), Jal., Mich., Gro. (Zihuatanejo), Oax. (GT).

Ceratium ranipes Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 15, pl. 7, fig. 1.
Tax. syn.: *C. ranipes* f. *palmatum* (Schröd.) Jörg., 1920: 82.

Balech, 1959a; Klement, 1964**; Round, 1967; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a; Ceballos-Corona, 1988; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga et al., 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, GC (Sin., Nay.), Jal., Col., Mich.

Ceratium reflexum Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 15, pl. 7, fig. 8, 9.

González-Villalobos, 1971; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; W of B.C.S., GC (B.C., Son., Sin.), Jal., Col., Mich.

Ceratium rubrum Muñoz-Cabrera, 1989: 10, nomen nudum; *C. rubrum* Saldate-Castañeda, Vázquez-Castellanos, Galván, Sánchez-Anguillano & Nazar, 1991: 240, nomen nudum.

Note: Obviously, Muñoz-Cabrera (1989) and Saldate-Castañeda et al. (1991) confused the name of one of the species of *Ceratium* with the ciliate *Mesodinium rubrum*, also given in the lists of identified species.

Ceratium schroeteri Schröd., 1906: 368, fig. 43.

Martínez-López, 1993b; W of B.C.S.

Ceratium setaceum Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 23, pl. 2, fig. 40, 41.

González-Villalobos, 1971*; Hernández-Becerril, 1987c; Licea-Durán et al., 1995*; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002 (as *C. aff. cetaceum*); GC (Son., Sin.), Oax.

Ceratium strictum (Okamura & Nishikawa) Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 172.

Nom. syn.: *Ceratium extensum* f. *strictum* (Okamura & Nishikawa) Steem. Niels., 1934: 14.

González-Villalobos, 1971; Gilmartin & Revelante, 1978; Signoret & Santoyo-Reyes, 1980; Ceballos-Corona, 1988; González-López, 1994, 2000; Licea-Durán et al., 1995; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; GC (B.C.S., Son., Sin.), Mich., Oax.

Ceratium symmetricum Pavill., 1905: 52, pl. 1, fig. 4, var. *symmetricum*.

Tax. syn.: *C. gracile* (Gourret) Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 44, fig. 92, 93.

Round, 1967; González-Villalobos, 1971; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002 (as *C. aff. summetricum*); Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; W of B.C.S., GC (Son., Sin.), Jal., Col., Mich., Oax., Chis.

Ceratium symmetricum var. *coarctatum* (Pavill.) H. W. Graham & Bronik., 1944, 29, fig. 15, I.

González-Villalobos, 1971*; García-Pamanes, 1987; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC (B.C.S., Son., Sin.).

Ceratium symmetricum var. *orthoceras* (Jörg.) H. W. Graham & Bronik., 1944: 29, fig. 15h.

González-Villalobos, 1971; Licea-Durán et al., 1995* **; GC (Son., Sin.).

Note: We believe that Licea-Durán et al. (1995: pl. 20, fig. 3) illustrated *C. symmetricum* var. *orthoceras* under the name of *C. symmetricum* because it has the right antapical horn slightly curved at its base, which according to Sournia (1968) is characteristic of the former.

Ceratium tenue var. *buceros* Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 149, pl. 66, fig. 2.

Nom. syn.: *Ceratium buceros* O. Zacharias, 1906: 551, fig. 15.

Lapota & Losee, 1984; Martínez-López, 1993b; W of B.C.S., GC.

Ceratium teres Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 308, pl. 29, fig. 34-36.

Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971*; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a, 1989**; Ceballos-Corona, 1988; Hernández-Cachou, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); W of B.C.S., GC (B.C.S., B.C., Son., Sin.), Col., Mich., Oax.

Ceratium trichoceros (Ehrenb.) Kof., 1908 (Univ. Cal. Publ. Zool. 4, 6): 361, fig. 16-19; 1908 (Univ. Cal. Publ. Zool. 4, 7): 388.

Balech, 1959a; Klement, 1964**; Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971*; Semina & Tarkhova, 1972; Nienhuis, 1979, 1982; Lapota & Losee, 1984; Rojas-Trejo, 1984; Hernández-Becerril, 1985c*, 1987c, 1988a, 1989; Priego-Martínez, 1985; Nienhuis & Guerrero, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993a, b; Verdugo-Díaz, 1993, 1997; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995**; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003. Varona-Cordero & Gutiérrez-Mendieta, 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, GC (B.C.S., B.C., Son., Sin.), Jal., Col., Mich., Chis.

Note: See the note for *Ceratium contrarium*.

Ceratium tripos (O. F. Müll.) Nitzsch, 1817: 4, var. *tripos*.

Gilbert & Allen, 1943; Klement, 1964; Barreiro-Güemes, 1967**; González-Villalobos, 1971*; Santoyo-Reyes, 1972; Gilmartin & Revelante, 1978; Nienhuis, 1979, 1982; García-Pamanes, 1982; Morey-Gaines, 1982; Hernández-Becerril, 1983, 1985a, (as *C. cf. tripos*), b, 1987c; León-Álvarez, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Cortés-Lara, 1985; Nienhuis & Guerrero, 1985, 1986; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Flores-Granados, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992, 1995; Hernández-Cachou, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano et al., 1993; Martínez-López, 1993b; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Lechuga-Devéze & Morquecho-Escamilla, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Gómez-Aguirre, 2003*; Meave del Castillo & Zamudio-Reséndiz, 2005; Peña-Manjarrez et al., 2005; Villalejo-Fuerte et al., 2005; W of B.C.S. and B.C., GC (B.C.S., Son., Sin., Nay.), Jal., Mich., Oax.

Ceratium tripos var. *atlanticum* (Ostenf.) Paulsen, 1907: 21, fig. 30.

Nom. syn.: *C. tripos* subsp. *atlanticum* (Ostenf.) N. Peters, 1934.

Tax. syn.: *C. tripos* var. *tripodoides* (Jörg.) Paulsen, 1930.

Round, 1967; Rojas-Trejo, 1984; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1989**; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC (B.C.S., Sin.), Jal., Col., Mich., Oax.

Ceratium tripos f. *hiemale* Paulsen, 1907: 21, fig. 31.
Licea-Durán et al., 1995; GC.

Ceratium tripos var. *indicum* (Böhm) F. J. R. Taylor, 1976: 89, pl. 16, fig. 168, 169.
González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC (B.C.S.).

Ceratium tripos var. *pulchellum* (Schröd.) López, 1955 ex Sournia, 1973, pro parte: fig. 6, fig. 13a, non b.
Nom. syn.: *C. pulchellum* Schröd., 1906, pro parte; non *C. tripos* subsp. *pulchellum* (Jörg.) N. Peters, 1934: 39, pl. 4, fig. 20; *C. schroederi* D. S. Nie, 1936: 47, fig. 16.

Klement, 1964; Barreiro-Güemes, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1972; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a, 1989; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; W of B.C.S., GC (B.C.S., Son., Sin.), Jal., Col., Mich., Oax.

Ceratium tripos subsp. *semipulchellum* (Jörg.) N. Peters, 1934: 39, pl. 1, fig. 5a, b.
Round, 1967; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988; Gárate-Lizárraga et al., 1990; Gárate-Lizárraga, 1992; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC, Mich.

Ceratium tripos f. *subsalsum* Ostenf., 1903: 584, fig. 134.
Barreiro-Güemes, 1967* (as *C. tripos* var. *subsalum*); Hernández-Becerril, 1987c; GC.

Ceratium vultur Cleve, 1900 (K. Sv. Vet.-Akad. Handl. 34, 1): 15, pl. 7, fig. 5 (*Ceratium (tripos* var.?) *vultur*), var. *vultur*.
Balech, 1959a; Klement, 1964**; Round, 1967; Hernández-Becerril, 1983, 1985a, 1987a, c, 1989** ***; Lapota & Losee, 1984; Colombo-Rivas, 1986; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Gárate-Lizárraga et al., 2000; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Ochoa et al., 2002; Esqueda-Lara, 2003; W of BCP, GC, Jal., Col., Mich., Oax.

Ceratium vultur f. *recurvum* (Jörg.) J. Schill., 1937: 419, fig. 460c.

Nom. syn.: *C. vultur* var. *recurvum* Jörg., 1911 (Int. Rev. ges. Hydrobiol. Hydrogr. 4): 74: fig. 156.

Ceballos-Corona, 1988; Mich.

Ceratium vultur f. *sumatranum* (G. Karst.) Sournia, 1968: 482.

Hernández-Becerril, 1983, 1985a, 1987c, 1989**; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995**; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC, B.C.S., Jal., Col.

Ceratocorys allenii B. F. Osorio, 1942: 443, pl. 36, fig. 20, 22, 23, 26.

Osorio-Tafall, 1942*; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Ceratocorys armata (F. Schütt) Kof., 1910 (Univ. Cal. Publ. Zool. 6, 8): 181.

Osorio-Tafall, 1942; Klement, 1964; Estrada & Blasco, 1979; Hernández-Becerril, 1987c, 1988b*, c; Ceballos-Corona, 1988; Licea-Durán et al., 1995*; Hernández-Becerril & León-Álvarez, 2002; Meave del Castillo & Zamudio-Reséndiz, 2005; Gárate-Lizárraga (this study); Okolodkov (this study); W of BCP, GC (Bahía de La Paz, B.C.S.; Mich.), Gro. (Acapulco).

Ceratocorys bipes (Cleve) Kof., 1910 (Univ. Cal. Publ. Zool. 6, 8): 183.

Martínez-López, 1993b; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S.

Ceratocorys horrida F. Stein, 1883: 20, pl. 6, fig. 4-11.

Osorio-Tafall, 1942; Klement, 1964; González-Villalobos, 1971**; Hernández-Becerril, 1987c, 1988a**, c**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988* **, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002 (as *Ceratocorys* aff. *horrida*); Esqueda-Lara, 2003; W of BCP, GC (Son., Sin.), Jal., Col., Mich., Oax.

Ceratocorys magna Kof., 1910 (Univ. Cal. Publ. Zool. 6, 8): 182.

González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Ochoa, 2003a; W of B.C.S., GC.

Ceratocorys reticulata H. W. Graham, 1942: 44, fig. 55.

Ceballos-Corona, 1988; Martínez-López, 1993b; W of B.C.S., Mich.

Citharistes apsteinii F. Schütt, 1895: pl. 5, fig. 24.

Martínez-López, 1993b; Hernández-Becerril et al., 2003; W of B.C.S., the transitional temporal-tropical zone (Nay., northern coast of Jal.).

Citharistes regius F. Stein, 1883: 24, pl. 22, fig. 1-4.

Hernández-Becerril et al., 2003; MP.

Cochlodinium catenatum Okamura, 1916: 41, fig. 1-3.

Orellana-Cepeda et al., 1993; Venrick, 2000; Cortés-Lara et al., 2001, 2004*; Cortés-Altamirano, 2002; Cortés-Altamirano et al., 2002**, 2004b; Cortés-Lara, 2002**; Ochoa et al., 2002; Ochoa, 2003a, b; Alonso-Rodríguez, 2004; Alonso-Rodríguez & Ochoa, 2004; Cortés-Altamirano & Licea-Durán, 2004; Cortés-Lara & Cortés-Altamirano, 2004; Sierra-Beltrán et al., 2004 (as *C. cf. catenatum*); W of BCP, GC (Sin., Nay.), Jal.

Note: See the note for *Cochlodinium polykrikoides*.

Cochlodinium citron Kof. & Swezy, 1921: 358, fig. HH12, pl. 7, fig. 79.

Gárate-Lizárraga et al., 2004a; GC (B.C.S.).

Cochlodinium faurei Kof. & Swezy, 1921: 366, fig. GG4, pl. 2, fig. 25.

Caballasi-Flores, 1985; Sin.

Cochlodinium cf. miniatum Kof. & Swezy, 1921: 372, Fig. GG6, pl. 10, fig. 107.

Hernández-Becerril, 1983, 1985a; GC.

Cochlodinium pirum (F. Schütt) Lemmerm., 1899: 360.

González-Villalobos, 1971*; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Cochlodinium polykrikoides Margalef, 1961: 76, fig. 27m.

Gárate-Lizárraga et al., 2000, 2001d, 2002b, 2003b, 2004a* **, 2004c, 2005a; Figueroa-Torres & Zepeda-Esquivel, 2001**; Morales-Blake et al., 2001**; Alonso-Rodríguez, 2003* **, 2004; Núñez-Vázquez et al., 2003; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **, Alonso-Rodríguez & Ochoa, 2004; Gárate-Lizárraga, 2005**; Peña-Manjarrez et al., 2005; GC (B.C.S., Sin.), Col.

Note: Gárate-Lizárraga et al. (2004a) compare the morphological characteristics and geographic distribution of *C. polykrikoides* and *C. catenatum*. According to these authors, the principal difference between the two species is the presence of stigma in *C. polykrikoides*. Additionally, while the epicone of *C. catenatum* is anteriorly subhemispherical, the epicone of *C. polykrikoides* is “cupuliform”. Cortés-Lara et al. (2004) believe that *C. polykrikoides* is synonymous to *C. catenatum*, indicating

that their specimens of *C. catenatum* have a stigma located anteriorly-dorsally. Genetic studies are recommended to separate them or to re-instate *C. polykrikoides* to *C. catenatum*. We observed a *C. polykrikoides* bloom in the area between Pto. Escondido and Pto. Ángel in October 2003. All examined cells had an anterior-dorsal stigma. Cortés-Altamirano & Gómez-Aguirre (2001) proposed a seasonality for these two species: *C. polykrikoides* in the winter-spring, and presumably *C. catenatum* in the summer-fall of 2000. However, *C. polykrikoides* has been reported blooming during the spring season in Manzanillo and Mazatlán, respectively (Figueroa-Torres & Zepeda-Esquivel, 2001; Morales-Blake et al., 2001; Gárate-Lizárraga et al., 2004b).

Cochlodinium schuettii Kof. & Swezy, 1921: 380, fig. HH2.
Gárate-Lizárraga et al., 2004a; GC (B.C.S.).

Coolia monotis Meunier, 1919: 68, pl. 19, fig. 13-19.
Okolodkov (this study); Oax.

Note: *Coolia monotis* was found associated with a macroalgal community in the upper littoral at Pto. Ángel, Oaxaca. Additionally, Núñez-Vázquez et al. (2000) and Núñez-Vázquez (2005) reported *Coolia* sp. from GC (El Paredito, B.C.S.).

Corythodinium diploconus (F. Stein) F. J. R. Taylor, 1976: 123.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; GC, B.C., Oax.

Note: Although Dodge & Saunders (1985) synonymized the genus *Corythodinium* Loeb. & A. R. Loeb. emend. F. J. R. Taylor with *Oxytoxum* F. Stein, we follow the opinion of Steidinger & Tangen (1997) and Balech (1988a) who consider that these two genera should be kept separate until plate analyses are completed with dissected specimens, in which examining the number of sulcal and epithecal plates is the most important factor. The tentative plate formula of *Corythodinium* is Po, 3', 2a, 6", 5c, 4(?)s, 5"', 1''', and the plate formula of *Oxytoxum* is Po, 5', 6", 5c, 4s, 5"', 1''' (Taylor, 1976; Dodge & Saunders, 1985). Balech (1988a) confirms the presence of one or two intercalary plates in *Corythodinium*, and he notes that it seems to have more sulcal plates than *Oxytoxum*. He proposes other criteria to distinguish these two genera: the size of the epitheca in relation to that of the hypotheca, the extent of displacement of the ends of the cingulum and the presence or absence of the sulcal notch on the epitheca.

Cystodinium sp.
Hernández-Becerril, 1983, 1985a; GC.

Note: All known species of the genus *Cystodinium* G. A. Klebs inhabit freshwater.

Dinofurcula ultima (Kof.) Kof. & Skogsb., 1928: 203, fig. 28(1), pl. 5, fig. 4, 6. Hernández-Becerril, 2002; Hernández-Becerril & Bravo-Sierra. 2004b*** (as *Dinofurcula* cf. *ultima*); Oax.

Dinophysis acuminata Clap. & J. Lachm., 1859: 408, pl. 20, fig. 17.

Tax. syn.: *D. ellipsoides* Kofoid, 1907 (Univ. Calif. Publ. Zool. 3, 13): 314, pl. 33, fig. 56.

Gilbert & Allen, 1943; Caballasi-Flores, 1985; Cortés-Lara, 1985; Hernández-Becerril, 1987c, 1992***; Orellana-Cepeda et al., 1993; Licea-Durán et al., 1995***; Cortés-Altamirano & Hernández-Becerril, 1998*; Góngora-González et al., 1999; Gárate-Lizárraga et al., 2000, 2001a; Morquecho-Escamilla et al., 2000a; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Cortés-Altamirano, 2002**; Herrera-Galindo, 2002*; Hernández-Becerril et al., 2003; Ochoa, 2003a, b; Gárate-Lizárraga, 2005; Peña-Manjarrez et al., 2005; W of BCP, GC (B.C.S., Sin.), Oax.

Dinophysis acuta Ehrenb., 1839: 124, 151, pl. 4, fig. 14.

Colombo-Rivas, 1986; Hernández-Becerril et al., 2003; GC, Jal.

Note: This species can be confused with *D. norvegica*.

Dinophysis acutoides Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 84.

Nom. syn.: *Phalacroma acutum* (F. Schütt) Pavill., 1916: 55, pl. 3, fig. 7; non *Dinophysis acuta* Ehrenb., 1839: 124, 151, pl. 4, fig. 14.

González-Villalobos, 1971; Hernández-Becerril, 1987c; Martínez-López, 1993b; Licea-Durán et al., 1995*; Hernández-Becerril et al., 2003; W of B.C.S., GC (Son., Sin.).

Dinophysis amandula Sournia, 1973: 18.

Tax. syn.: *Phalacroma ovum* F. Schütt, 1895: 90, pl. 2, fig. 11(2) (as *P. operculoides*); non *Dinophysis ovum* F. Schütt, 1895: pl. 1, fig. 6.

Klement, 1964; González-Villalobos, 1971*; Flores-Granados, 1986; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Hernández-Cachou, 1988; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003, 2004a; GC, Jal., Mich.

Note: The only measured cell was 49 µm long and 45 µm wide (53 µm with sulcal lists). Hernández-Becerril et al. (2003) included the occurrences of *Dinophysis ovum* with those of *D. amandula* (= *Phalacroma ovum*), by mistake.

Dinophysis apicata (Kof. & Skogsb.) T. H. Abé *vel* Balech; T. H. Abé, 1967: 73, fig. 23c-g; Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 82.

Hernández-Becerril et al., 2004a; tropical southeastern MP.

Dinophysis argus (F. Stein) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1), pro parte: 71, non fig. 23a, b.

Nom. syn.: *Phalacroma argus* F. Stein, 1883: pl. 18, fig. 15-17.

Barreiro-Güemes, 1967; González-Villalobos, 1971; García-Pamanes, 1987; Hernández-Becerril, 1987c; Hernández-Becerril, 1988c**; Licea-Durán et al., 1995**; Verdugo-Díaz, 1997 (as *Phalacroma* cf. *argus*); Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.; Son., Sin.), Jal.

Dinophysis brevisulcus L. S. Tai & Skogsb., 1934: 430, fig. 3.

Hernández-Becerril, 1988c** ***; Hernández-Becerril et al., 2003; W of B.C.S.

Dinophysis caudata Saville-Kent, 1881: 455-460, var. *caudata*.

Tax. syn.: *D. homunculus* F. Stein, 1883, pro parte: 24, pl. 21, fig. 8; *Dinophysis diegensis* Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 313, pl. 33, fig. 57-61;

Dinophysis diegensis f. *contracta* J. Schill., 1933: 152, fig. 144d.

Gilbert & Allen, 1943; Klement, 1964**; Barreiro-Güemes, 1967* **; Round, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1972; Gómez-Aguirre & Santoyo-Reyes, 1975; Gilmartin & Revelante, 1978; Revelante, 1978; Nienhuis, 1979, 1982; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; Morey-Gaines, 1982; Otero-Dávalos, 1981; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1984; León-Álvarez, 1983; Lapota & Losee, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Hernández-Becerril, 1985a**, b, c*, 1986, 1987c, 1988a, c, 1992** ***; Ortega-Banuel, 1985* (as *Dinophysis* sp.); Priego-Martínez, 1985**; Colombo-Rivas, 1986; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992, 2005**; Santoyo-Reyes & Hernández-Cachou, 1988; Gárate-Lizárraga et al., 1990, 2000, 2005d; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995**; Cortés-Altamirano et al., 1996; Morquecho-Escamilla et al., 1996, 2000a; Núñez-Moreno, 1996; Cortés-Altamirano & Hernández-Becerril, 1998*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Lechuga-Devéze & Morquecho-Escamilla, 1998; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Lechuga-Devéze et al., 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001; Cortés-Altamirano, 2002**; Flores et al., 2002;

Herrera-Galindo, 2002**; Ochoa et al., 2002; Palomares-García et al., 2002; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Gómez-Aguirre et al., 2003; Hernández-Becerril et al., 2003; Ochoa, 2003a, b; Varona-Cordero & Gutiérrez-Mendieta, 2003; Alonso-Rodríguez et al., 2004b**; Sierra-Beltrán et al., 2004; Gárate-Lizárraga, 2005**; Meave del Castillo & Zamudio-Reséndiz, 2005 (also as *D. diegensis*); Peña-Manjarrez et al., 2005; Poot-Delgado et al., 2005; Villalejo-Fuerte et al., 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Gro., Oax., Chis.

Note: The opinion that *D. diegensis* is synonymous to *D. caudata* is not new (see Jörgensen, 1923; Kofoid & Skogsberg, 1928). There is increasing evidence that the former, being the result of the so-called “depauperating divisions” sensu von Stosch, is a synonym to the latter (Reguera, 2001). Moreover, the article by Reguera & González-Gil (2001) says that *D. diegensis* is synonymous to both *D. caudata* and *D. tripos*.

Dinophysis caudata f. *acutiformis* Kof. & Skogsb., 1928: 330, fig. 46.
Rojas-Trejo, 1984 (as *D. caudata* var. *acuminiforme*); Hernández-Becerril et al., 2003 (as *D. caudata* var. *acuminiforme*); Sin.

Dinophysis caudata var. *pedunculata* (J. Schmidt) Jörg., 1923: 25, 29.
Nom. syn.: *D. caudata* f. *pedunculata* J. Schmidt, 1901: 221, fig. 8; *D. homunculus* var. *pedunculata* (J. Schmidt) Lemmerm., 1901: 374; *D. pedunculata* Ostenf., 1915.

García-Pamanes, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Rojas-Trejo, 1984; Cortés-Altamirano & Pastén-Miranda, 1985; Verdugo-Díaz, 1997; Hernández-Becerril et al., 2003;

Note: Matzenauer (1933) attributed *D. caudata* f. *pedunculata* to J. Schmidt, 1901. In Pastén-Miranda & Robles-Mungaray (1982), *D. caudata* var. *pedunculata* is attributed to Saville-Kent, and Hernández-Becerril & Meave del Castillo (2003) assigned it to Schröder, following Taylor (1976).

Dinophysis circumscuta (G. Karst.) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 82.

Martínez-López, 1993b; Okolodkov (this study); W of B.C.S., Mich. (El Faro).

Note: The only identified cell was 84 µm long (117 µm with the antapical spine), 68 µm wide (98 µm with sulcal lists) and 45 µm deep. The specimen corresponds well to the drawings of Kofoid (1907: pl. 53, fig. 8) and Balech (1988a: pl. 87, fig. 1), although the antapical spine and especially its base is much thicker in our cell and resembles *D. urceolus* Kof. & Skogsb. (1928: fig. 37(2, 3). However, our specimen has a list connecting the third rib and the antapical spine, which is

characteristic of *D. circumscuta* and which distinguishes it from *D. hastata* and *D. urceolus*.

Dinophysis cuneus (F. Schütt) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1): 68, fig. 21a-h.

Nom. syn.: *Phalacroma cuneus* F. Schütt, 1895: 148, pl. 3, fig. 14.

Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998 (as *Phalacroma cuneus*); Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002 (as *Dinophysis* aff. *cuneus*); Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.; Mich.), Oax.

Dinophysis dolychopterygium (J. Murray & Whitting) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 2, 3): 82.

Nom. syn.: *Phalacroma dolichopterygium* J. Murray & Whitting, 1899: 330, pl. 31, fig. 8a, b.

González-Villalobos, 1971; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Hernández-Becerril et al., 2003; GC (Son., Sin.).

Dinophysis doryphora (F. Stein) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1): 77, fig. 26.

Nom. syn.: *Phalacroma doryphorum* F. Stein, 1883: 23, pl. 19, fig. 1-4.

González-Villalobos, 1971*; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988c**; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, this study; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Licea-Durán et al., 1995* ***; Meave del Castillo & Hernández-Becerril, 1998; Santoyo-Reyes et al., 1999; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S., GC (Bahía de La Paz, B.C.S.; Son., Sin.), Jal., Col., Mich., Gro. (Acapulco), Oax.

Dinophysis ellipsoidea L. Mangin, 1926: 72, fig. 15I.

González-López, 1994, 2000; Hernández-Becerril et al., 2003; GC.

Dinophysis exigua Kof. & Skogsb., 1928: 239, fig. 30.

Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); Okolodkov (this study); GC (Bahía de La Paz, B.C.S.), Gro. (Acapulco), Oax.

Note: Our cell was 39 µm long and 33 µm wide (43 µm with sulcal lists).

Dinophysis favus (Kof. & J. R. Michener) T. H. Abé *vel* Balech, 1967 (T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1): 67, fig. 20a-e; Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 82).

Nom. syn.: *Phalacroma favus* Kof. & J. R. Michener, 1911: 289.

Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Gro. (Acapulco), Oax.

Dinophysis fortii Pavill., 1923: 881.

Tax. syn.: *D. intermedia* Pavill., 1916: 58, pl. 3, fig. 4; non *D. intermedia* Cleve, 1902.

Estrada & Blasco, 1979; Valero-Gamboa, 1980; Hernández-Becerril, 1983, 1985a, 1987c, 1988a, c** ***; Gárate-Lizárraga, 1991, 1992, 2005; Licea-Durán et al., 1995; Cortés-Altamirano & Hernández-Becerril, 1998*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga et al., 2000, 2001a, 2005d; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Alonso-Rodríguez et al., 2004b**; Peña-Manjarrez et al., 2005; W of BCP. GC (B.C.S.), Jal., Col., Mich., Oax.

Dinophysis hastata F. Stein, 1883: pl. 19, fig. 12.

Tax. syn.: *D. odiosa* (Pavill.) L. S. Tai & Skogsb., 1934: 448.

Ortega-Banuel, 1985*; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988*; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; González-López, 1994, 2000; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Martínez-López & Verdugo-Díaz, 2000; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Villalejo-Fuerte et al., 2005; W of B.C.S., GC (B.C.S.), Jal., Col., Mich., Oax.

Dinophysis hindmarchii (J. Murray & Whitting) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 83.

Nom. syn.: *Phalacroma hindmarchii* J. Murray & Whitting, 1899: 330, pl. 31, fig. 5.

Esqueda-Lara, 2003; Esqueda-Lara et al., 2003; Hernández-Becerril et al., 2003; Jal.

Dinophysis lativelata (Kof. & Skogsb.) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 83.

Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.).

Dinophysis miles Cleve, 1900: 1030, Fig. 1a, b.

Smayda, 1975; Hernández-Becerril et al., 2003, 2004a; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.), tropical southeastern MP.

Dinophysis mitra (F. Schütt) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1): 63, fig. 18(1,2).

Nom. syn.: *Phalacroma mitra* F. Schütt, 1895: pl. 4, fig. 18 (1,4).

Ceballos-Corona, 1988; Hernández-Becerril, 1988c** ***; Gárate-Lizárraga, 1992; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, Jal., Mich., Oax.

Dinophysis mucronata (Kof. & Skogsb.) Sournia, 1973: 22.

Nom. syn.: *Phalacroma mucronatum* Kof. & Skogsb., 1928: 172, fig. 22(4, 6, 8).

Tax. syn.: *Phalacroma paulsenii* J. Schill., 1928 (Arch. Protistenk. 61, 1): 67, fig. 29; non *P. paulsenii* Kof. & Skogsb., 1928, nec *Dinophysis paulsenii* Woloszyńska, 1929.

González-Villalobos, 1971*; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Hernández-Becerril et al., 2003; GC (Son., Sin.).

Note: Sournia (1973) gives a detailed discussion on the synonymy and the nomenclatural confusion related to this species. The records of *D. mucronata* in the MP are questionable because in the literature the authors of the taxa under discussion are not always given.

Dinophysis norvegica Clap. & J. Lachm., 1859: 407, pl. 20, fig. 19.

Licea-Durán et al., 1995; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); W of B.C.S., GC.

Note: The species was found in the waters W of B.C.S. at 15°C, and its abundance was 2000 cells/l (Gárate-Lizárraga, this study). *D. norvegica* clearly shows an Arctic-boreal distribution, and all previous records beyond the MP were from the Northern Hemisphere, north of the Ortmann Line (Ortmann, 1896) that approximately corresponds to the 15°C isotherm (Okolodkov, 1996, 1999a; Okolodkov & Dodge, 1996). The records of *D. norvegica* from the MP are presently the southernmost, supposedly due to the cold California Current.

Dinophysis operculoides (F. Schütt) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 2, 3): 83.

Nom. syn.: *Phalacroma operculoides* F. Schütt, 1895: pl. 2, (11: 1 and 3; non 2). Hernández-Becerril et al., 2003; MP (the area near Nay. and Jal.).

Dinophysis ovum F. Schütt, 1895: pl. 1, fig. 6.

Round, 1967; Nienhuis, 1979, 1982; Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril,

1983, 1985a, 1987c, 1988a; Lapota & Losee, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985; Flores-Granados, 1986; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999; Gárate-Lizárraga & Verdugo-Díaz, 2001; Hernández-Becerril et al., 2003; W of BCP, GC (B.C.S., B.C., Son., Sin.), Mich., Oax.

Dinophysis parvula (F. Schütt) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 83.

Nom. syn.: *Phalacroma parvulum* (F. Schütt) Jörg., 1923: 7, fig. 4; *Dinophysis rotundata* auct., non Clap. & J. Lachm.: Licea-Durán et al., 1995: pl. 6, fig. 7. Licea-Durán et al., 1995*; Hernández-Becerril et al., 2003; GC.

Note: On the basis of the long third rib of the left sulcal list, we believe that Licea-Durán et al. (1995: pl. 6, fig. 7) illustrated *D. parvula* under the name of *D. rotundata*.

Dinophysis porodictyum (F. Stein) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1), pro parte: 61, fig. 17a-f.

Nom. syn.: *Phalacroma porodictyum* F. Stein, 1883: pl. 18, fig. 11-14. Santamaría del Ángel, 1986; Hernández-Becerril, 1992; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.; B.C.), Jal., Oax.

Dinophysis rapa (F. Stein) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 1): 66, fig. 19.

Nom. syn.: *Phalacroma rapa* F. Stein, 1883: 23, pl. 19, fig. 5-8. Barreiro-Güemes, 1967; Hernández-Becerril, 1983, 1985a, 1988c***, 1992** ***; Lapota & Losee, 1984; Gárate-Lizárraga, 1988*, this study; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995**; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Okolodkov (this study); GC (Bahía de La Paz, B.C.S.), Jal., Col., Oax.

Dinophysis recurva Kof. & Skogsb., 1928: 228.

León-Álvarez, 1983; Hernández-Becerril et al., 2003; Jal.

Dinophysis rotundata Clap. & J. Lachm., 1859: 6, pl. 20, fig. 16.

Nom. syn.: *Phalacroma rotundatum* (Clap. & J. Lachm.) Kof. & J. R. Michener, 1911: 290; *Prodinophysis rotundata* (Clap. & J. Lachm.) Balech, 1944: 429.

Gilbert & Allen, 1943; Barreiro-Güemes, 1967; González-Villalobos, 1971**; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Rojas-Trejo, 1984; Priego-Martínez, 1985; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c, 1988c; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Góngora-González, 2001; Herrera-Galindo, 2002 (as *Dinophysis* aff. *laevis*); Cortés-Lara et al., 2003; Hernández-Becerril et al., 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, GC (B.C., Son., Sin., Nay.), Oax.

Note: Although Licea-Durán et al. (1995) give a description and an electron micrograph referring to *Dinophysis rotundata*, we are skeptical about its correct identification. According to these authors, the left sulcal list is short and narrow, extending to the median of the cell. This characteristic does not correspond to real *D. rotundata*, whose left sulcal list extends well behind the median (see Schiller, 1933; Dodge, 1985; Balech, 1988a). Moreover, the photographed cell has a wide left sulcal list almost equal to the hypotheca in length, which is not in agreement with the description (Licea-Durán et al., 1995: pl. 6, fig. 7). Thus, neither the description nor the illustration corresponds to *D. rotundatum*. The picture agrees with *D. exigua* Kof. & Skogsb. (Kofoid & Skogsb., 1928: 239, fig. 30; Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 86, pl. 1, fig. 4, 5). The indication of *Dinophysis* aff. *laevis* by Herrera-Galindo (2002) seems to be that of *D. rotundata*, although two different species are known under the same name: *Dinophysis laevis* Clap. & J. Lachm., which is considered by Schiller (1933) as a variety of *D. rotundatum*, and *D. laevis* (Bergh) C. H. G. Plate, which is a junior synonym of *D. arctica* Mereschkowsky, and is an Arctic-boreal or bipolar species.

Dinophysis rudgei J. Murray & Whitting, 1899: 331, pl. 31, fig. 9a, b.

Verdugo-Díaz, 1997 (as *D. cf. rudgei*); Gárate-Lizárraga (this study); GC (Bahía de La Paz, Bahía Concepción, B.C.S.).

Note: Verdugo-Díaz (1997) did not give the authors of the name of the species he found, so it is impossible to conclude if it is *Dinophysis rudgei* J. Murray & Whitting or *Dinophysis rudgei* (J. Murray & Whitting) T. H. Abé, which are different species. See the note for *D. whittingae*.

Dinophysis ruudii (Braarud) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 84.

Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Note: Hernández-Becerril et al. (2003) present the data by Licea-Durán et al. (1995) on *D. ruudii* from the Gulf of California and refer to *Phalacroma contracta* Kof. & Skogsb., 1928, which is synonymous to *Dinophysis contracta* (Kof. & Skogsb.) Balech, 1967. However, Braarud (1935) considers his new species, *D. ruudii*, and

P. contractum different species and gives solid arguments in favour of that. We think that Hernández-Becerril et al. (2003) did not present their arguments to consider them synonymous or, at least, no did they discuss why they believe that the record of *D. ruudii* from the Gulf of California is *P. contracta*.

Dinophysis sacculus F. Stein, 1883: pl. 20, fig. 10.

Gárate-Lizárraga et al., 2001a; Hernández-Becerril et al., 2003, 2004a; W of BCP, GC (B.C.S.), tropical southeastern MP.

Dinophysis schroederi Pavill., 1909: 284, fig. 5.

Estrada & Blasco, 1979; Hernández-Becerril, 1988c: fig. 8; Hernández-Becerril et al., 2003; W of BCP.

Note: *D. schroederi* and *D. acuta* are morphologically very similar, so probably the former is a junior synonym of the latter.

Dinophysis schuettii J. Murray & Whitting, 1899: 331, pl. 31, fig. 10.

Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; Hernández-Becerril, 1992***; González-López, 1994, 2000; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002 (as *D. aff. schuetti*); Esqueda-Lara, 2003; Gárate-Lizárraga (this study), Okolodkov (this study); Hernández-Becerril et al., 2003; GC (Bahía de La Paz, B.C.S.), Jal., Gro. (Bahía de Potosí), Oax.

Dinophysis similis Kof. & Skogsb., 1928, pro parte: 247, fig. 31 (1, 2).

Okolodkov (this study); Oax. (Huatulco).

Note: The cells observed were 52-56.5 µm long and 39-45 µm wide (50 µm with sulcal lists).

Dinophysis sphaerica F. Stein, 1883, pro parte: pl. 20, fig. 3, 4.

León-Álvarez, 1983; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Hernández-Becerril et al., 2003; W of B.C.S., Jal., Oax.

Dinophysis tripos Gourret, 1883: 114, pl. 3, fig. 53.

Tax. syn.: *Dinophysis diegensis* Kof., 1907 (Univ. Cal. Publ. Zool. 3, 13): 313, pl. 33, fig. 57, 59-61; *D. diegensis* f. *curvata* Kof., 1907 (Univ. Cal. Publ. Zool. 6, 8): 313, pl. 33, fig. 58; *Dinophysis taylorii* Hernández-Becerril, 1992: 107, fig. 19, 20; *Dinophysis* sp. sensu Hernández-Becerril, 1988: 192, pl. 6, fig. 34, 35.

Estrada & Blasco, 1979; Hernández-Becerril, 1983, 1985a**, c*, 1987c, 1988a, c, 1992***; Colombo-Rivas, 1986; Santamaría del Ángel, 1986; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; Hernández-Becerril, 1992; Martínez-López, 1993a, b; Cortés-Altamirano & Hernández-Becerril, 1998*; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Hernández-Becerril et al., 2003; Morquecho-Escamilla, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; Peña-Manjarrez et al., 2005; Villalejo-Fuerte et al., 2005; W of BCP, GC (B.C.S., B.C.), Jal.

Note: See the note for *D. caudata*.

Dinophysis uracantha F. Stein, 1883: pl. 20, fig. 22, 23.

Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Oax.

Dinophysis urceola Kof. & Skogsb., 1928: 281, fig. 37, 1.

Martínez-López, 1993b; Hernández-Becerril & Meave del Castillo, 1994; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S., Oax.

Dinophysis whittingae Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 2, 3): 85.

Nom. syn.: *Phalacroma rudgei* J. Murray & Whitting, 1899: 331, pl. 31, fig. 6a, b; non *Dinophysis rudgei* J. Murray & Whitting, 1899: 331, pl. 31, fig. 9a, b. Hernández-Becerril et al., 2003; tropical southeastern MP.

Diplopsalis lenticula Bergh, 1881: 244, fig. 60-62.

Nom. syn.: *Glenodinium lenticula* (Bergh) Pouchet, 1883: 443, pl. 21, fig. 35. González-Villalobos, 1971**; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979 (obviously, by mistake, as *Dinophysis lenticula*); Hernández-Becerril, 1983, 1985a (as *Diplopsalis* cf. *lenticula*), 1987c, 1988a; Ortega-Banuel, 1985*; García-Pamanes, 1987; Ceballos-Corona, 1988; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; W of BCP, GC (B.C.S.), Mich., Oax.

Diplopsalopsis bomba (F. Stein) J. D. Dodge & Toriumi, 1993: 145, fig. 7, 8, 25.

Nom. syn.: *Diplopelta bomba* F. Stein ex Jörg., 1912: F. Stein, 1883, pro parte: 12, pl. 9, fig. 2-4.

Tax. syn.: *Peridiniopsis asymmetrica* L. Mangin, 1911: 31, fig. 1, 2; *Diplopsalis asymmetrica* (L. Mangin) Er. Lindem., 1928: 91; *Diplopsalopsis asymmetrica*

(L. Mangin) T. H. Abé, 1941: 134, fig. 24-31; *Dissodium asymmetrica* (L. Mangin) A. R. Loebli., 1970: 905.

Barreiro-Güemes, 1967*; Hernández-Becerril, 1985c*, 1987c, 1988b***; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995** *** (as *Zygabikodinium lenticulatum*?); Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2004 (as *D. cf. bomba*); Morquecho-Escamilla, 2004 (as *D. cf. bomba*); W of B.C.S., GC (B.C.), Jal., Col., Mich.

Note: The illustrations of Licea-Durán et al. (1995: pl. 14, fig. 5a, c) with the indication to *Zygabikodinium lenticulatum* may also represent *Diplopsalopsis bomba*, which is more common in the MP, than *Preperidinium meunieri* (= *Z. lenticulatum*). In any case, the discriminative morphological features are not shown so as to be sure of the correct identification. Dodge & Toriumi (1993) mention the first apical plate (1') of the meta-type for *D. bomba*, which is obviously a mistake. This species has the 1' plate of the ortho-type. In the MP, we distinguished two morphotypes: one with the four-sided first intercalary plate of the epitheca and another with a five-sided plate, which are associated with the presence of 6 and 7 precingular plates, respectively (Okolodkov, this study). The taxonomic status of these morphotypes remains unclear.

Diplopsalopsis globula T. H. Abé, 1941: 132, fig. 20-23.

Nom. syn.: *Diplopelta globulus* (T. H. Abé) Balech, 1979 (Publ. Serv. Hidrogr. Naval B. Aires 655): 27, pl. 5, fig. 112-116.

Barreiro-Güemes, 1967; Meave del Castillo & Hernández-Becerril, 1998; Okolodkov (this study); Oax., Mich. (El Faro), Jal. (Barra de Navidad), Chis. (Paredón).

Note: The abnormal cell of *D. globula* with four apical plates was observed near El Faro, Mich., the first apical plate (1') being obliquely subdivided into two plates starting from the pore plate.

Diplopsalopsis orbicularis (Paulsen) Meunier, 1910: 46, pl. 3, fig. 14-17.

Nom. syn.: *Peridinium orbiculare* Paulsen, 1907: 11, fig. 10a-k.

Gilbert & Allen, 1943; González-Villalobos, 1971; Flores-Granados, 1986; Hernández-Becerril, 1987c (as *Protoperidinium orbiculare*); Ceballos-Corona, 1988; González-López, 1994, 2000 (as *Protoperidinium orbiculare*); Licea-Durán et al., 1995; GC (Son.), Mich.

Note: Hernández-Becerril (1987c) and González-López (1994, 2000), mention the name of *Protoperidinium orbiculare*, which is obviously a mistake for *Diplopsalopsis orbicularis* (= *Peridinium orbiculare*) and should be considered a nomen nudum (also see *Protoperidinium orbiculare*).

Diplopsalopsis ovata (T. H. Abé) J. D. Dodge & Toriumi, 1993: 145, fig. 29, 30. Okolodkov et al., 2003; Mich. (El Faro).

Note: The only cell observed was 51 μm long and 51 μm wide.

Dissodinium pseudolunula E. V. Swift ex Elbr. & Drebes, 1978: 362, fig. 1. Gárate-Lizárraga, 1988; Hernández-Becerril, 1988c; Gárate-Lizárraga et al., 1990; GC.

Note: See the note for *Pyrocystis elegans*. For complicated synonymy of *D. pseudolunula*, see Elbrächter & Drebes (1978).

Dissodinium rhomboides Matzen., 1933: 441, fig. 5. Martínez-López, 1993b; W of B.C.S.

Note: Most likely, the species illustrated by Matzenauer (1933) belong to the genus *Pyrocystis* E. V. Swift ex Elbr. & Drebes (see the note for *P. elegans*). The schematic drawing of a very angulated cell does not allow the correct identification. The species is morphologically similar to *P. robusta* and *P. fusiformis*.

Dolichodinium lineatum (Kof. & J. R. Michener) Kof. & Adamson, 1933: 123, pl. 12, fig. 6-8, pl. 17, fig. 41, pl. 22, fig. 87, 88. Okolodkov et al., 2003; Gro. (Zihuatanejo).

Note: The only examined cell was 76 μm long and 55 μm wide. The species has been previously reported from the tropical Pacific (Schiller, 1937).

Enciculifera angulata Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 202, pl. 83, fig. 11-14. Okolodkov et al., 2003; Sin. (Mazatlán), Oax. (GT, Huatulco), Chis. (Paredón, Pto. Madero).

Note: Our cells were 19.5-42 μm long and 16.5-34 μm wide.

Enciculifera mexicana Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 2, 3): 120, pl. 9, fig. 136-144. Okolodkov et al., 2003; Gro. (Acapulco), Oax. (GT, Huatulco, Pto. Escondido), Chis. (Paredón).

Note: Our cells were 15-37 μm long and 15-31 μm wide.

Erythrospidinium sp.

Nom. syn.: *Erythrospis* sp.

Osorio-Tafall, 1943 (as *Erythrospis*); GC.

Note: Because the name of *Erythroopsis* Hertwig is a later homonym of *Erythroopsis* Lindl. (Sterculiaceae), it was replaced with *Erythropsidinium* P. C. Silva (Silva, 1960; Sournia, 1973).

Fragilidium mexicanum Balech, 1988 (An. Inst. Biol. UNAM 58): 480, fig. 1-9. Balech, 1988b*; Okolodkov (this study); GC, B.C.S., Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (Caleta de Campos, Playa Azul), Gro. (Acapulco, Bahía de Potosí, Vicente Gro.), Oax. (Huatulco).

Note: One should take into account that the designation of the apical plates in the description of the type species *Fragilidium heterolobum* Balech (Balech, 1959a) is different from that used by Balech (1988b) in the description of *F. mexicanum*. The plates 2', 3', 4' and 1' in the former correspond to 1', 2', 3' and 4' in the latter, respectively. Moreover, some errors in the designation of thecal plates in the key for identification of *Fragilidium* Balech ex A. R. Loeb. species (Balech, 1988b: 484) did not permit us to make a more detailed comparison of these two morphologically similar species.

Fragilidium subglobosum (Stosch) A. R. Loeb., 1980: 323. Nom. syn.: *Helgolandinium subglobosum* Stosch, 1969: 576, fig. 1-6. Okolodkov et al., 2003; Oax. (Golfo de Tehuantepec).

Note: The only identified cell was 45 µm and 41 µm wide.

Gaarderia compressa Carbonell-Moore, 1994 (Rev. Palaeobot. Palynol. 84): 94, pl. 3, fig. 14-19.

Okolodkov (this study); Oax. (Huatulco).

Note: Apart from a cell identified to the species level, a few rounded triangular cells of Podolampadaceae gen. spp. (the genus *Gaarderia* Carbonell-Moore or related genera) 76-86 µm long, 45-50 µm wide and 76-83 µm deep were observed from Oax. (GT, Huatulco).

Gambierdiscus toxicus Adachi & Fukuyo, 1979: 68, fig. 1-7.

Sierra-Beltrán et al., 1998; Ochoa & Sierra-Beltrán, 1999*; Ochoa et al., 2002; Ochoa, 2003a, b; Gárate-Lizárraga, 2005**, this study; Okolodkov (this study); W of B.C.S. (Bahía Magdalena), GC (Bahía de La Paz, B.C.S.)

Note: We observed this species once in horizontal net hauls at Punta Diablo, La Ensenada de la Paz and Bahía de La Paz.

Glenodinium foliaceum F. Stein, 1883: pl. 3, fig. 22-26. Ceballos-Corona, 1988; Mich.

Goniodoma concavum Gaarder, 1954: 27, fig. 32a-f

Non *Gonyaulax concava* (Gaarder) Balech, 1967 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 2, 3): 108, pl. 6, fig. 108-116, nec *Alexandrium concavum* (Gaarder) Balech, 1985: 38, fig. 17a, b.

Okolodkov et al., 2003; Gro. (Zihuatanejo).

Note: Our identification of this taxon is preliminary. The only examined cell, 59 μm long, 58 μm wide and 45 μm deep, had a higher hypotheca with more concave sides than in Gaarder (1954). Furthermore, the cingulum had a more pronounced displacement of one cingular width. While Gaarder pictured the cell having the 1' plate not contacting the cingulum and located on the left side of the epitheca, our specimen had the 1' plate of the ortho-type contacting both the cingulum and the pore plate, characteristic of such genera as *Protoperidinium* Bergh and *Alexandrium* Halim, which makes our identification preliminary even at the generic level. However, we disagree with Balech (1967, 1985), who placed *G. concavum* first into the genus *Gonyaulax* and then into *Alexandrium* Halim. Although the connection of the 1' plate and the pore plate in some *Alexandrium* species (e.g., *A. minutum* and *A. kutnerae* (Balech) Balech) is optional, the difference in the shape and connection of the 1' plate between *G. concavum* and *A. concavum* seems to us to be too big to consider them synonymous. Another discriminative feature that we consider important is the position of the cingulum, anterior in *G. concavum* and equatorial in *A. concavum* (only in Balech, 1967: pl. 6, fig. 108). The latter is characterized by a slightly anterior position of the left part of the cingulum.

Goniodoma orientale (Er. Lindem.) Balech, 1979 (Lilloa 55, 2): 101, pl. 2, fig. 1-12.

Okolodkov et al., 2003; Oax. (Pto. Escondido).

Note: The only cell studied was 56.5 μm long and 58.5 μm wide.

Goniodoma polyedricum (Pouchet) Jörg., 1899: 33.

Tax. syn.; *Goniodoma acuminatum* (Ehrenb.) F. Stein, 1883: 12, pl. 7, fig. 1-16, pl. 8, fig. 1, 2; non *Peridinium acuminatum* Ehrenb., 1838; *Heteraulacus polyedricus* (Pouchet) Drugg & Loeb., 1967: 183; *Triadinium polyedricum* (Pouchet) J. D. Dodge, 1981: 279, fig. 9-11.

González-Villalobos, 1971; Valero-Gamboa, 1980; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1991, 1992; Hernández-Becerril, 1988a, c; Gárate-Lizárraga et al., 1990; González-López, Siqueiros-Beltrones, 1990; Licea-Durán et al., 1995***; Morquecho-Escamilla, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz,

2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; W of B.C., GC (B.C.S., B.C.), Jal., Col., Mich., Oax.

Note: According to Sournia (1984), *Triadinium* Dodge is a superfluous name, so under the ICBN it is recommended to use the genus name *Goniodoma* F. Stein.

Goniodoma sphaericum J. Murray & Whitting, 1899: 325, pl. 27, fig. 3.

Nom. syn.: *Triadinium sphaericum* (J. Murray & Whitting) J. D. Dodge, 1981: 278. González-Villalobos, 1971**; Hernández-Becerril, 1987c, 1988c**; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Okolodkov (this study); GC, Jal. (Cabo Corrientes), Gro. (Bahía de Potosí), Oax. (Chacahua).

Note: The only measured cell was 38 µm long, 37 µm wide and 38 µm deep.

Gonyaulax cf. *alaskensis* Kof., 1911 (Univ. Cal. Publ. Zool. 8, 4): 249, pl. 17, fig. 45, 46, pl. 14, fig. 32.

Okolodkov (this study); Jal. (Barra de Navidad, Cabo Corrientes), Mich. (Playa Azul), Gro. (Vicente Gro.), Oax. (Chacahua, Huatulco).

Note: The specimens studied were 64.5-84 µm long (spines up to 6 µm) and 53-72 µm wide. The cingulum overhang was 0.5-0.7 cingulum widths and the displacement of the cingulum ends was 3-3.5 cingulum widths (0.5-1.5 and 4 in the original description by Kofoed (1911a), respectively).

Gonyaulax apiculata (Pénard) Entz, 1904: 12, fig. 4.

Hernández-Becerril, 1988c; Licea-Durán et al., 1995; GC.

Note: It is the only freshwater species in the genus *Gonyaulax*. Their records are questionable because they are not documented with illustrations. Additionally, *G. apiculata* is not listed in a review of freshwater dinoflagellates in Mexico (Figueroa-Torres & Moreno-Ruíz, 2003).

Gonyaulax birostris F. Stein, 1883: pl. 4, fig. 20.

Tax. syn.: *Gonyaulax highleii* J. Murray & Whitting, 1899: 324, pl. 28, fig. 2a, b. Ceballos-Corona, 1988; Mich.

Note: For a detailed discussion and the synonymy, see Carbonell-Moore (1996).

Gonyaulax brunii F.J.R. Taylor, 1976: 99, pl. 35, fig. 409a-d.

Hernández-Becerril, 1988c; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Ochoa, 2003a; W of B.C.S., GC (B.C.S.).

Gonyaulax conjuncta E. J. F. Wood, 1954: 258, fig. 161.
Ceballos-Corona, 1988; Mich.

Note: Most likely it is an *Alexandrium* sp., but the 1' plate (and probably the 6' plate) is pictured wrong.

Gonyaulax diegensis Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 217, pl. 13, fig. 21-24, pl. 16, fig. 40.

González-Villalobos, 1971; Nienhuis, 1979, 1982; Hernández-Becerril, 1987c, 1988c; Licea-Durán et al., 1995; Esqueda-Lara, 2003; GC (B.C.S.), Jal., Col.

Gonyaulax digitalis (Pouchet) Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 214, pl. 9, fig. 1-5.

Tax. syn.: ? *Spiniferites bentorii* (M. Rossignol) D. Wall & B. Dale, 1970: 47, pl. 1, fig. 26-30 (cyst stage).

González-Villalobos, 1971**; Blasco, 1977, 1978; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Brinton et al., 1986; Flores-Granados, 1986; Hernández-Becerril, 1987c, 1988a**, c** ***; Martínez-Hernández & Hernández-Campos, 1991** *** (cysts); Gárate-Lizárraga, 1992 (as *Protogonyaulax digitale*), 2005**, this study; Martínez-López, 1993b; Licea-Durán et al., 1995***; Ochoa et al., 1996, 1998, 2002; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Peña-Manjarrez et al., 2001 (cysts); Herrera-Galindo, 2002; Esqueda-Lara, 2003; Ochoa, 2003a; Alonso-Rodríguez et al., 2004b**; Gárate-Lizárraga et al., 2004c, 2005a, d; Morquecho-Escamilla & Lechuga-Devéze, 2004; W of BCP, GC (B.C.S.), Son., Jal., Col., Gro. (Acapulco), Oax.

Note: Gárate-Lizárraga (1992) published, by mistake, the name of *Protogonyaulax digitale*, which is a nomen nudum (also see the note for *P. digitale*). Ochoa (2003a, b) published the name *Alexandrium digitale*, which is illegitimate, referring to *Gonyaulax digitale* as its synonym, without indication of the author, year and place of publication. Lewis et al. (2001: 145) doubt that *Spiniferites bentorii* is conspecific with *G. digitale* “as the distribution of the cysts and motile cells would then be disjunct”.

Gonyaulax divergens García-Pamanes, 1987: 17, nomen nudum.

Note: Probably this name is a misspelled *Gonyaulax diegensis*.

Gonyaulax fragilis (F. Schütt) Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 248, pl. 15, fig. 33.

Estrada & Blasco, 1979; Hernández-Becerril, 1988c**; González-López, 1994, 2000; Licea-Durán et al., 1995*; Ochoa, 2003a; W of BCP, GC.

Gonyaulax fusiformis H. W. Graham, 1942: 50, fig. 63.

Hernández-Becerril, 1988a**; Martínez-López, 1993b; Meave del Castillo & Hernández-Becerril, 1998; W of B.C.S., Mich., Oax.

Gonyaulax hyalina Ostenf. & J. Schmidt, 1901: 172, fig. 24.

Hernández-Becerril, 1988c; Meave del Castillo & Hernández-Becerril, 1998; Oax.

Gonyaulax kofoidii Pavill., 1909: 278, fig. 1.

Rojas-Trejo, 1984; Priego-Martínez, 1985; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Martínez-López & Verdugo-Díaz, 2000; W of BCP, Sin.

Gonyaulax cf. *macroporos* L. Mangin, 1926: 73, fig. 16(1).

Okolodkov (this study); Sin. (Mazatlán).

Note: The only specimen studied was 24.5 µm long (26 µm with spines), 19 µm wide and 15 µm deep, with a displacement of the cingulum ends of 1.7 of the cingulum width. Our specimen satisfactorily corresponds to the description and illustration by Balech (1971a: 164, fig. 684). However, the observed cell is obviously compressed; it also has less displacement of the cingulum ends and two tiny antapical spines not described by Balech.

Gonyaulax milneri (J. Murray & Whitting) Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 203.

Martínez-López, 1993b; W of B.C.S.

Gonyaulax minima Matzen., 1933: 450, fig. 17.

Hernández-Becerril, 1988a; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Oax.

Note: In our opinion, in his original description Matzenauer (1933) illustrated two or three different species from at least two genera. While the specimens in his Fig. 17a, b can be assigned to the genus *Gonyaulax*, the cells in Fig. 17c-e can hardly be ascribed to this genus. In particular, in Fig. 17e the cingulum is circular, without any displacement of its ends, so that it could be *Scrippsiella trochoidea*, considering similarity in cell shape in both taxa. Furthermore, *G. minima* is similar to *G. fragilis* sensu Dodge (1989).

Gonyaulax minuta Kof. & J. R. Michener, 1911: 271.

Gilmartin & Revelante, 1978; Lapota & Losee, 1984; Rojas-Trejo, 1984; Priego-Martínez, 1985; Brinton et al., 1986; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC (B.C., Sin.).

Gonyaulax monacantha Pavill., 1916: 21, pl. 1, fig. 78.

León-Álvarez, 1983; Martínez-López, 1993b; Verdugo-Díaz, 1997; W of B.C.S., GC (B.C.S.), Jal.

Gonyaulax monospina Rampi, 1951 (Atti Accad. Lig. Sc. Lett. 9): 108, fig. 19. Hernández-Becerril, 1988a; Esqueda-Lara, 2003; Okolodkov (this study); Col., Chis. (Paredón).

Note: Our cells were 32.5-33 μm long (36 μm with a spine) and 26-37 μm wide.

Gonyaulax ovalis J. Schill., 1929: 397, fig. 7a-d.

Santamaría del Ángel, 1986; GC (B.C.).

Gonyaulax pacifica Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 308, pl. 30, fig. 37-39.

Tax. syn.: *Gonyaulax kofoidii* Pavill., 1909: 278, fig. 1.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Flores-Granados, 1986; Ceballos-Corona, 1988; Hernández-Becerril, 1988c** ***; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.; Son.), Jal., Col., Mich., Oax.

Gonyaulax polygramma F. Stein, 1883: pl. 4, fig. 15.

Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971**; Estrada & Blasco, 1979; Hernández-Becerril, 1983, 1985a, 1987a, c, 1988a, c; Brinton et al., 1986; Flores-Granados, 1986; Nienhuis & Guerrero, 1986; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992 (as *Protogonyaulax polygramma*), 2005**; Millán-Núñez, 1988; Gárate-Lizárraga et al., 1990, 2001a, 2005d; Martínez-López, 1993b; Cortés-Altamirano et al., 1995b, 1996; Licea-Durán et al., 1995***; Verdugo-Díaz, 1997; Cortés-Altamirano & Hernández-Becerril, 1998*; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Silveira, 1999; Herrera-Galindo, 2000a; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001, 2004; Herrera-Galindo, 2002*; Ochoa et al., 2002; Esqueda-Lara, 2003; Ochoa, 2003a; Alonso-Rodríguez et al., 2004b**; Bustillos-Guzmán et al., 2004; Hernández-Becerril et al., 2004b; Morquecho-Escamilla, 2004; Gárate-Lizárraga & Muñetón-Gómez, 2005a, b**; W of B.C.S., GC (B.C.S., B.C., Son.), Jal., Col., Mich., Oax.

Note: Herrera-Silveira (1999) refers to the occurrence of toxic red tides caused by this species. We consider this to be undocumented and therefore incorrect. Gárate-Lizárraga (1992) published, by mistake, the name of *Protogonyaulax polygramma*, which is a nomen nudum (also see the note for *P. polygramma*). Ochoa (2003a,

b) published the name *Alexandrium polygrama*, which is illegitimate, referring to *Gonyaulax polygramma* as its synonym, without indication of the author, year and place of publication.

Gonyaulax scrippsae Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 228, pl. 13, fig. 26, 27, pl. 16, fig. 38.

Tax. syn.: *Spiniferites bulloideus* (Deflandre & Cookson) Sarjeant, 1970: 75 (cyst stage).

Hernández-Becerril, 1988c** (as *Gonyaulax scrippsae*?); Morquecho-Escamilla & Lechuga-Devéze, 2003; Okolodkov et al., 2003; Morquecho-Escamilla, 2004 (cysts); Peña-Manjarrez et al., 2005 (as cysts**); W of B.C., GC (B.C.S.).

Gonyaulax sphaeroidea Kof., 1911 (Univ. Calif. Publ. Zool. 8, 4): 206, pl. 16, fig. 41, 42.

Rojas-Trejo, 1984; Priego-Martínez, 1985; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.; Sin.), Gro. (Acapulco).

Gonyaulax spinifera (Clap. & J. Lachm.) Diesing, 1866: 96.

Tax. syn.: *Spiniferites ramosus* (Ehrenb.) Mantell, 1854: 239; *Spiniferites mirabilis* (M. Rossignol) Sarjeant, 1970: 76; *Ataxiodinium choanum* Reid, 1977: 588, pl. 1, fig. 1-2 (cyst stages).

González-Villalobos, 1971**; León-Álvarez, 1983; Caballasi-Flores, 1985; Flores-Granados, 1986; Hernández-Becerril, 1987c, 1988c***; Martínez-Hernández & Hernández-Campos, 1991** *** (cysts); Gárate-Lizárraga, 1992 (as *Protogonyaulax spinifera*), 2005**; Licea-Durán et al., 1995***; Morquecho-Escamilla, 1996, 2004** (also cysts); Meave del Castillo & Hernández-Becerril, 1998; Banda et al., 2001 (cysts); Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Peña-Manjarrez et al., 2001 (cysts); Cortés-Lara et al., 2003; Esqueda-Lara, 2003; Lira-Beltrán et al., 2003 (cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003**, 2004; Varona-Cordero & Gutiérrez-Mendieta, 2003; Alonso-Rodríguez, 2004; Alonso-Rodríguez et al., 2004b**; Gárate-Lizárraga et al., 2005a; Peña-Manjarrez et al., 2005 (also cysts**); W of B.C.S. and B.C., GC (Son., Sin., Nay.), Jal., Col., Oax., Chis.

Note: Gárate-Lizárraga (1992) published, by mistake, the name of *Protogonyaulax spinifera*, which is a nomen nudum. According to Lewis et al. (1999), all three cyst stages given above are synonymous with the *Gonyaulax spinifera* group undifferentiated.

Gonyaulax turbynei J. Murray & Whitting, 1899: 323, pl. 28, fig. 4.

Flores-Granados, 1986; Hernández-Becerril, 1988c**; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Góngora-González, 2001; Esqueda-

Lara, 2003; Okolodkov (this study); GC (Bahía Concepción, B.C.S.; Son.), Jal., Col., Oax., Chis. (Pto. Madero).

Note: Our cells were 30 µm long and 25 µm wide.

Gonyaulax verior Sournia, 1973: 34.

Nom. syn.: *Gonyaulax diacantha* (Meunier) J. Schill., 1937: 300, fig. 309; non *G. diacantha* Athanassopoulos, 1931: 8, fig. 8.

Ceballos-Corona, 1988; Morquecho-Escamilla et al., 1996, 2000a; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001, 2004; Ochoa et al., 2002; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Ochoa, 2003a; Alonso-Rodríguez et al., 2004b; Morquecho-Escamilla, 2004 (also cysts); Peña-Manjarrez et al., 2005; Okolodkov (this study); W of B.C., GC (B.C.S., Sin.), Mich., Col. (Manzanillo), Chis. (Pto. Madero).

Note: Ochoa (2003a, b) published the name *Alexandrium verior*, which is illegitimate, referring to *Gonyaulax verior* as its synonym, without indication of the author, year and place of publication.

Gonyaulax sp.

Syn.: *Nematosphaeropsis labyrinthea* (Ostenf.) Reid, 1974: 592, pl. 1, fig. 8, 9 (cyst stage).

Martínez-Hernández & Hernández-Campos, 1991** ***; GC.

Note: Although Sournia (1978) and Lewis et al. (1999) indicate that *N. labyrinthea* is a cyst stage of *Gonyaulax spinefera*, Martínez-Hernández & Hernández-Campos (1991) cautiously ascribe it to *Gonyaulax* sp.

Gotoius abei Matsuoka, 1988: 111, fig. 6A-D, 7A-B, pl. 5, fig. A-H.
Esqueda-Lara, 2003; Jal., Col.

Gotoius excentricus (Nie) Sournia, 1984: 350.

Okolodkov (this study); Oax. (Chacahua).

Note: The only specimen observed was 61 µm long, 66.5 µm wide and 65.5 µm deep.

Gymnodinium cf. *aequatoriale* Hasle, 1960: 32, fig. 25.

Hernández-Becerril, 1983, 1985a; GC.

Gymnodinium aff. *aurantium* P. H. Campbell, 1973: 136, 384, pl. 6, fig. 33a-d.
Santoyo-Reyes et al., 1999; Herrera-Galindo, 2002; B.C.S., Oax.

Gymnodinium auratum Kof. & Swezy, 1921: 187, fig. Y13, pl. 2, fig. 20.
Meave del Castillo & Hernández-Becerril, 1998; Oax.

Gymnodinium catenatum H. W. Graham, 1943: 259, fig. 1, 2.
Graham, 1943; Osorio-Tafall, 1943; González-Villalobos, 1971; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1985; Cortés-Altamirano & Rojas-Trejo, 1982; Morey-Gaines, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985**; Mee et al., 1986; Cortés-Altamirano, 1987** ****, 1995, 2002**; Hernández-Becerril, 1987c; Muñoz-Cabrera, 1989; Saldade-Castañeda et al., 1991; Cortés-Altamirano & Núñez-Pastén, 1991***, 1992*; Cortés-Altamirano et al., 1995a, b, c, 1996, 1999, 2002, 2004b; Gárate-Lizárraga, 1995*, 1996, 2002, 2005**; Gárate-Lizárraga et al., 1995, 2001a, b, 2002a, c, 2003a, 2004b**, c, 2005a**, b-d; Licea-Durán et al., 1995***; Sierra-Beltrán et al., 1995; Ochoa et al., 1996, 1998, 2002; Cortés-Altamirano & Alonso-Rodríguez, 1997**; Manrique & Molina, 1997; Verdugo-Díaz, 1997; Cortés-Altamirano & Hernández-Becerril, 1998*; Gómez-Aguirre, 1998, 2003*; Ochoa et al., 1998; Aguirre-Gómez et al., 1999; Blanco-Blanco et al., 1999; Herrera-Silveira, 1999; Cortés-Altamirano et al., 1999, 2000; Góngora-González et al., 1999; Ochoa & Sierra-Beltrán, 1999**; Ramírez-Camarena et al., 1999; Ronsón-Paulin, 1999; Cabrera-Mancilla et al., 2000; Herrera-Galindo, 2000a, b, 2002**; Morales-Blake et al., 2000**; Morquecho et al., 2000a, b (also cysts); Figueroa-Torres & Zepeda-Esquivel, 2001**; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001, 2003**, 2004; Band-Schmidt et al., 2002, 2004a, b**, c (also cysts), 2005a; Flores et al., 2002; Gómez-Villareal & Durán-Salguero, 2002; Alonso-Rodríguez, 2003* **, 2004; Alonso-Rodríguez & Páez-Osuna, 2003; Band-Schmidt, 2003; Esqueda-Lara, 2003; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Gómez-Aguirre et al., 2003; Ochoa, 2003a, b; Páez-Osuna et al., 2003; Palomares-García et al., 2003, 2004; Alonso-Rodríguez et al., 2004a, b* **, 2005**; Alonso-Rodríguez & Ochoa, 2004; Bustillos-Guzmán et al., 2004, 2005; Cortés-Altamirano & Licea-Durán, 2004; Cortés-Lara et al., 2004; Morquecho-Escamilla, 2004** (also cysts); Sierra-Beltrán et al., 2004; García-Hernández et al., 2005; Pérez-Cruz et al., 2005; Poot-Delgado et al., 2005; GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Gro., Oax.

Gymnodinium chlorophorum Elbr. & Schnepf, 1996: 382, fig. 1-39.
Hernández-Becerril & Bravo-Sierra, 2000; GC.

Gymnodinium costatum Kof. & Swezy, 1921: 200, fig. Z10, pl. 3, fig. 33.
González-Villalobos, 1971; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Gymnodinium danicans Castro-Sánchez, 1998: 53, 55, nomen nudum.

Note: Possibly an error for *Glenodinium danicum*, which is synonymous to *Peridiniella danica*.

Gymnodinium fuscum (Ehrenb.) F. Stein, 1878: 95, 97; 1883: pl. 2, fig. 14-18.
Cohen-Fernández, 2000; W of B.C.S.

Gymnodinium gracile Bergh, 1881: 251, pl. 16, fig. 68, 69.

Tax. syn.: *Gymnodinium abbreviatum* Kof. & Swezy, 1921: 180, fig. Z7, pl. 6, fig. 63; non *G. gracile* Kof. & Swezy, 1921: 214, fig. Z3, pl. 2, fig. 19.

Hernández-Becerril, 1983, 1985a, 1987c; Ceballos-Corona, 1988; González-López, 1994, 2000; GC, Mich.

Note: All the records of this species in the MP are referred to as *G. abbreviatum*. According to Elbrächter (1979), *G. gracile* Bergh and *G. abbreviatum* Kof. & Swezy are obviously conspecific. However, due to the much better quality of the illustrations by Kofoid & Swezy (1921), all subsequent authors identified their specimens of *G. gracile* Bergh as *G. abbreviatum*. The confusion is even worse because Kofoid & Swezy (1921) described another species as *G. gracile*, which should be considered a later homonym.

Gymnodinium cf. *hamulus* Kof. & Swezy, 1921: 218, fig. Y5, pl. 9, fig. 97.
Hernández-Becerril, 1983, 1985a; GC.

Gymnodinium herbaceum Kof. & Swezy, 1921: 220, fig. Y17, pl. 4, fig. 44.
Cortés-Altamirano & Pastén-Miranda, 1982b (as *G. cf. herbaceum*); Gárate-Lizárraga, 1992 (as *G. cf. herbaceum*); Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC, B.C.S.

Gymnodinium impudicum (Fraga & I. Bravo in Fraga, I. Bravo, M. Delgado, J. M. Franco & Zapata) G. Hansen & Moestrup in Daugbjerg, G. Hansen, Larsen & Moestrup, 2000: 305.

Nom. syn.: *Gyrodinium impudicum* Fraga & I. Bravo in Fraga, I. Bravo, M. Delgado, J. M. Franco & Zapata, 1995: 515.

Cortés-Altamirano et al., 1999; Alonso-Rodríguez, 2004; Sin.

Note: Hallegraeff & Fraga (1996) and Cho et al. (2001) mention that *Cochlodinium polykrikoides* can be mistaken for *Gymnodinium catenatum* and *Gyrodinium impudicum*. Cortés-Altamirano & Alonso-Rodríguez (1997) recorded several blooms of *G. catenatum* during autumn 1997 in Bahía de Mazatlán, Sinaloa, and later re-

identified it as *G. impudicum* (Cortés-Altamirano et al., 1999). However, Cortés-Altamirano (2002) again re-identified this species as *Cochlodinium catenatum*. In more recent work, Alonso-Rodríguez (2004), mentions cysts of *G. impudicum* for the Mazatlán area.

Gymnodinium incoloratum W. Conrad & Kuff., 1954: 96, pl. 9, fig. 3.
Cortés-Altamirano & Licea-Durán, 1999**; Alonso-Rodríguez & Páez-Osuna, 2001, 2003; Páez-Osuna et al., 2003; Alonso-Rodríguez et al., 2004b; Sin.

Gymnodinium instriatum (Freud. & J. J. Lee) Coats, 2002: 522.
Nom. syn.: *Gyrodinium instriatum* Freud. & J. J. Lee, 1963: 182, figs. 8-17.
Alonso-Rodríguez, 2003* **; Alonso-Rodríguez et al., 2003, 2004b* **; Hernández-Becerril et al., 2004b; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.; Sin.), Col.

Gymnodinium lohmannii Paulsen, 1908: 99, fig. 137A-D.
Gilmartin & Revelante, 1978; Hernández-Becerril, 1987c; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Gymnodinium mirabile Pénard, 1891: 11, 14, 16, 22-25, 30, 56, pl. 5, fig. 1-7.
Cortés-Lara, 1985; Hernández-Becerril, 1986 (as *G. cf. mirabile*); González-López, 1994; Licea-Durán et al., 1995; W of B.C., GC.

Gymnodinium mitratum J. Schill., 1933: 386, fig. 396a-c.
Gilmartin & Revelante, 1978; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c; González-López, 1994, 2000; Licea-Durán et al., 1995; GC, B.C.

Gymnodinium peridinium Ochoa, Hernández-Becerril, Lluch-Cota, Arredondo-Vega, Núñez-Vázquez, Heredia-Tapia, Pérez-Linares & Alonso-Rodríguez, 2002: 121 (table 20), nomen nudum; *G. peridinium* Ochoa, 2003a: 508, nomen nudum; *G. peridinium* Ochoa, 2003b: 12, nomen nudum.

Note: Ochoa et al. (2002) and Ochoa (2003a, b) refer to the work by Cortés-Altamirano et al. (1996), who discuss the presence of “*Gymnodinium, Peridinium*” or *Gymnodinium peridinium* as red-tide producers in the Bay of Acapulco-Pto. Marqués area, Gro. A Spanish version of the same article was also published by Cortés-Altamirano et al. (1995b) and contains the same information.

Gymnodinium punctatum Pouchet, 1887: 105, pl. 10, fig. 7.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC (B.C.).

Gymnodinium rhomboides F. Schütt, 1895: 163, pl. 21, fig. 63.
Santamaría del Ángel, 1986; Herrera-Galindo, 2002 (as *G. aff. rhomboides*); GC (B.C.), Oax.

Gymnodinium rubrum Kof. & Swezy, 1921: 253, fig. A, Y4, pl. 8, fig. 86.
Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga (this study); GC (Bahía de La Paz, B.C.S.), Oax.

Gymnodinium simplex (Lohmann) Kof. & Swezy, 1921: 256, fig. BB8.
Kiefer & Lasker, 1975; Hernández-Becerril, 1983, 1985a, 1987c; Santamaría del Ángel, 1986; González-López, 1994, 2000; Licea-Durán et al., 1995; Góngora-González, 2001; GC, B.C.

Gymnodinium tripos var. *ponctic*. Ochoa, Hernández-Becerril, Lluch-Cota, Arredondo-Vega, Núñez-Vázquez, Heredia-Tapia, Pérez-Linares & Alonso-Rodríguez, 2002: 122 (table 20), nomen nudum; *G. tripos* var. *ponctic*. Ochoa, 2003a: 508, nomen nudum; *G. tripos* var. *ponctic*. Ochoa, 2003b: 13, nomen nudum.

Note: Obviously, Ochoa et al. (2002) and Ochoa (2003a, b) wrote a wrong name instead of *Ceratium tripos* var. *ponticum*, which we consider a misidentified *C. balechii*.

Gymnodinium vestificii F. Schütt, 1895: 168, pl. 25, fig. 85.
Santamaría del Ángel, 1986; GC (B.C.).

Note: As noted by Lebour (1925), *G. vestificii* bears a strong resemblance to *Katodinium glaucum* (M. Lebour) A. R. Loeb. These two taxa are probably conspecific.

Gymnodinium viridescens Kof., 1931: 19, pl. 1, fig. 2.
Ceballos-Corona, 1988; Mich.

Gymnodinium sp.
Cortés-Altamirano & Núñez-Pastén, 1992*; Sin.

Note: A cell illustrated by Cortés-Altamirano & Núñez-Pastén (1992) under the name of *Peridinium* sp. most likely belongs to the genus *Gymnodinium*.

Gyrodinium falcatum Kof. & Swezy, 1921: 299, fig. CC11.
Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga (this study); GC (Bahía de la Paz, B.C.S.), Oax.

Gyrodinium fissum (Levander) Kof. & Swezy, 1921: 300, fig. DD8, pl. 9, fig. 95. Morey-Gaines, 1982; Sin.

Gyrodinium cf. *fulvum* Kof. & Swezy, 1921: 306, fig. DD9, pl. 7, fig. 70. Hernández-Becerril, 1983, 1985a; GC.

Gyrodinium fusiforme Kof. & Swezy, 1921: 307, fig. EE4, 8. Hernández-Becerril, 1983, 1985a (as *Gyrodinium* cf. *fusiforme*); Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Martínez-Hernández & Hernández-Campos, 1991; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; GC, B.C., Oax.

Gyrodinium herbaceum Kof. & Swezy, 1921: 310, fig. DD6, pl. 10, fig. 109. Barreiro-Güemes, 1967; Cortés-Altamirano & Pastén-Miranda, 1982b (as *G. herbaceum*?); Pastén-Miranda, 1983 (as *G. herbaceum*?); Caballasi-Flores, 1985; Priego-Martínez, 1985; Hernández-Becerril, 1987c; Verdugo-Díaz, 1993 (also as *G. cf. herbaceum*), 1997 (also as *G. cf. herbaceum*); Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; Palomares-García et al., 2002; W of BCP, GC (B.C.S., Sin.).

Gyrodinium lacryma (Meunier) Kof. & Swezy, 1921: 314, fig. EE6. Peña-Manjarrez et al., 2005; W of B.C.

Gyrodinium cf. *ochraceum* Kof. & Swezy, 1921: 321, fig. DD17, pl. 7, fig. 76, 82. Hernández-Becerril, 1986 (erroneously, as *Gymnodinium* cf. *ochraceum*); W of B.C.

Gyrodinium spirale (Bergh) Kof. & Swezy, 1921: 332, fig. DD14, pl. 4, fig. 43. Barreiro-Güemes, 1967*; Rojas-Trejo, 1984; Priego-Martínez, 1985; Hernández-Becerril, 1987c; Licea-Durán et al., 1995* ***; Cortés-Altamirano & Hernández-Becerril, 1998*; Cortés-Altamirano & Licea-Durán, 1999** ***; Herrera-Galindo, 2000a, 2002*; Góngora-González, 2001; Alonso-Rodríguez & Páez-Osuna, 2003; Ochoa, 2003a; Páez-Osuna et al., 2003; Alonso-Rodríguez & Ochoa, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; Gárate-Lizárraga, 2005**; Sierra-Beltrán et al., 2004; Peña-Manjarrez et al., 2005; GC (B.C.S., Sin.), Oax.

Halodinium cf. *minor* Bujak, 1984: 196 pl. 4 fig. 18-20. Peña-Manjarrez et al., 2005** (as cysts); W of B.C.

Note: This species is given by Peña-Manjarrez et al. (2005) as a dinoflagellate cyst. However, at present it is classified by most palynologists as a thecamoebian.

Heterocapsa niei (A. R. Loeb.) Morrill & A. R. Loeb., 1981: 63, fig. 1-3.
Góngora-González, 2001; Bustillos-Guzmán et al., 2004; Gárate-Lizárraga, 2005d, this study; GC (Bahía de La Paz, Bahía Concepción, B.C.S.).

Heterocapsa triquetra (Ehrenb.) F. Stein, 1883: 13, pl. 3, fig. 30-40.
Nom. syn.: *Peridinium triquetrum* (Ehrenb.) M. Lebour, 1925: 109, pl. 18, fig. 2.
Hernández-Becerril, 1983, 1985a, 1987c; Caballasi-Flores, 1985 (as *Peridinium triqueta*); González-López, 1994, 2000; Licea-Durán et al., 1995; Gárate-Lizárraga (this study); Okolodkov (this study); W of B.C.S. and B.C., GC (Bahía de La Paz, B.C.S.; Sin.), Chis. (Paredón).

Note: The cell studied was 26.5 µm long, 20 µm wide and 17.5 µm deep.

Heterodinium blackmanii (J. Murray & Whitting) Kof., 1906 (Univ. Calif. Publ. Zool. 2, 8): 358.
Meave del Castillo & Zamudio-Reséndiz, 2005; MP.

Heterodinium inaequale Kof., 1906 (Univ. Calif. Publ. Zool. 2, 8): 354, pl. 18, fig. 9, 10.
Gárate-Lizárraga (this study); GC (Bahía de La Paz).

Heterodinium milneri (J. Murray & Whitting) Kof., 1906 (Univ. Calif. Publ. Zool. 2, 8): 353.
Gárate-Lizárraga (this study); GC (Bahía de La Paz).

Heterodinium murrayi (J. Murray & Whitting) Kof., 1906 (Univ. Calif. Publ. Zool. 2, 8): 353.
Nom. syn.: *Peridinium tripos* J. Murray & Whitting, 1899: 327, pl. 30, fig. 4a, b; non *P. tripos* (O. F. Müll.) Ehrenb., 1833: 272.
Martínez-López & Gárate-Lizárraga, 1994; GC (Bahía Concepción, B.C.S.).

Note: Martínez-López & Gárate-Lizárraga (1994) mentioned *Protoperidinium tripos*, which is a nomen nudum (see the note) following Yamaji (1982), who mistakenly ascribed this name to Murray & Whitting. Hernández-Becerril (1993) illustrated *Heterodinium murrayi* Kof.; however, the origin of the illustrated cell is the area beyond Mexican waters (D. U. Hernández-Becerril, pers. comm.).

Heterodinium sp.
Round, 1967; Lapota & Losee, 1984; Verdugo-Díaz, 1997; B.C.S., GC.

Histioneis biremis F. Stein, 1883: pl. 22, fig. 13.

Hernández-Becerril & Meave del Castillo, 1994; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Meave del Castillo & Zamudio-Reséndiz, 2005; GC, Oax, GT.

Histioneis crateriformis F. Stein, 1883: 25, pl. 22, fig. 5, 6.

Okolodkov (this study); Gro. (Acapulco).

Note: The only specimen observed had a total length 62 μm (the body length 29 μm) and a total width 43 μm (the body width 29 μm).

Histioneis cymbalaria F. Stein, 1883: 25, pl. 22, pl. 7, non 8-10.

Meave del Castillo & Zamudio-Reséndiz, 2005; MP.

Histioneis isselii Forti, 1932: 539, fig. 1.

Hernández-Becerril, 1988a**, b***; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Oax.

Histioneis mitchellana J. Murray & Whitting, 1899: 335, pl. 33, fig. 3.

Hernández-Becerril, 1988c; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Esqueda-Lara et al., 2003; Hernández-Becerril et al., 2003; GC, Col.

Histioneis para J. Murray & Whitting, 1899: 333, pl. 32, fig. 4a-c.

Nom. syn.: *Parahistioneis para* (J. Murray & Whitting) Kof. & Skogsb., 1928: 601, fig. 85(6). Hernández-Becerril, 1988a; Hernández-Becerril et al., 2003; Mich.

Histioneis paraformis (Kof. & Skogsb.) Balech, 1971: 14, pl. 3, fig. 47-49.

Nom. syn.: *Parahistioneis paraformis* Kof. & Skogsb., 1928: 598, pl. 19, fig. 3, 6, fig. 93(4); ? *Parahistioneis acuta* Böhm, 1931 in J. Schill., 1933: 216, fig. 206.

Gárate-Lizárraga, 1988*; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Hernández-Becerril et al., 2003 (as *Histioneis acuta* (Böhm) Sournia and *H. paraformis* (J. Murray & Whittingae) Sournia); GC.

Note: Hernández-Becerril et al. (2003) mistakenly ascribe this species to different authors, with the orthographic error for Whitting, as *Histioneis paraformis* (J. Murray & Whittingae) Sournia. Although Hernández-Becerril et al. (2003) also mention *Histioneis acuta* (Böhm) Sournia, this binomial seems to be a nomen nudum.

Histioneis pieltainii (B. F. Osorio) Okolodkov comb. nov.

Bas.: *Parahistioneis pieltainii* B. F. Osorio, 1942 (An. Esc. Nac. Cienc. Biol. 2): 444, fig. 13, 14.

Osorio-Tafall, 1942; Hernández-Becerril et al., 2003; Oax.

Note: The only specimen was 30 μm long (80 μm with lists) and 35 μm deep (47.5 μm with lists). It was collected from the Gulf of Tehuantepec during a bloom of *Pyrodinium bahamense*, and it is very similar to *Histioneis karstenii*. However, in *H. karstenii* the third rib (R3) is fairly weak and curved (S-shaped) and the left sulcal list is reticulated. Our specimen has a straight thick R3, as in *Parahistioneis pieltainii*, which differentiates it from *H. karstenii*, but the former has a reduced lobe of the sulcal list behind R3, - the two diagnostic features most important, according to Osorio-Tafall (1942). Both species have been recorded from the eastern tropical Pacific, and *H. karstenii* also from the Ligurian Sea, the western Mediterranean (Rampi, 1940, 1947), although the Mediterranean cells have an almost straight R3, which is significantly thicker than the second (fission) rib (R2). Additionally, our specimen has a rib that runs posteriorly along the ventral margin of the left sulcal list between R2 and R3 and is about parallel to the margin, similar to that in *H. rotundata* Kof. & J. R. Michener, with which *H. pieltainii* has a number of features in common. However, *H. rotundata* is twice as small, and unlike *H. pieltainii* and *H. karstenii*, in this species the left sulcal list ends somewhat ventrally to the antapex, without the lobe behind R3, and the posterior cingular list has on each side five to six simple complete radial ribs. *H. costata* Kof. & J. R. Michener is another species reported from the eastern tropical Pacific, that shares many morphological features with all three species previously discussed. However, it is somewhat smaller than *H. pieltainii* and *H. karstenii* and almost lacks the lobe of the left sulcal list behind R3, the latter being slightly undulated and as thin as R2 (Kofoid & Skogsberg, 1928). The name of *Histioneis pieltainii* Osorio-Tafall erroneously appeared in the work by Hernández-Becerril et al. (2003).

Histioneis pulchra Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 205, pl. 16, fig. 99.

Martínez-López, 1993b; W of B.C.S.

Histioneis schilleri Böhm, 1931 (Arch. Protistenk. 75): 499, fig. 5, 6.

Hernández-Becerril, 1988c**; González-López, 1994, 2000; GC, Jal.

Note: Taylor (1976) considers *H. schilleri* synonymous to *H. mitchellana*. Hernández-Becerril (1988c) noted that his only specimen of *H. schilleri* is similar to *H. depressa* J. Schill. illustrated by Balech (1971b: pl. 2, fig. 18).

Karenia brevis (Davis) G. Hansen & Moestrup, 2000 in Daugbjerg, G. Hansen, Larsen & Moestrup, 2000: 308.

Nom. syn.: *Gymnodinium breve* Davis, 1948: 358, fig. 1, 2.

Gómez-Aguirre & Santoyo-Reyes, 1975 (as *Gymnodinium brevis*?); Ceballos-Corona, 1988; Meave del Castillo & Hernández-Becerril, 1998; GC, Oax.

Karenia mikimotoi (Miyake & Kominami ex Oda) G. Hansen & Moestrup, 2000 in Daugbjerg, G. Hansen, Larsen & Moestrup, 2000: 308, fig. 3A, B.

Cortés-Altamirano & Alonso-Rodríguez, 1997; Alonso-Rodríguez & Ochoa, 2004; Sin.

Katodinium glaucum (Lebour) A. R. Loebli., 1965: 16.

Morquecho-Escamilla & Lechuga-Devéze, 2004; GC (B.C.S.).

Katodinium sp.

Góngora-González, 2001; GC (B.C.S.).

Kofooidinium lebourae (Pavill.) F. J. R. Taylor, 1976: 185, pl. 39, fig. 477.

González-López & Siqueiros-Beltrones, 1990; González-López, 1994; Verdugo-Díaz, 1997; GC (B.C.S.).

Kofooidinium pavillardii Cachon & Cachon-Enj., 1967: 429, fig. 1-3, 5, 8a, pl. 1, fig. 1-5.

Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Okolodkov (this study); GC (B.C.S.), Gro. (Zihuatanejo).

Note: The only studied cell was 162 µm long and 148 µm wide.

Kofooidinium splendens Cachon & Cachon-Enj., 1967: 437, fig. 6a, 7, pl. 4, fig. 6-10. Gárate-Lizárraga, 1992; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Esqueda-Lara et al., 2003; W of B.C.S., Jal., Col.

Kofooidinium velelloides Pavill., 1928: 1, fig. A, B.

Góngora-González, 2001; Okolodkov (this study); GC (Bahía Concepción, B.C.S.), Gro. (Acapulco).

Note: The only cell identified was 146 µm long, with a nucleus of 25 µm in diameter.

Latifascia subantarctica (Balech) Okolodkov comb. nov.

Bas.: *Heteroschisma subantarcticum* Balech, 1971 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Inst. Nac. Invest. Cienc. Natur., Hidrobiol. 3, 1): 48, pl. 4, fig. 39-48.

Hernández-Becerril et al., 2003; tropical southeastern MP.

Note: The name of the genus *Heteroschisma* Kof. & Skogsb., 1928, is illegitimate under the ICZN and has been replaced by *Latifascia* Loeb. & A. R. Loeb., 1966 (Stud. Trop. Oceanogr. 3: 38). This name is conserved under the ICBN (see Appendix IIIA in Greuter et al., 2000: 160).

Lingulodinium polyedra (F. Stein) J. D. Dodge, 1989: 291, fig. 1H, I, 34-38.

Nom. syn.: *Gonyaulax polyedra* F. Stein, 1883: 13, pl. 4, fig. 7-9.

Tax. syn.: *Lingulodinium machaerophorum* (Deflandre & Cookson) D. Wall, 1967: 109 (cyst stage).

Gilbert & Allen, 1943; Osorio-Tafall, 1943; Round, 1967; González-Villalobos, 1971**; Smayda, 1975; Blasco, 1977, 1978; Packard et al., 1978; Estrada & Blasco, 1979; Otero-Dávalos, 1981; Morey-Gaines, 1982; León-Álvarez, 1983; Rojas-Trejo, 1984; Hernández-Becerril, 1985c*, 1986, 1987c, 1988c**; Priego-Martínez, 1985; Brinton et al., 1986; Flores-Granados, 1986; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1996, 2005**, this study; Hernández-Becerril, 1988a, c; Muñoz-Cabrera, 1989; Gárate-Lizárraga et al., 1990, 2000; González-López & Siqueiros-Beltrones, 1990; Martínez-Hernández & Hernández-Campos, 1991** *** (cysts); Saldate-Castañeda et al., 1991; Martínez-López, 1993b; Orellana-Cepeda et al., 1993; Cortés-Altamirano et al., 1995b, 1996; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996; Ochoa et al., 1996, 1998, 2002; Manrique & Molina, 1997 (as *Gonyaulax* cf. *polyedra*); Cortés-Altamirano & Hernández-Becerril, 1998*; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999; Ronsón-Paulin, 1999; Santoyo-Reyes et al., 1999; Herrera-Galindo, 2000a, 2002*; Morquecho-Escamilla et al., 2000b (also cysts); Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001, 2003** ***, 2004**; Peña-Manjarrez et al., 2001 (cysts), 2002a, b; Herrera-Galindo, 2002; Gómez-Aguirre, 2003*; Ochoa, 2003a; Páez-Osuna et al., 2003; Alonso-Rodríguez, 2004; Alonso-Rodríguez et al., 2004b* **; Bustillos-Guzmán et al., 2004; Morquecho-Escamilla, 2004** *** (also cysts); Meave del Castillo & Zamudio-Reséndiz, 2005; Peña-Manjarrez et al., 2005** (also cysts); W of B.C.S. and B.C., GC (Bahía de La Paz, B.C.S.; B.C., Son., Sin., Nay.), Jal., Mich., Gro. (Acapulco), Oax.

Note: In Licea-Durán et al. (1995: pl. 7, fig. 4a) there is a mistake. They give a mirror image of this species. Ochoa (2003a, b) published the name *Alexandrium polyedra*, which is illegitimate, referring to *Gonyaulax polyedra* as its synonym, without indication of the author, year and place of publication.

Mesoporos perforatus (Gran) Lillick, 1937: 497.

Nom. syn.: *Porella perforata* J. Schill., 1928 (Arch. Protistenk. 61, 1): 55, fig. 12. Barreiro-Güemes, 1967; Santoyo-Reyes & Signoret, 1980; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Okolodkov (this study); GC, Oax. (GT).

Noctiluca mirabilis Brinton, Fleminger & Siegel-Causey, 1986: 228, nomen nudum.

Note: Most likely it is *Noctiluca scintillans*.

Noctiluca scintillans (Macartney) Kof. & Swezy, 1921: 407, fig. KK1-6.

Tax. syn.: *Noctiluca miliaris* Suriray, 1836: 1-16, pl. 1, 2.

Streets, 1878; Gilbert & Allen, 1943; Osorio-Tafall, 1943; Barreiro-Güemes, 1967*; Gómez-Aguirre et al., 1974; Smayda, 1975; Blasco, 1977; Nienhuis, 1979, 1982; García-Pamanes, 1982; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Nienhuis & Guerrero, 1986; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a, c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1991, 1992, 1995*, 1996, 2005; Gárate-Lizárraga et al., 1990, 1995, 2000, 2001a, b, 2002d, 2005d; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano & Núñez-Pastén, 1991**, 1992; Martínez-López, 1993b; Orellana-Cepeda et al., 1993; Verdugo-Díaz, 1993, 1997; Martínez-López & Gárate-Lizárraga, 1994; Cortés-Altamirano, 1995, 2002**; Cortés-Altamirano et al., 1995b, c, 1996, 1999, 2002, 2004b; Gómez-Aguirre, 1995, 1998; Licea-Durán et al., 1995**; Morquecho et al., 1996, 2000a; Ochoa et al., 1996, 1997, 1998; Manrique & Molina, 1997; Cortés-Altamirano & Hernández-Becerril, 1998*; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999; Ronsón-Paulin, 1999; Figueroa-Torres & Zepeda-Esquivel, 2001**; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001; Herrera-Galindo, 2002*; Alonso-Rodríguez, 2003* **, 2004; Esqueda-Lara, 2003; Esqueda-Lara et al., 2003 (as *Noctiluca* sp.); Gárate-Lizárraga & Siqueiros-Beltrones, 2003; López-Cortés et al., 2003; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **, 2005**; Alonso-Rodríguez & Ochoa, 2004; Cortés-Lara et al., 2004; Sierra-Beltrán et al., 2004; Villalejo-Fuerte et al., 2005; W of B.C.S. and B.C., GC (B.C.S., Son., Sin.), Jal., Col., Mich., Oax.

Oblea rotunda (M. Lebour) Balech ex Sournia, 1973: 49.

Okolodkov et al., 2003; Col. (Manzanillo), Oax. (GT).

Note: The studied cells were 29 µm long and 27 µm wide.

Operculodinium janduchenei Head, D. R. Norris & P. J. Mudie, 1989: 459, pl. 4, fig. 7-8, 12.

Peña-Manjarrez et al., 2005** (as cyst); W of B.C.

Note: The vegetative stage affinity is unknown (Marret & Zonneveld, 2003; F. Marret, pers. comm.).

Ornithocercus cristatus Matzen., 1933: 447, fig. 11.

Hernández-Becerril & Meave del Castillo, 1994; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; Okolodkov (this study); Oax.

Note: The only observed cell was 33 μm long (43 μm with lists), 24 μm wide and 31 μm deep (47 μm with sulcal lists). *O. cristatus* seems to be a collective name for the known *Ornithocercus* species (*O. magnificus*, *O. thumii*, *O. steinii*, *O. quadratus*, and probably some others) with an undeveloped left sulcal list.

Ornithocercus formosus Kof. & J. R. Michener, 1911: 300.

Martínez-López, 1993b; Hernández-Becerril et al., 2003; W of BCP.

Ornithocercus galea (Pouchet) T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 2): 83, fig. 30.

Hernández-Becerril et al., 2004a; Meave del Castillo et al., 2005a; tropical southeastern MP.

Ornithocercus heteroporoides T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 2): 83, fig. 30.

Meave del Castillo & Zamudio-Reséndiz, 2005; MP.

Ornithocercus heteroporus Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 206, pl. 12, fig. 70.

González-Villalobos, 1971; Hernández-Becerril, 1988c* (as *O. heteroporus*?); Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Meave del Castillo et al., 2005a; Okolodkov (this study); Jal., Col., Mich. (Caleta de Campos, Playa Azul), Gro. (Zihuatanejo), Oax.

Note: The only cell measured was 35 μm long (54.5-70 μm with lists) and 33-37 μm deep (43-59 μm with lists).

Ornithocercus magnificus F. Stein, 1883, pro parte: 26, pl. 23, fig. 1, 2.

Barreiro-Güemes, 1967; González-Villalobos, 1971*; Colombo-Rivas, 1986; Hernández-Becerril, 1987c, 1988a**, c; Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000 (as *O. cf. magnificus*); Herrera-Galindo, 2002 (as *O. aff. magnificus*); Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Martínez-López & Gárate-Lizárraga, 2004; Meave del Castillo et al., 2005a; Meave del Castillo & Zamudio-Reséndiz, 2005; Gárate-

Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.), Jal., Col., Gro. (Acapulco), Oax.

Ornithocercus orbiculatus Kof. & J. R. Michener, 1911: 300.
Meave del Castillo & Zamudio-Reséndiz, 2005; MP.

Ornithocercus quadratus F. Schütt, 1900: 5, fig. 1-4, 12, 13.
Hernández-Becerril, 1988c** ***; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Meave del Castillo et al., 2005a; Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C.S. and B.C., Oax.

Ornithocercus skogsbergii T. H. Abé, 1967 (Publ. Seto Mar. Biol. Lab. 15, 2): 85, fig. 31.
Martínez-López, 1993b; Martínez-López & Verdugo-Díaz, 2000; Hernández-Becerril et al., 2003; W of B.C.S.

Ornithocercus splendidus F. Schütt, 1893: 272, fig. 82; 1895: 19, pl. 5, fig. 22.
González-Villalobos, 1971; Ortega-Banuel, 1985*; González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; GC, Jal., Col.

Ornithocercus steinii F. Schütt, 1900, pro parte: fig. 5, 6.
Tax. syn.: *O. serratus* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 206, pl. 15, fig. 93.
González-Villalobos, 1971**; Rojas-Trejo, 1984; Priego-Martínez, 1985; Colombo-Rivas, 1986; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Meave del Castillo et al., 2005a; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, Sin., Jal., Col., Mich., Oax.

Ornithocercus thumii (A. Schmidt) Kof. & Skogsb., 1928: 540, fig. 81, 82, pl. 18, fig. 4-6.
Colombo-Rivas, 1986; Hernández-Becerril, 1988c**; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Hernández-Becerril et al., 2003; Ochoa, 2003a; Meave del Castillo et al., 2005a; Meave del Castillo & Zamudio-Reséndiz, 2005; GC, Jal., Col., Oax.

Ostreopsis lenticularis Fukuyo, 1981: 970, 972, fig. 30-34.
Gárate-Lizárraga, 2005; GC (B.C.S.).

Ostreopsis marinus M. A. Faust, 1999: 93, fig. 1-5, 17(2).
Gárate-Lizárraga, 2005**; W of B.C.S.

Ostreopsis ovata Fukuyo, 1981: 971, 972, fig. 35-38, 54, 55.
Sierra-Beltrán et al., 1998; Núñez-Vázquez et al., 2000; Núñez-Vázquez, 2005; GC (B.C.S., B.C.).

Ostreopsis siamensis Schmidt, 1901: 218, fig. 5-7.
Cortés-Altamirano et al., 2005; Cortés-Lara et al., 2005***; Gárate-Lizárraga, 2005; GC (B.C.S., Nay.).

Oxyphysis oxytoxoides Kof., 1926: 205, pl. 18, fig. 1-4.
Osorio-Tafall, 1942*; Morey-Gaines, 1982; Hernández-Becerril, 1987c, 1988a, b** ***; Gárate-Lizárraga, 1992; Verdugo-Díaz, 1993 (probably, under the name *Oxytoxum oxitoides*, by mistake); González-López, 1994, 2000 (probably, under the name *Oxytoxum oxitoides*, by mistake); Licea-Durán et al., 1995* ***; Verdugo-Díaz, 1997; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Hernández-Becerril et al., 2003; Ochoa, 2003a; Morquecho-Escamilla & Lechuga-Devéze, 2004; Meave del Castillo & Zamudio-Reséndiz, 2005; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (B.C.S.), Mich., Oax.

Oxytoxum biconicum (Kof.) J. D. Dodge & R. D. Saunders, 1985: 117, fig. 70-73, 77F.

Okolodkov et al., 2003; Gro. (Zihuatanejo).

Note: The only cell observed was 75 µm long and 45 µm wide.

Oxytoxum caudatum J. Schill., 1937: 454, fig. 504.

Okolodkov (this study); Mich. (El Faro).

Note: The only cell observed was 25 µm long and 10 µm wide.

Oxytoxum challengeroides Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 187, pl. 10, fig. 65.

Caballasi-Flores, 1985; Sin.

Oxytoxum constrictum (F. Stein) Buetschli, 1885: pl. 53, fig. 5.

Nom. syn.: *Corythodinium constrictum* (F. Stein) F. J. R. Taylor, 1965: 123.

Hernández-Becerril, 1988a, c; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002 (as *C. aff. constrictum*); Mich., Oax.

Oxytoxum crassum J. Schill., 1937: 459, fig. 518.

Tax. syn.: *Oxytoxum globosum* J. Schill., 1937: 458, fig. 515.

Caballasi-Flores, 1985 (also as *O. globosum*); Sin.

Oxytoxum curvatum (Kof.) Kof. & J. R. Michener, 1911: 287.

Hernández-Becerril, 1986; W of B.C.

Oxytoxum elegans Pavill., 1916: 43, pl. 2, fig. 4.

Otero-Dávalos, 1981; Hernández-Becerril, 1988c***; Meave del Castillo & Hernández-Becerril, 1998; Jal., Oax.

Oxytoxum gracile J. Schill., 1937: 455, fig. 506.

Caballasi-Flores, 1985; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; GC, Sin., Oax.

Oxytoxum laticeps J. Schill., 1937: 461, fig. 523.

Caballasi-Flores, 1985; Cortés-Lara, 1985; Hernández-Becerril, 1988a; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002; Sin., Mich., Oax.

Oxytoxum milneri J. Murray & Whitting, 1899: 328, pl. 27, fig. 6.

Tax. syn.: *O. subulatum* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 190, pl. 10, fig. 62.

Pastén-Miranda & Robles-Mungaray, 1982; Caballasi-Flores, 1985; Hernández-Becerril, 1988c***; Martínez-López, 1993b; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; W of B.C.S., GC (B.C.S., Sin.), GT.

Oxytoxum mitra (F. Stein) J. Schill., 1937: 459, fig. 517.

Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; GC, Oax.

Oxytoxum nanum Halldal, 1953: 56, fig. 20 (in Sournia, 1973: *O. nanus*)

Meave del Castillo & Zamudio-Reséndiz, 2005 (as *O. nanum*); MP.

Oxytoxum nipponicum Verdugo-Díaz, 1997: 18 (table), nomen nudum.

Oxytoxum ovale J. Schill., 1937: 456, fig. 509.

Oxytoxum laticeps auct., non J. Schill.: Licea-Durán et al., 1995: pl. 8, fig. 7.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Note: Although the species described and illustrated by Licea-Durán et al. (1995) as *O. laticeps* is closer to the original description by Schiller (1937) and to cells pictured by Dodge & Saunders (1985) in cell shape, it lacks the antapical spine, a morphological feature characteristic of *O. laticeps* (at least it is absent both in the description and in the microphotograph given by Licea-Durán et al., 1995).

Oxytoxum ovum Gaarder, 1954: 37, fig. 45.
Herrera-Galindo, 2002*; Oax.

Oxytoxum pachyderme J. Schill. ex F. J. R. Taylor, 1976: 127, pl. 24, fig. 250.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Oxytoxum parvum J. Schill., 1937: 464, fig. 531.
Caballasi-Flores, 1985; Santamaría del Ángel, 1986; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; W of B.C.S., GC (B.C., Sin.), Oax.

Oxytoxum reticulatum (F. Stein) F. Schütt, 1895(?): fig. 52(5, 6).
Nom. syn.: *Corythodinium reticulatum* (F. Stein) F. J. R. Taylor, 1976: 123.
Tax. syn.: *Oxytoxum latum* Gaarder, 1954: 36, fig. 43; *Corythodinium latum* (F. Stein) F. J. R. Taylor, 1976: 123.
Otero-Dávalos, 1981; Cortés-Lara, 1985; González-López, 1994, 2000; Licea-Durán et al., 1995; Herrera-Galindo, 2002 (as *Corythodinium* aff. *reticulatum*); Esqueda-Lara, 2003; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.), Jal., Oax.

Oxytoxum sceptrum (F. Stein) Schröd., 1906: 327.
Tax. syn.: *Oxytoxum longiceps* J. Schill., 1937: 464, fig. 532.
Rojas-Trejo, 1984; Caballasi-Flores, 1985 (also as *O. longiceps*); Priego-Martínez, 1985; Hernández-Becerril, 1986, 1987c, 1988a; Santamaría del Ángel, 1986; Licea-Durán et al., 1995* **; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; Gárate-Lizárraga (unpublished); W of B.C.S. and B.C., GC (B.C.S., B.C., Sin.), Jal., Mich., Oax.

Oxytoxum scolopax F. Stein, 1883: 19, pl. 5, fig. 1-3.
Estrada & Blasco, 1979; Otero-Dávalos, 1981; Hernández-Becerril, 1983, 1985a, b, 1988c**; León-Álvarez, 1983; Pastén-Miranda, 1983; Rojas-Trejo, 1984; Cortés-

Altamirano & Pastén-Miranda, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985**;
Flores-Granados, 1986; Ceballos-Corona, 1988; Esparza-Leal, 1994; Gárate-
Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995***; Núñez-
Moreno, 1996; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998;
Góngora-González, 2001; Herrera-Galindo, 2002**; Esqueda-Lara, 2003; Okolodkov
(this study); W of B.C.S. and B.C., GC (B.C.S., Son., Sin., Nay.), Jal., Col., Mich.,
Oax., Chis. (Paredón).

Oxytoxum sphaeroideum F. Stein, 1883: 19, pl. 5, fig. 9.
Hernández-Becerril, 1983, 1985a (as cf. *Oxytoxum sphaeroideum*); Caballasi-Flores,
1985; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Sin.,
Oax.

Oxytoxum tessellatum (F. Stein) F. Schütt, 1895: 160, pl. 17, fig. 52.
Nom. syn.: *Corythodinium tessellatum* Loeb. & A. R. Loeb., 1966: 23.
Gárate-Lizárraga, 1992; Verdugo-Díaz, 1997; Gárate-Lizárraga & Verdugo-Díaz,
2001; Herrera-Galindo, 2002*; Okolodkov (this study); GC (B.C.S.), Mich. (Caleta
de Campos), Oax.

Oxytoxum variabile J. Schill., 1937: 455, fig. 505.
Hernández-Becerril, 1983, 1985a, 1987a, c; Caballasi-Flores, 1985; Santamaría del
Ángel, 1986; Martínez-López, 1993b (as *O. cf. variabile*); Licea-Durán et al., 1995*;
Cohen-Fernández, 2000; Venrick, 2000 (as *O. cf. variabile*); Gárate-Lizárraga &
Verdugo-Díaz, 2001; Herrera-Galindo, 2002*; Meave del Castillo & Zamudio-
Reséndiz, 2005; W of B.C.S. and B.C., GC (B.C., Sin.), Oax.

Palaeophalacroma unicinctum J. Schill., 1928 (Arch. Protistenk. 61, 1): 65, fig. 27.
Okolodkov et al., 2003; Gro. (Zihuatanejo).

Paulsenella chaetoceratis (Paulsen) Chatton, 1920: 320, fig. 139.
Gárate-Lizárraga & Martínez-López, 2004; Gárate-Lizárraga & Muñetón-Gómez,
2005b; GC (B.C.S.).

Pentapharsodinium sp.
Góngora-González, 2003** (also cysts); GC (B.C.S.).

Peridiniella catenata (Levander) Balech, 1977 (Rev. Mus. Argent. Cienc. Natur.
“B. Rivadavia” Hidrobiol. 5, 6): 133, pl. 2, fig. 48, pl. 3.
Nom. syn.: *Gonyaulax catenata* (Levander) Kof., 1911 (Univ. Calif. Publ. Zool. 8,
5): 291, pl. 18, fig. 1-7.

Pastén-Miranda, 1983; Cortés-Altamirano & Pastén-Miranda, 1985; Priego-Martínez, 1985; Gárate-Lizárraga (this study); GC (Bahía Concepción, B.C.S.; Sin.).

Note: This species clearly shows an Arctic-boreal distribution, and it is the only thecate dinoflagellate hitherto known to be associated with sea ice (Okolodkov, 1996, 1998, 1999a, b; Okolodkov & Dodge, 1996). All but one record of *P. catenata* is from the Northern Hemisphere. The only record from the Southern Hemisphere, the Bay of Guanabara, Brazil (Sevrin-Reyssac, 1981), is hard to explain unless it is a misidentification.

Peridiniella danica (Paulsen) Okolodkov & J. D. Dodge, 1995: 300, fig. 1A-G. Nom. syn.: *Glenodinium danicum* Paulsen, 1907: 6, fig. 2.

Okolodkov (this study); W of B.C.S., Jal. (Cabo Corrientes), Mich. (El Faro), Gro. (Acapulco).

Note: Venrick (2000) found cf. *Glenodinium danicum* in the waters to the west of Ensenada, B.C.

Peridiniella globosa (P. A. Dang.) Okolodkov comb. nov.

Bas.: *Peridinium globosum* P. A. Dang., 1927 (Ann. Inst. Oceanogr. Monaco 4, 8): 355, fig. 20a-d.

Tax. syn.: *Gonyaulax* sp. Paulsen, 1931: 39, fig. 24; *Gonyaulax paulsenii* Gaarder, 1954: 25, fig. 28.

Okolodkov et al., 2003; Gro. (Zihuatanejo).

Note: The formula of the epitheca of our specimen corresponds to that of *Protoperidinium* (4', 3a, 7"). This is probably why Dangeard (1927) ascribed his new species to the genus *Peridinium*. He also stressed that the second intercalary plate (2a), which is pentagonal, is very small. On the hypotheca, the antapical plates are of different sizes, the right plate being larger than the left one. Additionally, there are six postcingular plates. The species fits well into the genus *Peridiniella* Kof. & J. R. Michener, which now includes the type species *P. sphaeroidea*, *P. catenata* and *P. danica*. *P. sphaeroidea* was later redefined, so the tabulation formula of *Peridiniella* is: Po, x, 4', 3-4a, 7", 6"', 2"" (Balech, 1979; Dodge, 1987). Our cell contained both the Po and the x plate so that the pore complex is very similar to that in *P. sphaeroidea*, *P. catenata* and *P. danica* (Balech, 1979: fig. 214; Okolodkov & Dodge, 1995: fig. 1F, 3-5; Okolodkov, 1999b: fig. 7). Species of the genus *Alexandrium* lack the x plate. In *A. concavum*, the sulcus slightly enlarges toward the antapex reaching it and forming the antapical concavity (Balech, 1985), which we cannot see in any of the taxa put as the basionym and the synonyms of *Peridiniella globosa*. Gaarder (1954: fig. 28a) pictured his specimen of *Gonyaulax*

paulsenii with a much narrower 1' plate than in *P. globosum*. Our cell had the 1' plate intermediate in size between these two taxa, with very narrow, tapering proximal and distal parts, similar to that in *Gonyaulax* sp. illustrated by Paulsen (1931: fig. 24).

Peridiniella sphaeroidea Kof. & J. R. Michener, 1911: 280.

Okolodkov et al., 2003; W of B.C.S., Sin. (Mazatlán), Mich. (Caleta de Campos, El Faro), Gro. (Vicente Gro., Zihuatanejo).

Note: Our cells were 29-51 µm, 29-51 µm wide and 32-45 µm deep.

Peridiniopsis polonicum (Woloszynska) Bourrelly, 1968: 9.

Tax. syn.: *Glenodinium gymnodium* Penard, 1891: 54, pl. 4, fig. 8-10.

Hernández-Becerril, 1983, 1985a (as cf. *Glenodinium gymnodium*); GC.

Note: The identification of this freshwater species is preliminary and may be a misidentification even to the generic level.

Peridinium aciculiferum Lemmerm., 1900: 28; 1910: 667, fig. 25-27.

Herrera-Galindo, 2002*; Oax.

Peridinium punctatum González-Villalobos, 1971: table 1, nomen nudum.

Note: Most probably it is *Protoperidinium punctulatum*.

Peridinium quinquecorne T. H. Abé, 1927: 410, fig. 30.

Martínez-López & Gárate-Lizárraga, 1994 (as *Protoperidinium quinquecorne*, evidently, by mistake); Cortés-Altamirano, 2002***; Alonso-Rodríguez et al., 2004b***; Cortés-Altamirano & Licea-Durán, 2004***; Cortés-Altamirano et al., 2004b (as *Protoperidinium quinquecorne*, evidently, by mistake); Gárate-Lizárraga, 2005; Okolodkov (this study); W of B.C.S. (Bahía Magdalena), GC (Bahía de La Paz, B.C.S.; Sin.) Oax. (Pto. Ángel), Chis. (Pto. Madero).

Note: The cell observed was 20 µm long (25 µm with spines), 16.5 µm wide and 10 µm deep.

Peridinium willei Huitf.-Kaas, 1900: 5, fig. 6-9.

Caballasi-Flores, 1985; Sin.

Pheopolykrikos hartmannii (W. Zimm.) Matsuoka & Fukuyo, 1986: 811, fig. 1-22. Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004 (cysts); Peña-Manjarrez et al., 2005; W of B.C., GC.

Plectodinium miniatum (Kof. & Swezy) F. J. R. Taylor, 1980: 103.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Podolampas bipes F. Stein, 1883: 22, pl. 8, fig. 6-8.

Barreiro-Güemes, 1967* **; González-Villalobos, 1971**; Santoyo-Reyes & Signoret, 1979; Lapota & Losee, 1984; Hernández-Becerril, 1987c, 1988b***, c; Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; W of BCP, GC (B.C.S.), Jal., Col.

Podolampas elegans F. Schütt, 1895: pl. 18, fig. 57.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Hernández-Becerril, 1983, 1985a, 1987c, 1988a, c**; Gárate-Lizárraga, 1988**; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; González-López, 1994, 2000; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC (B.C.S.), Oax.

Podolampas palmipes F. Stein, 1883: 22, pl. 8, fig. 9-11.

Gilbert & Allen, 1943; Barreiro-Güemes, 1967*; González-Villalobos, 1971*; Lapota & Losee, 1984; Cortés-Lara, 1985; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c, 1988a, c; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Licea-Durán et al., 1995**; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Morquecho-Escamilla & Lechuga-Devéze, 2004; W of BCP, GC (B.C.S., B.C.), Oax.

Podolampas reticulata Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 187, pl. 2, fig. 11.

Hernández-Becerril, 1988b***; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; Okolodkov (this study); GC (B.C.S.), Mich. (Caleta de Campos), Gro. (Acapulco, Bahía de Potosí), Oax. (Pto. Escondido).

Note: Our cells were 82-87.5 µm long (100-106 µm with spines) and 68.5-72.5 µm wide.

Podolampas spinifera Okamura, 1912: 17, pl. 2, fig. 35, 36.

Ceballos-Corona, 1988; Hernández-Becerril, 1988a, c**; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-

Lara, 2003; Gárate-Lizárraga et al., 2005d; Okolodkov (this study); W of B.C.S., GC, Jal., Col., Mich., Gro. (Zihuatanejo), Oax. (GT).

Polykrikos kofoidii Chatton, 1914: 161.

Blasco, 1977, 1978; Estrada & Blasco, 1979; Rojas-Trejo, 1984; Priego-Martínez, 1985; Ceballos-Corona, 1988; Góngora-González, 2001; Peña-Manjarrez et al., 2001 (as *Polykrikos* sp. cf. *kofoidii* cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003** (cysts), 2004** (cysts); Morquecho-Escamilla, 2004** (cysts); Peña-Manjarrez et al., 2005 ** (as cysts of *P. cf. kofoidii*); W of B.C., GC (Sin., B.C.S.), Mich.

Polykrikos schwartzii Buetschli, 1873: 673, pl. 26, fig. 22.

Otero-Dávalos, 1981; Rojas-Trejo, 1984; Priego-Martínez, 1985; Santamaría del Ángel, 1986; Licea-Durán et al., 1995; Morquecho-Escamilla & Lechuga-Devéze, 2003* (cysts); Morquecho-Escamilla, 2004** (cysts); Peña-Manjarrez et al., 2005; W of B.C., GC (B.C.S., B.C., Sin.), Jal.

Preperidinium meunieri (Pavill.) Elbr., 1993: 176.

Tax. syn.: *Diplopsalis minor* (Paulsen) Paulsen, 1931: 42; *Zygabikodinium lenticulatum* Loeb. & A. R. Loeb., 1970: 541.

Packard et al., 1978; Hernández-Becerril, 1985c* (as *Diplopsalis* cf. *minor*), 1988b; Licea-Durán et al., 1995; Góngora-González, 2003** (also cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003, 2004; Esqueda-Lara, 2003 (possibly, as *Preperidinium* sp.); Morquecho-Escamilla, 2004** (cysts); Okolodkov (this study); GC (B.C.S.), Jal.

Note: Although the records of this species are not frequent in the literature, it is rather common in the MP. It is usually found together with *Diplopsalopsis bomba*, another species from the so-called “*Diplopsalis* group”. It is clearly distinguished from *D. bomba* by its narrow first apical plate and the presence of only one antapical plate.

Pronoctiluca acuta (Lohmann) J. Schill., 1933: 271, fig. 260a.

Venrick, 2000 (as *P. cf. acuta*); Meave del Castillo & Zamudio-Reséndiz, 2005; W of B.C., MP.

Pronoctiluca pelagica Fabre-Dom., 1889: 356, pl. 3, fig. 9, 10.

Santamaría del Ángel, 1986; Hernández-Becerril, 1988b**; Gárate-Lizárraga, 1991, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Venrick, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Okolodkov (this study); W of BCP, GC, B.C., Mich. (Caleta de Campos), Oax.

Pronoctiluca rostrata F. J. R. Taylor, 1976: 187, 199, pl. 37, fig. 425.

Santamaría del Ángel, 1986; Gárate-Lizárraga, 1992; Verdugo-Díaz, 1993; Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC, B.C.

Note: *P. rostrata* might be a species of *Lessardia* Saldarriaga & F. J. R. Taylor of the family Lessardiaceae Carbonell-Moore (Saldarriaga et al., 2003; Carbonell-Moore, 2004).

Pronoctiluca spinifera (Lohmann) J. Schill., 1933: 270, fig. 259a-d.

Verdugo-Díaz, 1993; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S.

Prorocentrum arcuatum Issel, 1928: 278, fig. 2.

Rojas-Trejo, 1984; Priego-Martínez, 1985; Sin.

Prorocentrum balticum (Lohmann) A. R. Loebli., 1970: 906.

Estrada & Blasco, 1979; Hernández-Becerril, 1983, 1985a, 1987c; Cortés-Lara, 1985; Santamaría del Ángel, 1986; González-López, 1994, 2000; Licea-Durán et al., 1995; Cortés-Altamirano, 2002***; Cortés-Altamirano et al., 2002, 2003, 2004b; Herrera-Galindo, 2002 (as *P. aff. balticum*); Alonso-Rodríguez & Ochoa, 2002, 2004; Alonso-Rodríguez, 2003* **, 2004; Alonso-Rodríguez et al., 2004b* **; Gárate-Lizárraga, 2005, this study; Okolodkov (this study); W of BCP, GC (B.C.S., B.C., Sin.), Chis. (Pto. Madero).

Note: Our cells were 10 µm long and 9 µm wide.

Prorocentrum belizeanum M. A. Faust, 1993 (J. Phycol. 29): 101, fig. 1-10.

Gárate-Lizárraga (this study); W of B.C.S. (Bahía Magdalena).

Prorocentrum compressum (Bailey) T. H. Abé ex J. D. Dodge, 1975: 110.

Nom. syn.: *Exuviaella compressa* Ostenf., 1899: 59.

Tax. syn.: *Prorocentrum lebourae* J. Schill., 1928 (Arch. Protistenk. 61, 1): 62, fig. 23; *Exuviaella lenticulata* Matzen., 1933: 438, fig. 1; *Prorocentrum lenticulatum* (Matzen.) F. J. R. Taylor, 1976: 23, pl. 1, fig. 11, 12.

Osorio-Tafall, 1942*; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Santoyo-Reyes & Signoret, 1979 (as *Exuviaella compressa*?); Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; Hernández-Becerril, 1983, 1985a, b, 1987b, c, 1988a, b, c; Santamaría del Ángel, 1986; Gárate-Lizárraga, 1988, 1991; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Castro-Sánchez, 1998; Lechuga-Devéze & Morquecho-Escamilla, 1998; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2000** ***; Lechuga-Devéze et al., 2000; Góngora-González, 2001; Herrera-Galindo, 2002; Ochoa et al., 2002; Esqueda-Lara, 2003;

Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b**; Morquecho-Escamilla & Lechuga-Devéze, 2004; W of B.C.S. and B.C., GC (B.C.S., B.C., Son.), Jal., Gro, Oax., Chis.

Prorocentrum concavum Fukuyo, 1981: 968, 972, fig. 13-19, 49.
Núñez-Vázquez et al., 2000; Núñez-Vázquez, 2005; GC (B.C.S.).

Prorocentrum dactylum (F. Stein) J. D. Dodge, 1975: 109, fig. 1G.
Hernández-Becerril et al., 2000**; Sin.

Prorocentrum dentatum F. Stein, 1883: 18, pl. 1, fig. 14, 15, var. *dentatum*.
Tax. syn.: *P. obtusidens* J. Schill., 1928 (Arch. Protistenk. 61, 1): 57, fig. 15; *P. veloi* B. F. Osorio, 1942: 437, fig. 4-6.
Osorio-Tafall, 1942*; González-Villalobos, 1971; Cortés-Altamirano & Pastén-Miranda, 1982a; Cortés-Altamirano & Rojas-Trejo, 1982; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985; Cortés-Altamirano, 1987**, 1988c; Hernández-Becerril, 1987c, 1988c; Cortés-Altamirano & Núñez-Pastén, 1991***, 1992, 2000; Cortés-Altamirano, 1995, 2002; Cortés-Altamirano et al., 1995c, 1996, 1999, 2002***, 2004b; Gárate-Lizárraga et al., 1995; Licea-Durán et al., 1995* ***; Sierra-Beltrán et al., 1995; Cortés-Altamirano & Hernández-Becerril, 1998*; Ochoa et al., 1998, 2002; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999; Hernández-Becerril et al., 2000** ***; Morquecho-Escamilla et al., 2000a; Herrera-Galindo, 2002*; Alonso-Rodríguez, 2003* **; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Bustillos-Guzmán et al., 2004; GC (B.C.S., Sin.), Gro., Oax.

Prorocentrum dentatum var. *minor* Cortés-Altamirano, Hernández-Becerril & Luna-Soria, 1995: 12, fig. 4A, B.
Cortés-Altamirano et al., 1995a** ***; Sin.

Prorocentrum emarginatum Fukuyo, 1981: 968, 972, fig. 8-12, 48.
Núñez-Vázquez et al., 2000; Herrera-Galindo, 2002*; Núñez-Vázquez, 2005**; GC (B.C.S.), Oax.

Prorocentrum gracile F. Schütt, 1895: pl. 1, fig. 3.
Tax. syn.: *P. sigmoides* Böhm, 1933 (Bot. Arch. 35, 4): 398, fig. 1.
Osorio-Tafall, 1942*; González-Villalobos, 1971**; Estrada & Blasco, 1979; Morey-Gaines, 1982; Hernández-Becerril, 1983, 1985a, b, 1987b, c, 1988a, b***, c**; León-Álvarez, 1983; Pastén-Miranda, 1983; Cortés-Altamirano & Pastén-Miranda, 1984, 1985; Rojas-Trejo, 1984; Priego-Martínez, 1985**; García-Pamanes,

1987; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992, 2005; Martínez-López, 1993b; Cortés-Altamirano et al., 1993; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995**; Gárate-Lizárraga & Martínez-López, 1997; Castro-Sánchez, 1998; Meave del Castillo & Hernández-Becerril, 1998; Cohen-Fernández, 2000; Gárate-Lizárraga et al., 2000; Hernández-Becerril et al., 2000** ***; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Muñetón-Gómez et al., 2001; Herrera-Galindo, 2002; Cortés-Lara et al., 2003; Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; Cohen-Fernández et al., 2004, 2005; Frausto-Sotelo, 2004**; Morquecho-Escamilla & Lechuga-Devéze, 2004 (also as *P. sigmoides*); Meave del Castillo & Zamudio-Reséndiz, 2005; Peña-Manjarrez et al., 2005**; W of BCP (B.C.S., B.C.), GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Gro., Oax., Chis.

Note: While Dodge (1975) considers *P. sigmoides* synonymous to *P. gracile*, Hernández-Becerril et al. (2000) and Cohen-Fernández et al. (2004) believe that they are separate species differing mainly in the cell shape, measurements and the poroid pattern of the thecae. We share Dodge's (1975) point of view because we observed a wide continuous variation in the cell shape and length.

Prorocentrum lima (Ehrenb.) F. Stein, 1878: 70.

Tax. syn.: *Exuviaella marina* Cienkowski, 1881: 159, fig. 36, 37.

Gilmartin & Revelante, 1978; Cortés-Lara, 1985; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987c, 1988a; Hernández-Cachou, 1988; González-López, 1994, 2000; Licea-Durán et al., 1995*; Cortés-Altamirano & Hernández-Becerril, 1998*; Heredia-Tapia et al., 1999a-c, 2000, 2002; Núñez-Vázquez et al., 1999, 2000, 2003; Ochoa & Sierra-Beltrán, 1999** (as *Prorocentrum* sp.); Morquecho-Escamilla et al., 2000a; López-Hernández et al., 2003; Ochoa, 2003a, b; Ochoa & Arredondo-Vega, 2003**; Bustillos-Guzmán et al., 2004; Núñez-Vázquez, 2005**; Poot-Delgado et al., 2005; Gárate-Lizárraga (this study); Okolodkov (this study); W of BCP (Bahía Magdalena, B.C.S.; B.C.), GC (Bahía de La Paz, B.C.S.; B.C., Son.), Oax. (Pto. Ángel).

Prorocentrum maximum (Gourret) J. Schill., 1933: fig. 44a-c.

Osorio-Tafall, 1942*; Hernández-Becerril, 1983, 1985a, 1987c, 1988c; León-Álvarez, 1983; Caballasi-Flores, 1985; Licea-Durán et al., 1995*; Meave del Castillo & Hernández-Becerril, 1999; Hernández-Becerril et al., 2000**; Cortés-Altamirano & Sierra-Beltrán, 2003*; Esqueda-Lara, 2003; Sin., Jal., Col., Oax.

Note: Although Hernández-Becerril (1983, 1985a, 1987c, 1988c) considers *P. mexicanum* synonymous to *P. maximum*, obviously following Dodge (1975), we prefer to separate them until a more detailed comparative study on these two taxa is carried out. Thus, two different species may be involved in reports on *P. maximum* from the Mexican Pacific.

Prorocentrum mexicanum B. F. Osorio, 1942: pl. 34, fig. 3, 8.

Osorio-Tafall, 1942*; Barreiro-Güemes, 1967; González-Villalobos, 1971; Santoyo-Reyes, 1974b; Cortés-Altamirano & Pastén-Miranda, 1982a, b; Pastén-Miranda, 1983; Rojas-Trejo, 1984; Gárate-Lizárraga & Martínez-López, 1997; Morquecho-Escamilla et al., 1996, 2000a; Cortés-Altamirano & Hernández-Becerril, 1998*; Meave del Castillo & Hernández-Becerril, 1998; Góngora-González et al., 1999; Cortés-Altamirano & Núñez-Pastén, 2000b; Hernández-Becerril et al., 2000** ***; Herrera-Galindo, 2000a (*P. aff. mexicanum*), 2002 (as *P. aff. mexicanum*); Lechuga-Devéze et al., 2000; Gárate-Lizárraga et al., 2001a; Góngora-González, 2001; Morquecho-Escamilla & Lechuga-Devéze, 2001; Alonso-Rodríguez & Ochoa, 2002, 2004; Ochoa et al., 2002; Cortés-Altamirano & Sierra-Beltrán, 2003* ** ***; Cortés-Altamirano et al., 2003***; Alonso-Rodríguez, 2003* **, 2004; Gómez-Aguirre et al., 2003; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **; Bustillos-Guzmán et al., 2004; Gárate-Lizárraga, 2005, this study; Poot-Delgado et al., 2005; W of B.C.S. (Bahía Magdalena), GC (Bahía de La Paz, B.C.S.; Sin.), Gro., Oax.

Note: As noted by Cortés-Altamirano & Sierra-Beltrán (2003a), some descriptions of *P. mexicanum* from the MP (Gárate-Lizárraga & Martínez-López, 1997; Cortés-Altamirano & Hernández-Becerril, 1998; Hernández-Becerril et al., 2000) do not agree with the original description by Osorio-Tafall (1942) but agree with *P. rhathymum*, which Steidinger (1983) and Faust (1990) erroneously considered synonymous with *P. mexicanum*. Unlike *P. rhathymum*, in *P. mexicanum* trichocyst pores in the periflagellar area are located in both valves (Cortés-Altamirano & Sierra-Beltrán, 2003). Since both species produce red tides in the MP, it is most likely that records of *P. mexicanum* from this region also include *P. rhathymum*.

Prorocentrum micans Ehrenb., 1833: 307.

Osorio-Tafall, 1942, 1943; Gilbert & Allen, 1943; Barreiro-Güemes, 1967*; González-Villalobos, 1971**; Santoyo-Reyes, 1972, 1974a; Gómez-Aguirre & Santoyo-Reyes, 1975; Blasco, 1977, 1978; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980; Otero-Dávalos, 1981; Cortés-Altamirano & Pastén-Miranda, 1982a, b, 1984, 1985; Cortés-Altamirano & Rojas-Trejo, 1982; García-Pamanes & Villavicencio-Garayzar, 1982; Morey-Gaines, 1982; Pastén-Miranda & Robles-Mungaray, 1982; León-Álvarez, 1983; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987c, 1988a, c; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985**; Flores-Granados, 1986; Nienhuis & Guerrero, 1986; Colombo-Rivas, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1991, 1992, 1995, 2005; Gárate-

Lizárraga et al., 1990, 2000, 2004c, 2005a, d; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano et al., 1993; Lechuga-Devéze et al., 1993; Martínez-López, 1993a, b; Orellana-Cepeda et al., 1993; Verdugo-Díaz, 1993, 1997; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996; Ochoa et al., 1996, 1998, 2002; Gárate-Lizárraga & Martínez-López, 1997; Cortés-Altamirano & Hernández-Becerril, 1998*; Lechuga-Devéze & Morquecho-Escamilla, 1998; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999; Herrera-Silveira, 1999; Cortés-Altamirano & Núñez-Pastén, 2000; Hernández-Becerril et al., 2000**, 2004b; Herrera-Galindo, 2000a; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Edgcomb et al., 2002; Herrera-Galindo, 2002**; Alonso-Rodríguez, 2003* **, Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Ochoa, 2003a, b; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Cohen-Fernández et al., 2004, 2005; Frausto-Sotelo, 2004**; Band-Schmidt et al., 2005b; Meave del Castillo & Zamudio-Reséndiz, 2005; Orellana-Cepeda et al., 2005; Peña-Manjarrez et al., 2005**; Rodríguez et al., 2005; Villalejo-Fuerte et al., 2005; Zepeda-Esquivel et al., 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Gro., Oax.

Prorocentrum minimum (Pavill.) J. Schill., 1933: 32, fig. 33a, b.

Tax. syn.: *Exuviaella mariae-lebouriae* Parke & Ballantine, 1957: 645, fig. 1-9. Hernández-Becerril, 1983, 1985a, 1987c, 1988b***; Cortés-Altamirano et al., 1992, 1995b, 1996, 1999; Gárate-Lizárraga, 1992 (as *P. minimum mariae-lebourae*); Cortés-Altamirano & Agraz-Hernández, 1994; Esparza-Leal, 1994; Licea-Durán et al., 1995***, 1999, 2004a; Morquecho-Escamilla, 1996; Castro-Sánchez, 1998; Cortés-Altamirano & Hernández-Becerril, 1998*; Gómez-Aguirre, 1998; Cortés-Altamirano & Licea-Durán, 1999** ***; Góngora-González et al., 1999; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999; Cohen-Fernández, 2000; Cortés-Altamirano & Núñez-Pastén, 2000; Hernández-Becerril et al., 2000** ***; Lechuga-Devéze et al., 2000; Morquecho-Escamilla et al., 2000a; Alonso-Rodríguez & Páez-Osuna, 2001, 2003; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Martínez-López et al., 2001; Cortés-Altamirano, 2002**; Herrera-Galindo, 2002*; Ochoa et al., 2002; Alonso-Rodríguez, 2003* **, Gómez-Aguirre et al., 2003; Núñez-Vázquez et al., 2003; Ochoa, 2003a, b; Páez-Osuna et al., 2003; Ulloa-Pérez et al., 2003; Alonso-Rodríguez et al., 2004b* **; Morquecho-Escamilla & Lechuga-Devéze, 2004; Sierra-Beltrán et al., 2004, 2005***; Gárate-Lizárraga, 2005; Gárate-Lizárraga et al., 2005a, d; Poot-Delgado et al., 2005; W of B.C.S. and B.C., GC (Sin., Nay.), Jal., Mich., Gro., Oax., Chis.

Prorocentrum oblongum (J. Schill.) F. J. R. Taylor, 1976: 24, pl. 1, fig. 7. Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Prorocentrum ovum (J. Schill.) J. D. Dodge, 1975: 109, fig. 1J.
Verdugo-Díaz, 1997; GC (B.C.S.).

Prorocentrum rhathymum A. R. Loebli, Sherley & R. J. Schmidt, 1979: 118, fig. 10.

Cortés-Altamirano & Núñez-Pastén, 2000 (as *Prorocentrum mexicanum* aff.); Cortés-Altamirano et al., 2003; Cortés-Altamirano & Sierra-Beltrán, 2003; Alonso-Rodríguez et al., 2004b**; Gárate-Lizárraga et al., 2004c, 2005a, d; Band-Schmidt et al., 2005b; Gárate-Lizárraga, 2005**, this study; W of B.C.S., GC (B.C.S.).

Note: According to Cortés-Altamirano & Sierra-Beltrán (2003), Steidinger (1983) and Faust (1990) erroneously considered *P. rhathymum* to be synonymous with *P. mexicanum*. Unlike *P. mexicanum*, in *P. rhathymum* trichocyst pores in the periflagellar area are present only on the right valve (Cortés-Altamirano & Sierra-Beltrán, 2003). Moreover, unlike *P. mexicanum*, *P. rhathymum* has been frequently mentioned as associated with floating detritus (macroalgae). Recent observations on phytoplankton from Bahía de La Paz (B.C.S.) and Bahía Magdalena (W of B.C.S.) demonstrated the presence of these two species in the water column (Gárate-Lizárraga, this study).

Prorocentrum rostratum F. Stein, 1883: 18, pl. 1, fig. 16, 17.
Santoyo-Reyes, 1974b; Hernández-Becerril, 1983, 1985a, 1986, 1987c, 1988a; Cortés-Lara, 1985; González-López, 1994, 2000; Licea-Durán et al., 1995*; Hernández-Becerril et al., 2000**; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; GC (Sin., Nay.), Jal., Mich., Oax.

Prorocentrum scutellum Schröd., 1900 (Mitt. Zool. Stat. Neapel 14): pl. 1, fig. 12.
Tax. syn.: *Prorocentrum sphaeroideum* J. Schill., 1928 (Arch. Protistenk. 61, 1): 61, fig. 25; *P. robustum* B. F. Osorio, 1942: pl. 34, fig. 9, 10.
Osorio-Tafall, 1942*; Santoyo-Reyes, 1972, 1974a; Gómez-Aguirre & Santoyo-Reyes, 1975; Santoyo-Reyes & Signoret, 1979; Cortés-Altamirano & Pastén-Miranda, 1982b (as *P. scutellum*?); Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Hernández-Becerril et al., 2000**; GC (Son., Sin.), Gro., Oax.

Prorocentrum triestinum J. Schill., 1918: 252, fig. 1a, b.
Gárate-Lizárraga, 1988; Gárate-Lizárraga et al., 1990, 2000, 2001c, 2005; Verdugo-Díaz, 1993, 1997; González-López, 1994, 2000; Cortés-Altamirano et al., 1999, 2000** ***, 2002, 2004b; Hernández-Becerril et al., 2000** ***; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Cortés-Altamirano, 2002***; Alonso-Rodríguez, 2003* **; Esqueda-Lara, 2003; Gárate-Lizárraga & Siqueiros

Beltrones, 2003; Ochoa, 2003a, b; Alonso-Rodríguez, 2004; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; GC (B.C.S., Sin.), Jal.

Prorocentrum vaginula (F. Stein) J. D. Dodge, 1975: 117, fig. 4.

Nom. syn.: *Exuviaella vaginula* (F. Stein) F. Schütt (?).

Gilmartin & Revelante, 1978 (as *Exuviaella vaginula*); Hernández-Becerril, 1983, 1985a, 1987c; González-López, 1994, 2000; Licea-Durán et al., 1995; Herrera-Galindo, 2002**; GC, Oax.

Protinium bahamense var. *compressum* Herrera-Silveira, 1999: 8 (table), nomen nudum.

Note: See the note for *Pyrodinium bahamense* var. *compressa*.

Protoceratium globosum Kof. & J. R. Michener, 1911: 278.

Protoceratium reticulatum auct., non Buetschli: Hargraves & Maranda, 2002: 100, fig. 20.

Okolodkov et al., 2003 (as *Protoceratium* sp.); Morquecho-Escamilla, 2004** (as *Protoceratium* sp., also cysts); Alonso-Rodríguez et al., 2004b**; Okolodkov (this study); Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (Caleta de Campos, El Faro), Gro. (Zihuatanejo, Vicente Gro.), Oax. (Punta Maldonado, GT).

Note: The studied cells were 40-69 µm long and 39.5-59 µm wide. The species differs from *P. reticulatum* mainly in having a globular shape (*P. reticulatum* has angulate outline due to ridges along the sutures), an epitheca more or less equal to the hypotheca in size (in *P. reticulatum*, the epitheca is smaller) and a wider intercalary plate.

Protoceratium reticulatum (Clap. & J. Lachm.) Buetschli, 1885: 1007, pl. 52, fig. 2.

Tax. syn.: *Gonyaulax grindleyi* Reinecke, 1967: 157, fig. 1; *Operculodinium centrocarpum* (Deflandre & Cookson) D. Wall in D. Wall & B. Dale, 1967: 111 (cyst stage); *O. israelianum* (M. Rossignol) D. Wall in D. Wall & B. Dale: 111 (cyst stage).

Barreiro-Güemes, 1967; González-Villalobos, 1971; Gilmartin & Revelante, 1978; Brinton et al., 1986; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c, 1988c**; Martínez-Hernández & Hernández-Campos, 1991** *** (cysts); González-López, 1994, 2000; Licea-Durán et al., 1995***; Peña-Manjarrez et al., 2001 (cysts); Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004 (cysts); Peña-Manjarrez et al., 2005 (also cysts**); Gárate-Lizárraga (this study); W of B.C. (Bahía Magdalena), GC (Bahía de La Paz, B.C.S.; B.C.), Jal., Gro. (Acapulco).

Protoceratium spinulosum (J. Murray & Whitting) J. Schill., 1937: 326, fig. 340. Hernández-Becerril, 1988c**; Okolodkov et al., 2003 (as *P. cf. spinulosum*); Peña-Manjarrez et al., 2005; W of B.C.; Oax. (Huatulco).

Note: The only specimen found in Oaxaca was 69 µm long and 59 µm wide.

Protogonyaulax digitale Gárate-Lizárraga, 1992: 82, nomen nudum.

Note: See the note for *Gonyaulax digitale*.

Protogonyaulax polygramma Gárate-Lizárraga, 1992: 82, nomen nudum.

Note: See the note for *Gonyaulax polygramma*.

Protogonyaulax spinifera Gárate-Lizárraga, 1992: 82, nomen nudum.

Note: See the note for *Gonyaulax spinifera*.

Protoperidinium abei (Paulsen) Balech, 1974: 54.

Nom. syn.: *Peridinium abei* Paulsen, 1931: 73.

Barreiro-Güemes, 1967; González-Villalobos, 1971* **; Hernández-Becerril, 1986, 1987c, 1988a; Ceballos-Corona, 1988; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); W of B.C., GC (Bahía de La Paz, B.C.S.), Jal., Col., Mich., Oax.

Protoperidinium achromaticum (Levander) Balech, 1974: 56.

González-López, 1994; Licea-Durán et al., 1995; GC.

Note: Balech (1976) who described a new species, *Protoperidinium finitimum*, believes that it was previously referred to as *Peridinium achromaticum* or *Protoperidinium achromaticum*. The aspect of *P. finitimum* and *Peridinium achromaticum* is very much alike but their cingular and sulcal plates greatly differ. The species also differ in ecology: real *P. achromaticum* has been found in fresh and brackish waters whereas *Protoperidinium finitimum* is a marine species. If the identification of the species found in the MP was correct, most likely it is *P. finitimum*.

Protoperidinium acutipes (P. A. Dang.) Balech, 1974: 59.

Nom. syn.: *Peridinium acutipes* P. A. Dang., 1927: 363, fig. 30a-d.

González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; W of B.C.S., GC.

Protoperidinium americanum (Gran & Braarud) Balech, 1974: 57.

Peña-Manjarrez et al., 2001 (cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003;

Alonso-Rodríguez, 2004; Morquecho-Escamilla, 2004 (cysts); Peña-Manjarrez et al., 2005 (also cysts**); W of B.C., GC.

Protoperidinium cf. *anomaloplaxum* (Balech) Balech, 1974: 53.
Morquecho-Escamilla, 1996; GC (B.C.S.).

Protoperidinium asymmetricum Balech, 1974: 54.

Bas.: *Sphaeridinium asymmetrica* T. H. Abé, 1927: 391, fig. 11-13.

Nom. syn.: *Peridinium asymmetrica* (T. H. Abé) T. H. Abé, 1936 (Sci. Rep. Tôhoku Imper. Univ. 10, 4): 671.

González-López & Siqueiros-Beltrones, 1990 (as *Peridinium asymmetricum* (G. Karst.); González-López, 1994, 2000; Licea-Durán et al., 1995; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; W of B.C.S., GC.

Note: Since there are no illustrations of the material from the MP, it is hard to say which species is involved. González-López & Siqueiros-Beltrones (1990) refer to poorly described *Peridinium asymmetricum* G. Karst., which has two short pointed antapical horns, after Karsten (1907: pl. 53, fig. 2). Licea-Durán et al. (1995) reported *Protoperidinium assymmetricum* (T. H. Abé) Balech and mentioned two antapical horns and a descendent cingulum, which the true *P. asymmetricum* does not have (Abé, 1927, 1936). Obviously, two different species from the MP are involved here, and the information about them is contradictory. *Peridinium asymmetrica* is illegitimate as a later homonym of *P. asymmetricum* Karsten (M. Elbrächter, pers. comm.).

Protoperidinium avellana (Meunier) Balech, 1974: 54.

Tax. syn.: *Brigantedinium cariacensis* (D. Wall) P. C. Reid, 1977: 434, pl. 1, fig. 2 (cyst stage).

Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Hernández-Becerril, 1991*** (as *Protoperidinium avellana*?); Martínez-Hernández & Hernández-Campos, 1991** (cysts); Licea-Durán et al., 1995** (also cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004 (cysts); GC, B.C., Mich.

Note: Martínez-Hernández & Hernández-Campos (1991) mistakenly refer to *Brigantedinium cariacensis* Harland & Reid.

Protoperidinium biconicum (P. A. Dang.) Balech, 1974: 58.

Nom. syn.: *Peridinium biconicum* P. A. Dang., 1927: 349, fig. 15a-d ; non *P. biconicum* T. H. Abé, 1927: 416, fig. 34A-G.

Cortés-Altamirano & Pastén-Miranda, 1982a; Pastén-Miranda, 1983; Priego-Martínez, 1985; Hernández-Becerril, 1987c, 1991; Licea-Durán et al., 1995; Sin.

Protoperidinium bipes (Paulsen) Balech, 1974: 53.

Estrada & Blasco, 1979; Colombo-Rivas, 1986; Gárate-Lizárraga, 1988*; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Góngora-González, 2001; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Gómez-Aguirre, 2003; W of BCP, GC, Nay., Col.

Note: The drawing by Gómez-Aguirre (2003: fig. 2(5)) does not correspond to the morphology of *P. bipes*. Additionally, the species has not been recorded as toxic, which is contrary to the data presented by the same author.

Protoperidinium bispinum (J. Schill.) Balech, 1974: 62.

Okolodkov et al., 2003; Col. (Cuyutlán, Manzanillo).

Note: Our cells were 43-53.5 µm long (50.5-63 µm with spines), 34-42 µm wide and 32-37 µm deep.

Protoperidinium breve Verdugo-Díaz, 1997: 18 (table), nomen nudum.

Note: See the note for *Protoperidinium pyriforme* subsp. *breve*.

Protoperidinium brevipes (Paulsen) Balech, 1974: 60.

Esqueda-Lara, 2003; Jal., Col.

Protoperidinium brochii (Kof. & Swezy) Balech, 1974: 60.

Nom. syn.: *Peridinium brochii* Kof. & Swezy, 1921: 183.

Estrada & Blasco, 1979; Nienhuis, 1979, 1982; Cortés-Lara, 1985; Hernández-Becerril, 1985c*, 1987c, 1988a, 1991; Santamaría del Ángel, 1986; García-Pamanes, 1987; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995* ***; Verdugo-Díaz, 1997; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Okolodkov, 2005* **; W of B.C.S. and B.C., GC (B.C.S., B.C.), Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Caleta de Campos), Oax. (Chacahua, Pto. Escondido, Huatulco).

Protoperidinium capurroi (Balech) Balech, 1974: 66, subsp. *capurroi*.

Okolodkov (this study); W of B.C.S.

Note: Three examined cells were 35-41 µm long (43-50 µm with spines), 34-43 µm wide and 31-34 µm deep.

Protoperidinium cassum (Balech) Balech, 1974: 62, var. *cassum*.

Nom. syn.: *Peridinium cassum* Balech, 1971: 103, pl. 19, fig. 333-341.

Licea-Durán et al., 1995; Okolodkov, 2002; Okolodkov et al., 2003; Col.

(Manzanillo), Mich. (Caleta de Campos), Gro. (Acapulco, Zihuatanejo), Oax. (Huatulco, Pto. Escondido).

Note: Licea-Durán et al. (1995: pl. 12, fig. 2a) illustrated *P. cassum* under the name of *P. latispinum*. Unlike *P. latispinum*, *P. cassum* is twice as small, and it has a well separated apical horn. Our specimens were 40-62.5 µm long (50-79 µm with spines) and 31-49 µm wide. In the drawings that accompany the original description of *P. cassum* by Balech (1971a), the cells are more globular and with more divergent antapical spines than in his later drawings (Balech, 1988a) which are very similar to *Protoperidinium steinii* (= *Peridinium michaelis* F. Stein, 1883: pl. 8, fig. 10). However, *P. cassum* is very different from *P. steinii* as redefined by Kofoed (1909: pl. 2, fig. 3-7). The latter species has widely winged longer antapical spines.

Protoperidinium cassum var. *decens* Balech, 1988: 96, pl. 34, fig. 11-13.

Nom. syn.: *Peridinium cassum* Balech, 1971: 103, pl. 19 fig. 333-341.

Tax. syn.: *Peridinium decens* Balech, 1971: 105, pl. 20, fig. 342-348.

Okolodkov, 2002; Gro. (Zihuatanejo), Oax. (Pto. Escondido, Punta Maldonado).

Note: The studied cells were 35-43 µm long (43-56.5 µm with spines) and 27.5-30 µm wide. Although originally Balech (1971a) described *Protoperidinium cassum* and *P. decens* as two different species, later he amalgamated them into *P. cassum* (Balech, 1988a). In fact, the differences between the two varieties of this species are subtle, and Balech (1971a) himself presents drawings of *P. cassum* var. *decens* that look intermediate in terms of cell shape between *P. cassum* var. *cassum* and var. *decens* in his later work (Balech, 1988a).

Protoperidinium catenatum Hernández-Becerril, 1983: 91; 1985a: 31 (table 1), nomen nudum; *P. catenatum* González-López, 1994: 7, nomen nudum; González-López, 2000: 44, nomen nudum; Yamaji, 1982: 126, nomen nudum (the name is mistakenly adscribed to Levander).

Note: In the thesis by Hernández-Becerril (1983), the name of *Gonyaulax catenata* (see *Peridiniella catenata*) is given as a synonym to *Protoperidinium catenatum* (Lev.) Balech by mistake. Balech is not the author of this new combination. In other works in which *Protoperidinium catenatum* is mentioned, it is impossible to conclude which species is involved, *Gymnodinium catenatum*, *Cochlodinium catenatum* or *Peridiniella catenata*, although it is most likely the latter.

Protoperidinium cepa (Balech) Balech, 1974: 62.

Morquecho-Escamilla, 1996; GC (B.C.S.).

Protoperidinium cerasus (Paulsen) Balech, 1973 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 3, 5): 357, pl. 3, fig. 57-62, pl. 4, fig. 63-72.

Nom. syn.: *Peridinium cerasus* Paulsen, 1904: 12, fig. 12a-g.

González-Villalobos, 1971**; García-Pamanes & Villavicencio-Garayzar, 1982; Pastén-Miranda, 1983; Santamaría del Ángel, 1986; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997 (also as *P. cf. cerasus*); Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; W of BCP, GC (B.C.S., B.C.), Jal., Col., Mich., Chis.

Protoperidinium claudicans (Paulsen) Balech, 1974: 57.

Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, 1988a, 1991** ***; Rojas-Trejo, 1984; Priego-Martínez, 1985**; Flores-Granados, 1986; Hernández-Becerril, 1987c, 1991; Gárate-Lizárraga, 1988**, 1992; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996, 2004** (cysts); Núñez-Moreno, 1996; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2003, 2004**; Gómez-Aguirre et al., 2003; Góngora-González, 2003** (also cysts); Góngora-González et al., 2004; Morquecho-Escamilla, 2004** (cysts); Okolodkov, 2005* **; Peña-Manjarrez et al., 2005; W of BCP, GC (B.C.S., Son., Sin., Nay.), Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Playa Azul), Gro. (Zihuatanejo, Bahía de Potosí, Vicente Gro., Acapulco, Punta Maldonado), Oax. (Salina Cruz).

Protoperidinium compressum (T. H. Abé) Balech, 1974: 54.

Nom. syn.: *Congruentidium compressum* T. H. Abé, 1927: 420, fig. 36A-E.

Tax. syn.: *Stelladinium reidii* Bradford, 1975: 3065, fig. 2-4 (cyst stage).

Colombo-Rivas, 1986; Ceballos-Corona, 1988; Martínez-Hernández & Hernández-Campos, 1991** (cysts); Licea-Durán et al., 1995**; Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003; Alonso-Rodríguez, 2004; Morquecho-Escamilla, 2004 (cysts); GC (B.C.S.), Mich.

Protoperidinium conicoides (Paulsen) Balech, 1973 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 3, 5): 356, pl. 3, fig. 50-56 (the combination mistakenly appeared for the second time in Balech, 1974: 58).

Nom. syn.: *Peridinium conicoides* Paulsen, 1905: 3, fig. 2a-e; *Brigantedinium simplex* (D. Wall) P. C. Reid ex Harland & P. C. Reid in Harland, P. C. Reid, Dobell & G. Norris, 1980: 222 (cyst stage).

Barreiro-Güemes, 1967*; González-Villalobos, 1971; Valero-Gamboa, 1980; Ceballos-Corona, 1988; Martínez-Hernández & Hernández-Campos, 1991** (cysts); Licea-Durán et al., 1995**; Esqueda-Lara, 2003; GC, Jal., Col., Mich.

Note: Martínez-Hernández & Hernández-Campos (1991) mistakenly refer to *Brigantedinium simplex* Harland & Reid.

Protoperidinium conicum (Gran) Balech, 1974: 58.

Nom. syn.: *Peridinium conicum* Gran, 1902: 189, fig. 14.

Tax. syn.: *Multispinula quanta* Bradford ex Harland & P. C. Reid in Harland, P. C. Reid, Dobell & G. Norris, 1980: 224 (cyst stage); *Selenopemphix quanta* (Bradford) Matsuoka, 1985: 51, pl. 11, fig. 1-9 (cyst stage).

Klement, 1964; Barreiro-Güemes, 1967**; Round, 1967; González-Villalobos, 1971**; Santoyo-Reyes, 1972; Nienhuis, 1979, 1982; Gómez-Aguirre, 1982; Cortés-Altamirano & Pastén-Miranda, 1982a, 1984, 1985; Morey-Gaines, 1982; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, c*, 1987c, 1991** ***; Lapota & Losee, 1984; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985**; Flores-Granados, 1986; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Hernández-Cachou, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-Hernández & Hernández-Campos, 1991** (cysts); Gárate-Lizárraga, 1992; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995** ***; Morquecho-Escamilla, 1996, 2004** (cysts); Núñez-Moreno, 1996; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Peña-Manjarrez et al., 2001 (cysts); Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Gómez-Aguirre et al., 2003; Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003**, 2004**; Varona-Cordero & Gutiérrez-Mendieta, 2003; Ochoa, 2003a; Alonso-Rodríguez, 2004; Alonso-Rodríguez et al., 2004b**; Góngora-González et al., 2004; Meave del Castillo & Zamudio-Reséndiz, 2005; Okolodkov, 2005* **; Peña-Manjarrez et al., 2005 (also cysts); Villalejo-Fuerte et al., 2005; W of BCP, GC (B.C.S., B.C., Son., Sin., Nay.), Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (Caleta de Campos), Gro. (Bahía de Potosí, Acapulco), Oax. (Chacahua, Pto. Escondido, Salina Cruz), Chis. (Paredón, Pto. Madero).

Protoperidinium corniculum (Kof. & J. R. Michener) F. J. R. Taylor & Balech ex Balech, 1979 (Publ. Serv. Hidrogr. Naval B. Aires 655): 39, pl. 8, fig. 155-162. García-Pamanes, 1987; Licea-Durán et al., 1995**; GC.

Note: The species illustrated by Licea-Durán et al. (1995) is poorly described (the pattern of the epitheca and displacement of the cingulum remain unknown). Unlike

P. corniculum in Balech (1988a), which has relative short parallel or almost parallel antapical spines, the species from the Gulf of California has longer antapical spines that are clearly divergent.

Protoperidinium crassipes (Kof.) Balech, 1974: 60.

Nom. syn.: *Peridinium crassipes* Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 309, pl. 31, fig. 46, 47.

Gilbert & Allen, 1943; Santoyo-Reyes, 1972; Gilmartin & Revelante, 1978; Estrada & Blasco, 1979; Hernández-Becerril, 1985c*, 1991***; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Flores-Granados, 1986; Hernández-Cachou, 1987c, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Verdugo-Díaz, 1997 (as *P. cf. crassipes*); Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002 (as *P. aff. crassipes*); Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; Alonso-Rodríguez, 2004; Meave del Castillo & Zamudio-Reséndiz, 2005; Okolodkov, 2005* **; Peña-Manjarrez et al., 2005; W of BCP, GC (B.C.S., B.C., Son.), Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Playa Azul), Gro. (Acapulco), Oax. (Huatulco, Salina Cruz), Chis.

Protoperidinium cf. cruciferum (Balech) Balech, 1973 (Contr. Inst. Antárt. Argent. 107): 25, pl. 7, fig. 134-137 (the combination *Protoperidinium cruciferum* mistakenly appeared for the second time in Balech, 1974: 64).

Okolodkov, 2003*; Oax. (Pto. Escondido, Punta Maldonado).

Note: The studied cells were 34-38 µm long (39-43 µm with spines) and 33 µm wide. Compared with Balech (1988a: pl. 35, fig. 15), our specimens had longer antapical spines and more pronounced displacement of the cingulum ends (about 0.7-1.0 of the cingulum width).

Protoperidinium curtipes (Jörg.) Balech, 1974: 60, f. *asymmetricum* (Matzen.) Okolodkov comb. nov.

Bas.: *Peridinium curtipes* f. *asymmetrica* Matzen. (Bot. Arch. 35), 1933: 468, fig. 52c.

Okolodkov (this study); Oax. (Huatulco).

Note: Our specimens were 114-117 µm long, 114-126 µm wide and 104-114 µm deep (in Matzenauer, 1933: 63-100 µm and 78-100 µm wide). They are also similar to Schiller's (1937: fig. 220o) *Peridinium crassipes* in that they have two antapical horns of different lengths. However, while Schiller's specimen is longer than wide and has a circular cingulum, ours are wider than they are long and possess a clearly descending cingulum.

Protoperidinium curvipes (Ostenf.) Balech, 1974: 65.
Hernández-Becerril, 1988a: GC (B.C.S.).

Protoperidinium dakariense (P. A. Dang.) Balech, 1974: 64.
González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Protoperidinium decipiens (Jörg.) Parke & J. D. Dodge in Parke & H. H. Dixon, 1976: 545.
González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Protoperidinium denticulatum (Gran & Braarud) Balech, 1974: 54.
Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004** (also cysts); Okolodkov (this study); GC, Jal. (Cabo Corrientes).
Note: The only cell measured was 28.5 µm long and 40 µm wide.

Protoperidinium depressum (Bailey) Balech, 1974: 57.
Nom. syn.: *Peridinium depressum* Bailey, 1855: 12, fig. 33, 34.
Gilbert & Allen, 1943; Klement, 1964; Barreiro-Güemes, 1967*; Round, 1967; González-Villalobos, 1971**; Santoyo-Reyes, 1972; Blasco, 1978; Gilmartin & Revelante, 1978; Packard et al., 1978; Estrada & Blasco, 1979; Nienhuis, 1979, 1982; Signoret & Santoyo-Reyes, 1980; Cortés-Altamirano & Pastén-Miranda, 1982a; Hernández-Becerril, 1983, 1985a, b, c*, 1986, 1987c, 1988a, 1991***; Pastén-Miranda, 1983; Lapota & Losee, 1984; Caballasi-Flores, 1985; Cortés-Lara, 1985; Priego-Martínez, 1985; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin.), Jal., Col., Mich., Oax.

Protoperidinium diabolus (Cleve) Balech, 1974: 66.
Nom. syn.: *Peridinium diabolus* Cleve, 1900: 16, pl. 7, fig. 19, 20.
Barreiro-Güemes, 1967; Round, 1967; González-Villalobos, 1971*; Cortés-Altamirano & Pastén-Miranda, 1982a; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Hernández-Cachou, 1988; Hernández-Becerril, 1988a**; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Licea-Durán et al., 1995***; Martínez-López &

Verdugo-Díaz, 2000; Herrera-Galindo, 2002; W of B.C.S., GC (Son., Sin.), Mich., Oax.

Protoperidinium divaricatum (Meunier) Parke & J. D. Dodge, 1976: 545.
Esqueda-Lara, 2003**; Esqueda-Lara et al., 2003; Jal., Col.

Note: The cells illustrated by Esqueda-Lara (2003) are longer than they are wide, have a clearly descending cingulum and a deep antapical depression. Although Balech (1988a) indicates that the antapical depression in his specimens is shallow, the drawings by Meunier (1919), who originally described *P. divaricatum*, show it deep. The last two authors pictured the cells of *P. divaricatum* as wider than they are long, with a circular cingulum without displacement. We believe that the specimens from the MP satisfactorily correspond to *P. obtusum*, which is common there.

Protoperidinium divergens (Ehrenb.) Balech, 1974: 60.

Nom. syn.: *Peridinium divergens* Ehrenb., 1841: 201.

Gilbert & Allen, 1943; Klement, 1964; Barreiro-Güemes, 1967*; González-Villalobos, 1971**; García-Pamanes, 1982; Nienhuis, 1982; Lapota & Losee, 1984; Cortés-Lara, 1985; Flores-Granados, 1986; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Hernández-Becerril, 1988a; González-López, Siqueiros-Beltrones, 1990; Hernández-Becerril, 1991** ***; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995*; Morquecho-Escamilla, 1996, 2004 (as *P. cf. divergens*); Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; Gómez-Aguirre et al., 1999; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Gómez-Aguirre, 2003*; Varona-Cordero & Gutiérrez-Mendieta, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2004 (as *P. cf. divergens*); Okolodkov, 2005* **; Peña-Manjarrez et al., 2005; W of BCP, GC (B.C.S., Son., Nay.), Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Caleta de Campos, Playa Azul), Gro. (Bahía de Potosí, Acapulco, Punta Maldonado), Oax. (Pto. Escondido, Pto. Ángel, Huatulco, Salina Cruz), Chis.

Protoperidinium diversus González-López, 1994: 7, nomen nudum; *P. diversus* González-López, 2000: 44, nomen nudum.

Protoperidinium elegans (Cleve) Balech, 1974: 60, f. *elegans*.

Nom. syn.: *Peridinium elegans* Cleve, 1900: 16, pl. 7, fig. 15, 16.

Klement, 1964**; Round, 1967; Lapota & Losee, 1984; Cortés-Lara, 1985; Hernández-Becerril, 1987c, 1988a**, 1991** ***; Gárate-Lizárraga et al., 1990;

González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Ochoa, 2003a; Okolodkov, 2005* **; Villalejo-Fuerte et al., 2005; W of BCP, GC (B.C.S.), Jal., Col., Mich., Gro. (Zihuatanejo, Acapulco), Oax. (Pto. Escondido, Huatulco).

Note: The cells observed were 147-228 µm long and 88-160 µm wide.

Protoperidinium elegans f. *granulatum* (G. Karst.) Matzen., 1933: 471, fig. 57a, b.

Klement, 1964; González-Villalobos, 1971; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Protoperidinium excentricum (Paulsen) Balech, 1974: 54.

Nom. syn.: *Peridinium excentricum* Paulsen, 1907: 14, fig. 17a-f.

González-Villalobos, 1971*; Santoyo-Reyes, 1972; Cortés-Altamirano & Pastén-Miranda, 1982a; Rojas-Trejo, 1984; Priego-Martínez, 1985; Hernández-Becerril, 1987c, 1991***; Licea-Durán et al., 1995; Morquecho-Escamilla, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; Okolodkov, 2005*; GC (B.C.S., Son., Sin.), Mich. (El Faro), Jal. (Barra de Navidad), Oax. (Salina Cruz).

Note: Our cells were 31-35 µm long, 49-57 µm wide and 51-57 µm deep.

Protoperidinium fatulipes (Kof.) Balech, 1974: 60.

Nom. syn.: *Peridinium fatulipes* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 174, pl. 5, fig. 30.

González-Villalobos, 1971; Lapota & Losee, 1984; Caballasi-Flores, 1985; Hernández-Becerril, 1987c; Ceballos-Corona, 1988 (as *P. faltipes*); Licea-Durán et al., 1995; Sin., Mich.

Note: Balech (1988a) indicates close relationships between *Peridinium fatulipes* Kof., *P. tumidum* Okamura and *P. tessellatum*, and that if their conspecificity is proved, the name of the former has priority.

Protoperidinium globulus (F. Stein) Balech, 1974: 64.

Nom. syn.: *Peridinium globulus* F. Stein, 1883: pl. 9, fig. 5-7.

Morey-Gaines, 1982; Hernández-Becerril, 1983, 1985a, 1987c; Caballasi-Flores, 1985; Cortés-Lara, 1985; Flores-Granados, 1986; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC (Son., Sin.), Mich.

Protoperidinium grande (Kof.) Balech, 1974: 60.

Nom. syn.: *Peridinium grande* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 174, pl. 5, fig. 30.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Caballasi-Flores, 1985; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Hernández-Becerril, 1991**; Martínez-López, 1993b; Licea-Durán et al., 1995; Verdugo-Díaz, 1997 (as *P. cf. grande*); Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Okolodkov, 2005* **; W of B.C.S., GC (B.C.S., Sin.), Jal., Col., Mich., Gro. (Acapulco), Oax. (Chacahua, Huatulco).

Note: Our cell was 166 µm long and 108 µm wide.

Protoperidinium granii (Ostenf.) Balech, 1974: 65.

Nom. syn.: *Peridinium granii* Ostenf., 1906: 15.

Barreiro-Güemes, 1967* **; González-Villalobos, 1971**; Santoyo-Reyes, 1972; Estrada & Blasco, 1979; Santoyo-Reyes & Signoret, 1979; Signoret & Santoyo-Reyes, 1980 (as *Peridinium granii*?); Ortega-Banuel, 1985*; Colombo-Rivas, 1986; Hernández-Becerril, 1987c; Gárate-Lizárraga, 1992; Cortés-Altamirano et al., 1993; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1999; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, Son., Jal., Col., Oax.

Protoperidinium hamatum Balech, 1979 (Publ. Serv. Hidrogr. Naval B. Aires 655): 43, pl. 8, fig. 174-180.

Okolodkov et al., 2003; Sin. (Mazatlán), Mich. (Caleta de Campos), Oax. (GT).

Note: The only studied cell was 54.5 µm long and wide.

Protoperidinium heteracanthum (P. A. Dang.) Balech, 1974: 67.

Martínez-López, 1993b; W of B.C.S.

Protoperidinium hirobis (T. H. Abé) Balech, 1974: 64.

Caballasi-Flores, 1985; Verdugo-Díaz, 1997; Gárate-Lizárraga (this study); Okolodkov (this study); GC (Bahía de La Paz, B.C.S.; Sin.), Mich. (Caleta de Campos), Oax. (San Agustínillo).

Protoperidinium incognitum (Balech) Balech, 1974: 62.

Okolodkov (this study); Oax. (Pto. Escondido).

Note: The only studied cell was 42.5 µm long (50 µm with spines) and 35.5 µm wide.

Protoperidinium inflatum (Okamura) Balech, 1974: 60.

Martínez-López & Gárate-Lizárraga, 1994; Verdugo-Díaz, 1997; GC (B.C.S.).

Protoperidinium joergensenii (Balech) Balech, 1974: 62, var. *luculentum* Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 95, pl. 32, fig. 13-17.

Okolodkov et al., 2003; Gro. (Acapulco), Oax. (Chacahua), Chis. (Paredón).

Note: The cells studied were 22.5-42.5 µm long (30-57.5 µm with spines) and 17.5-31.5 µm wide. Because Balech (1988a) published it under the ICZN, the var. *luculentum* has no nomenclatural status (M. Elbrächter, pers. comm.).

Protoperidinium kofoidii Caballasi-Flores, 1985, nomen nudum.

Note: Probably it is *Peridinium kofoidii* Fauré-Frem. (1908: 224, fig. 11, pl. 16, fig. 12), a species not well-defined, which has not been transferred to the genus *Protoperidinium* (A. Boltovskoy, pers. comm.). Schiller (1937) believes that it is synonymous with *P. depressum*, and Balech (1994) considers it more similar to *Protoperidinium divergens* and *P. grande*. Therefore, the systematic position of *Peridinium kofoidii* is unclear.

Protoperidinium lacinosum Balech, 1994: 65.

González-López, 1994, 2000; GC.

Protoperidinium latidorsale (P. A. Dang.) Balech, 1974: 58.

Esqueda-Lara, 2003; Jal.

Protoperidinium latispinum (L. Mangin) Balech, 1974: 62.

Hernández-Becerril, 1988a, 1991***; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; Herrera-Galindo, 2002* **; Esqueda-Lara, 2003; Varona-Cordero & Gutiérrez-Mendieta, 2003; Okolodkov, 2005* **; W of BCP, GC (B.C.S.), Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Playa Azul), Gro. (Zihuatanejo, Bahía de Potosí, Vicente Gro.), Oax. (Chacahua, Pto. Escondido, Salina Cruz), Chis.

Protoperidinium latissimum (Kof.) Balech, 1974: 67.

Nom. syn: *Peridinium latissimum* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 175, pl. 5, fig. 31, 32; *P. pentagonum* var. *latissimum* (Kof.) J. Schill., 1937: 242, fig. 243a-j.

Tax. syn.: *P. pentagonum* var. *depressum* T. H. Abé, 1927: 409, fig. 29.

Klement, 1964; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a**, 1991** ***; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Hernández-Becerril, 1991; Martínez-López, 1993b (as *P. cf. latissimum*); Verdugo-

Díaz, 1993; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000 (as *P. cf. latissimum*); Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004 (cysts); W of B.C.S., Mich., Oax.

Protoperidinium leonis (Pavill.) Balech, 1974: 58.

Nom. syn.: *Peridinium leonis* Pavill., 1916: 32, fig. 6.

Tax. syn.: *Quinquecuspsis concreta* (P. C. Reid) Harland, 1977: 107, pl. 3, fig. 1-6, 17-20 (cyst stage); ? *Lejeunecysta concreta* (P. C. Reid) Matsuoka, 1987: 58, fig. 1-4, pl. 7, fig. 9, 10, pl. 8, fig. 1-9, pl. 9, fig. 1-4 (cyst stage); ? *Lejeunecysta sabrina* (Reid) Bujak, 1977: 441-442, pl. 2, fig. 15-17 (cyst stage).

Klement, 1964**; Santoyo-Reyes, 1972; Cortés-Altamirano & Pastén-Miranda, 1982a; Lapota & Losee, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Santamaría del Ángel, 1986; Hernández-Becerril, 1987c, 1988a; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Peña-Manjarrez et al., 2001 (as cyst *Lejeunecysta sabrina* (Reid) Bujak); Esqueda-Lara, 2003; Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003, 2004** (as *P. cf. leonis*); Alonso-Rodríguez, 2004; Góngora-González et al., 2004; Morquecho-Escamilla, 2004** (cysts; also *P. cf. leonis*); Peña-Manjarrez et al., 2005 (also cysts**); W of B.C.S. and B.C., GC (B.C., Son., Sin.), Jal., Col., Mich., Oax.

Note: Most probably starting with the work by Klement (1964), there has been much confusion in identification of *P. leonis* in the MP. We suggest that in many cases it is actually *P. obtusum*. The two species have several features in common, such as the presence of longitudinal ridges on the thecal plates, slightly displaced ends of the descending cingulum and the antapical horns ending with strong spines. However, the original drawing by Pavillard (1916), who described *P. leonis*, demonstrates a regularly rhomboid first apical plate 1', while *P. obtusum* has short proximal sides and long distal sides of the 1' plate. The inclination of the plane, where the cingulum lies, to the longitudinal axis of the cell is another important discriminating feature. As Balech (1976) noted, his *P. leonis* from the Gulf of Lion is *P. leonis* sensu Dangeard (1927), but does not correspond to the original description of Pavillard (1916) in having the very oblique cingulum plane to the longitudinal axis. Balech (1976) concluded that examination of the material from the type locality is needed to resolve the problem. His *P. leonis* has slightly asymmetrical 1' and the descending cingulum with its ends displaced one width of it. Nevertheless, we assume that the cells identified by Klement (1964) as *Peridinium leonis* f. *matzenaueri* and *P. leonis* f. *leonis* belong to *Protoperidinium obtusum*. In the MP, we have encountered only *P. obtusum*, in some cases as a common species.

Protoperidinium cf. *lipopodium* (Balech) Balech, 1974: 60.
Okolodkov (this study); Mich. (Playa Azul).

Protoperidinium longipes Balech, 1974: 67.
Nom. syn.: *Peridinium longipes* G. Karst., 1907 (Wiss. Ergebn. D. Deutsch. Tiefsee-Exped. 2, 2): 418, pl. 53, fig. 6.
Nienhuis, 1979, 1982; Valero-Gamboa, 1980; Hernández-Becerril, 1987c, 1991** ***; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC (B.C.S.), Mich.

Protoperidinium mediterraneum (Kof.) Balech, 1974: 62.
Hernández-Becerril, 1988a**, 1991***; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Jal., Col., Oax.

Protoperidinium minutum (Kof.) A. R. Loeb., 1969: 905.
Nom. syn.: *Peridinium minutum* Kof., 1907 (Univ. Calif. Publ. Zool. 3, 13): 310, pl. 31, fig. 42-45.
Barreiro-Güemes, 1967; Ceballos-Corona, 1988; Hernández-Becerril, 1991***; Licea-Durán et al., 1995** ***; Meave del Castillo & Hernández-Becerril, 1998; Morquecho-Escamilla & Lechuga-Devéze, 2003; Morquecho-Escamilla, 2004 (cysts); Peña-Manjarrez et al., 2005 (as cf. *P. minutum*); Okolodkov, 2005* **; W of B.C., GC, Mich. (El Faro), Jal. (Cabo Corrientes).

Protoperidinium mite (Pavill.) Balech, 1974: 63.
Okolodkov et al., 2003; Jal. (Cabo Corrientes), Oax. (GT), Chis. (Paredón).
Note: The studied cells were 31-34 µm long (41-44 µm with spines), 35.0-35.5 µm wide and 33 µm deep.

Protoperidinium murrayi (Kof.) Hernández-Becerril, 1991: 79, pl. 1, fig. 6, pl. 2, fig. 27.
Nom. syn.: *Peridinium murrayi* Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 176, pl. 5, fig. 29.
Klement, 1964**; Barreiro-Güemes, 1967*; Nienhuis, 1982; Hernández-Becerril, 1987c, 1991** ***; Hernández-Cachou, 1988; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of BCP, GC (Bahía de La Paz, B.C.S.; Son.), Oax.

Note: Hernández-Becerril (1991) considers that the larger size, body shape not as depressed as in *P. oceanicum*, and the more developed apical and antapical horns distinguish *P. murrayi* from the morphologically similar *P. oceanicum*.

Protoperidinium nanum (Balech) Balech, 1974: 65.
Cortés-Lara et al., 2003; Nay.

Protoperidinium nipponicum (T. H. Abé) Balech, 1974: 67.
Martínez-López, 1993b; Verdugo-Díaz, 1997; Gárate-Lizárraga (this study); W of B.C.S., GC (Bahía de La Paz, B.C.S.).

Protoperidinium norpacense (Balech) Balech, 1974: 67.
Caballasi-Flores, 1985; Sin.

Protoperidinium nudum (Meunier) Balech, 1974: 59.
Peña-Manjarrez et al., 2001, 2005** (cysts); W of B.C.

Protoperidinium nux (J. Schill.) Balech, 1974: 55.
Nom. syn.: *Peridinium levanderi* T. H. Abé, 1927: 413, fig. 32; non *P. levanderi* Lemmerm., 1900.
Barreiro-Güemes, 1967*; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Protoperidinium oblongum (Auriv.) Parke & J. D. Dodge in Parke & H. H. Dixon, 1976: 545.
Tax. syn.: *Votadinium calvum* P. C. Reid, 1977: 444, pl. 2, fig. 21-23 (cyst stage). Nienhuis, 1979; Cortés-Lara, 1985; Hernández-Becerril, 1987c; Martínez-Hernández & Hernández-Campos, 1991** (cysts); Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996 (as *P. oblongum?* *oceanicum?*); Peña-Manjarrez et al., 2001 (cysts); Esqueda-Lara, 2003; Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003**, 2004**; Alonso-Rodríguez, 2004; Góngora-González et al., 2004; Morquecho-Escamilla, 2004** (cysts); Peña-Manjarrez et al., 2005 (also cysts**); W of B.C., GC (B.C.S.), Jal.

Protoperidinium obtusum (G. Karst.) Parke & J. D. Dodge in Parke & H. H. Dixon, 1976: 545, 549.
Nom. syn.: *Peridinium divergens obtusum* G. Karst., 1906: 149, pl. 23, fig. 12; non *P. obtusum* Fauré-Frem., 1908: 223, fig. 9; *P. obtusum* J. Schill., 1937: 240, fig. 241a, b.
Tax. syn.: *Peridinium leonis* f. *matzenaueri* J. Schill., 1937: 239, fig. 238a, b; Klement, 1964**; Barreiro-Güemes, 1967; González-Villalobos, 1971; Hernández-

Becerril, 1991** ***; Licea-Durán et al., 1995***; Esqueda-Lara, 2003; Gómez-Aguirre et al., 2003; Morquecho-Escamilla, 2004; Morquecho-Escamilla & Lechuga-Devéze, 2004; Okolodkov, 2005* **; GC, Jal. (Cabo Corrientes, Barra de Navidad), Col. (Manzanillo), Mich. (Lázaro Cárdenas), Gro. (Zihuatanejo, Vicente Gro.), Oax. (Pto. Escondido, Huatulco, Salina Cruz)

Note: As noted by Sournia (1990), the combination *Protoperidinium obtusum* (G. Karst.) Balech, 1988, is invalid since it was published earlier by Parke & Dodge (1976). Moreover, we consider *Peridinium leonis* f. *matzenaueri* a taxonomic synonym to *Protoperidinium obtusum* on the basis of the rounded epitheca and the 1' plate.

Protoperidinium oceanicum (Vanhöffen) Balech, 1974: 57.

Nom. syn.: *Peridinium oceanicum* Vanhöffen, 1897: pl. 5, fig. 2.

Gilbert & Allen, 1943; Klement, 1964**; Barreiro-Güemes, 1967* **; Round, 1967; González-Villalobos, 1971*; Santoyo-Reyes, 1972; Gilmartin & Revelante, 1978; Signoret & Santoyo-Reyes, 1980; Valero-Gamboa, 1980; Pastén-Miranda & Robles-Mungaray, 1982; Hernández-Becerril, 1983, 1985a, b, c*, 1987c, 1988a; Pastén-Miranda, 1983; Lapota & Losee, 1984; Rojas-Trejo, 1984; Cortés-Altamirano & Pastén-Miranda, 1985; Priego-Martínez, 1985; Flores-Granados, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Hernández-Becerril, 1991; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995; Núñez-Moreno, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (B.C.S., B.C., Son., Sin., Nay.), Jal., Col., Mich., Oax.

Protoperidinium orbiculare Hernández-Becerril, 1987c: 256, nomen nudum; *P. orbiculare* González-López, 1994: 7, nomen nudum; *P. orbiculare* González-López, 2000: 44, nomen nudum.

Note: See the note for *Diplopsalopsis orbicularis*.

Protoperidinium ovatum Pouchet, 1883: 35, pl. 18, fig. 13.

Nom. syn.: *Peridinium ovatum* (Pouchet) F. Schütt, 1895: pl. 16, fig. 49.

González-Villalobos, 1971 (as *Peridinium ovatum*); Lapota & Losee, 1984; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; GC.

Protoperidinium oviforme (P. A. Dang.) Balech, 1974: 63.

Nom. syn.: *Peridinium oviforme* P. A. Dang., 1927: 3, fig. 2a-c.

Hernández-Becerril, 1991**; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Esqueda-Lara, 2003; Okolodkov, 2005; GC, Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (El Faro, Caleta de Campos), Gro. (Zihuatanejo, Acapulco, Punta Maldonado), Oax. (Pto. Escondido).

Note: The studied cells were 39-62 μm long (57-80 μm with spines) and 37-45 μm wide.

Protoperidinium ovum (J. Schill.) Balech, 1974: 67.

Gilbert & Allen, 1943; Priego-Martínez, 1985**; Flores-Granados, 1986; García-Pamanes, 1987; Hernández-Becerril, 1987c, 1988a; Martínez-López, 1993b; Licea-Durán et al., 1995***; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; Herrera-Galindo, 2002*; Villalejo-Fuerte et al., 2005; GC (B.C.S., Son.), Mich., Oax.

Protoperidinium pacificum (Kof. & J. R. Michener) F. J. R. Taylor & Balech ex Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 107, 203, pl. 40, fig. 13-18.

Nom. syn.: *Peridinium pacificum* Kof. & J. R. Michener, 1911: 283.

González-Villalobos, 1971; Santamaría del Ángel, 1986; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); Okolodkov (this study); W of B.C.S., GC (B.C.S., B.C., Nay.), Jal.

Note: The only identified cell was 51 μm long (59 μm with spines), 49 μm wide and 36 μm deep.

Protoperidinium pallidum (Ostenf.) Balech, 1973 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 3, 5): 365, pl. 6, fig. 101-110, subsp. *pallidum*.

Nom. syn.: *Peridinium pallidum* Ostenf., 1899: 60.

González-Villalobos, 1971*; Flores-Granados, 1986; Hernández-Becerril, 1987c; Martínez-López, 1993b; Verdugo-Díaz, 1993; Licea-Durán et al., 1995; Gárate-Lizárraga & Verdugo-Díaz, 2001; Okolodkov, 2003* **; Peña-Manjarrez et al., 2005; W of BCP, Son.

Protoperidinium pallidum subsp. *daedalum* (Ostenf.) Balech, 1978 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 5, 7): 184, pl. 7, fig. 200-205, pl. 8, fig. 206.

Licea-Durán et al., 1995; GC.

Protoperidinium paradoxum (F. J. R. Taylor) Balech, 1994 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 7, 4): 75.

Barreiro-Güemes, 1967; González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Protoperidinium parapyriforme (Hermosilla) Balech, 1974: 65.

Okolodkov, 2002; Okolodkov et al., 2003; Mich. (El Faro).

Note: The only specimen identified was 48 µm long (62 µm with spines), 43 µm wide and 35 µm deep.

Protoperidinium parcum (Balech) Balech, 1974: 63.

Okolodkov et al., 2003; Jal. (Cabo Corrientes).

Protoperidinium parvicollum (Balech) Balech, 1973 (Contr. Inst. Antárt. Argent. 107): 22, pl. 6, fig. 100-102.

Okolodkov (this study); Oax. (Salina Cruz).

Note: The cell studied was 35 µm long (37.5 µm with spines) and 33 µm wide. The long third apical plate (longer than the second intercalary plate 2a by a factor of 1.5) is characteristic of this species.

Protoperidinium parvispinum (Gaarder) Balech, 1974: 63.

Okolodkov (this study); Oax. (GT).

Note: The only specimen identified was 44 µm long (48 µm with spines) and 39 µm wide.

Protoperidinium parviventris Balech, 1978 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 5, 7): 174, pl. 5, fig. 148-155, pl. 6, fig. 156-158.

Hernández-Becerril, 1991*** (as *P. aff. pariventer*); Esqueda-Lara, 2003; Jal.

Protoperidinium pedunculatum (F. Schütt) Balech, 1974: 64.

Valero-Gamboa, 1980; Verdugo-Díaz, 1993; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC.

Protoperidinium pellucidum Bergh, 1882: 227, pl. 15, fig. 46-48.

Gilbert & Allen, 1943; Barreiro-Güemes, 1967*; González-Villalobos, 1971; Estrada & Blasco, 1979; Hernández-Becerril, 1983, 1985a (as *P. cf. pellucidum*), 1987c, 1988a, 1991***; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Licea-Durán et al., 1995; Verdugo-Díaz, 1997; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Esqueda-

Lara, 2003; Okolodkov, 2003* **; Peña-Manjarrez et al., 2005 (as cf. *P. pellucidum*); W of BCP, GC (B.C.S.), Jal., Col., Oax. (Chacahua).

Protoperidinium pentagonum (Gran) Balech, 1974: 59.

Nom. syn.: *Peridinium pentagonum* Gran, 1902: 185, 190, fig. 15.

Tax. syn.: ? *Brigantedinium majusculum* P. C. Reid, 1977: 434, pl. 1, fig. 5 (cyst stage); ? *Trinovantedinium capitatum* P. C. Reid, 1977: 437, pl. 1, fig. 6-8 (cyst stage).

Klement, 1964; Barreiro-Güemes, 1967* **; González-Villalobos, 1971; Santoyo-Reyes, 1972; Hernández-Becerril, 1983, 1985a, 1987c, 1988a, 1991; Lapota & Losee, 1984; Caballasi-Flores, 1985; Santamaría del Ángel, 1986; García-Pamanes, 1987; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-Hernández & Hernández-Campos, 1991 (cysts); Verdugo-Díaz, 1993; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996, 2004 (also cysts); Núñez-Moreno, 1996; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Peña-Manjarrez et al., 2001 (cysts), 2005 (also cysts**); Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2003; Okolodkov, 2005* **; W of BCP, GC (B.C., Son., Sin., Nay.), Jal. (Cabo Corrientes), Col., Mich. (Caleta de Campos), Gro. (Zihuatanejo, Vicente Gro., Acapulco, Punta Maldonado), Oax. (Pto. Escondido).

Note: Peña-Manjarrez et al. (2001) erroneously used the name *Protoperidinium sinuosum* (Lemmerm.), which is a nomen nudum, in place of *P. sinuosum* Lemmerm., which is synonymous to *Protoperidinium pentagonum* (also see the note for *Protoperidinium sinuosum*).

Protoperidinium punctulatum (Paulsen) Balech, 1974: 58.

Barreiro-Güemes, 1967; González-Villalobos, 1971; Ceballos-Corona, 1988; Hernández-Becerril, 1991**; Licea-Durán et al., 1995** ***; Esqueda-Lara, 2003; Morquecho-Escamilla, 2004; Okolodkov, 2005* **; GC, Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (El Faro), Gro. (Zihuatanejo), Oax. (Pto. Escondido, Huatulco, Salina Cruz), Chis. (Pto. Madero).

Protoperidinium pyriforme (Paulsen) Balech, 1974: 63, subsp. *pyriforme*.

Nom. syn.: *P. pyriforme* Paulsen, 1907: 13, fig. 15.

Gilbert & Allen, 1943; Klement, 1964; Barreiro-Güemes, 1967*; González-Villalobos, 1971*; Gilmartin & Revelante, 1978; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; Licea-Durán et al., 1995; Esqueda-Lara, 2003; GC (B.C.S.), Jal. (Barra de Navidad), Mich., Gro. (Bahía de Potosí), Oax. (Salina Cruz).

Note: Our cells were 39-45 μm long (47-49 μm with spines), 29-37 μm wide and 27-33 μm deep. We observed a specimen of *P. pyriforme* with about ten chloroplasts, which are supposedly cleptoplasts.

Protoberidinium pyriforme subsp. *breve* (Paulsen) Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 94, pl. 31, fig. 20, 21.

Hernández-Becerril, 1991** ***; Verdugo-Díaz, 1997; Esqueda-Lara, 2003; Okolodkov (this study); Jal., Col., Oax. (GT).

Note: Verdugo-Díaz (1997), by mistake, mentions *Protoberidinium breve*, which is a nomen nudum (also see the note for *Protoberidinium breve*).

Protoberidinium pyrum (Balech) Balech, 1974: 63.

Hernández-Becerril, 1991; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Verdugo-Díaz, 1993; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC.

Protoberidinium quarnerense (Schröd.) Balech, 1974: 61.

Hernández-Becerril, 1983, 1985a, c*, 1987b, c, 1988a, 1991***; Ceballos-Corona, 1988; Licea-Durán et al., 1995***; Meave del Castillo & Hernández-Becerril, 1998; GC (B.C.), Mich., Oax.

Protoberidinium rectum (Kof.) Balech, 1974: 63.

Santamaría del Ángel, 1986; Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Meave del Castillo & Hernández-Becerril, 1998; GC (B.C.S., B.C.), Oax.

Protoberidinium robustum (Meunier) Hernández-Becerril, 1991: 79, pl. 1, fig. 1, pl. 2, fig. 18.

Hernández-Becerril, 1991** ***; GC.

Protoberidinium roseum (Paulsen) Balech, 1974: 65.

Hernández-Becerril, 1983, 1985a (as *P. cf. roseum*); Rojas-Trejo, 1984; Priego-Martínez, 1985; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Sin., Oax.

Protoberidinium schilleri (Paulsen) Balech, 1974: 67.

Santamaría del Ángel, 1986; Martínez-López, 1993b; Licea-Durán et al., 1995; Esqueda-Lara, 2003; W of B.C.S., GC (B.C.S., B.C.), Jal.

Protoperidinium simulum (Paulsen) Balech, 1974: 61.

Hernández-Becerril, 1991***; Martínez-López, 1993b (as *P. cf. simulus*); Okolodkov (this study); W of B.C.S., GC., B.C.S. (La Paz), Jal. (Barra de Navidad), Col. (Manzanillo), Mich. (Caleta de Campos), Gro. (Zihuatanejo).

Note: Our cells were 58.5-76 µm long, 72-86 µm wide and 66-80 µm deep. Most of the specimens studied had the second intercalary plate (2a) of penta-type, unlike Balech (1988a) who observed most cells having the 2a plate of quadra-type.

Protoperidinium sinuosum Peña-Manjarrez, Gaxiola-Castro, Helenes-Escamilla & Orellana-Cepeda, 2001: 549 (table 1), nomen nudum.

Note: See the note for *Protoperidinium pentagonum*.

Protoperidinium solidicorne (L. Mangin) Balech, 1974: 67, f. *solidicorne*.

Martínez-López, 1993b; González-López, 1994; Licea-Durán et al., 1995; W of B.C.S., GC.

Protoperidinium solidicorne f. *makronyx* J. Schill., 1929: 408, fig. 26.

González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; GC.

Protoperidinium spenceri García-Pamanes, 1987: 29, nomen nudum.

Protoperidinium sphaericum (J. Murray & Whitting) Balech, 1974: 65.

Caballasi-Flores, 1985; Colombo-Rivas, 1986; Sin., Jal.

Protoperidinium sphaeroideum (L. Mangin) Balech, 1974: 61.

Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; GC, Oax.

Protoperidinium spiniferum (J. Schill.) Balech, 1974: 67.

Caballasi-Flores, 1985; Sin.

Protoperidinium steinii (Jörg.) Balech, 1974: 63.

Nom. syn.: *Peridinium steinii* Jörg., 1899: 38.

Gilbert & Allen, 1943; Klement, 1964; González-Villalobos, 1971; Estrada & Blasco, 1979; Flores-Granados, 1986; Hernández-Becerril, 1987c, 1988a**, 1991*** (as *P. steinii*?); Ceballos-Corona, 1988; Gárate-Lizárraga et al., 1990; Martínez-López, 1993b; Martínez-López & Gárate-Lizárraga, 1994; Licea-Durán et al., 1995***; Góngora-González, 2001; Esqueda-Lara, 2003; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (B.C.S., Son.), Jal., Col., Mich.

Protoperidinium stellatum (D. Wall in D. Wall & B. Dale) Balech, 1994 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 7, 4): 75.

Nom. syn.: *Peridinium stellatum* D. Wall in D. Wall & B. Dale, 1968: 275, pl. 2, fig. 13-15, pl. 3, fig. 16-21; non *Protoperidinium pellucidum* subsp. *stellatum* Balech, 1978 (Rev. Mus. Argent. Cienc. Natur. "B. Rivadavia" Hidrobiol. 5, 7): 188, pl. 9, fig. 227-241.

Góngora-González, 2003** (as *Peridinium* (*Protoperidinium*?) cf. *stellatum*); Góngora-González et al., 2004; Okolodkov (this study); GC (B.C.S.), Oax. (Pto. Ángel), Chis. (Paredón, Pto. Madero).

Note: Our cells were 50-55 µm long and 42.5-44 µm wide. We observed some cysts of *P. stellatum* in net vertical hauls near Pto. Ángel.

Protoperidinium subinermis (Paulsen) A. R. Loeb., 1969: 905.

Nom. syn.: *Peridinium subinermis* Paulsen, 1904: 24, fig. 10a-d.

Tax. syn.: *Selenopemphix alticinctum* (Bradford) Matsuoka, 1985: 52, pl. 15, fig. 6-10 (cyst stage); *Selenopemphix nephroides* Benedek, 1972 p. 47-48, pl. 11, fig. 13, pl. 16, figs. 1-4 (cyst stage).

González-Villalobos, 1971**; Santoyo-Reyes, 1972; Hernández-Becerril, 1987c, 1988a**, 1991; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988; Gárate-Lizárraga et al., 1990; Martínez-Hernández & Hernández-Campos, 1991** (cysts); Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Peña-Manjarrez et al., 2001 (cysts); Góngora-González, 2003: pl. 7, fig. 80-82 (cysts); Morquecho-Escamilla & Lechuga-Devéze, 2003**; Góngora-González et al., 2004; Morquecho-Escamilla, 2004** (cysts); Peña-Manjarrez et al., 2005 (also cysts**); W of B.C., Son., Mich., Oax.

Note: Martínez-Hernández & Hernández-Campos (1991) erroneously refer to *Selenopemphix alticinctum* (Bradford) Lentin & Williams.

Protoperidinium subpyriforme (P. A. Dang.) Balech, 1974: 63.

Nom. syn.: *Peridinium subpyriforme* P. A. Dang., 1927: 358, fig. 21d, e.

González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; González-López, 1994, 2000; Licea-Durán et al., 1995; Verdugo-Díaz, 1997 (as *P. cf. subpyriforme*); Esqueda-Lara, 2003; Ochoa, 2003a; Okolodkov (this study); W of B.C.S., GC (B.C.S.), Jal.

Note: The only cell observed was 39 µm long (45 µm with spines) and 37 µm wide, which is smaller than reported by Dangeard (1927) and Balech (1988a).

Protoperidinium subsphaericum (Balech) Balech, 1974: 67 (the combination appeared for the first time in Balech, 1973 (Contr. Inst. Antárt. Argent. 107): 24). Okolodkov et al., 2003; Gro. (Zihuatanejo).

Note: The cells studied were 51-56.5 μm long (63-73 μm with spines), 49-54 μm wide and 47-53 μm deep. The displacement of the cingulum ends was 1.5 times the width of the cingulum (one width of the cingulum in Balech, 1959b, 1988a).

Protoperidinium tenuissimum (Kof.) Balech, 1974: 67.

Hernández-Becerril, 1991** ***; Martínez-López, 1993b (as *P. cf. tenuissimum*); Licea-Durán et al., 1995; Morquecho-Escamilla, 1996; Verdugo-Díaz, 1997; Martínez-López & Verdugo-Díaz, 2000 (as *P. cf. tenuissimum*); Esqueda-Lara, 2003; W of B.C.S., GC (B.C.S.), Jal.

Protoperidinium thorianum (Paulsen) Balech, 1973 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 3, 5): 347, pl. 1, fig. 1-18 (the combination mistakenly appeared for the second time in Balech, 1974: 55).

Hernández-Becerril, 1988a**, 1991; Licea-Durán et al., 1995; Góngora-González, 2003** (as *P. cf. thorianum*); Góngora-González et al., 2004 (as *P. cf. thorianum*); Okolodkov (this study); GC, Sin. (Mazatlán), Jal. (Cabo Corrientes), Mich.

Note: Our cells were 39-53.5 μm long and 33-53.5 μm wide. The size of our specimens is smaller than that indicated by Abé (1936) and Dodge (1985): 56-85 μm long and 53-85 μm wide. However, it corresponds well to the data from the North Atlantic published by Dangeard (1927): 50 μm long and 53 μm wide (the drawings were measured based on the scale bar given in the work), as well as by Balech (1988a) for *Protoperidinium* sp. aff. *P. thorianum* for the South Atlantic: 47-59 μm long and 38-45 μm wide. Moreover, it is possible that some specimens of *P. nux* (= *Peridinium levanderi* T. H. Abé) described from the NW Pacific were identified as *P. thorianum* (according to Abé (1927), the former is 37 μm long and 34 μm wide).

Protoperidinium thulesense (Balech) Balech, 1973 (Contr. Inst. Antárt. Argent. 107): 27 (the combination mistakenly appeared for the second time in Balech, 1974: 61).

Okolodkov, 2002; Okolodkov et al., 2003; Mich. (Playa Azul), Gro. (Vicente Gro., Zihuatanejo).

Note: The only measured cell was 68 μm , 74 μm wide and 62.5 μm deep.

Protoperidinium tripos Martínez-López & Gárate-Lizárraga, 1994: 311, nomen nudum; *P. tripos* Verdugo-Díaz, 1997: 18 (table), nomen nudum; *P. tripos* Yamaji, 1982: 126, fig. 9, nomen nudum.

Note: See the note for *Heterodinium murrayi*.

Protoperidinium tristylum (F. Stein) Balech, 1974: 67.

Hernández-Becerril, 1991***; Licea-Durán et al., 1995; Esqueda-Lara, 2003; GC, Jal.

Protoperidinium trochoideum Rojas-Trejo, 1984 (as *Protoperidinium trocoideum*), nomen nudum; *P. trochoideum* Hernández-Becerril, 1985a: 31 (table1), nomen nudum.

Note: Other works reporting on *Protoperidinium trochoideum* from the MP are not given here (also see the note for *Scrippsiella trochoidea*).

Protoperidinium tuba (J. Schill.) Balech, 1974: 69.

Hernández-Becerril, 1991; Licea-Durán et al., 1995**; Verdugo-Díaz, 1997 (also as *Peridinium* cf. *tuba*); Meave del Castillo & Hernández-Becerril, 1998; GC (B.C.S.), Oax.

Note: *P. tuba* is one of the most poorly described species in the genus *Protoperidinium*, of which the tabulation was not given. Therefore, many *Protoperidinium* species share various features in common with *P. tuba*.

Protoperidinium tumidum (Okamura) Balech, 1988 (Publ. Espec. Inst. Esp. Oceanogr. 1): 191, pl. 86, fig. 5-7.

Nom. syn.: *Peridinium tumidum* Okamura, 1907: 133, pl. 5, fig. 37a-d.

González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; GC.

Note: The only cell of *P. cf. tumidum* 167 µm long, 115 µm wide and 103 µm deep was found near Acapulco. Unlike in Balech (1988a), it had a slender antapical horn without spinules.

Protoperidinium venustum (Matzen.) Balech, 1974: 57.

Peridinium depressum auct., non Balech: Licea-Durán et al., 1995: pl. 11, fig. 5;

Protoperidinium divergens auct., non Balech: Licea-Durán et al., 1995: pl. 12, fig. 1b.

González-Villalobos, 1971; Hernández-Becerril, 1988a, 1991***; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Esqueda-Lara, 2003; Okolodkov, 2005* **; GC (B.C.S.), Jal., Col., Mich. (El Faro), Oax. (Pto. Escondido, Salina Cruz).

Protoperidinium vulgare Balech, 1978 (Rev. Mus. Argent. Cienc. Natur. “B. Rivadavia” Hidrobiol. 5, 7): 169.

Okolodkov, 2002, 2005* **; Okolodkov et al., 2003; Gárate-Lizárraga (this study); W of B.C.S., B.C.S. (La Paz), Sin. (Mazatlán), Jal. (Cabo Corrientes), Col.

(Manzanillo), Mich. (Caleta de Campos, El Faro, Playa Azul), Gro. (Zihuatanejo, Isla de Ixtapa), Oax. (GT).

Protoperidinium wiesneri (J. Schill.) Balech, 1974: 61, subsp. *wiesneri*.

Nom. syn.: *Peridinium wiesneri* J. Schill., 1911: 33, fig. 2.

González-Villalobos, 1971; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Okolodkov (this study); GC, Mich. (Caleta de Campos).

Protoperidinium sp. Peña-Manjarrez et al., 2005: 1387, pl. 3, fig. 2.

Peña-Manjarrez et al., 2005 ** (as cyst *Islandinium minutum* (Harland & Reid) Head et al., 2001); W of B.C.

Protoperidinium sp. 1 Góngora-González, 2003: 16, fig. 21-23.

Góngora-González, 2003**; GC (B.C.S.).

Protoperidinium sp. 2 Góngora-González, 2003: 17, fig. 24-26.

Góngora-González, 2003**; GC (B.C.S.).

Protoperidinium sp. 1 (meta-hexa) Okolodkov, 2003 (Hidrobiológica 13, 4): 265, fig. 7a-c, 15, 16.

Okolodkov, 2003* **; Mich. (Caleta de Campos), Oax. (Chacahua, GT), Chis. (Paredón).

Note: Our cells were 30.5 µm long (36 µm with spines) and 24 µm wide.

Protoperidinium sp. 2 (para-hexa) Okolodkov, 2003 (Hidrobiológica 13, 4): 265, fig. 8a, b, 17, 18.

Okolodkov, 2003* **; Sin. (Mazatlán), Jal. (Cabo Corrientes), Col. (Manzanillo), Mich. (Caleta de Campos), Gro. (Acapulco), Oax. (Chacahua).

Note: Our cells were 39-47 µm long (44-51.5 µm with spines) and 37-41.5 µm wide. The species is morphologically similar to *P. ovum*; however, it has only one (right) antapical spine, a more displaced cingulum (usually about one width of the cingulum), a more rounded cell shape, a smaller size and the hypothecal pore located closer to the cingulum (Okolodkov, 2003). Our specimens are close to *Protoperidinium* sp. K, Balech (Balech, 1988a: 122, pl. 52, fig. 13-15), *P. capurroi* (Balech) Balech subsp. *subpellucidum* Balech (Balech, 1971a: 155, pl. 33, fig. 240-242), and *P. aequatoriale* (Balech) Balech (Balech, 1971b: 26, pl. 6, fig. 112-114). However, in none of these species the hypothecal pore was described or illustrated, which makes correct identification of our specimens difficult.

cf. *Protoperidinium* sp. 1 Góngora-González, 2003: 24, fig. 84.
Góngora-González, 2003**; GC (B.C.S.).

cf. *Protoperidinium* sp. 2 Góngora-González, 2003: 25, fig. 85.
Góngora-González, 2003**; GC (B.C.S.).

Pselodinium vaubanii Sournia, 1972 (Cah. O.R.S.T.O.M. 10, 2): 156, fig. 18-22.
Hernández-Becerril, 1988c**; Martínez-López & Gárate-Lizárraga, 1994; Verdugo-Díaz, 1997; González-López, 1994, 2000; Esqueda-Lara, 2003; Esqueda-Lara et al., 2003 (as *Pselodinium* sp.); W of BCP, GC (B.C.S.), Jal.

Pseudophalacroma nasutum (F. Stein) Jörg., 1923: 4, fig. 1.
Hernández-Becerril, 1988c** ***; Hernández-Becerril et al., 2003; Gárate-Lizárraga (this study); Okolodkov (this study); W of BCP, GC (B.C.S.), Mich. (El Faro).

Note: Two studied cells were 52 µm long, 43-45 µm wide and 27 µm deep.

Ptychodiscus noctiluca F. Stein, 1883: 28, pl. 23, fig. 7-10.
Semina & Tarkhova, 1972; Estrada & Blasco, 1979; Okolodkov (this study); W of BCP, Mich. (El Faro, Playa Azul), Gro. (Zihuatanejo).

Note: The cells observed were 53-67 µm wide.

Pyrocystis elegans Pavill., 1930: 6, fig. 21A, B.
Nom. syn.: *Dissodinium elegans* (Pavill.) Matzen., 1933: 441.
García-Pamanes, 1987; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; W of B.C.S., GC (B.C.S.), Oax.

Note: The genus *Dissodinium* Klebs in Pascher is now regarded as comprising only ectoparasites (in particular, the ectoparasites of copepod eggs), whereas the free-living phototrophic coccoid species are now assigned to the genus *Pyrocystis* (Elbrächter & Drebes, 1978; Elbrächter et al., 1987; M. Elbrächter, pers. comm.).

Pyrocystis fusiformis (Wyville-Thomson ex Haeckel) V. H. Blackmann, 1902: 183, fig. 9, var. *fusiformis*.

Semina & Tarkhova, 1972; Ceballos-Corona, 1988; Martínez-López, 1993b; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Martínez-López & Verdugo-Díaz, 2000; Esqueda-Lara, 2003; Gárate-Lizárraga (this study); W of B.C.P., GC, Jal., Col., Mich., Oax.

Pyrocystis fusiformis f. *detruncata* Matzen., 1933: 440, fig. 3c.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Pyrocystis fusiformis f. *lanceolata* (Schröd.) F. J. R. Taylor, 1976: 179, pl. 39, fig. 467.
Santamaría del Ángel, 1986; Licea-Durán et al., 1995; GC, B.C.

Pyrocystis gerbaultii Pavill., 1935: 4, fig. 2.
Nom. syn.: *Dissodinium gerbaultii* (Pavill.) F. J. R. Taylor, 1976: 176, pl. 38, fig. 444, 445.
González-López & Siqueiros-Beltrones, 1990; González-López, 1994, 2000; Licea-Durán et al., 1995; Martínez-López & Verdugo-Díaz, 2000; Hernández-Becerril et al., 2003; Ochoa, 2003a; W of B.C.S., GC.

Pyrocystis hamulus Cleve, 1900: 19, pl. 7, fig. 23.
Hernández-Becerril, 1988a; Gárate-Lizárraga, 1992; Martínez-López, 1993b; Verdugo-Díaz, 1997; Gárate-Lizárraga & Verdugo-Díaz, 2001; W of B.C.S., GC (B.C.S.), Mich.

Pyrocystis lunula (F. Schütt) F. Schütt, 1896: 4, fig. 2B-E, non 2F.
Nom. syn.: *Gymnodinium lunula* F. Schütt, 1895: pl. 25, fig. 80.3; *Dissodinium lunula* (F. Schütt) Pascher, 1916: 132, fig. 3b(?).
Gómez-Aguirre & Santoyo-Reyes, 1975; Smayda, 1975; Estrada & Blasco, 1979; Pastén-Miranda & Robles-Mungaray, 1982; Lapota & Losee, 1984; Cortés-Lara, 1985; Santamaría del Ángel, 1986; García-Pamanes, 1987; Hernández-Becerril, 1987c; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Gárate-Lizárraga, 1992, this study; Martínez-López, 1993b; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995*; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Esqueda-Lara, 2003; Peña-Manjarrez et al., 2005; W of B.C.S. and B.C., GC (Bahía de La Paz, B.C.S.; B.C.), Jal., Col., Mich.
Note: Schütt (1896) illustrated a species, *Gymnodinium lunula*, which is a mixture of the true *Pyrocystis lunula*, *P. obtusa* and what is known at present as *Dissodinium pseudolunula* (Elbrächter et al., 1987).

Pyrocystis noctiluca J. Murray, 1885: 935, fig. 335-337, ex Haeckel.
Lapota & Losee, 1984; Hernández-Becerril, 1987c, 1988c; Ceballos-Corona, 1988; Gárate-Lizárraga, 1988**, 1992; Gárate-Lizárraga et al., 1990; González-López & Siqueiros-Beltrones, 1990; Martínez-López, 1993b; Martínez-López & Verdugo-Díaz, 2000; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC, Jal., Col., Mich.

Pyrocystis obtusa Pavill., 1931: 38.

Lapota & Losee, 1984; Hernández-Becerril, 1987c; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1999; GC.

Pyrocystis robusta Kof., 1907 (Bull. Mus. Compar. Zool. Harvard Coll. 50, 6): 167, pl. 1, fig. 5.

Hernández-Becerril, 1988a, c**; Martínez-López, 1993b; Esqueda-Lara, 2003; W of B.C.S., Jal., Col., Mich.

Pyrodinium bahamense L. Plate, 1906: 411, pl. 19, var. *bahamense*.

Tax. syn.: *Polysphaeridium zoharyi* (M. Rossignol) Bujak et al., 1980: 34 (cyst stage); *Polysphaeridium zoharyi* subsp. *ktana* (M. Rossignol) Lentin & Williams, 1981: 232 (cyst stage).

Osorio-Tafall, 1942*; Martínez-Hernández & Hernández-Campos, 1991** *** (cysts); Cortés-Altamirano et al., 1995b; Licea-Durán et al., 1995** ***; Peña-Manjarrez et al., 2001, 2005** (cysts); W of B.C., GC, Chis.

Pyrodinium bahamense var. *compressa* (Böhm) Steid., Tester & F. J. R. Taylor, 1980: 329.

Tax. syn.: *Pyrodinium schilleri* (Matzen.) J. Schill., 1935: 314, fig. 330a-e.

Osorio-Tafall, 1942*; Barreiro-Güemes, 1967; González-Villalobos, 1971; Sotomayor-Navarro, 1992, 1994*; Cortés-Altamirano et al., 1993***, 1996; Sotomayor-Navarro & Domínguez-Cuellar, 1993; Gómez-Aguirre, 1995; Licea-Durán et al., 1995; Sierra-Beltrán et al., 1995; Ramírez-Camarena et al., 1996, 2004; Cortés-Altamirano & Hernández-Becerril, 1998*; Gómez-Aguirre, 1998; Meave del Castillo & Hernández-Becerril, 1998; Orellana-Cepeda et al., 1998; Sierra-Beltrán et al., 1998, 2004; Herrera-Silveira, 1999; Ochoa & Sierra-Beltrán, 1999**; Ronsón-Paulin, 1999; Morquecho-Escamilla et al., 2000a; Gárate-Lizárraga et al., 2001b; Morquecho-Escamilla & Lechuga-Devéze, 2001; Fierro et al., 2002; Flores et al., 2002; Ochoa et al., 2002; Ochoa, 2003a, b; Bustillos-Guzmán et al., 2004; Rodríguez-Salvador, 2004; Gro. Oax., Chis.

Note: Herrera-Silveira (1999), obviously by mistake, refers to this species as *Protinium bahamense* var. *compressum*, which is a nomen nudum (also see the note for *Protinium bahamense* var. *compressum*).

Pyrophacus horologium F. Stein, 1883, pro parte: 28, pl. 24, fig. 5-13, pl. 25, fig. 1. Barreiro-Güemes, 1967* **; González-Villalobos, 1971**; Santoyo-Reyes, 1972; Gómez-Aguirre & Santoyo-Reyes, 1975; Smayda, 1975; Gilmartin & Revelante, 1978; Cortés-Lara, 1985; Hernández-Becerril, 1985c*, 1987c, 1988a, c; Priego-Martínez, 1985**; Colombo-Rivas, 1986; Santamaría del Ángel, 1986; Gaxiola-

Castro et al., 1987; Ceballos-Corona, 1988; González-López & Siqueiros-Beltrones, 1990; Cortés-Altamirano et al., 1993; Verdugo-Díaz, 1993, 1997; Licea-Durán et al., 1995**; Meave del Castillo & Hernández-Becerril, 1998; Gárate-Lizárraga & Verdugo-Díaz, 2001; Esqueda-Lara, 2003; W of BCP, GC (B.C.S., B.C., Son.), Jal., Col., Mich., Oax.

Pyrophacus steinii (J. Schill.) D. Wall & B. Dale, 1971: 234, fig. 26-30, subsp. *steinii*.

García-Pamanes, 1987; Gárate-Lizárraga, 1988, 1992, 2005; Hernández-Becerril, 1988c; Gárate-Lizárraga et al., 1990, 2000; González-López & Siqueiros-Beltrones, 1990; Licea-Durán et al., 1995**; Morquecho-Escamilla, 1996, 2004** (cysts); Verdugo-Díaz, 1997; Gárate-Lizárraga & Siqueiros-Beltrones, 1998; Meave del Castillo & Hernández-Becerril, 1998; Ochoa & Sierra-Beltrán, 1999 (as *P. steinii*); Cohen-Fernández, 2000; Martínez-López & Verdugo-Díaz, 2000; Morquecho-Escamilla et al., 2000a; Gárate-Lizárraga & Verdugo-Díaz, 2001; Góngora-González, 2001; Palomares-García et al., 2002; Esqueda-Lara, 2003; Morquecho-Escamilla & Lechuga-Devéze, 2003**, 2004**; W of BCP, GC (B.C.S.), Jal., Col.

Pyrophacus steinii subsp. *vancampoe* (M. Rossignol) Balech, 1979 (Physis A 38, 94): 38, pl. 1, fig. 3, pl. 2, fig. 6-13.

Nom. syn.: *P. vancampoe* (M. Rossignol) D. Wall & B. Dale, 1971: 234, fig. 1C, E, 2, 3, 4A-C, 6-8, 10-25.

Tax. syn.: *Tuberculodinium vancampoe* (M. Rossignol) D. Wall, 1967: 114 (cyst stage).

González-López & Siqueiros-Beltrones, 1990; Martínez-Hernández & Hernández-Campos, 1991 (cysts); González-López, 1994, 2000; Licea-Durán et al., 1995; Verdugo-Díaz, 1997; Ochoa, 2003a; GC (B.C.S.).

Schuettilia mitra (F. Schütt) Balech, 1988: 174, pl. 78, fig. 1-17.

Esqueda-Lara, 2003; Meave del Castillo & Zamudio-Reséndiz, 2005; Jal.

Scrippsiella precaria Montresor & Zingone, 1988: 388, fig. 1-10.

Góngora-González, 2003** (as *S. cf. precaria*); Morquecho-Escamilla & Lechuga-Devéze, 2003**; Morquecho-Escamilla, 2004** (cysts); GC (B.C.S.).

Scrippsiella spinifera Honsell & Cabrini, 1991: 167, fig. 1-23.

Gárate-Lizárraga (this study); GC (Bahía de La Paz, Bahía Concepción, B.C.S.).

Scrippsiella trochoidea (F. Stein) A. R. Loebli, 1976: 25, emend. Janofske, 2000: 180.

Nom. syn.: *Peridinium trochoideum* Lemmerm., 1910: 336.

Packard et al., 1978; Estrada & Blasco, 1979; Morey-Gaines, 1982; Hernández-Becerril, 1983, 1985a, 1987b, c, 1988a, c**; Rojas-Trejo, 1984; Caballasi-Flores, 1985; Priego-Martínez, 1985; Santamaría del Ángel, 1986; García-Pamanes, 1987; Gárate-Lizárraga, 1988, 1991, 1992, 2005; Gárate-Lizárraga et al., 1990, 1995, 2000, 2001a, 2004c (also cysts), 2005a, d; Cortés-Altamirano & Núñez-Pastén, 1992; Martínez-López, 1993b; Orellana-Cepeda et al., 1993; Verdugo-Díaz, 1993, 1997; Esparza-Leal, 1994; Cortés-Altamirano, 1995, 2002; Cortés-Altamirano et al., 1995a***, 2004b; Licea-Durán et al., 1995** ***, 1999; Morquecho-Escamilla, 1996, 2004** (cysts); Castro-Sánchez, 1998 (also as *Peridinium trochoideum*); Cortés-Altamirano & Hernández-Becerril, 1998*; Gómez-Aguirre, 1998; Meave del Castillo & Hernández-Becerril, 1998; Cortés-Altamirano et al., 1999, 2000, 2002**; Cortés-Altamirano & Licea-Durán, 1999***, 2004; Gómez-Aguirre et al., 1999, 2003; Alonso-Rodríguez et al., 2000; Martínez-López & Verdugo-Díaz, 2000; Morquecho-Escamilla et al., 2000b; Gárate-Lizárraga & Verdugo-Díaz, 2001; Morales-Blake et al., 2001; Góngora-González, 2001; Herrera-Galindo, 2002*; Ochoa et al., 2002; Alonso-Rodríguez, 2003* **, 2004; Cortés-Lara et al., 2003; Esqueda-Lara, 2003; Gárate-Lizárraga & Siqueiros-Beltrones, 2003; Góngora-González, 2003**; Morquecho-Escamilla & Lechuga-Devéze, 2003**, 2004**; Ochoa, 2003a, b; Páez-Osuna et al., 2003; Alonso-Rodríguez et al., 2004b* **; Alonso-Rodríguez & Ochoa, 2004; Bustillos-Guzmán et al., 2004; Orellana-Cepeda et al., 2005; Peña-Manjarrez et al., 2005; W of BCP, GC (B.C.S., B.C., Sin., Nay.), Jal., Col., Mich., Oax.

Note: In a number of works the species is referred to as *Protoperidinium trochoideum*, which is a nomen nudum. In the article of Cortés-Lara (2005) devoted to a spring boom caused by *Alexandrium* sp., the illustrated cells seem to be *Scrippsiella trochoidea* rather than *Alexandrium*, judging from the cell shape. At least, we could not see that they belong to *Alexandrium*.

Sinophysis canaliculata Quod, Ten-Hage, Turquet, Mascarell & Couté, 1999: 87, fig. 1-16.

Sinophysis macrocephala auct., non D. S. Nie & Chia C. Wang: Hernández-Becerril, 1988b: 523, fig. 13, 14.

Hernández-Becerril, 1988b** ***; Licea-Durán et al., 1995; Hernández-Becerril et al., 2003; Okolodkov (this study); GC, Oax.

Note: The comparison of our specimens of *Sinophysis canaliculata* from Oaxaca with the photomicrographs of cells identified as *S. microcephala* given by Hernández-Becerril (1988b) shows clearly their conspecificity, although on these photographs one of the discriminative morphological features, a canal on the left hypothecal valve, cannot be distinguished due to the use of short-distance optics and the presence of an SEM image of only the right hypothecal valve.

Spatulodinium pseudonoctiluca (Pouchet) Cachon & Cachon-Enj., 1967: 441, fig. 9, pl. 4, fig. 11, ex Loeb. & A. R. Loeb., 1969: 195.
Gárate-Lizárraga (this study); W of B.C.S.

Spiraulax jolliffei (J. Murray & Whitting) Kof., 1911 (Univ. Calif. Publ. Zool. 8, 6): 296, pl. 19, fig. 1-5.

Nom. syn.: *Gonyaulax jolliffei* J. Murray & Whitting, 1899: 324, pl. 28, fig. 1a, b.
Tax. syn.: *Spiraulax kofoidii* H. W. Graham, 1942: 55, fig. 66.

Ceballos-Corona, 1988; Hernández-Becerril, 1988b***, c** ***; Martínez-López, 1993b; Licea-Durán et al., 1995; Esqueda-Lara, 2003** (also as *Gonyaulax jolliffei*); Gárate-Lizárraga (this study); Okolodkov (this study); W of B.C.S., GC, Jal., Col., Mich. (Caleta de Campos), Gro. (Acapulco).

Note: According to Graham (1942), who described a new species, *Spiraulax kofoidii*, the specimens illustrated by Murray & Whitting (1899) under the name of *Gonyaulax jolliffei* do not belong to *Spiraulax* Kof.; thus Graham explicitly excluded *G. jolliffei* J. Murray & Whitting from his *S. kofoidii*. We follow the opinion of Carbonell-Moore (1996) who included *S. kofoidii* as a synonym to *S. jolliffei*, and therefore place herein the records of *S. kofoidii* from the MP.

Symbiodinium spp.

Iglesias-Prieto et al.; GC (B.C.S.).

Thoracosphaera heimii (Lohmann) Kamptner, 1944: 145.

Hernández-Becerril & Bravo-Sierra, 2000, 2004***; W of B.C. and B.C.S., GT.

Torodinium robustum Kof. & Swezy, 1921: 391, fig. II1-3, pl. 4, fig. 49.

Gaxiola-Castro et al., 1987; Morquecho-Escamilla & Lechuga-Devéze, 2004; GC (B.C.S.), Jal., Gro.

Note: Hernández-Becerril (1987b) reported *Torodinium* sp. as a component of a red tide dominated by the ciliate *Myrionecta rubra* (Lohmann) Jankowski (= *Mesodinium rubrum* Lohmann) in the Gulf of California in June 1982.

Triposolenia bicornis Kof., 1906 (Univ. Calif. Publ. Zool. 3, 6): 105, pl. 15, fig. 1, 2, pl. 16, fig. 6.

Hernández-Becerril & Meave del Castillo, 1994; Licea-Durán et al., 1995; Meave del Castillo & Hernández-Becerril, 1998; Hernández-Becerril et al., 2003; Oax.

Warnowia schuettii (Kof. & Swezy) J. Schill., 1933: 585, fig. 614a, b.

Santamaría del Ángel, 1986; Ceballos-Corona, 1988; GC (B.C.), Mich.

Warnowia violescens (Kof. & Swezy) Er. Lindem., 1928: 52.
Caballasi-Flores, 1985 (as *Wawornio violences*); Sin.

Cyst, morphotype A.

Morquecho-Escamilla & Lechuga-Devéze, 2004***; GC (B.C.S.).

DISCUSSION

Although the checklist includes about 605 species and infraspecific names from 91 genera, the true diversity of dinoflagellates has not yet been revealed. The leading genera reported from the Mexican Pacific are *Protoperidinium* Bergh (111 species), *Ceratium* Schrank (63), *Dinophysis* Ehrenb. (41), *Gonyaulax* Diesing (25), *Oxytoxum* F. Stein (22), *Gymnodinium* F. Stein emend. G. Hansen & Moestrup in Daugbjerg, G. Hansen, Larsen & Moestrup (22), *Prorocentrum* Ehrenb. (21), *Alexandrium* Halim (17) *Ornithocercus* F. Stein (12) and *Amphidinium* Clap. & J. Lachm. (12). A tenth of the total number of species and infraspecific taxa of dinoflagellates are from the order Gymnodiniales. We think that dozens or even hundreds of the so-called athecate dinoflagellates are still to be registered and described from the Mexican Pacific. To discover the true dinoflagellate species diversity in the Mexican Pacific, more studies on the athecate Gymnodiniales species, benthic and epiphytic dinoflagellates, the "*Diplopsalis* group", the genus *Protoperidinium* and recently described genera of the family Podolampadaceae are needed.

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