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ZOOLOGICAL SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change

MYZOZOA: DINOZOA: DINOFLAGELLATA, BÜTSCHLI, 1885 (MARINE)

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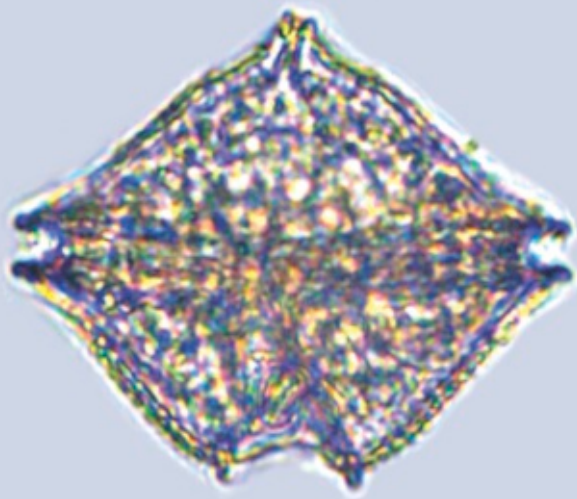

FAUNA OF INDIA CHECKLIST

MYZOZOA: DINOZOA: DINOFLAGELLATA (MARINE)

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Introduction : Dinoflagellates (Phylum Myzozoa, Infraphylum Dinoflagellata) are a group of ecologically complex organisms, with dimensions ranging from 2 µm to 2 mm. Dinoflagellates comprise over 2000 taxonomically described extant species; 90% of the extant species are found in marine environments. They are protists with various morphologies, occupying a wide range of ecological niches. Their survival strategies originate from a multitude of ecological and functional tactics, such as their dietary adaptability (Glibert et al. 2008), capacity for symbiotic or parasitic relationships (Hoppenrath et al. 2014), producing bioluminescence, and production of bioactive secondary metabolites, which are critical for allelopathic interactions (Tillmann et al. 2008). The trophic roles of dinoflagellates range from pure autotrophs to heterotrophs, with a combination of both mechanisms in some species (mixotrophs). Dinoflagellates thus undermine the conventional concepts of functional groupings in biological oceanography as they are grouped with the phytoplankton as well as zooplankton categories. The phagotrophic species prey on organisms of various sizes and taxa; in turn, they are preyed upon by a variety of other zooplankton. Dinoflagellates thus form an important bridge between the microbial food web and the classical food web. Most dinoflagellates are morphologically characterised by two dissimilar flagella (with varied positions in dinokont or desmokont types) and their intricate cell walls giving them thecate or athecate appearance (Tomas, 1997). Dinoflagellate life cycle differs greatly depending on the species, with asexual reproduction being the most prevalent. Sexual reproduction may occur during unfavourable conditions, resulting in the formation of resting cysts. Dinoflagellate cysts are non-motile with resistant walls made of dinosporin, which settle at the benthos and can withstand unfavourable conditions as compared to motile stages, thereby broadening the tolerance range of the cyst-bearing species.

Global diversity : Marine planktonic dinoflagellates have a worldwide distribution. The biogeographical distribution of dinoflagellates shows "modified latitudinal cosmopolitanism," that is, the same dinoflagellate morphospecies can be found within the same climatic zones in the northern and southern hemispheres. In the marine waters of the world, 2539 extant species of dinoflagellates are found, belonging to 2 classes, 26 orders and 82 families (Guiry & Guiry, 2024).

Diversity in India : In the Indian marine waters, 259 planktonic species belonging to one class, eight orders and 26 families have been reported so far.

Diversity in States:

Sl. No.	State / Union Territory	No. of Species	No. of Endemic Species
1	Andhra Pradesh	33	1
2	Arunachal Pradesh	0	0
3	Assam	0	0
4	Bihar	0	0
5	Chhattisgarh	0	0
6	Gujarat	26	0
7	Goa	63	2
8	Haryana	0	0
9	Himachal Pradesh	0	0
10	Jharkhand	0	0
11	Karnataka	47	1
12	Kerala	41	0
13	Madhya Pradesh	0	0
14	Maharashtra	19	0
15	Manipur	0	0
16	Meghalaya	0	0
17	Mizoram	0	0
18	Nagaland	0	0
19	Odisha	28	0
20	Punjab	0	0
21	Rajasthan	0	0
22	Sikkim	0	0
23	Tamil Nadu	64	1
24	Telangana	0	0
25	Tripura	0	0
26	Uttar Pradesh	0	0
27	Uttarakhand	0	0
28	West Bengal	9	0
29	Andaman & Nicobar	22	1
30	Chandigarh	0	0
31	Dadra Nagar Haveli, Daman & Diu	4	0
32	Delhi	0	0
33	Jammu & Kashmir	0	0
34	Ladakh	0	0
35	Lakshadweep	16	0
36	Puducherry	0	0
37	State Unknown	181	2
	INDIA TOTAL	**259**	**4**

Endemism: True endemism is not present in any of the species recorded from Indian marine waters.

Habitat: They occupy various kinds of habitats, dwelling in brackish, freshwater, marine environments; as planktonic as well as benthic, free living, symbiotic as well as parasitic forms (Tomas, 1997).

Ecological Significance: Dinoflagellates are a biochemically diverse group that differ in terms of the kinds of photosynthetic pigments they possess, their capacity to produce toxins and the presence of luminescent characteristics. Being primary producers, they are critical for trophic energy transfer in the marine food web and their phagotrophic counterparts are known to regulate the microbial loop in the oceans. They are also key components in regulating global biogeochemical cycles and are important biological indicators of aquatic ecosystems. Many species possess significant ecological impacts, including their ability to form symbiosis with marine animals (for instance, as zooxanthellae, they underpin the coral reef ecosystem), parasitic relationships, harmful algal blooms (HABs), and their allelopathic activity. Conclusively, diversity and abundance of dinoflagellates can be utilised to gauge ecosystem changes and overall health.

Human Significance (Economic importance, human and veterinary importance): Dinoflagellates are particularly noteworthy due to their role in toxin production and the formation of harmful algal blooms (HABs). When these blooms release toxins into the aquatic environment, they can harm other marine life as well as human health. The toxins produced by dinoflagellates, known as dinotoxins, can accumulate in fish and shellfish, leading to severe illnesses if consumed by humans. While HABs can occur naturally, historical records show evidence of their existence long before human activities began to impact coastal ecosystems. The dinoflagellates responsible for these blooms have garnered increasing attention, primarily due to their economic implications. As a result, more research has been undertaken to understand their effects and develop control strategies. HABs are also known to cause respiratory irritations in humans, which can lead to the closure of beaches due to the potential health risks associated with these blooms. Consequently, it is widely recognized that HAB events can significantly affect the travel and tourism sector.

Threatened species as per IUCN (Numbers under different categories) : No species are included under IUCN as Threatened species.

Protected Species as per WPA (2022) (Number of species in different schedules) : No species are included under any schedule as per the WPA (2022)

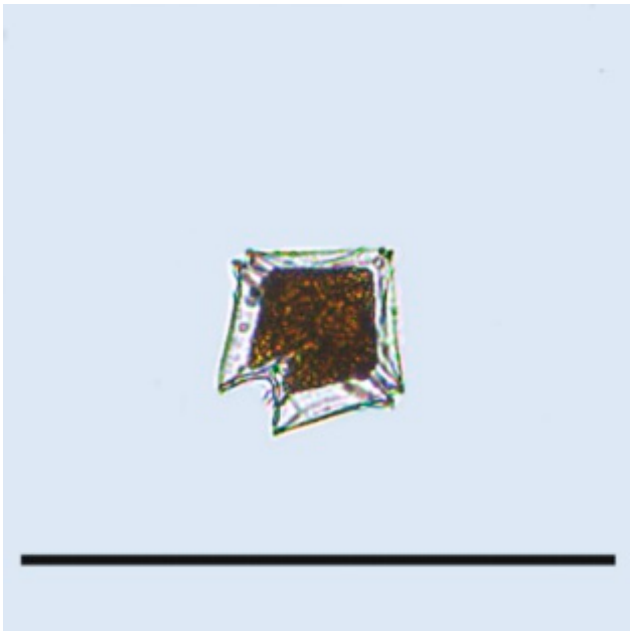
Species under CITES (Number of species) : No Indian species are listed under any appendices of CITES.

Invasive alien species (Number of species) : 4 invasive species: *Alexandrium catenella* (Whedon & Kofoid) Balech 1985; *Alexandrium minutum* Halim, 1960; *Alexandrium tamarense* (Lebour, 1925) Balech, 1995; *Gymnodinium catenatum* H.W.Graham 1943. These species mostly spread and extend their geographical range by means of translocation through ship ballast waters.

Gap areas (Discuss taxonomic and geographic gap areas): More research is needed in deep, oceanic waters. Research is needed to counter and manage the repeated instances of bloom formation, especially on the southern coasts of India. Despite their ecological significance, the genetic mechanisms for the ecological and functional strategies of dinoflagellates remain obscure. Advanced research efforts on these topics will provide potential information for confirmation of biosynthetic pathways and the development of novel bio-engineering applications.

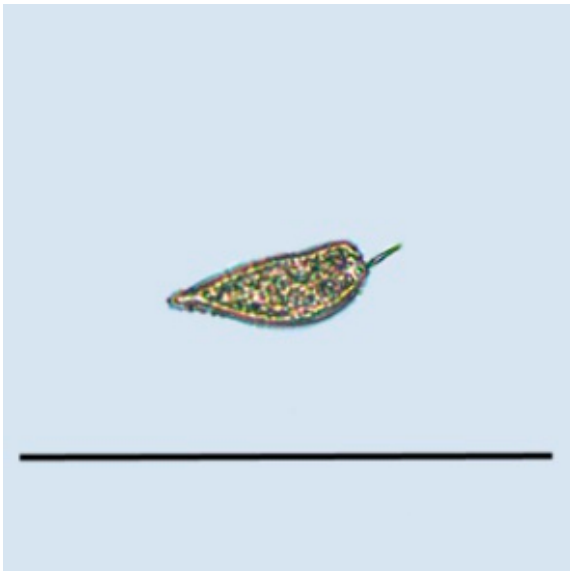
Images of the taxa

Dinophysis caudata Saville-Kent, 1881



Protoperidinium conicum (Gran) Balech, 1974

Tripos furca (Ehrenberg) F.Gómez, 2013



Prorocentrum gracile F.Schütt, 1895

Scale Bars: 200µm

Sl. No.	Species
	Phylum MYZOZOA Cavalier-Smith & Chao
	Infraphylum DINOFLAGELLATA Bütschli, 1885
	Class DINOPHYCEAE Fritsch, 1927
	Order AMPHIDINIALES Moestrup & Calado, 2018
	Family AMPHIDINIACEAE Moestrup & Calado, 2018
	Genus ***Amphidinium*** Claperède & Lachmann, 1859
1	*Amphidinium crassum* Lohmann 1908
	Order DINOPHYSALES Kofoid, 1926
	Family AMPHISOLENIACEAE Lindemann, 1928
	Genus ***Amphisolenia*** Stein, 1883
2	*Amphisolenia astragalus* Kofoid & Michener, 1911
3	*Amphisolenia bidentata* Schröder, 1900
4	*Amphisolenia globifera* Stein, 1883
5	*Amphisolenia schauinslandii* Lemmermann, 1899
6	*Amphisolenia schroederi* Kofoid, 1907
7	*Amphisolenia spinulosa* Kofoid, 1907
8	*Amphisolenia thrinax* Schütt, 1893
	Genus ***Triposolenia*** Kofoid, 1906
9	*Triposolenia bicornis* Kofoid, 1906
	Family DINOPHYSACEAE Bütschli, 1885
	Genus ***Citharistes*** Stein, 1883
10	*Citharistes apsteinii* F.Schütt, 1895
	Genus ***Dinophysis*** Ehrenberg, 1839
11	*Dinophysis acuminata* Claparède & Lachmann, 1859
12	*Dinophysis acuta* (Ehrenberg, 1839)
13	*Dinophysis apicata* (Kofoid and Skogsberg) Abé 1967
14	*Dinophysis argus* (Stein) Abé 1967
15	*Dinophysis caudata* Saville-Kent, 1881
16	*Dinophysis dens* Pavillard, 1915
17	*Dinophysis exigua* Kofoid & Skogsberg, 1928
18	*Dinophysis expulsa* Kofoid & Michener, 1911
19	*Dinophysis fortii* Pavillard, 1924
20	*Dinophysis hastata* Stein, 1883
21	*Dinophysis infundibulum* J.Schiller, 1928
22	*Dinophysis miles* Cleve, 1900
23	*Dinophysis norvegica* Claparède & Lachmann, 1859
24	*Dinophysis ovum* (F.Schütt) T.H.Abé, 1967
25	*Dinophysis parvula* (Schütt) Balech, 1967
26	*Dinophysis punctata* Jörgensen, 1923
27	*Dinophysis schuettii* Murray & Whitting, 1899
28	*Dinophysis swezyae* Kofoid & Skogsberg, 1928

Sl. No.	Species
29	*Dinophysis tripos* Gourret, 1883
30	*Dinophysis uracantha* Stein, 1883
	Genus ***Histioneis*** Stein, 1883
31	*Histioneis biremis* Stein, 1883
32	*Histioneis carinata* Kofoid, 1907
33	*Histioneis costata* Kofoid & Michener, 1911
34	*Histioneis depressa* Schiller, 1928
35	*Histioneis highleyi* Murray & Whitting, 1899
36	*Histioneis hyalina* (Kofoid and Michener,1911)
37	*Histioneis milneri* Murray & Whitting, 1899
38	*Histioneis mitchellana* Murray & Whitting, 1899
39	*Histioneis panda* Kofoid & Michener, 1911
40	*Histioneis pulchra* Kofoid, 1907
41	*Histioneis striata* (Kofoid and Michener, 1911)
	Genus ***Ornithocercus*** Stein, 1883
42	*Ornithocercus formosus* Kofoid & Michener, 1911
43	*Ornithocercus francescae* (Murray) Balech, 1962
44	*Ornithocercus heteroporus* Kofoid, 1907
45	*Ornithocercus magnificus* (Stein, 1883)
46	*Ornithocercus quadratus* (Schutt,1990)
47	*Ornithocercus skogsbergii* (Abé, 1967)
48	*Ornithocercus splendidus* Schütt, 1895
49	*Ornithocercus steinii* (Schutt,1990)
50	*Ornithocercus thumii* (Kofoid and Skogsberg,1928)
	Genus ***Parahistioneis*** Kofoid & Skogsberg, 1928
51	*Parahistioneis para* (Kofoid and Skogsberg, 1928)
	Family OXYPHYSACEAE Sournia, 1984
	Genus ***Phalacroma*** Stein, 1883
52	*Phalacroma acutum* (F.Schütt) Pavillard, 1916
53	*Phalacroma circumcinctum* Kofoid & Michener, 1911
54	*Phalacroma cuneus* (Schutt, 1895)
55	*Phalacroma doryphorum* (Stein, 1883)
56	*Phalacroma favus* (Kofoid and Michener, 1911)
57	*Phalacroma mitra* (Schutt,1895)
58	*Phalacroma rapa* (Jorgensen, 1923)
59	*Phalacroma rotundatum* (Claparéde & Lachmann) Kofoid & Michener, 1911
	Order GONYAULACALES Taylor, 1980
	Family CERATIACEAE Kofoid, 1907
	Genus ***Ceratium*** F.Schrank, 1793
60	*Ceratium hirundinella* (O.F. Muller) Dujardin, 1841
	Genus ***Tripos*** Bory de Saint-Vincent, 1823

Sl. No.	Species
61	*Tripos arietinus* (Cleve) F.Gómez, 2013
62	*Tripos axialis* (Kofoid) F.Gómez, 2013
63	*Tripos azoricus* (Cleve) F.Gómez, 2013
64	*Tripos belone (*Cleve) F.Gómez, 2013
65	*Tripos bigelowii* (Kofoid) F.Gómez, 2013
66	*Tripos brevis* (Ostenfeld & Schmidt) F.Gómez, 2013
67	*Tripos bucephalus* (Cleve) F.Gómez, 2013
68	*Tripos candelabrus* (Pouchet) F.Gómez, 2013
69	*Tripos carriensis* (Gourret) F.Gómez, 2013
70	*Tripos concilians* (Jørgenen) F.Gómez, 2013
71	*Tripos gracilis* (Pavillard) F.Gómez 2013
72	*Tripos deflexus* (Kofoid) F.Gómez, 2013
73	*Tripos dens* (Ostenfeld & Johannes Schmidt) F.Gómez, 2013
74	*Tripos euarcuatus* (Jørgensen) F.Gómez, 2013
75	*Tripos extensus* (Gourret) F.Gómez, 2013
76	*Tripos falcatiformis* (Jørgensen) F.Gómez, 2013
77	*Tripos falcatus* (Kofoid) F.Gómez, 2013
78	*Tripos furca* (Ehrenberg) F.Gómez, 2013
79	*Tripos fusus* (Ehrenberg) F.Gómez, 2013
80	*Tripos gallicus* (Kofoid) F.Gómez, 2013
81	*Tripos gibberus* (Gourret) F.Gómez, 2013
82	*Tripos gravidus* (Gourret) F.Gómez, 2013
83	*Tripos hexacanthus* (Gourret) F.Gómez, 2013
84	*Tripos inflatus* (Kofoid) F.Gómez, 2013
85	*Tripos karstenii* (Pavillard) F.Gómez, 1907
86	*Tripos kofoidii* (Jörgenen) F.Gómez, 2013
87	*Tripos lineatus* (Ehrenberg) F.Gómez, 2013
88	*Tripos longipes* (J.W. Bailey) F.Gómez, 2013
89	*Tripos longirostrus* (Gourret) F.Gómez, 2013
90	*Tripos longissimus* (Schröder) F.Gómez, 2013
91	*Tripos lunula* (Schimper ex Karsten) F.Gómez, 2013
92	*Tripos massiliensis* (Gourret) F.Gómez, 2013
93	*Tripos macroceros* (Ehrenberg) F.Gómez, 2013
94	*Tripos minutus* (Jørgensen) F.Gómez 2013
95	*Tripos muelleri* Bory de Saint-Vincent, 1826
96	*Tripos paradoxides* (Cleve) F.Gómez, 2013
97	*Tripos pavillardii* (Jørgensen) F.Gómez 2013
98	*Tripos pentagonus* (Gourret) F.Gómez, 2013
99	*Tripos platycornis* (Daday) F.Gómez 2021
100	*Tripos ranipes* (Cleve) F.Gómez 2013
101	*Tripos recurvus* (Jørgesen) F.Gómez, 2013

Sl. No.	Species
102	*Tripos schroeteri* (B.Schröder) F.Gómez, 2013
103	*Tripos setaceus* (Jørgesen) F.Gómez, 2013
104	*Tripos sumatranus* (Karsten) F.Gómez, 2013
105	*Tripos symmetricus* (Pavillard) F.Gómez 2021
106	*Tripos teres* (Kofoid) F.Gómez, 2013
107	*Tripos trichoceros* (Ehrenberg) Gómez, 2013
108	*Tripos vultur* (Cleve) F.Gómez, 2013
	Family GONYAULACACEAE Lindemann, 1928
	Genus ***Gonyaulax*** Diesing, 1866
109	*Gonyaulax brevisulcatum* P.A.Dangeard 1927
110	*Gonyaulax ceratocoroides* Kofoid, 1910
111	*Gonyaulax diegensis* Kofoid, 1911
112	*Gonyaulax fragilis* (Schütt) Kofoid, 1911
113	*Gonyaulax kofoidii* Pavillard, 1909
114	*Gonyaulax milneri* (Murray & Whitting) Kofoid, 1911
115	*Gonyaulax minima* Matzenauer, 1933
116	*Gonyaulax pacifica* Kofoid, 1907
117	*Gonyaulax pavillardii* Kofoid & Michener, 1911
118	*Gonyaulax polygramma* Stein, 1883
119	*Gonyaulax spinifera* (Claparède & Lachmann) Diesing, 1866
	Genus ***Lingulodinium*** D.Wall, 1967
120	*Lingulodinium polyedra* (F.Stein) J.D.Dodge, 1989
	Genus ***Protoceratium*** Bergh, 1881
121	*Protoceratium reticulatum* (Claparède & Lachmann) Bütschli, 1885
122	*Protoceratium spinulosum* (Murray & Whitting) Schiller, 1937
	Family HETERODINIACEAE Lindemann, 1928
	Genus ***Heterodinium*** Kofoid, 1906
123	*Heterodinium blackmanii* (Kofoid, 1906)
124	*Heterodinium fides* Kofoid, 1907
	Family LINGULODINIACEAE W.A.Sarjeant & C.Downie, 1974
	Genus ***Sourniaea*** H.Gu, K.N.Mertens, Zhun Li & H.H.Shin, 2020
125	*Sourniaea diacantha* (Meunier) H.Gu., K.N.Mertens, Zhun Li & H.H.Shin 2020
	Family OSTREOPSIDACEAE Lindemann, 1928
	Genus ***Alexandrium*** Halim, 1960
126	*Alexandrium catenella* (Whedon & Kofoid) Balech 1985
127	*Alexandrium insuetum* Balech, 1985
128	*Alexandrium minutum* Halim, 1960
129	*Alexandrium ostenfeldii* (Paulsen) Balech & Tangen 1985
130	*Alexandrium tamarense* (Lebour, 1925) Balech, 1995
	Family PYROPHACACEAE Lindemann, 1928
	Genus ***Pyrophacus*** Stein, 1883

Sl. No.	Species
131	*Pyrophacus horologium* Stein, 1883
132	*Pyrophacus steinii* (Schiller) Wall & Dale, 1971
133	*Pyrophacus vancampoae* (R.Rossignol) Wall & Dale, 1971
	Order GYMNODINIALES Lemmermann, 1910
	Family BRACHIDINIACEAE Sournia, 1972
	Genus ***Karenia*** Gert Hansen & Moestrup, 2000
134	*Karenia brevis* (C.C.Davis) Gert Hansen & Ø.Moestrup, 2000
135	*Karenia mikimotoi* (Miyake & Kominami ex Oda) Gert Hansen & Moestrup, 2000
136	*Karenia selliformis* A.J.Haywood, K.A.Steidinger & L.MacKenzie, 2004
	Family GYMNODINIACEAE Lankester, 1885
	Genus ***Akashiwo*** Gert Hansen & Moestrup, 2000
137	*Akashiwo sanguinea* (K.Hirasaka) G.Hansen & Ø.Moestrup, 2000
	Genus ***Gymnodinium*** F. Stein, 1878
138	*Gymnodinium abbreviatum* (Kofoid & Swezy, 1921)
139	*Gymnodinium catenatum* H.W.Graham, 1943
140	*Gymnodinium impudicum* (S.Fraga & I.Bravo) Gert Hansen & Ø.Moestrup, 2000
	Genus ***Gyrodinium*** Kofoid & Swezy, 1921
141	*Gyrodinium spirale* (Bergh) Kofoid & Swezy,1921
	Genus ***Margalefidinium*** F.Gómez, Richlen & D.M.Anderson, 2017
142	*Margalefidinium citron* (Kofoid & Swezy) F.Gómez, Richlen & D.M.Anderson 2017
143	*Margalefidinium polykrikoides* (Margalef) F.Gómez, Richlen & D.M.Anderson 2017
	Genus ***Torodinium*** Kofoid & Swezy, 1921
144	*Torodinium teredo* (Pouchet) Kofoid & Swezy, 1921
	Family POLYKRIKACEAE Kofoid & Swezy, 1921
	Genus ***Polykrikos*** Bütschli, 1873
145	*Polykrikos hartmannii* W.M.Zimmermann 1930
146	*Polykrikos kofoidii* Chatton, 1914
147	*Polykrikos schwartzii* Bütschli, 1873
	Family PTYCHODISCACEAE (Schütt) Lemmermann, 1899
	Genus ***Balechina*** Loeblich & A.R.Loeblich, 1968
148	*Balechina gracilis* (Bergh) F.Gómez, Artigas & Gast 2021
	Genus ***Berghiella*** Kofoid & J.R.Michener, 1911
149	*Berghiella josephinae* F.J.R. Taylor 1976
	Family GYMNODINIALES incertae sedis
	Genus ***Levanderina*** Ø.Moestrup, P.Hakanen, G.Hansen, N.Daugbjerg & M.Ellegaard, 2014
150	*Levanderina fissa* (Levander) Ø.Moestrup, P.Hakanen, G.Hansen, N.Daugbjerg & M.Ellegaard, 2014
	Order NOCTILUCALES Haeckel, 1894
	Family NOCTILUCACEAE Kent, 1881
	Genus ***Noctiluca*** Suriray, 1836
151	*Noctiluca scintillans* (Kofoid & Swezy, 1921)
	Family PROTODINIFERACEAE Kofoid & Swezy, 1921

Sl. No.	Species
	Genus ***Pronoctiluca*** Fabre-Domergue, 1889
152	*Pronoctiluca pelagica* Fabre-Domergue, 1889
153	*Pronoctiluca spinifera* (Lohmann) Schiller, 1932
	Order PERIDINIALES Haeckel, 1894
	Family HETEROCAPSACEAE R.A. Fensome, F.J.R. Taylor, G. Norris, W.A.S. Sarjeant, D.I. Wharton & G.L. Williams
	Genus ***Heterocapsa*** F.Stein, 1883
154	*Heterocapsa niei* (A.R.Loeblich) L.C.Morrill & A.R.Loeblich, 1981
	Family KRYPTOPERIDINIACEAE Er.Lindemann, 1925
	Genus ***Blixaea*** Gottschling, 2017
155	*Blixaea quinquecornis* (T.H.Abé) Gottschling 2017
	Family OXYTOXACEAE Lindemann, 1928
	Genus ***Oxytoxum*** Stein, 1883
156	*Oxytoxum scolopax* Stein, 1883
157	*Oxytoxum subulatum* Kofoid, 1907
	Family PERIDINIACEAE Ehrenberg, 1831
	Genus ***Peridinium*** Ehrenberg, 1830
158	*Peridinium quadridentatum* (F.Stein) Gert Hansen 1995
	Genus ***Scrippsiella*** Balech ex A.R.Loeblich III, 1965
159	*Scrippsiella trochoidea* (Stein) Loeblich III, 1976
	Family PERIDINIIDA Bergh 1881
	Genus ***Archaeperidinium*** Jörgensen, 1912
160	*Archaeperidinium minutum* (Kofoid) Jørgensen, 1912
	Genus ***Spiraulax*** Kofoid, 1911
161	*Spiraulax jolliffei* (Murray & Whitting) Kofoid, 1911
162	*Spiraulax kofoidii* H.W.Graham, 1942
	Family PODOLAMPADACEAE Lindemann, 1928
	Genus ***Podolampas*** Stein, 1883
163	*Podolampas bipes* (Stein, 1883)
164	*Podolampas elegans* (Schütt, 1895)
165	*Podolampas palmipes* (Stein, 1883)
166	*Podolampas reticulata* (Kofoid, 1907)
167	*Podolampas spinifera* (Okamura, 1912)
	Family PROTOPERIDINIACEAE J.P. Bujak & E.H. Davies,1983
	Genus ***Diplopelta*** F.Stein ex E.Jørgensen, 1912
168	*Diplopelta parva* (T.H.Abé) K.Matsuoka, 1988
	Genus ***Diplopsalis*** Bergh, 1881
169	*Diplopsalis lenticula* (Kissilev, 1935)
170	*Diplopsalis saecularis* Murray & Whitting, 1899
	Genus ***Diplopsalopsis*** Meunier, 1910
171	*Diplopsalopsis bomba* (Stein) J.D.Dodge & S.Toriumi, 1993
	Genus ***Gotoius*** T.H.Abé ex Matsuoka, 1988

Sl. No.	Species
172	*Gotoius abei* K.Matsuoka, 1988
	Genus ***Lebouraia*** T.H.Abé, 1941
173	*Lebouraia minuta* T.H.Abé, 1941
	Genus ***Preperidinium*** Mangin, 1913
174	*Preperidinium meunieri* (Pavillard) Elbrächter, 1993
	Genus ***Protoperidinium*** Bergh, 1881
175	*Protoperidinium abei* (Paulsen) Balech 1974
176	*Protoperidinium achromaticum* (Levander) Balech 1974
177	*Protoperidinium americanum* (Gran & Braarud, 1935) Balech, 1974
178	*Protoperidinium asymmetricum* (Abé, 1927) Balech, 1974
179	*Protoperidinium avellana* (Meunier, 1919) Balech, 1974
180	*Protoperidinium bipes* (Paulsen) Balech 1974
181	*Protoperidinium breve* (Balech, 1974)
182	*Protoperidinium brevipes* (Balech, 1974)
183	*Protoperidinium brochii* (Kofoid & Swezy, 1921) Balech, 1974
184	*Protoperidinium cerasus* (Paulsen) Balech 1973
185	*Protoperidinium claudicans* (Paulsen) Balech 1974
186	*Protoperidinium compressum* (Abé, 1927) Balech, 1974
187	*Protoperidinium conicum* (Balech, 1974)
188	*Protoperidinium crassipes* (Balech, 1974)
189	*Protoperidinium curtipes* (Balech, 1974)
190	*Protoperidinium denticulatum* (Gran & Braarud, 1935) Balech, 1974
191	*Protoperidinium depressum*(Balech, 1974)
192	*Protoperidinium diabolum* (Cleve, 1900) Balech, 1974
193	*Protoperidinium divaricatum* (Meunier) Balech, 1988
194	*Protoperidinium divergens* (Balech, 1974)
195	*Protoperidinium elegans* (Cleve, 1900) Balech, 1974
196	*Protoperidinium excentricum* (Paulsen, 1907) Balech, 1974
197	*Protoperidinium fatulipes* (Balech, 1974)
198	*Protoperidinium globulus* (Balech, 1974)
199	*Protoperidinium grande* (Kofoid, 1907) Balech, 1974
200	*Protoperidinium granii* (Balech, 1974)
201	*Protoperidinium heteracanthum* (Balech, 1974)
202	*Protoperidinium inflatum* (Okamura) Balech 1974
203	*Protoperidinium latispinum* (Mangin, 1926) Balech, 1974
204	*Protoperidinium latistriatum* (Balech, 1974)
205	*Protoperidinium leonis* (Pavillard, 1916) Balech, 1974
206	*Protoperidinium longicollum* Pavillard, 1916
207	*Protoperidinium marielebouriae* (Paulsen) Balech,1974
208	*Protoperidinium mite* (Pavillard) Balech, 1974
209	*Protoperidinium nudum* (Meunier, 1919) Balech, 1974

Sl. No.	Species
210	*Protoperidinium oblongum* (Parke & Dodge, 1976)
211	*Protoperidinium obtusum* (Karsten) Parke & Dodge, 1976
212	*Protoperidinium oceanicum* (Balech, 1974)
213	*Protoperidinium ovatum* (Pouchet, 1883)
214	*Protoperidinium ovum* (Schiller, 1911) Balech, 1974
215	*Protoperidinium pacificum* (Kofoid & Michener) F.J.R.Taylor & Balech ex Balech, 1988
216	*Protoperidinium pallidum* (Ostenfeld, 1899) Balech, 1973
217	*Protoperidinium paradoxum* (F.J.R.Taylor) Balech, 1994
218	*Protoperidinium pedunculatum* (Schütt, 1895) Balech, 1974
219	*Protoperidinium pellucidum* (Bergh, 1881)
220	*Protoperidinium pentagonum* (Gran, 1902) Balech, 1974
221	*Protoperidinium persicum* (J.Schiller) Okolodkov, 2008
222	*Protoperidinium punctulatum* (Paulsen) Balech, 1974
223	*Protoperidinium pyriforme* (Paulsen, 1905) Balech, 1974
224	*Protoperidinium quarnerense* (B.Schröder, 1900) Balech, 1974
225	*Protoperidinium sinaicum* (Matzenauer, 1933) Balech, 1974
226	*Protoperidinium solidicorne* (Mangin, 1926) Balech, 1974
227	*Protoperidinium steinii* (Balech, 1974)
228	*Protoperidinium stellatum* (D.Wall) M.Head, 1999
229	*Protoperidinium subinerme* (Paulsen) Loeblich III, 1969
230	*Protoperidinium subpyriforme* (P.-A.Dangeard, 1927) Balech, 1974
231	*Protoperidinium thorianum* (Paulsen, 1905) Balech, 1974
232	*Protoperidinium tenuissimum* (Kofoid) Balech 1974
233	*Protoperidinium tristylum* (Stein) Balech 1974
234	*Protoperidinium tuba* (Balech, 1974)
235	*Protoperidinium venustum* (Matzenauer, 1933) Balech, 1974
	Order PROROCENTRALES Lemmermann, 1910
	Family PROROCENTRACEAE Stein, 1883
	Genus ***Prorocentrum*** Ehrenberg, 1834
236	*Prorocentrum arcuatum* Issel, 1928
237	*Prorocentrum balticum* (Lohmann) Loeblich, 1970
238	*Prorocentrum concavum* Y.Fukuyo, 1981
239	*Prorocentrum cordatum* (Ostenfeld) J.D.Dodge, 1975
240	*Prorocentrum dentatum* Stein, 1883
241	*Prorocentrum gracile* Schütt, 1895
242	*Prorocentrum hoffmannianum* M.A.Faust, 1990
243	*Prorocentrum lenticulatum* (Matzenauer) F.J.R.Taylor, 1976
244	*Prorocentrum lima* (Ehrenberg) F.Stein, 1878
245	*Prorocentrum magnum* (Gaarder) J.D.Dodge, 1975
246	*Prorocentrum maximum* (Gourret) Schiller, 1937
247	*Prorocentrum mexicanum* Osorio-Tafall, 1942

Sl. No.	Species
248	*Prorocentrum micans* Ehrenberg, 1834
249	*Prorocentrum obtusum* Ostenfeld, 1908
250	*Prorocentrum ovale* (Gourret) J.Schiller, 1931
251	*Prorocentrum rostratum* Stein, 1883
252	*Prorocentrum scutellum* Schröder, 1900
253	*Prorocentrum triestinum* J.Schiller, 1918
	Order PYROCYSTALES Apstein, 1909
	Family PYROCYSTACEAE (Schütt, 1896) Lemmermann, 1899
	Genus ***Pyrocystis*** J.Murray ex Haeckel, 1890
254	*Pyrocystis fusiformis* C.W.Thomson, 1876
255	*Pyrocystis hamulus* Cleve, 1900
256	*Pyrocystis lunula* (Schütt) Schütt, 1896
257	*Pyrocystis pseudonoctiluca* Wyville-Thompson, 1876
258	*Pyrocystis rhomboides* (Matzenauer) Schiller, 1937
259	*Pyrocystis robusta* Kofoid, 1907

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