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CHECKLIST

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Species check-list for Tintinnids of the Philippines Archipelago (Protozoa, Ciliophora)

Jane Abigail Santiago[1], Maria Carmen Lagman[1]

1 *De La Salle University, Taft Avenue, Manila*

Corresponding author: *Maria Carmen Lagman* (ma.carmen.lagman@dlsu.edu.ph)

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Abstract

Tintinnids are an essential link between nano- and macro- planktons in the food webs of the marine environment. It is also known that tintinnids are one of the major components of marine planktonic ciliates and has a cosmopolitan character. In the Philippine archipelago, which is recognized as a center of marine biodiversity, tintinnids checklist has not been done or published. Therefore, a checklist is presented in this study based on a compilation of previous tintinnids studies conducted at the Philippines waters. As a result of the studies done since 1941 up to present, a total of 114 taxa belonging to 14 families and 37 genera were listed. The Philippines coastal waters record a total of 50 species while the open seas document 72 species to date.

Keywords

Ciliates, list, Manila Bay, Philippine Sea, plankton, zooplankton

Introduction

Microzooplankton (20–200μm) constitute a major component of the marine plankton community. Previously, the significance of microzooplankton (MZP) was commonly linked with microbial loop and corresponding microbial web (Calbet and Landry 2004, Calbet et al. 2008), but recent studies have shown that they also play a key

role in the herbivorous food web (Dolan et al. 2007, Putland and Iverson 2007). MZP graze a wide variety of particles from bacteria to nano- and phytoplankton as well as other similar organisms. They have a crucial role in the first feeding of the larval fishes (Stoecker and Capuzzo 1990, Fukami et al. 1999) and thus should be valued in the aquaculture industry. The awareness of the dynamic role of MZP in marine ecosystem resulted in the increase of scientific interest in the factors affecting their abundance and distribution. Research on microzooplankton arises as one of the vital parts of biological oceanography. In order to fully understand MZP behavior in different environments, a systematic qualitative study that includes listing of the species in a region is an essential step in exploring these organisms.

One of the best-known groups of marine microzooplanktonic ciliates is tintinnid (Kato and Taniguchi 1993). The distinctive characteristic of the tintinnid is its lorica, which has been the basis of their identification and classification. The easiness in identifying tintinnids based on their morphological features made them model specimens for research on species distributions, diversity, and variations in the structure of microzooplankton communities (Dolan and Gallegos 2001). Studies about the tintinnids distribution are essential due to the fact that they have been used as bio-indicators of different water massess (Kim et al. 2012). For example, the tintinnid species named *Epiplocyloides reticulata* (Ostenfeld & Schmidt, 1901) has been acknowledged as the Kuroshio water current indicator (Lee and Kim 2010). Records of *E. reticulata* are important to know the geographic extension of the warm Kuroshio current and the possible areas it can affect. A documentation of the tintinnid distribution is recognized as one of the best method to trace the flow of the water mass in open oceans and coastal waters (Lee and Kim 2010). In an archipelagic country such as Philippines, conducting tintinnid studies can be helpful in tracing different water masses and can aid in the assessment and management of its marine environment. However, tintinnids are poorly studied in the Philippines, a place which has been recognized as the center of the center of marine shore fish biodiversity (Carpenter and Springer 2005). A species- checklist for tintinnids specific for the Philippines can be a good starting point for any researcher who wants to conduct a tintinnid survey or any type of investigation in the country.. In order to assist other possible and future tintinnids studies in the Philippines, this present work aims to present the first and current checklist of tintinnid species in the Philippines. The authors also made this list to encourage other researcher to increase tintinnid studies in the Philippines. This study is based on a compilation of the literature to date.

Materials and methods

The Philippines archipelago is bound by the Bashi Channel to the north, the Philippine Sea to the east and northeast, the Celebes Sea to the south, the Sulu Sea to the southwest, and the South China Sea to the west and northwest side.

In this study, all published literature from 1941 to 2017 was examined. Taxonomical species and author names were written according to Roxas (1941), Gómez (2007),

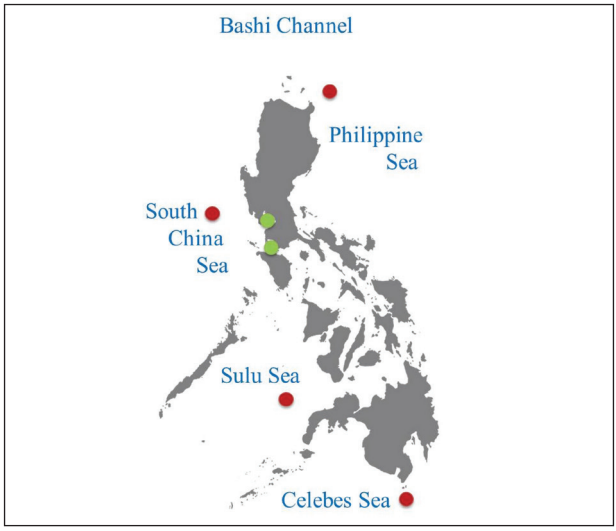

Figure 1. Map of the Philippines. Dots imdicate the sites with recorded tintinnid species. Key: green dots: coastal water; red dots: open sea.)

Kim et al. (2012) and Santiago et al. (2017).The study of Taniguchi (1977) was not included as a reference in enumerating tintinnid species since he only referred tintinnids as a group and his paper does not contain any detailed list of tintinnid species. The WoRMS (World Register of Marine Species) data system (Warren 2018) was used for classification and basis of the current species name. The species checklist in this study is alphabetically ordered.

Results

In related studies conducted in the Philippines, 114 tintinnid species belonging to 14 families and 37 genera have been recorded. The families Codonellidae (22 species, 19.30%) and Tintinnidae (21 species, 18.42%) have the highest recorded species (Table 3).
The systematic list and biogeographical distribution of the species are presented below:

Kingdom: Chromista
Subkingdom: Harosa
Phylum: Ciliophora Doflein, 1901
Class: Oligotrichea Bütschli, 1887
Subclass: Oligotrichia Bütschli, 1887
Order: Choreotrichida Small & Lynn, 1985
Family: **Ascampbelliellidae** Corliss, 1960
Genus: *Acanthostomella* Jörgensen, 1927
Acanthostomella conicoides Kofoid & Campbell, 1929
Acanthostomella minutissima Kofoid & Campbell, 1929

Genus: *Ascampbelliella* Corliss, 1960
Ascampbelliella acuta (Kofoid & Campbell, 1929)
Ascampbelliella armilla (Kofoid & Campbell, 1929)
Ascampbelliella retusa (Hada, 1935)
Ascampbelliella urceolata (Ostenfeld, 1899)
Genus: Craterella Kofoid & Campbell, 1929
Craterella aperta Marshall
Family: **Codonellidae** Kent, 1881
Genus: *Codonaria* Kofoid & Campbell, 1939
Codonaria oceanica (Brandt, 1906)
Genus: *Codonella* Haeckel, 1873
Codonella amphorella Biedermann, 1893
Genus: *Poroecus* Cleve, 1902
Poroecus annulatus Kofoid & Campbell, 1929
Poroecus apicatus Kofoid & Campbell, 1929
Genus: *Tintinnopsis* Stein, 1867
Tintinnopsis bacoornensis Roxas, 1941
Tintinnopsis beroidea Stein, 1867
Tintinnopsis buetschlii Daday, 1887
Tintinnopsis campanula Ehrenberg, 1840
Tintinnopsis chinglanensis Nie & Cheng, 1947
Tintinnopsis corniger Hada, 1964
Tintinnopsis cylindrica Daday, 1887
Tintinnopsis directa Hada, 1932
Tintinnopsis gracilis Kofoid & Campbell, 1929
Tintinnopsis loricata Brandt, 1906
Tintinnopsis major Meunier, 1910
Tintinnopsis manilensis Roxas, 1941
Tintinnopsis mortensenii Schmidt, 1902
Tintinnopsis radix (Imhof, 1886)
Tintinnopsis rotundata Kofoid & Campbell, 1929
Tintinnopsis tocantinensis Kofoid & Campbell, 1929
Tintinnopsis turgida Kofoid & Campbell, 1929
Tintinnopsis uruguayensis Balech, 1948
Family: **Codonellopsidae** Kofoid & Campbell, 1929
Genus: *Codonellopsis* Jörgensen, 1924
Codonellopsis morchella (Cleve) Jörgensen, 1924
Codonellopsis orthoceras (Haeckel, 1873) Jörgensen, 1924
Codonellopsis ostenfeldi (Schmidt, 1902) Kofoid & Campbell, 1929
Codonellopsis pusilla (Cleve) Jörgensen, 1924
Codonellopsis schabi (Brandt, 1906) Kofoid & Campbell, 1929
Family: **Cyttarocylididae** Kofoid & Campbell, 1939
Genus: *Cyttarocylis* Fol, 1881
Cyttarocylis cassis (Haeckel, 1837)

Family: **Dictyocystidae** Haeckel, 1873
- Genus: Wangiella Nie, 1934
  - *Wangiella dicollaria* Nie, 1934
- Genus: *Dictyocysta* Ehrenberg, 1854
  - *Dictyocysta elegans* Ehrenberg, 1854
  - *Dictyocysta mitra* Haeckel, 1873

Family: **Epiplocylididae** Kofoid & Campbell, 1939
- Genus: *Epiplocylis* Jörgensen, 1924
  - *Epiplocylis calyx* (Brandt, 1906)
  - *Epiplocylis exquisita* Kofoid & Campbell, 1929
  - *Epiplocylis undella* (Ostenfeld & Schmidt) Jörgensen, 1927
- Genus: *Epiplocyloides* Hada, 1938
  - *Epiplocyloides acuta* (Kofoid & Campbell,1929)
  - *Epiplocyloides ralumensis* (Brandt, 1906)
  - *Epiplocyloides reticulata* (Ostenfeld & Schmidt, 1901)

Family: **Metacylididae** Kofoid & Campbell, 1929
- Genus: *Coxliella* Brandt
  - *Coxliella longa* Kofoid & Campbell, 1929
  - *Coxliella mariana* Hada, 1938
- Genus: *Metacylis* Jörgensen, 1924
  - *Metacylis hemisphaerica* Roxas, 1941
  - *Metacylis jörgensenii* (Cleve) Kofoid & Campbell, 1929
  - *Metacylis kofoidi* Roxas, 1941
  - *Metacylis tropica* Duran, 1957
- Genus: *Helicostomella* Jörgensen, 1924
  - *Helicostomella longa* (Brandt, 1906)
- Genus: *Climacocylis* Jörgensen, 1924
  - *Climacocylis elongata* Kofoid & Campbell, 1929
  - *Climacocylis* cf. *leospiralis* Kofoid & Campbell
  - *Climacocylis scalaria* Brandt, 1906
  - *Climacocylis sipho* (Brandt, 1906) Kofoid & Campbell, 1929

Family: **Petalotrichidae** Kofoid & Campbell, 1929
- Genus: *Petalotricha* Kent, 1881
  - *Petalotricha major* Jörgensen, 1925

Family: **Ptychocylididae** Kofoid & Campbell, 1929
- Genus: *Favella* Jörgensen, 1924
  - *Favella ehrenbergii* (Claparède & Lachmann, 1858) Jörgensen, 1924
  - *Favella simplex* Roxas, 1941
  - *Favella philippinensis* Roxas, 1941
  - *Favella elongata* Roxas, 1941
  - *Favella azorica* (Cleve, 1900) Jörgensen, 1924

Family: **Rhabdonellidae** Kofoid & Campbell, 1929
- Genus: *Rhabdonella* Brandt, 1906
  - *Rhabdonella amor* (Cleve, 1900) Brandt, 1907

Rhabdonella apophysata Jörgensen, 1924
Rhabdonella brandti Kofoid & Campbell, 1929
Rhabdonella conica Kofoid & Campbell, 1929
Rhabdonella cornucopia Kofoid & Campbell, 1929
Rhabdonella elegans Jörgensen, 1924
Rhabdonella exilis Kofoid & Campbell, 1929
Rhabdonella sanyahensis Nie & Cheng, 1947
Rhabdonella fenestrata Roxas, 1941
Rhabdonella valdestriata (Brandt) Kofoid & Campbell, 1929
Rhabdonella spiralis (Fol, 1881)
Genus: *Protorhabdonella* Jörgensen, 1924
Protorhabdonella curta Cleve, 1900
Protorhabdonella simplex (Cleve) Jörgensen, 1924
Protorhabdonella striatura Kofoid & Campbell, 1929
Family: **Tintinnidae** Claparède & Lachmann, 1858
Genus: *Amphorellopsis* Kofoid & Campbell, 1929
Amphorellopsis acuta (Schmidt, 1902)
Genus: *Amphorides* Strand, 1928
Amphorides amphora (Claparède & Lachmann, 1858)
Amphorides quadrilineata (Claparède & Lachmann, 1858)
Amphorides minor Jörgensen, 1924
Genus: *Brandtiella* Kofoid & Campbell, 1929
Brandtiella palliata (Brandt, 1906) Kofoid & Campbell, 1929
Genus*: Canthariella* (Kofoid & Campbell, 1929)
Canthariella pyramidata (Jörgensen, 1924) Kofoid & Campbell, 1929
Genus: *Dadayiella* Kofoid & Campbell, 1929
Dadayiella ganymedes (Entz, 1884) Kofoid & Campbell, 1929
Dadayiella pachytoecus (Dendy, 1924)
Genus: *Eutintinnus* Kofoid & Campbell, 1939
Eutintinnus apertus Kofoid & Campbell, 1929
Eutintinnus fraknoii (Daday, 1887)
Eutintinnus lusus-undae (Entz, 1885)
Eutintinnus stramentus (Kofoid & Campbell, 1929)
Genus *Ormosella* Kofoid & Campbell, 1929
Ormosella haeckeli Kofoid & Campbell, 1929
Genus: *Salpingella* Jörgensen, 1924
Salpingella acuminata (Claparède & Lachmann, 1858) Jörgensen, 1924
Salpingella acuminatoides (Laackmann) Kofoid & Campbell, 1929
Salpingella attenuata Kofoid & Campbell, 1929
Salpingella decurtata Jörgensen, 1924
Salpingella subconica Kofoid & Campbell, 1929

Genus: *Steenstrupiella* Kofoid & Campbell, 1929
Steenstrupiella intumescens (Jörgensen, 1924) Kofoid & Campbell, 1929
Steenstrupiella steenstrupii (Claparède & Lachmann, 1858) Kofoid & Campbell, 1929
Genus: *Tintinnus* Schrank, 1803
Tintinnus perminutus Kofoid & Campbell, 1929
Family: **Tintinnidiidae** Kofoid & Campbell
Genus*: Tintinnidium* Kent, 1881
Tintinnidium primitivum Busch, 1923
Tintinnidium cylindrica Daday, 1886
Tintinnidium ampullarium Roxas, 1941
Genus*: Leprotintinnus* Jörgensen, 1899
Leprotintinnus nordqvistii (Brandt, 1906) Kofoid & Campbell, 1929
Leprotintinnus tubulosus Roxas, 1941
Family: **Undellidae** Kofoid & Campbell, 1929
Genus: *Undella* Daday, 1887
Undella claparedei (Entz) Daday, 1887
Undella clevei Jörgensen, 1924
Undella hyalina Daday, 1887
Undella subcaudata Jörgensen, 1924
Family: **Xystonellidae** Kofoid & Campbell, 1929
Genus: *Parundella* Jörgensen, 1924
Parundella aculeata (Joergensen, 1924)
Parundella caudata (Ostenfeld, 1899) Jörgensen, 1924
Parundella inflata Kofoid & Campbell, 1929
Parundella longa Joergensen, 1924
Genus: *Xystonella* Brandt, 1907
Xystonella treforti (Daday, 1887)
Genus: *Xystonellopsis* Jörgensen, 1924
Xystonellopsis brandti (Laackmann) Jörgensen, 1924
Xystonellopsis cymatica (Brandt, 1906) Jörgensen, 1924
Xystonellopsis dahli (Brandt, 1906) Kofoid & Campbell, 1929
Xystonellopsis paradoxa (Cleve, 1900) Jörgensen, 1924

The study of Roxas (1941) contained the first recorded tintinnid species in the Philippines. Roxas (1941) documented 32 tintinnid species wherein ten were newly discovered species (Table 2). *Favella simplex*, *Favella philippinensis,* and *Favella elongata* were the only accepted and registered species in the WoRMS database (Warren 2018) among the said newly discovered species. The other newly discovered species are still included in this present checklist due to the scarcity of tintinnid studies in the Philippines. The other newly discovered species were not recorded in any other studies and

we took into consideration that they might be endemic in the area where Roxas (1941) collected them. Roxas also misspelled *Leprotinntinnus nordqvistii,* which he recorded as *Leprotinntinnus nordquisti.*

Since 1941, only three other studies (Gómez 2007, Kim et al. 2012, Santiago et al. 2017) were made in the Philippines that identified tintinnids to species level. The paper of Roxas (1941) and Santiago et al. (2017) recorded a total of 50 tintinnid species from coastal waters of Manila Bay (39 species) and Puerto Galera Bay (11 species). On the other hand, Gómez (2007) and Kim et al. (2012) conducted their sample collection within the Philippines open seas, which amounted to 72 tintinnid species.

Tintinnopsis, Codonellopsis, Coxliella, Metacylis, Rhabdonella, Epiplocylis and *Eutintinus* were the genera that both appeared in coastal and open waters (Table 1). There were eight genera that were only recorded in coastal waters and a total of 24 genera were solely found in the open seas (Table 1). *Epiplocylis undella* and *Rhabdonella spiralis* were the only species common to all of four tintinnid studies in the Philippines (Table 2).

Discussion

Presently, there are only four related studies (Roxas 1941, Gómez 2007, Kim et al. 2012, Santiago et al. 2017) that contain tintinnid species in the Philippines. Roxas (1941) and Santiago et al. (2017) conducted their zooplankton collection within the Philippines coastal waters while Gómez (2007) and Kim et al. (2012) had cruises along the open seas. Table 1 and 2 showed the tintinnids distribution between open seas and coastal waters. This is an important data because some of the tintinnids were categorized into biogeographical groups (Pierce and Turner 1993). The studies (Lee and Kim 2010, Kim et al. 2012) that utilized tintinnids as indicator species used their biogeographical groups to assess water quality and mass movements. In this present study, there are species and genera that were only recorded in one area and some both appeared in open seas and coastal waters. Hence, the variation of the tintinnids distribution between open seas and coastal waters in this current work might help in further classification of tintinnid species to their biogeographical groups.

It should also be noted that each of the said four studies had a different sampling technique and effort. Roxas (1941) towed a no. 20 plankton net with 176 mesh per inch which means that it has an aperture of 0.076 mm or 76 μm. The plankton net that Santiago et al. 2017 used has 64 μm mesh size. These can indicate that the majority of the collected species of Roxas (1941) and Santiago et al. 2017 were large tintinnid species (>64 μm). Microzooplankton size range from 20 to 200 μm, thus, collecting tintinnids through plankton net with a relatively larger aperture size can result in loss of most of the smaller-sized tintinnids.

In the studies conducted in Philippines open seas, Gómez (2007) used Niskin bottles while Kim et al. (2012) towed a 20 μm mesh-plankton-net. The differences in methodologies and lack of standardization of sampling technique on tintinnids collection (Gómez 2007) can add complication on the analysis and comparison of

Table 1. Summary of the tintinnid appearance between coastal and open seas by genus.

	Coastal	Open sea	Both
	Favella	*Acanthostomella*	*Codonellopsis*
	Helicostomella	*Amphorellopsis*	*Coxliella*
	Leprotintinnus	*Amphorides*	*Epiplocylis*
	Petalotricha	*Ascampbelliella*	*Eutintinnus*
	Tintinnidium	*Brandtiella*	*Metacylis*
	Tintinnus	*Canthariella*	*Rhabdonella*
	Wangiella	*Climacocylis*	*Tintinnopsis*
		Codonaria	
		Codonella	
		Craterella	
		Cyttarocylis	
		Dadayiella	
		Dictyocysta	
		Epiplocylididae	
		Epiplocyloides	
		Ormosella	
		Parundella	
		Poroecus	
		Protorhabdonella	
		Salpingella	
		Steenstrupiella	
		Undella	
		Xystonella	
		Xystonellopsis	
Total	**7**	**24**	**7**

Table 2. Distribution of tintinnid species reported in the Philippines. The open sea has records from the southwest (**SW**) seas that include Sulu, Celebes and South China Sea (Gómez 2007). The northeast **(NE**) was based on the study of Kim et al. (2012) in the Philippine Sea. The species in the Coastal areas were from Manila bay (**MB**) (Roxas 1941, Santiago et al. 2017) and Puerto Galera Bay (**PG**) (Roxas 1941). An asterisk (*) denotes new species.

Taxon	**Open sea**		**Coastal**	
	SW	**NE**	**MB**	**PG**
1. *Acanthostomella conicoides*		+		
2.*Acanthostomella minutissima*	+			
3. *Amphorellopsis acuta*		+		
4. *Amphorides amphora*	+	+		
5. *Amphorides minor*		+		
6. *Amphorides quadrilineata*	+	+		
7. *Ascampbelliella acuta*		+		
8. *Ascampbelliella armilla*	+			
9. *Ascampbelliella retusa*	+			
10. *Ascampbelliella urceolata*		+		

Taxon	Open sea		Coastal	
	SW	NE	MB	PG
11. *Brandtiella palliata*	+	+		
12. *Canthariella pyramidata*	+	+		
13. *Climacocylis cf. leospiralis*	+			
14. *Climacocylis elongata*		+		
15. *Climacocylis scalaria*	+	+		
16. *Climacocylis sipho*		+		
17. *Codonaria oceanica*	+			
18. *Codonella amphorella*		+		
19. *Codonellopsis morchella*			+	
20. *Codonellopsis orthoceras*		+	+	
21. *Codonellopsis ostenfeldi*			+	
22. *Codonellopsis pusilla*	+			
23. *Codonellopsis schabi*	+			
24. *Coxliella longa*			+	
25. *Coxliella mariana*		+		
26. *Craterella aperta*	+			
27. *Cyttarocylis cassis*		+		
28. *Dadayiella ganymedes*	+	+		
29. *Dadayiella pachytoecus*		+		
30. *Dictyocysta elegans*	+	+		
31. *Dictyocysta mitra*		+		
32. *Epiplocylis calyx*		+		
33. *Epiplocylis exquisita*				+
34. *Epiplocylis undella*	+	+	+	+
35. *Epiplocyloides acuta*		+		
36. *Epiplocyloides ralumensis*				+
37. *Epiplocyloides reticulata*	+			
38. *Eutintinnus apertus*	+			
39. *Eutintinnus fraknoii*	+	+	+	
40. *Eutintinnus lusus-undae*	+	+	+	
41. *Eutintinnus stramentus*	+	+		
42. *Favella azorica*				+
43. *Favella ehrenbergii*			+	
44. *Favella elongate**			+	
45. *Favella philippinensis**			+	
46. *Favella simplex**			+	
47. *Helicostomella longa*			+	
48. *Leprotintinnus nordqvistii*			+	
49. *Leprotintinnus tubulosus**			+	
50. *Metacylis hemisphaerica**				+
51. *Metacylis jörgensenii*		+	+	
52. *Metacylis kofoidi**				+
53. *Metacylis tropica*			+	
54. *Ormosella haeckeli*		+		
55. *Parundella aculeata*	+			
56. *Parundella caudata*		+		

Taxon	Open sea		Coastal	
	SW	NE	MB	PG
57. *Parundella inflata*		+		
58. *Parundella longa*	+			
59. *Petalotricha major*				+
60. *Poroecus annulatus*	+			
61. *Poroecus apicatus*		+		
62. *Protorhabdonella curta*	+	+		
63. *Protorhabdonella simplex*	+	+		
64. *Protorhabdonella striatura*		+		
65. *Rhabdonella amor*	+	+		+
66. *Rhabdonella apophysata*	+	+		
67. *Rhabdonella brandti*				+
68. *Rhabdonella conica*			+	
69. *Rhabdonella cornucopia*		+		
70. *Rhabdonella elegans*	+			
71. *Rhabdonella exilis*		+		
72. *Rhabdonella fenestrata**				+
73. *Rhabdonella sanyahensis*				
74. *Rhabdonella spiralis*	+	+	+	+
75. *Rhabdonella valdestriata*		+		
76. *Salpingella acuminata*	+	+		
77. *Salpingella acuminatoides*		+		
78. *Salpingella attenuata*	+			
79. *Salpingella decurtata*	+			
80. *Salpingella subconica*		+		
81. *Steenstrupiella intumescens*		+		
82. *Steenstrupiella steenstrupii*	+	+		
83. *Tintinnidium ampullarium**			+	
84. *Tintinnidium cylindrica*			+	
85. *Tintinnidium primitivum*			+	
86. *Tintinnopsis bacoornensis**			+	
87. *Tintinnopsis beroidea*			+	
88. *Tintinnopsis buetschlii*			+	
89. *Tintinnopsis campanula*	+			
90. *Tintinnopsis chinglanensis*			+	
91. *Tintinnopsis corniger*			+	
92. *Tintinnopsis cylindrica*			+	
93. *Tintinnopsis directa*			+	
94. *Tintinnopsis gracilis*			+	
95. *Tintinnopsis loricata*			+	
96. *Tintinnopsis major*			+	
97. *Tintinnopsis manilensis**			+	
98. *Tintinnopsis mortensenii*			+	
99. *Tintinnopsis radix*			+	
100. *Tintinnopsis rotundata*			+	
101. *Tintinnopsis tocantinensis*			+	
102. *Tintinnopsis turgida*			+	

Taxon	Open sea		Coastal	
	SW	NE	MB	PG
103. *Tintinnopsis uruguayensis*			+	
104. *Tintinnus perminutus*			+	
105. *Undella claparedei*	+	+	+	
106. *Undella clevei*	+			
107. *Undella hyalina*		+		
108. *Undella subcaudata*	+			
109. *Wangiella dicollaria*			+	
110. *Xystonella treforti*	+	+		
111. *Xystonellopsis brandti*		+		
112. *Xystonellopsis cymatica*	+	+		
113. *Xystonellopsis dahli*		+		
114. *Xystonellopsis paradoxa*		+		
108. *Undella subcaudata*	+			
109. *Wangiella dicollaria*			+	
110. *Xystonella treforti*	+	+		
111. *Xystonellopsis brandti*		+		
112. *Xystonellopsis cymatica*	+	+		
113. *Xystonellopsis dahli*		+		
114. *Xystonellopsis paradoxa*		+		
108. *Undella subcaudata*	+			
109. *Wangiella dicollaria*			+	
110. *Xystonella treforti*	+	+		
111. *Xystonellopsis brandti*		+		
112. *Xystonellopsis cymatica*	+	+		
113. *Xystonellopsis dahli*		+		
114. *Xystonellopsis paradoxa*		+		

Table 3. Percentage (%) Distribution of Tintinnids families from the Philippines.

Family	Genus	Species	%
Ascampbelliellidae	3	7	6.14
Codonellidae	**4**	**22**	**19.30**
Codonellopsidae	1	5	4.39
Cyttarocylididae	1	1	0.88
Dictyocystidae	2	3	2.63
Epiplocylididae	2	6	5.26
Metacylididae	4	11	9.65
Petalotrichidae	1	1	0.88
Ptychocylididae	1	5	4.39
Rhabdonellidae	2	14	12.28
Tintinnidae	**10**	**21**	**18.42**
Tintinnidiidae	2	5	4.39
Undellidae	1	4	3.51
Xystonellidae	3	9	7.89

their biogeographical distribution. Apparently, more studies on tintinnids in the Philippines and a standard of methodology should be established. The authors executed this current work to serve as a starting point for other researchers and encourage them to conduct studies on tintinnids in a center of marine biodiversity such as the Philippines.

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