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Rotifera from southeastern Mexico, new records and comments on zoogeography

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Resumen. Se examinaron muestras litorales y pelágicas procedentes de 36 sistemas acuáticos del sureste de México y la Península de Yucatán. Se encontraron 128 taxa, de los cuales 22 constituyen ampliaciones de ámbito para esta región (*Epiphanes brachionus* f. *spinosus*, *Anuraeopsis navicula*, *Euchlanis semicarinata*, *Macrochaetus collinsi*, *Colurella sulcata*, *C. uncinata* f. *bicuspidata*, *Lepadella costatoides*, *L. cyrtopus*, *Lecane curvicornis* f. *lofuana*, *L. curvicornis* f. *nitida*, *L. rhytida*, *Scaridium bostjani*, *Trichocerca elongata* f. *braziliensis*, *Dicranophorus epicharis*, *D. halbachi*, *D. prionacis*, *Testudinella mucronata* f. *hauerensis*, *Limnias melicerta*, *Ptygura libera*, *Hexarthra intermedia* f. *braziliensis*, *Filinia novaezealandiae* y *Collotheca ornata*. Todos los nuevos registros se ilustran y discuten. Adicionalmente se comenta sobre la distribución geográfica de las especies encontradas.

Palabras clave: rotíferos, taxonomía, distribución, Syndermata, nuevo registro.

Abstract. Littoral and limnetic samples from 36 water-systems located in the Yucatan Peninsula and southeastern Mexico were examined for rotifer fauna. We recorded 128 rotifer taxa, 22 of which are new records for Mexico. These species are *Epiphanes brachionus* f. *spinosus*, *Anuraeopsis navicula*, *Euchlanis semicarinata*, *Macrochaetus collinsi*, *Colurella sulcata*, *C. uncinata* f. *bicuspidata*, *Lepadella costatoides*, *L. cyrtopus*, *Lecane curvicornis* f. *lofuana*, *L. curvicornis* f. *nitida*, *L. rhytida*, *Scaridium bostjani*, *Trichocerca elongata* f. *braziliensis*, *Dicranophorus epicharis*, *D. halbachi*, *D. prionacis*, *Testudinella mucronata* f. *hauerensis*, *Limnias melicerta*, *Ptygura libera*, *Hexarthra intermedia* f. *braziliensis*, *Filinia novaezealandiae* and *Collotheca ornata*. All new records are described and discussed. Additionally, some geographical comments about the species are given.

Key words: rotifers, new record, taxonomy, Syndermata, distribution

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Introduction

The knowledge of the rotifer fauna of southeastern Mexico (Chiapas, southern Veracruz and Tabasco), and the Yucatan Peninsula is almost nonexistent, with only one previous survey in the latter (Sarma & Elías-Gutiérrez 1999). The Mexican tropical region is characterized by diverse natural water bodies (Alcocer & Escobar 1996), many of which have not been studied. For instance, this paper reports for the first time information on the rotifer fauna of Chiapas. We are still far from a complete picture of the diversity and species distribution in a region with contrasting physiographic conditions, and a well recognized megadiversity (Vásquez 1992; West *et al.* 1987). This study provides data on the diversity of the rotifer fauna in ponds, sinkholes and lakes of the Yucatan Peninsula and southeastern Mexico.

Methods

Biological samples were collected from 36 water bodies located in the states of Chiapas, Tabasco and Quintana Roo (Fig. 1). Sampling was carried out in different dates by using a plankton net (50 mm mesh size). At the same time of sampling, some environmental variables were measured *in situ*: maximum depth, temperature and dissolved oxygen with a YSI oxymeter, and pH with a field pHmeter. Date of collections, geographical coordinates and environmental characteristics are resumed in Table 1. Qualitative samples were immediately preserved in 4% formalin, and included limnetic and littoral regions. In the limnetic zone, a vertical tow was performed in deeper systems (>5m depth), and a surface tow was done in shallow systems. Littoral sampling included all possible habitats for rotifers: submersed vegetation, bottom dwellers, etc. Organisms were sorted and identified following Koste (1978), Segers (1994), Nogrady *et al.* (1995), and De Smet & Pourriot (1997). When needed, original descriptions were used. When necessary, trophi were examined by dissolving the animals with a diluted sodium hypoclorate solution.

Illustrations of specimens representing new records were done by using a camera lucida attached to a Nikon optical microscope. Subspecific level information was incorporated in some cases, because rotifer taxonomy is changing rapidly and some subspecies or varieties are now valid species (*e.g.* Segers 1994; Sarma 2002). Even at genus and family level, rotifers are still confused (Segers 2002). All material and original samples were deposited at El Colegio de la Frontera Sur, Reference Collection of Zooplankton (ECO-CHZ). Some aspects related to the geographic distribution of the rotifer fauna in this region are discussed.

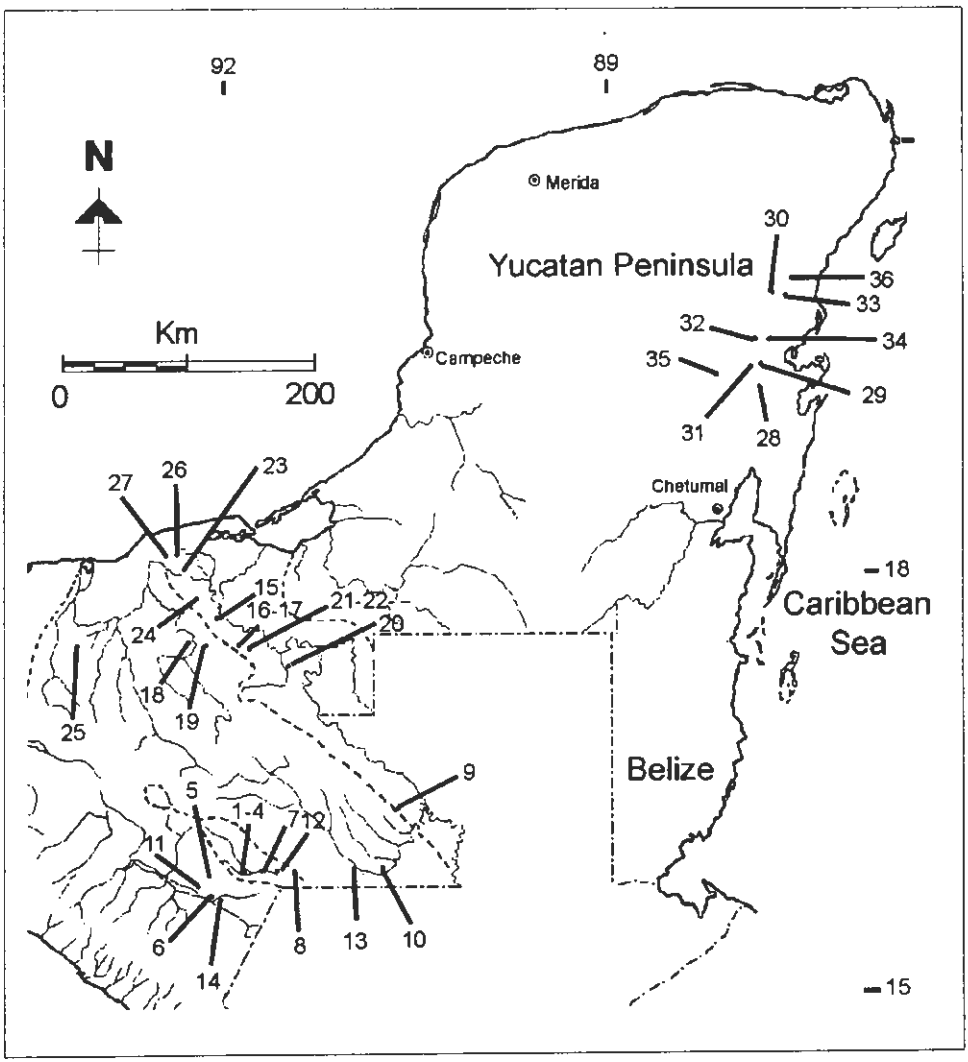


Fig. 1. Location of the systems in the study area. 1-4. Tziscao, Montebello, Escondida and La Cañada. 5. Pojoj. 6. Cenote Pojoj. 7. Nuevo San Juan Chamula. 8. Ejido Ixcan. 9. Km 109+108.10. Nuevo Orizaba. 11. Comitán-Montebello. 12. Puente Arroyo. 13. Km 131+500. 14. Km 123. 15. Balancan I. 16-17. Leona Vicario I and Leona Vicario II. 18. Báscula. 19. El Tigre. 20. El Pulsar. 21-22. Popalillo and El Guanal. 23. El Guao. 24. El Pajonal. 25. Matillas. 26. Km 51. 27. El Espino. 28. Noh ts'onot. 29. Esperanza. 30. Donato. 31. Galeana. 32. El Padre. 33. Km 157A. 34. Minicenote. 35. Kaná. 36. Chunyaxché.

Table 1. Localities, dates of sampling, geographical coordinates, and biological and environmental variables of studied water systems. *Data from littoral zone. L: lake, S: sink-hole, and P: pond.

No.	Locality	Geographical coordinates		Date of sampling	Type of water body	# Species	Temp. (°C)	Maximum depth (m)	Secchi (m)	Dissolved oxygen (mg/l)	pH
	Chiapas	N	W								
1	Tziscao*	16°05'12"	91°40'31"	15/04/00	L	3	22	79.5	11.37	7.5	ND
2	Montebello*	16°06'42"	91°41'32"	15/04/00	L	12	22.4	18	8.88	6.5	ND
3	Escondida*	16°06'43"	91°40'36"	15/04/00	L	3	23	35	17.37	5.4	ND
4	La Cañada*	16°06'50"	91°40'46"	15/04/00	L	3	22.6	111.6	14.5	6.3	ND
5	Pojoj*	16°12'35"	91°45'13"	16/04/00	L	6	22.6	69	20.3	7.6	ND
6	Cenote Pojoj*	16°06'49"	91°59'35"	16/04/00	S	3	23.5	9	4.3	4.6	ND
7	Nvo. Sn. Juan Chamula*	16°06'50"	91°27'11"	16/04/00	P	9	29.4	0.3	0.3	7.5	ND
8	Ejido Ixcan*	16°04'53"	91°05'37"	16/04/00	P	25	32.1	0.8	0.17	7.7	ND
9	Km 109* Highway Montebello-Palenque	16°22'17"	90°30'02"	16/04/00	P	21	33.2	0.7	0.22	6.3	ND
10	Nuevo Orizaba*	16°04'53"	90°35'33"	16/04/00	P	5	37.1	0.35	0.2	6.7	ND
11	Comitán-Montebello*	16°09'57"	92°05'23"	14/04/00	P	4	24.7	0.57	0.55	8.5	ND
12	Pte. Arroyo*	16°05'07"	91°07'49"	16/04/00	P	7	26.5	0.12	0.12	4.2	ND
13	Km 131+500* Highway Montebello-Palenque	16°04'49"	90°50'52"	16/04/00	P	5	33.9	0.38	0.38	6.9	ND
14	Km 123* Highway Montebello-Palenque	16°05'01"	91°55'21"	16/04/00	P	10	34.7	0.51	0.51	4.9	ND
	Tabasco										
15	Balancan I*	17° 55' 42"	91° 44' 26"		P	10	32	0.29	0.1	1.5	6.0
16	Leona Vicario I*	17° 42' 54"	91° 32' 53"	31/09/99	L	13	28.8	2.5	2.5	2.0	7.0
17	Leona Vicario II*	17° 43' 02"	91° 33' 15"	31/01/99	L	11	31.2	2.35	0.77	2.1	7.0
18	Báscula*	17° 43' 56"	91° 46' 58"	01/02/99	P	10	32	ND	0.28	1.85	6.5
19	El Tigre*	17° 42' 54"	91° 46' 47"	01/02/99	L	22	30.4	0.29	0.28	1.65	6.0

Table 1. *Continues.*

No.	Locality	Geographical coordinates		Date of sampling	Type of water body	# Species	Temp. (°C)	Maximum depth (m)	Secchi (m)	Dissolved oxygen (mg/l)	pH
20	El Pulsar*	17° 39' 10"	91° 33' 23"	31/01/99	P	11	28.8	0.67	0.3	1.65	6.5
21	Popalillo*	17° 47' 57"	91° 32' 06"	31/01/99	L	15	26.2	2	0.37	1.35	8
22	El Guanal*	17° 45' 10"	91° 31' 19"	31/01/99	L	49	31.2	2.79	0.8	1.55	8.5
23	El Guao*	18° 16' 48"	92° 18' 21"	13/01/98	L	32	27.5	2.22	0.55	ND	7.2
24	El Pajonal*	18° 00' 04"	92° 17' 11"	12/01/98	L	36	30.3	1.66	0.59	8.7	6.7
25	Matillas	17° 53' 46"	92° 31' 20"	12/01/98	L	30	27.6	1.52	0.67	7.2	6.32
26	km 51	18° 23' 52"	92° 17' 56"	13/01/98	P	15	25.55	0.69	0.26	ND	6.65
27	El Espino	18° 13' 26"	92° 19' 19"	13/01/98	L	5	28.1	1.05	0.05	12.5	6.54
	Quintana Roo										
28	Noh ts'onot*	19° 15' 40"	87° 57' 15"	14/04/01	S	14	27.55	19	2.94	8.1	10.05
29	La Esperanza*	19° 29' 09"	87° 59' 19"	11/04/01	S	21	28.38	14	7.5	9.8	9.7
30	Donato*	19° 45' 36"	87° 53' 55"	12/04/01	S	14	28.84	17	4.7	9.9	9.9
31	Galeana*	19° 28' 07"	88° 01' 46"	11/04/01	S	15	30.07	9.7	2.4	9.89	10.3
32	El Padre*	19° 36' 23"	87° 59' 17"	13/04/01	S	24	28.96	15	1.21	9.6	9.7
33	Km 157* Highway Carrillo Puerto-Tulum	19°45'38"	87°54'15"	12/04/01	S	26	29.08	16	2.3	8.5	9.6
34	Minicenote*	19° 36' 22"	87° 59' 18"	13/04/01	S	28	26.96	47	5.5	8.5	9.15
35	Kaná	19° 29' 49"	88° 23' 59"	02/05/97	L	29	31.2	4.0	2.41	4.16*	9.15*
36	Chunyaxché	20° 02' 28"	87° 35' 12"	30/05/97	L	31	31.3	14.09	4.5	2.27*	7.8*

Results

Studied systems varied from small temporary ponds to deep lakes like La Cañada, located in Chiapas, where we measured 111.6 m depth, which could be considered the deepest system in Mexico (see Table 1). In the same region (Montebello), the Tziscao system was very deep (79.5 m).

The taxonomic analysis revealed 128 rotifer taxa (Table 2). Classification followed Segers (2002) proposal. The recorded taxa belong to two subclasses, three orders, 22 families, and 34 genera. Of the 128 taxa found, 22 are new records for Mexico. The order Ploimida had the highest number of families (15), some of them with the largest number of species. The order Flosculariaceae had five families and the order Collothecaceae had only one. The subclass Bdelloidea was represented by only one family. Best-represented genera were *Lecane* (39 taxa), *Lepadella* (13), *Trichocerca* (11) and *Brachionus* (10). The species number agrees with the reports from other studies in tropical zones (Segers *et al.* 1998; Vásquez *et al.* 1998).

A re-examination of samples collected in 1997 from Kaná and Chunyaxché lakes, previously studied by Sarma & Elías-Gutiérrez (1999), increased the numbers of rotifers from 15 and 22 species to 38 and 43 respectively. All taxa, except *L. sibina* Harring, reported by these authors, appeared in other systems studied here. The latter species is part of the confusing *L. rhenana* complex, not yet clarified. An accurate comparison and description of both taxa is needed, considering type material or type localities. The other species not found again in the same locality, represent a common problem in many of these tropical systems: they appear in very small numbers, and it is difficult to find them again without intensive sampling.

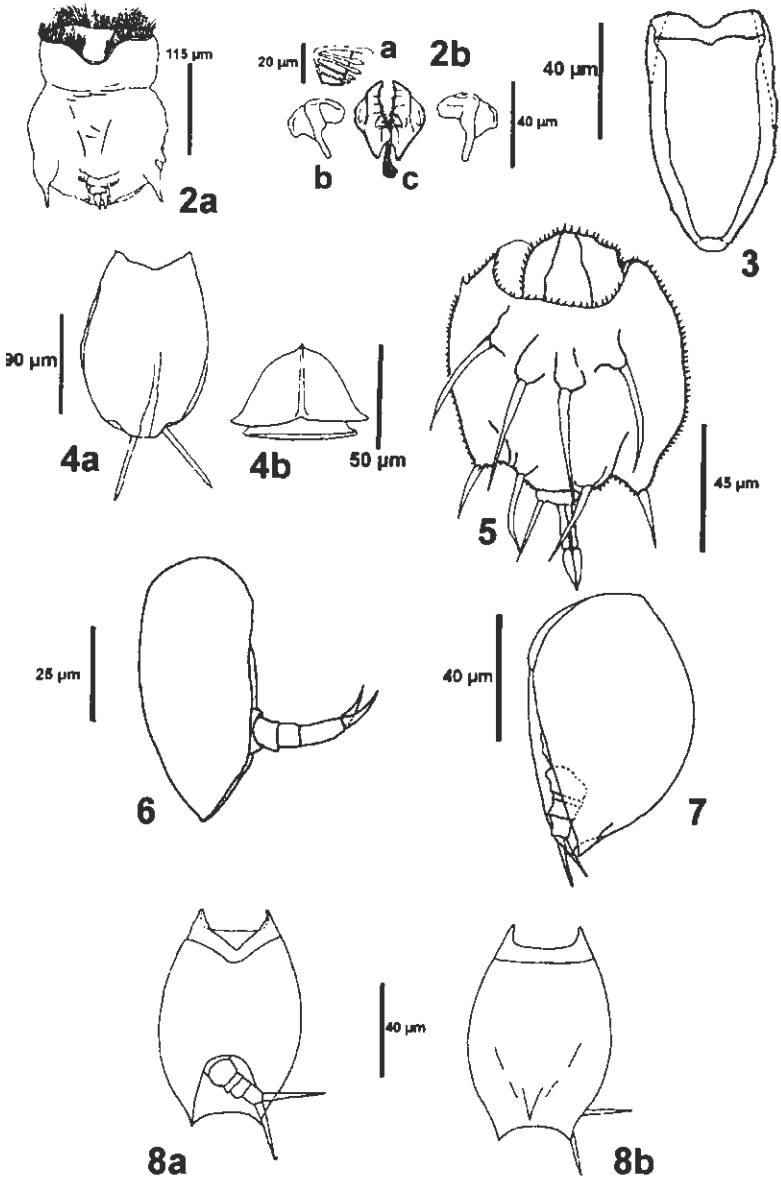
It is important to notice that this list of species was obtained from a limited number of samples collected only once. Probably, by increasing the sampling effort, these numbers would increase significantly.

A brief description of the new records is given below, with some remarks about their known distribution:

Epiphanes brachionus f. *spinosus* (Rousselet 1901). (Fig. 2a and 2b). Semiloricate animals. Body sacciform. Foot distinct from body. Toes bent inwards. Pseudolorica with two long, lateral, caudal spines. Trophi robust (Fig. 2b, a-c); uncus with 5 teeth. Distribution: warm waters of Asia, Australia, Brazil and Martinica (Nogrady 1983; Koste & Shiel 1987). It was found only in the Nuevo San Juan Chamula pond, Chiapas.

Anuraeopsis navicula Rousselet 1910. (Fig. 3). Anterior part of ventral plate narrower than the dorsal one. Anterior dorsal margin slightly serrated. Lorica surface finely granulated. A small cloacal opening present. Distribution: tropical and subtropical warm waters. Known from Australia, South America and USA (Koste & Shiel 1987). It was found in Noh ts'onot sinkhole, Quintana Roo.

Euchlanis semicarinata Segers 1993. (Fig. 4 a-b). This taxon is related to *E. incisa* and *E. triquetra*. It has a characteristic medio-dorsal keel present only in the poste-



Figs. 2-8. 2. *Epiphanes brachionus spinosus*. 2a, habitus, ventral view; 2b, trophi; a) uncus, b) manubria lateral view, c) rami and fulcrum, ventral view. 3. *Anuraeopsis navicula*, ventral view. 4. *Euchlanis semicarinata*, dorsal. 5. *Macrochaetus collinsi*, ventral. 6. *Colurella sulcata*, lateral. 7. *C. uncinata* f. *bicuspidata*, lateral. 8. *Lepadella costatoides*. 8a, ventral view, 8b, dorsal.

Table 2. Taxa recorded in the study. Names of localities according to Fig. 1. 1-14, systems belonging to Chiapas; 15-27, systems of Tabasco and 28-36, systems of Quintana Roo. (*) New records. "x", "y ",-" presence and absence, respectively

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
SUBCLASS MONOGONONTA																																				
ORDER PLOIMIDA																																				
1. Family Epiphanidae																																				
Epiphanes brachionus f. *spinosus*	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Rousselet 1901).*																																				
2. Family Brachionidae																																				
Anuraeopsis fissa (Gosse 1851)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	x	-	-	-
A. navicula Rousselet 1910*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Brachionus angularis (Gosse 1851).	-	-	-	-	-	-	-	x	x	-	-	-	-	x	x	x	-	-	x	-	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-	-
B. bidentatus Anderson 1889.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	-	-	-	-
B. budapestinensis (Daday 1885).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-
B. caudatus Barrois and Daday 1894.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	-	x	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-
B. falcatus Zacharias 1898	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-
B. havanensis Rousselet 1911.	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	-	-	x	-	-	x	-	-	-	x	
B. patulus (O. F. Müller 1786).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	x	x	x	x	-	-	-	-	-	-	-	-	x	x
B. patulus f. *macracanthus* (Daday	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	x	-	-	-	-	-	-	-	-	-	-
1905).																																				
B. quadridentatus (Hermann 1783).	-	-	-	-	-	-	-	-	x	-	x	-	-	-	-	x	x	-	x	x	x	x	x	x	x	-	-	-	-	-	-	-	-	-	-	-
B. urceolaris (O. F. Müller 1773).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-	-	x	-	-	-	-	-	-	-	-
Keratella americana Carlin 1943.	x	x	x	x	x	x	-	-	x	-	-	-	-	x	x	-	-	x	-	-	x	-	x	x	-	-	-	x	x	x	x	x	x	-	x	x
K. cochlearis (Gosse 1851).	x	x	x	x	x	x	x	-	x	x	-	-	-	-	-	x	x	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K. lenzi (Hauer 1953).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
K. tropica (Apstein 1907).	-	-	-	-	-	-	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Platyias leloupi (Gillard 1957).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
P. quadricornis (Ehrenberg 1832).	-	-	-	-	x	-	-	-	x	-	-	-	-	-	-	-	-	-	-	x	-	-	x	x	-	-	x	-	-	-	-	-	-	-	-	-
3. Family Euchlanidae																																				
Dipleuchlanis propatula (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	x	x	-	-	-
Euchlanis dilatata Ehrenberg 1832.	-	-	-	-	-	-	x	x	-	-	-	-	-	-	x	-	-	x	-	x	-	-	x	-	-	x	-	-	-	-	-	-	-	-	-	x
E. incisa Carlin 1939.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-	-	x	-	-	-	-	-
E. semicarinata Segers 1993.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
Tripleuchlanis plicata (Levander 1894).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	x
4. Family Mytilinidae																																				
Mytilina acantophora Hauer 1938.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-
M. bisulcata (Lucks 1912).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
M. ventralis (Ehrenberg 1832).	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	x	x	x	-	-	-	-	-	x	-	-	-	x	-
5. Family Trichotriidae																																				
Macrochaetus collinsi (Gosse 1867).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-
6. Family Colurellidae																																				
Colurella adriatica (Ehrenberg 1831).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-
C. obtusa (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	-	-	-	-	-	-	-	x	-
C. sulcata (Stenroos 1898).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	x
C. uncinata f. *bicuspidata* (Ehrenberg 1832).*	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-	x	-	-
Lepadella acuminata (Ehrenberg 1834).	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K. lenzi (Hauer 1953).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
K. tropica (Apstein 1907).	-	-	-	-	-	-	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Platyias leloupi (Gillard 1957).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
P. quadricornis (Ehrenberg 1832).	-	-	-	-	x	-	-	-	x	-	-	-	-	-	-	-	-	-	-	x	-	-	x	x	-	-	x	-	-	-	-	-	-	-	-	-
3. Family Euchlanidae																																				
Dipleuchlanis propatula (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	x	x	-	-	-
Euchlanis dilatata Ehrenberg 1832.	-	-	-	-	-	-	x	x	-	-	-	-	-	-	x	-	-	x	-	x	-	-	x	-	-	x	-	-	-	-	-	-	-	-	-	x
E. incisa Carlin 1939.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-	-	x	-	-	-	-	-
E. semicarinata Segers 1993.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
Tripleuchlanis plicata (Levander 1894).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	x
4. Family Mytilinidae																																				
Mytilina acantophora Hauer 1938.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-
M. bisulcata (Lucks 1912).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
M. ventralis (Ehrenberg 1832).	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	x	x	x	-	-	-	-	-	x	-	-	-	x	-
5. Family Trichotriidae																																				
Macrochaetus collinsi (Gosse 1867).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-
6. Family Colurellidae																																				
Colurella adriatica (Ehrenberg 1831).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-
C. obtusa (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	-	-	-	-	-	-	-	x	-
C. sulcata (Stenroos 1898).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	x
C. uncinata f. *bicuspidata* (Ehrenberg 1832).*	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-	x	-	-
Lepadella acuminata (Ehrenberg 1834).	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
L. apsida Harring 1916.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-
L. costatoides Segers 1992.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
L. cyrtopus (Harring 1914).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-
L. donneri Koste 1972.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	x	x	-	-	-	-	-	-	-	-	-
L. heterostyla (Murria 1913).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	x	x
L. latusinus (Hilgendorf 1899).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	x	-	-
L. ovalis (O. F. Müller 1786).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-	-	-	-	-	-	-	-	-
L. patella (O. F. Müller 1786)	-	x	-	-	x	-	-	x	-	-	-	x	-	-	x	-	-	-	-	x	-	x	x	-	x	-	-	-	-	-	-	-	-	x	-	x
L. quadricarinata (Stenroos 1898).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-
L. quinquecostata (Lucks 1912).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
L. rhomboides (Gosse 1886).	-	-	-	-	-	-	-	x	-	-	-	x	-	-	-	-	-	x	-	x	-	x	x	x	x	x	x	-	-	-	-	-	-	-	-	x
L. triptera (Ehrenberg 1830).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	x	-
7. Family Lecanidae																																				
Lecane aculeata (Jakubski 1912).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
L. arcula Harring 1914.	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x	-	-	x	-	-	x	-	-	x	x	x	x	x
L. bulla (Gosse 1851).	-	x	-	-	-	x	x	x	-	x	x	x	x	x	x	-	-	x	x	-	-	x	x	x	x	x	x	-	x	x	x	-	x	x	x	x
L. closterocerca (Schmarda 1859).	-	-	-	-	-	-	-	-	x	-	-	-	x	x	-	-	-	-	-	x	-	-	x	x	x	-	x	-	-	-	x	x	-	x	-	x
L. cornuta (O. F. Müller 1786).	-	-	-	-	-	-	-	x	x	x	-	x	-	x	-	-	-	-	-	x	-	-	x	x	x	x	x	-	x	-	x	-	x	x	x	-
L. crepida Harring 1914.	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	x	x	x
L. curvicornis f. *nitida* (Murray 1913).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. curvicornis f. *lofuana* (Murray 1913).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
L. doryssa Harring 1914.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-	-	-	-	-	-	-
L. flexilis (Gosse 1886).	x	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. *Continues*.

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
L. furcata (Murria 1913).	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	x	-	-
L. haliclysta Harring & Myers 1926.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
L. hamata (Stokes 1896).	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	x	-	x	-	-	x	x	x	x	x	-	x	x	-	-	x	-	-	x
L. hastata (Murria 1913).	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. hornemanni (Ehrenberg 1834).	-	-	-	-	-	-	-	-	x	x	-	-	x	-	x	-	-	-	-	-	-	-	-	-	-	x	-	-	x	x	x	-	x	x	x	x
L. inopinata Harring & Myers 1926.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-
L. leontina (Turner 1892).	-	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	-	-	x	-	x	x	x	x	x	-	-	x	-	x	-	-	x	-	-
L. ludwigii (Eckstein 1883).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	x	-	-	-	-	-	-	-	-	-	x
L. luna (O. F. Müller 1776).	-	-	-	-	-	-	-	-	-	x	-	-	-	x	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	x
L. lunaris (Ehrenberg 1832).	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x
L. margarethae Segers 1991.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x
L. monostyla (Daday 1897).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	x
L. nana (Murray 1913).	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
L. obtusa (Murria 1913).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	x	-	x.	x	x
L. papuana (Murria 1913).	-	-	-	-	-	-	x	x	x	x	-	x	x	x	-	x	-	x	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-
L. punctata (Murria 1913).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x
L. pyriformis (Daday 1905).	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	x	-	-	-
L. quadridentata (Ehrenberg 1832).	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	x	x	-	-	x	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	x
L. rhenana Hauer 1929.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
L. rhytida Harring & Myers 1926.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	x	-	-	-	-	-	-	-	-	-
L. rugosa (Harring 1914).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. ruttneri Hauer 1938.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-
L. signifera (Jennings 1896).	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-	-	-	-	-	-	-	x	x

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
L. spinulifera Edmondson 1935	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	x	x
L. stenroosi (Meissner 1908).	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. stichaea Harring 1913.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-	-	-	-	-	-	-	-	-
L. thalera (Harring & Myers 1926).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x
L. uenoi Yamamoto 1951.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x
L. ungulata (Gosse 1887).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-
8. Family Proalidae																																				
Prooles decipiens (Ehrenberg 1831).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
9. Family Lindiidae																																				
Lindia torulosa Dujardin 1841.	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x
10. Family Notommatidae																																				
Eosphora anthadis Harring & Myers 1922.	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-
Eothinia carogaensis Myers 1937.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
Cephalodella catellina (O. F. Müller 1786).	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C. forficula (Ehrenberg 1832).	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	-	-	-	-	-	-	-	-	-
C. gibba (Ehrenberg 1838).	-	x	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
Notommata pachyura (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	-	-
Taphrocampa selenura (Gosse 1887).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
11. Family Scaridiidae																																				
Scaridium botsjani Dames & Dumont 1974.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	x	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
12. Family Trichocercidae																																				
Trichocerca bicristata (Gosse 1887).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	x	-	-	-	x	-	x	x	-	-	-	-	-	-	-	-	-
T. brachyura (Gosse 1851).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-
T. bidens (Lucks 1912).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. capucina (Wierzejski & Zacharias 1893).	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. elongata f. *braziliensis* (Murray 1913).*	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. iernis (Gosse 1887).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	-	x	-	-
T. pusilla (Laterbourn 1898).	-	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	-	x	-	x	x	x	x	-	-	-	-	-	-	-	-	-	-	-	-
T. similis (Wierzejski 1893).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	-	x	x	x	x	x	x	-	-	-	-	-	-	-	-	-	-
T. stylata (Gosse 1851).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	x	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-
T. tenuior (Gosse 1886).	-	-	-	-	-	-	-	x	-	-	-	x	-	-	-	-	-	-	-	x	-	-	-	-	x	x	-	-	-	-	-	-	-	-	x	-
T. weberi (Jennings 1903).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x'	-	-
13. Family Synchaetidae																																				
Polyarthra cf. *dolichoptera*	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	x	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-
Polyarthra cf. *vulgaris*	-	x	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	x	-
Synchaeta longipes Gosse 1887.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	x	x	x	-	-	-	-	-	-	-	-	-	-	-	-
14. Family Asplanchnidae																																				
A. sieboldi (Leydig 1854).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	x	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-
15. Family Dicranophoridae																																				
Dicranophorus epicharis Harring & Myers 1928.*	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
D. grandis (Ehrenberg 1832).	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	x
D. halbachi Koste 1981.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
D. prionacis Harring & Myers 1928.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	x	-	x	-	-
ORDER FLOSCULARIACEAE																																				
16. Family Testudinellidae																																				
Testudinella emarginula (Stenroos 1898).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-
T. mucronata (Gosse 1886).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-
T. mucronata f. *hauerensis* (Gillard 1967).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-
T. patina (Hermann 1783).	-	-	-	-	-	-	x	-	x	-	-	-	-	-	x	-	x	-	-	x	-	x	x	x	x	-	-	-	x	-	-	-	-	x	-	-
T. patina f. *intermedia* Anderson 1889.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17. Family Floscullariidae																																				
Limnias melicerta Weisse 1848.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptygura furcillata (Kellicott 1889).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x	-	-	x	-	-
P. libera Myers 1934.*	-	x	x	x	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-	-	-	-	-	-
18. Family Conochilidae																																				
Conochilus dossuarius (Hudson 1875).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
19. Family Hexarthridae																																				
Hexarthra fennica (Levander 1892).	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H. intermedia f. *braziliensis* (Hauer 1953).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-

Table 2. *Continues.*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
H. mira (Hudson 1871).	-	-	-	-	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20. Family Filiniidae																																				
Filinia novaezealandiae Shiel and Sanoamuang 1993.*	-	-	-	-	-	-	-	-	x	-	x	-	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
ORDER COLLOTHECACEAE																																				
21. Family Collothecidae																																				
Collotheca ornata (Ehrenberg 1832).*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
SUBCLASS BDELLOIDEA																																				
22. Family Philodinidae																																				
Dissotrocha aculeata (Ehrenberg 1832).	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	x	x	x	x	-	-

rior part of lorica. Ventral plate well developed, ovoid, convex anteriorly. The pair of antero-dorsal ridges on the dorsal lorica are absent. Foot two-jointed, toes long, slender, with or without distinct tips. Distribution: known from Nigeria, French Guyana and Bolivia (Segers 1993; Pourriot 1996). It was recorded in the Báscula pond and El Guao lake, Tabasco.

Macrochaetus collinsi (Gosse 1867). (Fig. 5). Species characterized by the presence of ten spines in ventral view. Spines in the anal segment do not exceed the length of foot and fingers. Distribution: cosmopolitan (Koste 1978). This species was found in the Balancan I pond, Tabasco and the Galeana and km 157 sinkholes, Quintana Roo.

Colurella sulcata (Stenroos 1898) (Fig. 6). Small species. Lorica enlarged, thin. Foot broad, directed forward. Warm stenotherm. Distribution: widely distributed (Koste 1978). It was found in Chunyaxché lake, Quintana Roo.

Colurella uncinata f. *bicuspidata* (Ehrenberg 1832). (Fig. 7). Lorica wide. Head-opening long, crossing from dorsal to ventral side of lorica. Posteriorly, there are two short, acute, and curved projections. Toes relatively short. Distribution: cosmopolitan, in the littoral zones of fresh and saline waters (Koste & Shiel 1989). It was found in the Ejido Ixcan pond, Chiapas, El Guanal, and El Guao lake, Tabasco and Minicenote sinkhole, Quintana Roo.

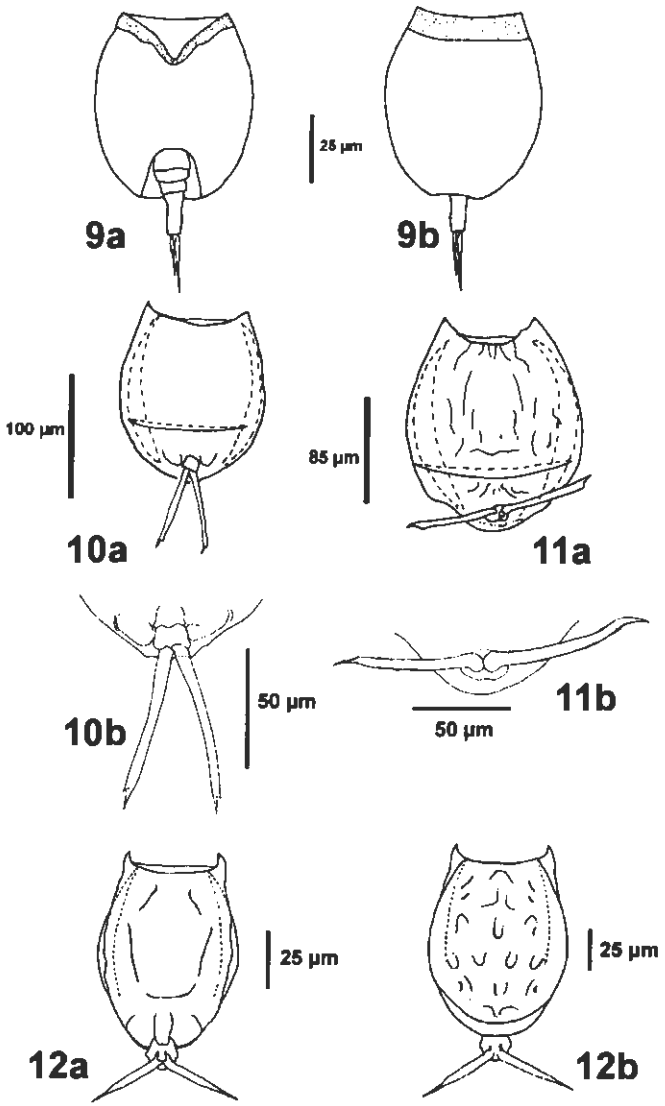
Lepadella costatoides Segers 1992. (Fig. 8 a-b). Species related to *L. latusinus*. Lorica broader in the middle part of the body; posteriorly with two small projections. Aperture of foot wide. Three pairs of sublongitudinal striae of unequal length in the dorsal plate. Distribution: widely distributed in warm waters. Known in Brazil, India and USA (Segers & Sarma 1993; Segers 1997). It was located in El Guao lake, Tabasco.

Lepadella cyrtopus (Harring 1914) (Fig. 9 a-b). Lorica ovoid. Ventral margin "V" shaped. Anterior opening with a spotted collar. Foot groove bell-shaped, with four pseudosegments, a distal one twice as long as first and second ones. Toes asymmetrical. Distribution: Europe, North and Central America (Koste 1978; Koste & Shiel 1989). It was found in Km 51 pond and El Espino lake, Tabasco.

Lecane curvicornis f. *lofuana* (Murray 1913). (Fig. 10 a-b). With antero-lateral spines. Lateral folds do not reach the head aperture. Transversal fold complete. Foot trapezoid, toes long. With claws and pseudoclaws. Posterior end of lorica trilobate. Distribution: Singapore and Brazil (Segers 1994). It was found in El Guao lake, Tabasco.

Lecane curvicornis f. *nitida* (Murray 1913). (Fig. 11 a-b). General characters as in the previously discussed taxa. Main differences are: 1) dorsal and ventral plates strongly ornamented, and 2) posterior end not trilobated. Distribution: Relatively common, cosmopolitan taxon, more frequent in warm waters (Segers 1994). It was found in Balancan I pond, Tabasco.

Lecane rhytida Harring & Myers 1926 (Fig. 12 a-b). Lorica strong. Dorsal plate narrowed anteriorly, wider than ventral plate. Head opening margins almost par-



Figs. 9-12. 9. *Lepadella cyrtopus*. 9a, ventral view; 9b, dorsal. 10. *Lecane curvicornis* f. *lofuana*. 10a, ventral; 10b, detail of toes and foot. 11. *L. curvicornis* f. *nitida*. 11a, ventral; 11b, detail of toes. 12. *L. rhytida*. 12a, ventral view; 12b, dorsal.

allel with antero-lateral spines. Coxal plates wide, triangle-shaped. Foot plate rectangular. Toes pointed, without claws. Distribution: USA, Nigeria, and Papua New Guinea (Segers 1994). It was found in Matillas and El Espino, Tabasco.

Scaridium botsjani Dames & Dumont 1974. (Fig. 13 a-b). Body cylindrical. Foot long, with three pseudosegments. Toes relatively longer than foot. Fulcrum with midventral crest and basal plate well-developed. Rami teeth large. Distribution: tropicopolitan. Known from Nepal, Bolivia and Antarctica (De Ridder & Segers 1992; Nogrady *et al.* 1995). It was found in Balancan I pond, El Pulsar and El Guao lakes, Tabasco, and Minicenote sinkhole, Quintana Roo.

Trichocerca elongata f. *braziliensis* (Murray 1913). (Fig. 14). Body cylindrical. In well contracted specimens, a double dorsal keel can be observed. Medial part of body broadest. Asymmetric toes, one of them long, with small substilis in both sides. Trophi asymmetric. Distribution: known from Brazil, Malasya, and Singapore (De Ridder & Segers 1992). This species was found in Ejido Ixcan pond, Chiapas.

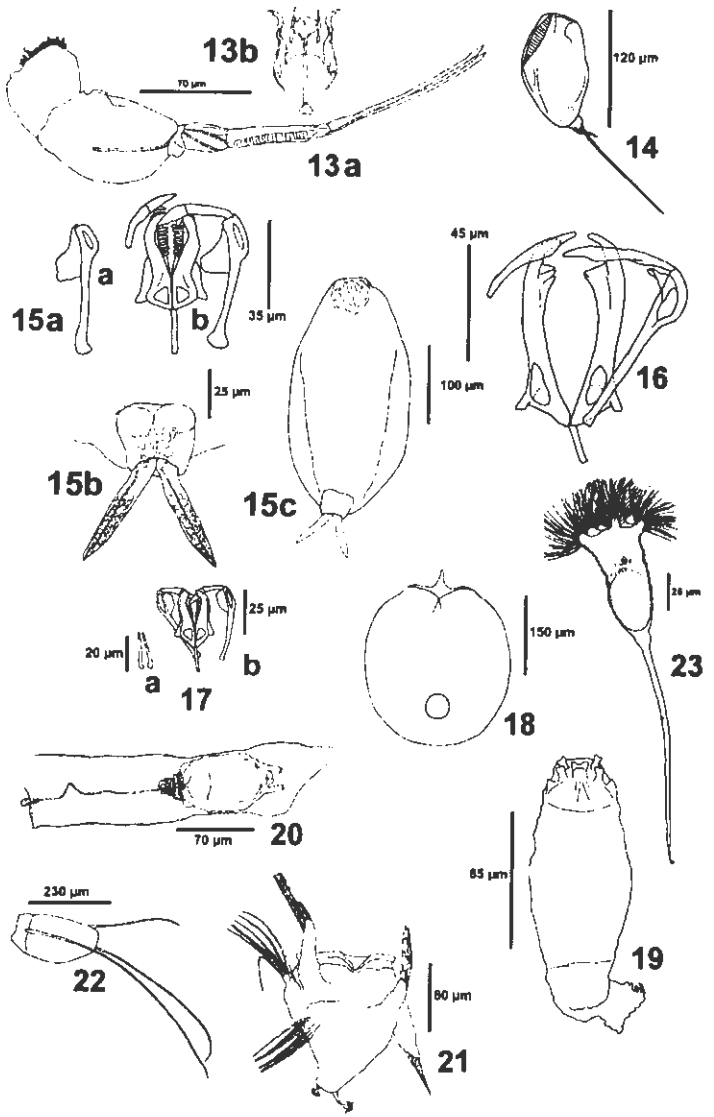
Dicranophorus epicharis Harring & Myers 1928. (Fig. 15 a-c). Body slender, subcylindrical. Foot fairly long, with caudal antenna. Toes rather short. Pedal glands large and pyriform. Trophi large. Outer margin of rami undulate; dorsal and ventral apical teeth bifid and incurved. Fulcrum short. Each unci with one long teeth and two shorter lateral ribs. Distribution: cosmopolitan in stagnant and running waters (De Smet & Pourriot 1997). It was found in Montebello and Popalillo lakes, Chiapas and Tabasco respectively.

Dicranophorus halbachi Koste 1981. (Fig. 16). Lorica stiff. Trunk fusiform. Foot trapezoid. Toes short, slightly curved, tips acute. Trophi large and robust. Rami elongate; each ramus with a single, long apical tooth dorsally. Fulcrum short. Unci single-toothed, with dorsal and ventral rib. Manubria short, anterior end clubbed with large chamber and narrow lamella. Distribution: Australia and Africa (De Smet & Pourriot 1997). A record from South America by Koste (1986) requires confirmation according to De Smet & Pourriot (1997). It was found in El Guao lake, Tabasco.

Dicranophorus prionacis Harring & Myers 1928. (Fig. 17 a-b). Body elongate. Foot stout. Toes relatively short, tips conical. Trophi large. Rami very large, broad, terminating in blunt tip ventrally. Alulae elongated-triangular. Fulcrum short. Unci single-toothed with dorsal and ventral rib. Manubria anteriorly clubbed, with a small chamber and large alulae, posterior end spatulate. Distribution: Europe, Africa, North and South America (De Smet & Pourriot 1997). It was found in El Guanal lake, Tabasco and Minicenote sinkhole, Quintana Roo.

Testudinella mucronata f. *hauerensis* (Gillard 1967). (Fig. 18). Loricate rotifers. Body dorso-ventrally flattened. Posterior lorica rounded, anteriorly narrow. Dorsal head aperture, margin with a single spine. Aperture of foot rounded, located near half of body in ventral plate. Distribution: South America (Koste 1978). It was found in El Guao and El Pajonal lakes, Tabasco.

Limnias melicerta Weisse 1848. (Fig. 19). Sessile; iloricated; body and foot elongated; with some characteristic protuberances in the neck region when the animal



Figs. 13-23. *13. Scaridium bostjani*. 13a, lateral; 13b, trophi. 14. *Trichocerca elongata* f. *braziliensis*, lateral. 15. *Dicranophorus epicharis*. 15a, trophi. a) manubria lateral, b) rami, fulcrum and unci ventral; 15b, detail of toes and pedal glands; 15c, habitus. 16. *D. halbachi* trophi, ventral. 17. *D. prionacis*. a) Epipharyngeal element, b) trophi, ventral. 18. *Testudinella mucronata* f. *hauerensis*, ventral. 19. *Limnias melicerta*, ventral. 20. *Ptygura libera*, ventral. 21. *Hexarthra intermedia* f. *braziliensis*, ventral. 22. *Filinia novaezealandiae*, lateral. 23. *Collotheca ornata*, ventral.

is contracted (see Fig. 19). Tube constructed of secreted rings. Distribution: cosmopolitan (Koste 1978). Recent records have been documented for this taxon in South America and Jamaica (Turner & Da Silva 1992; Koste et al. 1995). This species was found in El Guao lake, Tabasco.

Ptygura libera Myers 1934. (Fig. 20). Planktonic organisms; body and foot elongate; corona circular. Lateral antennas, and one protuberance present, visible in contracted animals. Tube constructed of jelly and debris, appearance gelatinous and transparent. Distribution: subtropical and tropical waters of North, Central and South America (Koste 1978). It is one of the few members of the Flosculariidae with active movement. It was observed in Montebello, Escondida, La Cañada and Pojoj lakes in Chiapas, and La Esperanza and Donato sinkholes in Quintana Roo.

Hexarthra intermedia f. *braziliensis* (Hauer 1953). (Fig. 21). Body conical. Posteriorly rounded, with two asymmetric appendages. Foot absent. With six arms armed with spines and setae. Ventral arm with three spines on each side. Trophi malleoramate. Unci with five teeth. Distribution: warm waters of South America (De Ridder & Segers 1992). It was found in Leona Vicario II lake, Tabasco, and Donato sinkhole, Quintana Roo.

Filinia novaezealandiae Shiel & Sanoamuang 1993. (Fig. 22). Caudal setae immovable. In preserved specimens the setae always points posteriorly and are never upright. With 18-19/19-20 teeth on unci. Species related to *F. terminalis*. Distribution: New Zealand, Brazil, Bolivia, French Guyana and Nicaragua (Sanoamuang 1993; Pourriot 1996; Segers, 1996). It was found in km 109, Comitán-Montebello ponds, Chiapas, and El Tigre and El Pajonal lakes, Tabasco.

Collotheca ornata (Ehrenberg 1832) (Fig. 23). It bears five bulbs with rounded tips surrounding the funnel. Corona without cilia between bulbs. Foot length twice the body length. Peduncle short. Sometimes adults with an eye-spot. A littoral species often sessile. Distribution: cosmopolitan (Koste 1978). It was collected only in Kaná lake, Quintana Roo.

Most of the taxa found in this study are cosmopolitan (65%). Few of them are neotropical (3%): *Brachionus havanensis*, *Lepadella donneri*, *Testudinella mucronata* f. *hauerensis* and *Hexarthra intermedia* f. *braziliensis*. A substantial number of taxa have a tropical distribution: 12 are tropicopolitan (*Platyias leloupi*, *Lepadella costatoides*, *Lecane aculeata*, *L. crepida*, *L. curvicornis* f. *lofuana*, *L. curvicornis* f. *nitida*, *L. haliclysta*, *L. leontina*, *L. papuana*, *L. rhytida*, *L. signifera* and *Scaridium bostjani*). A single species, *Euchlanis semicarinata* is strictly pantropical, whereas little is known about *Filinia novaezealandiae*, perhaps because this taxon is easily confused with *F. terminalis* (Sanoamuang 1993). Ten species are subtropical: *Anuraeopsis fissa*, *Keratella lenzi*, *K. tropica*, *Lepadella latusinus*, *Lecane doryssa*, *L. monostyla*, *L. punctata*, *L. rugosa*, *L. ruttneri* and *Hexarthra mira*. Others, such as *Eothinia carogaensis* and *Ptygura furcillata* have been reported only in North America (Sarma & Elías-Gutiérrez 1999). The distribution of the remaining taxa is not well documented.

12 of the 22 new records are warm-stenotherms, restricted to warm tropical and subtropical waters of the world (see Nogrady 1983; Pourriot 1996). *Anuraeopsis*

navicula and *Ptygura libera* are known in North and South America only. The other eight taxa have a wider distribution; though some of them have some peculiarities that explain their occurrence in only certain localities. For example, *Colurella uncinata* f. *bicuspidata* and *Dicranophorus prionacis* currently are found mostly in alkaline waters (Koste & Shiel 1989; De Smet & Pourriot 1997); both of them were found in alkaline waters (pH 9) of the surveyed area. *Macrochaetus collinsi, Colurella sulcata, Dicranophorus epicharis, D. prionacis, Limnias melicerta* and *Collotheca ornata* seem to be species occurring in a broad range of habitats (De Ridder & Segers 1992).

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