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A survey on the rotifer (Rotifera) fauna of the Yucatan Peninsula (Mexico)

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Abstract. Taxonomic studies on the freshwater rotifers were conducted on samples collected from 12 localities in the south-central part of Quintana Roo State (Yucatan Peninsula, Mexico) during 1997. The water bodies sampled ranged from small cenotes (carstic deep circular sinkholes) to temporary and permanent lagoons. Data on selected physical and chemical variables of the waterbodies were also obtained. We recorded 102 rotifer species of which 15 are new to the fauna of Mexico. These are: *Eosphora anthadis, Eothinia carogaensis, Lecane aeganea, Lecane grandis, Lecane haliclysta, Lecane margarethae, Lecane rugosa, Lecane sibina, Lecane spinulifera, Lecane uenoi, Lepadella donneri, Lepadella heterostyla, Macrochaetus longipes, Proales daphnicola,* and *Ptygura tacita.* In this study, we present illustrations of all new records and comments on selected taxa from a zoogeographical point of view.

Keywords: Rotifer, Mexico, distribution, new record, taxonomy.

Taxonomic studies on Mexican rotifers are not many. Most of the studies are from the limnological point of view (Torres-Orozco *et al.* 1996). A few studies have indeed aimed at understanding the species diversity of rotifers (i.e. Rico-Martínez and Silva-Briano 1993) but detailed illustrations are rarely provided. Since a few new species are described from Mexico (Kutikova and Silva-Briano 1995, Örstan 1995), it is interesting to investigate in detail the rotifer fauna from a taxonomic point of view.

Mexico is characterized by a variety of natural and man-made lakes. Consequently, the diversity of rotifers from different water bodies is likely to vary significantly. For example, Sarma *et al.* (1996) recorded a total of 34 species from high altitude natural lakes with acidic waters. A survey of rotifers from a single small pond (less than 2 ha in area and 3 m deep), located at Kilometer 28 in the federal highway Ixtlahuaca-Jilotepec in the State of Mexico (19°49'13" N, 99°42'22" W) resulted in a total of 78 species (Sarma and Elías-Gutiérrez 1998). On the other hand, Rico-Martínez and Silva-Briano (1993) reported 96 taxa from various parts of Mexico. However, information from the Yucatan Peninsula and adjacent areas is scanty. We present here some data on this aspect.

MATERIAL AND METHODS

Rotifers were collected using a plankton net (50 µm mesh size and 30 cm of mouth opening) from 12 waterbodies located in the south-central part of the Quintana Roo State (Yucatan Peninsula, Mexico). The samples were immediately preserved in 10% formalin. The collected rotifers were from the limnetic, benthic and littoral regions. From the collection sites, selected physical and chemical variables including depth, Secchi transparency, temperature, dissolved oxygen and pH were obtained following standard methods by APHA (Anonymous, 1989).

Rotifers from the collections were sorted using a stereomicroscope and identification was made using a compound microscope. Figures were drawn using a camera lucida tube attached to the compound microscope. The rotifer species were measured using an ocular micrometer calibrated with stage micrometer.

For the identification and classification of rotifers, we mostly followed Koste (1978). In addition, we employed some recent literature (Koste and Shiel 1987, 1989, 1990, 1991, Segers 1995) where necessary. For some species, trophi identification became necessary. For this, we dissolved the soft parts of rotifers using dilute sodium hypochlorate solution. Camera lucida figures were drawn at magnifications ranging from 100X - 1000X depending on the species.

Slides are deposited at Reference Collection in the National Autonomous University of Mexico, Campus Iztacala. Original samples are deposited at El Colegio de la Frontera Sur.

RESULTS

Data on the selected physical and chemical variables of the waterbodies studied are presented in Table 1.

Taxonomic analysis of rotifers from these reservoirs located at Yucatan Peninsula revealed the presence of 102 species (Table 2). Only one species of the genus *Collotheca* could be identified to species level and for the rest, the specimens were contracted beyond

TABLE 1

Main environmental variables and location of the water-bodies sampled

Place	Coordinates	Date of sampling	Depth (m)	Secchi transparency (m)	Temperature °C	Dissolved oxygen (mg/l)	pH
(1) Puente Sorpresas	18°27.652' N 89°02.195' W	03/19/97	0.45*	0.45	23.7	9.03	ND
(2) Ucum	18°30.399' N 88°30.907' W	03/19/97	0.75*	0.75	23.8	16.3	ND
(3) La Esperanza	19°56'33.7" N 87°17'38.6"W	05/29/97	6.7**	6.42	31	6.2	7.6
(4) Calakmul	18°07.398' N 89°18.912'W	03/20/97	0.87**	0.87	26.4	11.7	ND
(5) Chichancanab	19°57.004' N 88°45.513'W	05/01/97	4.2**	1.44	32	7.4	9.15
(6) Sink-hole near Carrillo Puerto	19°36'22.2"N 87°59'18.6"W	05/28/97	39**	5.73	30.2	9.6	7.53
(7) El Muyil	20°04'41"N 87°35'37.3"W	05/30/97	16.5**	5.8	30.8	5.8	7.91
(8) Kana	19°29.493'N 88°23.795'W	05/02/97	4.0**	2.41	31.2	7.4	9.1
(9) Avispero	19°55'39.7"N 87°18'14.8"W	05/29/97	27.17**	4.16	26.4	1.0	6.63
(10) Sn Erick	20°07'50.2"N 87°28'02.1"W	05/31/97	7.73**	7.73	27.7	5.8	7.29
(11) Chun-yache	20°02'28.4"N 87°35'11.9"W	05/30/97	14.09**	4.5	31.3	4.0	7.97
(12) Kohunlich	18°25.530' N 88°18.270'W	03/19/97	0.47**	0.47	27.3	12.35	ND

*Readings in the sampling zone. **Maximum depth. ND= Not determined.

TABLE 2

List of rotifer taxa found in the study

New records are marked with asterisk (*). The symbols 'X' and '-' indicate presence and absence, respectively. Numbers are: 1. Puente Sorpresas; 2. Ucum; 3. La Esperanza; 4. Calakmul; 5. Chichancanab; 6. Cenote near Carillo Puerto town; 7. El Muyil; 8. Kana Lagoon; 9. El Avispero; 10. San Erick; 11. Chunyanché Lagoon; 12. Kohunlich

Taxa	Localities											
	1	2	3	4	5	6	7	8	9	10	11	12
Order: Ploimida												
Family: Brachionidae												
Anuraeopsis fissa (Gosse, 1851)	-	-	-	X	-	-	-	X	-	-	-	-
Brachionus angularis (Gosse, 1851)	X	X	-	X	-	-	-	-	-	-	-	X
B. budapestinensis (Daday, 1885)	-	-	-	-	-	-	-	-	-	-	-	X
B. falcatus Zacharias, 1898	-	-	-	-	-	X	-	-	-	-	-	-
B. havanensis Rousselet, 1911	X	-	X	X	-	-	-	X	-	-	-	-
B. patulus (O. F. Muller, 1786)	X	X	-	X	-	-	X	X	-	-	-	-
B. quadridentatus (Hermann, 1783)	-	X	-	X	-	-	-	-	-	-	-	X
Keratella americana Carlin, 1943	-	X	X	X	X	X	X	X	X	X	X	-
K. cochlearis (Gosse, 1851)	X	X	-	X	-	-	-	-	-	-	-	-
K. lenzi (Hauer, 1953)	-	X	-	-	-	-	-	-	-	-	-	-
Platyias quadricornis (Ehrenberg, 1832)	X	X	-	-	-	-	-	-	-	-	-	-
Family: Euchlanidae												
Dipleuchlanis propatula (Gosse, 1886)	X	-	-	X	-	-	-	-	-	-	-	-
Euchlanis dilatata Ehrenberg, 1832	-	X	X	-	-	-	-	X	-	-	-	X
E. incisa Carlin, 1939	-	X	-	-	-	-	-	-	-	-	-	-
Manfredium eudactylota (Gosse, 1886)	-	-	-	X	-	-	-	-	-	-	-	-
Tripleuchlanis plicata (Levander, 1894)	-	-	-	-	-	-	-	X	-	-	X	-
Family: Mytilinidae												
Lophocharis salpina (Ehrenberg, 1834)	X	-	-	-	-	-	-	-	-	-	-	-
Mytilina ventralis (Ehrenberg, 1832)	-	X	X	X	-	-	-	-	-	-	-	-
Family: Trichotriidae												
Macrochaetus longipes Myers, 1934*	-	-	-	X	-	X	X	-	-	-	X	-
Family: Colurellidae												
Colurella adriatica (Ehrenberg, 1831)	X	-	-	-	X	-	-	-	-	-	-	-
C. colurus (Ehrenberg, 1830)	-	-	-	-	-	-	-	-	-	X	-	-
C. obtusa (Gosse, 1886)	X	X	-	-	-	-	-	-	-	-	-	-
Lepadella donneri Koste, 1972*	-	X	-	-	-	-	-	-	-	-	-	-
L. heterostyla (Murray, 1913)*	-	-	X	-	-	-	-	X	-	-	X	-
L. ovalis (O. F. Muller, 1786)	X	X	X	-	-	-	-	-	-	-	-	-
L. patella (O. F. Muller, 1786)	-	X	X	-	-	-	-	-	-	-	X	-
L. rhomboides (Gosse, 1886)	X	-	-	-	-	-	-	-	-	-	-	-
L. triptera (Ehrenberg, 1830)	-	-	X	X	-	-	X	-	-	X	X	-
Family: Lecanidae												
Lecane aculeata (Jakubski, 1912)	-	-	-	X	-	-	-	-	-	-	-	X
L. arcula Harring, 1914	-	X	X	X	-	X	-	-	-	X	-	-
L. aeganea Harring, 1914*	-	-	-	X	-	-	-	-	-	-	-	-
L. bulla(Gosse, 1851)	-	X	X	X	X	X	X	X	-	-	X	-
L. closterocerca (Schmarda, 1859)	-	X	-	X	-	-	X	-	-	-	X	-

(Continue...)

(Continued Table 2)

Taxa	Localities											
	1	2	3	4	5	6	7	8	9	10	11	12
L. cornuta (O.F. Müller, 1786)	X	-	X	X	-	-	-	-	-	-	-	-
L. crepida Harring, 1914	-	-	X	X	-	-	-	-	-	-	X	-
L. curvicornis (Murray, 1913)	-	-	-	X	-	-	-	-	-	-	-	-
L. decipiens (Murray, 1913)	-	-	-	-	-	-	-	-	X	-	-	-
L. furcata (Murray, 1913)	-	-	-	X	-	-	-	-	-	-	X	X
L. grandis (Murray, 1913)*	-	-	-	-	-	-	-	-	-	X	-	-
L. haliclysta Harring & Myers, 1926*	-	-	X	-	-	-	-	-	-	X	-	-
L. hamata (Stokes, 1896)	-	X	-	X	-	X	-	-	-	-	-	-
L. hastata (Murray, 1913)	X	-	X	X	X	X	X	-	-	-	X	X
L. hornemanni (Ehrenberg, 1834)	-	X	X	X	X	-	X	-	-	-	X	-
L. inopinata Harring & Myers, 1926	-	X	X	X	-	-	-	-	-	-	X	-
L. leontina (Turner, 1892)	-	X	X	X	-	-	-	-	-	-	-	X
L. ludwigii (Eckstein, 1883)	-	X	X	X	-	-	-	-	-	-	-	X
L. luna (O. F. Muller, 1776)	-	X	-	X	-	-	-	-	-	-	-	X
L. lunaris (Ehrenberg, 1832)	-	X	X	-	X	-	X	X	-	-	X	-
L. margarethae Segers, 1991*	-	-	-	-	-	X	-	-	-	X	X	-
L. monostyla (Daday, 1897)	-	-	-	X	-	-	-	-	-	X	-	-
L. nana (Murray, 1913)	-	-	X	-	-	-	X	-	-	-	-	-
L. obtusa (Murray, 1913)	-	X	X	X	X	-	X	X	-	X	X	-
L. papuana (Murray, 1913)	X	-	-	-	X	-	-	-	-	-	-	X
L. punctata (Murray, 1913)	-	-	-	X	X	-	-	-	-	-	X	-
L. pyriformis (Daday, 1905)	-	X	-	X	-	-	-	-	-	-	-	-
L. quadridentata (Ehrenberg, 1832)	-	X	-	-	-	-	-	-	-	-	X	-
L. rugosa (Harring, 1914)*	-	-	X	-	-	-	-	-	-	-	-	-
L. ruttneri Hauer, 1938	-	-	-	-	X	-	-	-	-	-	-	-
L. sibina Harring, 1914	-	-	X	-	-	-	X	-	-	X	X	-
L. signifera (Jennings, 1896)	-	X	X	X	-	-	-	X	-	-	-	-
L. spinulifera Edmondson, 1935*	-	X	X	-	X	-	X	X	-	-	X	-
L. tenuiseta Harring, 1914	-	X	-	X	-	-	-	-	-	-	-	-
L. thalera (Harring & Myers, 1926)	-	-	X	-	-	-	X	X	-	-	X	-
L. uenoi Yamamoto, 1951*	-	-	X	-	-	-	-	-	-	-	-	-
L. unguitata (Fadeev, 1925)	X	X	-	X	-	-	-	-	-	-	-	-
L. ungulata (Gosse, 1887)	-	-	X	-	-	-	-	-	-	-	-	-
Family: Proalidae												
Proales daphnicola (Thompson, 1892)*	X	-	-	-	-	-	-	-	-	-	-	-
Family: Lindiidae												
Lindia torulosa Dujardin, 1841	-	-	-	-	-	-	-	-	-	X	-	-
Family: Notommatidae												
Cephalodella forficula (Ehrenberg, 1832)	X	-	-	-	-	-	-	-	-	-	X	-
C. gibba (Ehrenberg, 1838)	X	X	X	X	-	-	-	-	-	-	-	-
C. giganthea Remane, 1933	X	-	-	-	-	-	-	-	-	-	-	-
Eothinia carogaensis (Myers, 1937)*	-	X	-	-	-	-	-	-	-	-	-	-
Eosphora anthadis Harring & Myers, 1922*	-	-	-	X	-	-	-	-	-	-	-	-
Itura myersi Wulfert, 1935	-	X	-	-	-	-	-	-	-	-	-	-
Monommata arndti Remane, 1933	-	-	-	-	-	-	-	-	-	X	-	-
Notommata pachyura (Gosse, 1886)	-	X	-	-	-	-	-	-	-	-	-	-
N. tripus Ehrenberg, 1838	-	-	-	X	-	-	-	-	-	-	-	-
Resticula melandocus (Gosse, 1887)	-	-	-	X	-	-	-	-	-	-	-	-

(Continue...)

(Continued Table 2)

Taxa	Localities											
	1	2	3	4	5	6	7	8	9	10	11	12
Scaridum longicaudum (O. F. Muller, 1786)	-	X	-	-	-	-	-	-	-	-	-	-
Taphrocampa selenura (Gosse, 1887)	-	X	-	-	-	-	-	-	-	-	-	-
Family: Trichocercidae												
Trichocerca elongata (Gosse, 1886)	-	X	-	-	-	-	-	-	-	-	-	-
T. pusilla (Laterbourn, 1898)	-	-	-	-	-	-	-	-	-	-	-	X
T. ruttneri (Donner, 1953)	-	-	X	-	-	-	-	-	-	-	-	-
T. similis (Wierzejski, 1893)	-	-	-	X	-	-	-	-	-	-	-	X
Family: Gastropodidae												
Ascomorpha ecaudis (Perty, 1850)	-	X	-	-	-	-	-	-	-	-	-	-
A. ovalis (Bergendal, 1892)	-	-	-	X	-	-	-	-	-	-	-	-
Family: Synchaetidae												
Polyarthra vulgaris Carlin, 1943	-	X	-	-	-	-	-	X	-	-	-	-
Synchaeta tremula (O. F. Muller, 1786)	-	X	-	-	-	-	-	-	-	-	-	-
Family: Dicranophoridae												
Dicranophoroides caudatus (Ehrenberg, 1834)	X	-	-	-	-	-	-	-	-	-	-	-
Dicranophorus forcipatus (O. F. Muller, 1786)	-	X	-	X	-	-	-	-	-	-	-	-
Order: Gnesiotrocha												
Family: Testudinellidae												
Testudinella caeca (Parsons, 1892)	-	-	-	X	-	-	-	-	-	-	-	-
T. emerginula (Stenroos, 1898)	-	X	-	-	-	-	-	-	-	-	-	-
T. mucronata (Gosse, 1886)	X	-	-	-	-	-	-	-	-	-	-	-
T. patina (Hermann, 1783)	X	X	-	-	-	-	-	-	-	-	-	-
Family: Floscullariidae												
Ptygura furcillata (Kellicott, 1889)	-	X	-	X	-	-	-	-	-	-	-	-
P. tacita Edmondson, 1940*	-	-	X	-	-	-	X	-	-	-	-	-
Sinantherina semibullata (Thorpe, 1889)	-	X	-	-	-	-	-	-	-	-	-	-
Family: Hexarthridae												
Hexarthra intermedia Wiszniewski, 1929	-	-	X	-	-	-	-	X	X	-	-	-
Family: Filiniidae												
Filinia longiseta (Ehrenberg, 1834)	-	X	-	X	-	-	-	-	-	-	-	-
Family: Collothecidae												
Collotheca pelagica	-	X	-	-	-	-	-	-	-	-	-	X
Family: Atrochidae												
Cupelopagis vorax (Leidy, 1857)	-	X	-	X	-	-	-	-	-	-	-	-
Bdelloidea												
Dissotrocha aculeata (Ehrenberg, 1832)	-	-	-	-	-	-	X	-	-	-	-	-

recognition. The recorded taxa belong to 20 families and 39 genera. Sixteen species are new (marked by *) to Mexico. In general, the largest diversity of rotifers in the area surveyed was from the Lecanidae (38 species) followed by Notommatidae (12 species).

DISCUSSION

Among the most interesting taxa, *Brachionus patulus* var. *macracanthus* (Daday, 1905) (Fig. 1) and *Macrochaetus longipes* Myers, 1934 (Fig. 2), are commonly found in American waters (see Koste, 1978). The taxa *Lepadella donneri* Koste, 1972 (Fig. 3), *Lepadella heterostyla* (Murray, 1913) (Fig. 4), *Lecane aeganea* Harring, 1914 (Fig. 5), *Lecane grandis* (Murray, 1913) (Fig. 6), and *Lecane haliclysta* Harring & Myers, 1926 (Fig. 7) are well-documented in literature.

Lecane margarethae Segers, 1991 (Fig. 8) was originally well-documented by Paggi (1989) from Argentina under the name *L. (Monostyla) deridderae*. However, another species with the same name but in a different sub-genus (*L. (Lecane) deridderae*) has been described by Koste (1972). Therefore, Segers (1991) renamed the former as *L. margarethae* since he does not consider subgenera in the Lecanidae. *L. margarethae,* however, becomes invalid if generic status (Koste and Shiel 1990) or even subgeneric status (Koste 1978) is used for *Monostyla* in Lecanidae.

Lecane sibina Harring, 1914 (Fig. 9) is strongly loricate. Anterior end of dorsal plate with prominent lateral projections. Anterior ventral margins lunate and dorsal nearly straight. Lateral margins of dorsal plate not completely reaching the anterior margins. Two toes, long. Pseudoclaws and accessory claws prominent. Koste (1978) with some doubt synonymized *L. sibina* with *L. rhenana*. Segers (1995) followed Koste (op. cit.) although he pointed out the lack of similarity between *L. rhenana* and *L. sibina*. The main reason for this confusion is that both of these workers are from Europe and did not have direct access to the American samples for comparison. Accordingly, specimens described by Segers (op. cit.) as *L. rhenana* were doubted in literature (Sarma & Elías-Gutiérrez 1997). We have a good number of specimens of *L. sibina* which tallied well with the first description given by Harring (1914) and hence we retain the original status of this species.

Lecane rugosa (Harring, 1914) (Fig. 10) and *Lecane spinulifera* Edmondson, 1935 (Fig. 11) are well-kown species in the American waters. *Lecane uenoi* Yamamoto, 1951 (Fig. 12) is an interesting and rare species recorded earlier only from Japan and Brazil (Segers, 1995).

Proales daphnicola (Thompson, 1892) (Fig. 13) and *Eosphora anthadis* Harring & Myers, 1922 (Fig. 14) are known from Europe, North America, Australia and Japan (Koste and Shiel 1990). *Eothinia carogaensis* (Myers, 1937) (Fig. 15). is a soft-bodied rotifer. Body elongate, transparent and trunk with longitudinal lines. Trophi virgate type. Fulcrum long, rod-like. Rami triangular, alula pointed. Manubrium thin. Unci single-toothed. Carnivorous rotifer. Many trophi of bdelloids seen in gut. Known from USA (Koste 1978).

Ptygura tacita Edmondson, 1940 (Fig. 16) is a soft-bodied rotifer enclosed in gelatinous coat. Under preserved condition ventral antennae clearly visible. Known from North and South Americas and India (Koste, 1978; Sarma, 1988). *Dissotrocha aculeata* (Ehrenberg, 1832) (Fig. 17) is the only bdelloid rotifer we could identify in this study. Preserved specimens reveal several spines on the body. Trophi ramate type (Donner 1965).

This study adds 15 new records to the fauna of Mexico thereby increasing the number of known species from Mexico to about 260. Some species hitherto thought to be of restricted distribution are also encountered in Mexico. This study thus suggests that a thorough investigation of the Mexican rotifer fauna is relevant to add new information on their overall distribution in the Americas.

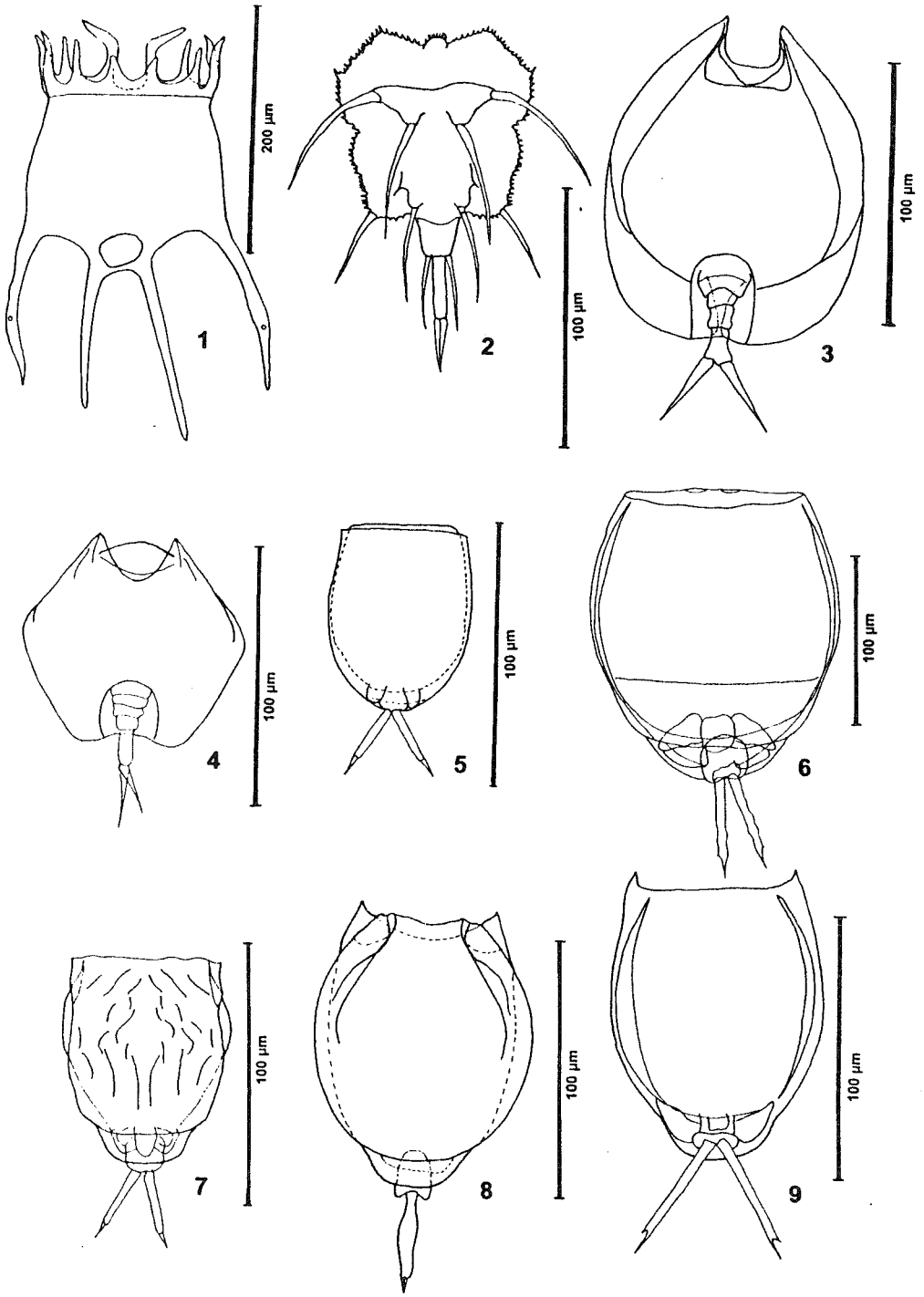

Fig. 1.- *B. patulus* var. *macracanthus* (ventral); 2.- *M. longipes* (dorsal); 3.- *Lepadella donneri* (ventral); 4.- *L. heterostyla* (ventral); 5.- *Lecane aeganea* (ventral); 6.- *L.grandis* (ventral); 7.- *L. haliclysta* (dorsal); 8.- *L. margarethae* (dorsal); 9.- *L. sibina* (ventral)

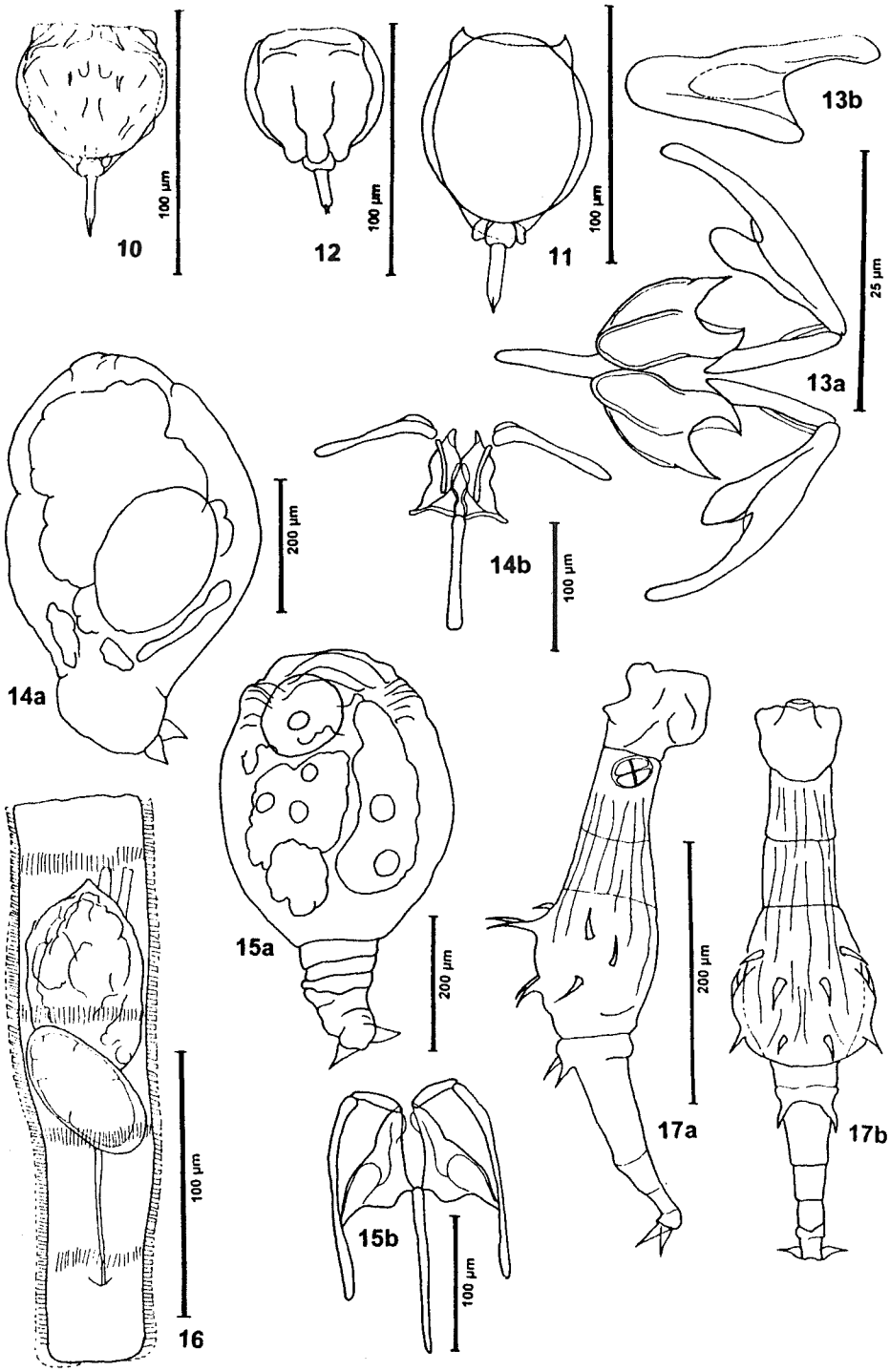

Fig. 10.- *L. rugosa* (dorsal); 11.- *L. spinulifera* (ventral); 12.- *L. uenoi* (ventral); 13.- *Proales daphinicola*. a. trophi; b. manubrium; 14.- *Eosphora anthadis* (trophi); 15.- *Eothinia carogaensis*. a. contracted animal; b: trophi; 16.- *Ptygura tacita* (contracted animal); 17.- *Dissotrocha aculeata*. a: lateral view (contracted); b: ventral

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RESUMEN

Se realizó un análisis taxonómico de los rotíferos encontrados en 12 localidades de la región sur-centro del estado de Quintana Roo (Península de Yucatán, México) muestreadas durante 1997. Los sistemas muestreados variaron desde pequeños cenotes (de origen cárstico) a lagunas temporales y permanentes. Adicionalmente se obtuvieron datos sobre algunas variables físicas y químicas seleccionadas. Se registraron 102 especies de rotíferos, de las cuales 15 constituyen ampliaciones de ámbito hacia México. Estos son: *Eosphora anthadis, Eothinia carogaensis, Lecane aeganea, Lecane grandis, Lecane haliclysta, Lecane margarethae, Lecane rugosa, Lecane sibina, Lecane spinulifera, Lecane uenoi, Lepadella donneri, Lepadella heterostyla, Macrochaetus longipes, Proales daphnicola* y *Ptygura tacita*. En este estudio se presentan ilustraciones de todos los nuevos registros y comentarios sobre algunos taxa seleccionados, desde un punto de vista zoogeográfico.

REFERENCES

Anonymous . 1989. Standard methods for the examination of water and wastewater. 17th ed. Washington, D.C.

Donner, J. 1965. Ordnung Bdelloidea (Rotatoria, Rädertiere). Best. Bücher z. Bodenfauna Europas. Berlin, 6: 297 p.

Harring, H.K, 1914. Report on Rotatoria from Panama with descriptions of new species. Proc. US Nat. Mus. 47: 525-564.

Koste, W. 1972. Rotatorien aus Gewassern Amazoniens. Amazoniana 3: 258-505

Koste, W. 1978. Rotatoria die Radertiere Mitteleuropas. Borntraeger, Berlin, Stuttgart, Vol. 1: 673 p.

Koste, W. 1978. Rotatoria die Radertiere Mitteleuropas. Borntraeger, Berlin, Stuttgart, Vol 2: 234 p.

Koste, W. & R.J. Shiel. 1987. Rotifera from Australian inland waters. 2. Epiphanidae and Brachionidae (Rotifera: Monogononta). Invertebr. Taxon. 7: 949-1021

Koste, W. & R.J. Shiel. 1989. Rotifera from Australian inland waters. 4. Colurellidae (Rotifera: Monogononta). Trans. Roy. Soc. S. Aust. 113: 119-143

Koste, W. & R.J. Shiel. 1990. Rotifera from Australian inland waters. 5. Lecanidae (Rotifera: Monogononta). Trans. Roy. Soc. S. Aust. 114: 1-36

Koste, W. & R.J. Shiel. 1991. Rotifera from Australian inland waters. 7. Notommatidae (Rotifera: Monogononta). Trans. Roy. Soc. Aust. 115: 111-159

Kutikova, L.A. & M. Silva-Briano. 1995. *Keratella mexicana* sp. nov., a new rotifer from Aguascalientes, Mexico. Hydrobiologia 310: 119-122

Örstan, A. 1995. A new species of bdelloid rotifer from Sonora, Mexico. Southwest. Nat. 40: 255-258

Paggi, S. 1989. Rotíferos de algunas provincias del Noreste argentino. Rev. Hydrobiol. Trop.22: 223-238.

Rico-Martínez, R. & M. Silva-Briano. 1993. Contribution to the knowledge of the rotifera of Mexico. Hydrobiologia 255/256: 467-474

Sarma, S.S.S. 1988. New records of freshwater rotifers (Rotifera) from Indian waters. Hydrobiologia 160: 263-269.

Sarma, S.S.S. & M. Elías-Gutiérrez. 1997. Taxonomic studies of freshwater rotifers (Rotifera) from Mexico. Pol. Arch. Hydrobiol. 44: 341-357.

Sarma, S.S.S. & M. Elías-Gutíerrez. 1998. Rotifer diversity in a central Mexican pond. Hydrobiologia (In press).

Sarma, S.S.S., M. Elías-Gutiérrez & C. Serranía-Soto. 1996. Rotifers from high altitude crater-lakes at Nevado de Toluca Volcano, Mexico. Hidrobiologica 6: 33-38.

Segers, H. 1991. Nomenclatorial note on a primary homonym in the genus *Lecane*. Rev. Hydrobiol. trop. 24: 77

Segers, H. 1995. Rotifera 2. The Lecanidae (Monogononta). SPB Academic Publishers. The Hague, The Netherlands, 226 p.

Torres-Orozco BR, C. Jiménez-Sierra & A. Pérez-Rojas A. 1996. Some limnological features of three lakes from Mexican neotropics. Hydrobiologia 341: 1-9.