

First record of *Sarsilatona serricauda* (Sars, 1901) (Crustacea: Branchiopoda: Sididae) from Mexico, with redescription of its male

Первое сообщение о *Sarsilatona serricauda* (Sars, 1901) (Crustacea: Branchiopoda: Sididae) из Мексики с переописанием самца этого вида

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KEY WORDS: *Sarsilatona serricauda*, Mexico, male, distribution.

КЛЮЧЕВЫЕ СЛОВА: *Sarsilatona serricauda*, Мексика, самец, распространение.

ABSTRACT: Rare species *Sarsilatona serricauda* (Sars, 1901) is recorded from several localities in the southeast of Mexico for the first time. The abundant material including males and gamogenetic females has been analyzed morphologically in detail and supplemented by new data on biology and geographical distribution of the species.

РЕЗЮМЕ: Впервые сообщается о находке редкого вида *Sarsilatona serricauda* (Sars, 1901) из нескольких местонахождений на юго-востоке Мексики. Изучен массовый материал, включающий самцов и гамогенетических самок. Получены новые данные по биологии и географическому распространению вида.

Introduction

Genus *Sarsilatona* Korovchinsky, 1985 has been described recently comprising species formerly incorporated in genera *Latonopsis* Sars, 1888 and *Pseudosida* Herrick, 1884 [Korovchinsky, 1985]. *S. serricauda* was redescribed based on Sars' and Daday's type materials (*Latonopsis serricauda* Sars, 1901 and *L. fasciculata* Daday, 1905) from the vicinity of San Paulo City (Brazil) and Paraguay and few additional specimens from Amazon region (Brazil) and Florida (USA). Studied materials included no males which were briefly described earlier from the southern United States [Birge, 1910]. In general, *S. serricauda* was so far recorded from Brazil, Paraguay, northern Argentina, Venezuela, Peru, Central America (Nicaragua, probably Guatemala), Cuba, Puerto Rico, and southern USA (Louisiana, Texas, and Florida) [Collado et al., 1984; Korovchinsky, 1992]. Also Wilson [1936] listed *Latonopsis fasciculata* from Yucatan Peninsula (Mexico). Most of

literature records of the species, including those from other continents [e.g., Sharma & Sharma, 1990], are not documented enough and need further confirmation.

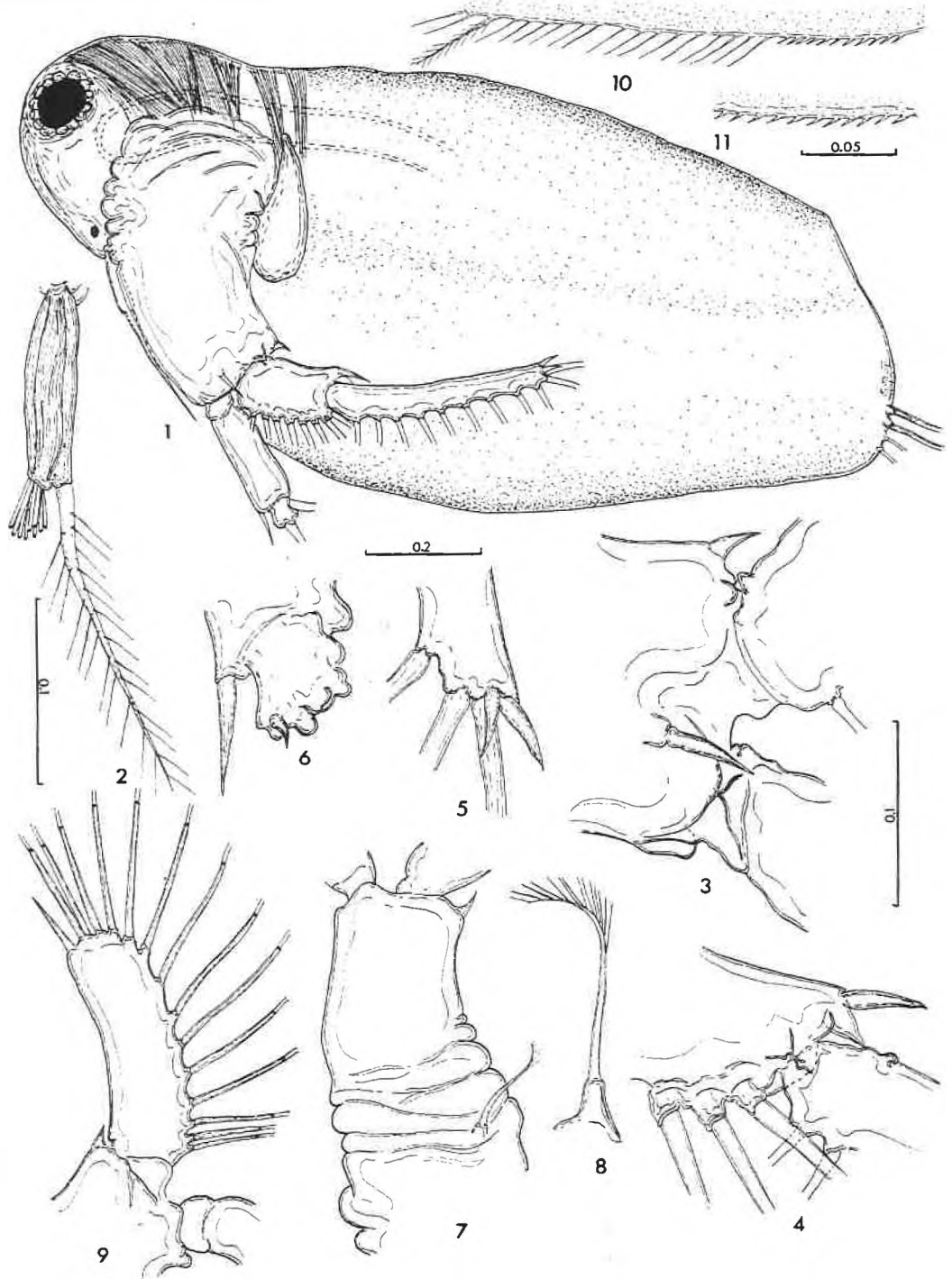
Modern extensive survey of Mexican cladocerans [Elías-Gutiérrez et al., 1997, 1999] made it possible to collect large number of these rare microcrustaceans, including males, in the southeast of this country, thus giving an opportunity to complete the species redescription and represent some further considerations on its biology.

Materials and methods

88 juvenile and parthenogenetic females, 2 gamogenetic females with resting eggs, and 15 males were collected on October 3, 1998 in two ponds in Chicanna, within the Biosphere Reserve of Calackmul (18°30'50" N, 89°28'54" W) at the south of Yucatan Peninsula, in Campeche State. Both water bodies were undoubtedly connected during the rainy season, thus all specimens were considered as originated from one population. Additional few parthenogenetic females were obtained from a pond about 70 km from Chicanna (Kohunlich, Quintana Roo State) and two localities in Tabasco State. All specimens were preserved in formalin. Scanning electron microscopy was performed after dehydration in alcohol and subsequent critical point drying. After sputter-coating with gold, the preparations were examined with a Topcone scanning microscope at 10–15 kv. The line drawings were made by means of a RA-4 drawing apparatus.

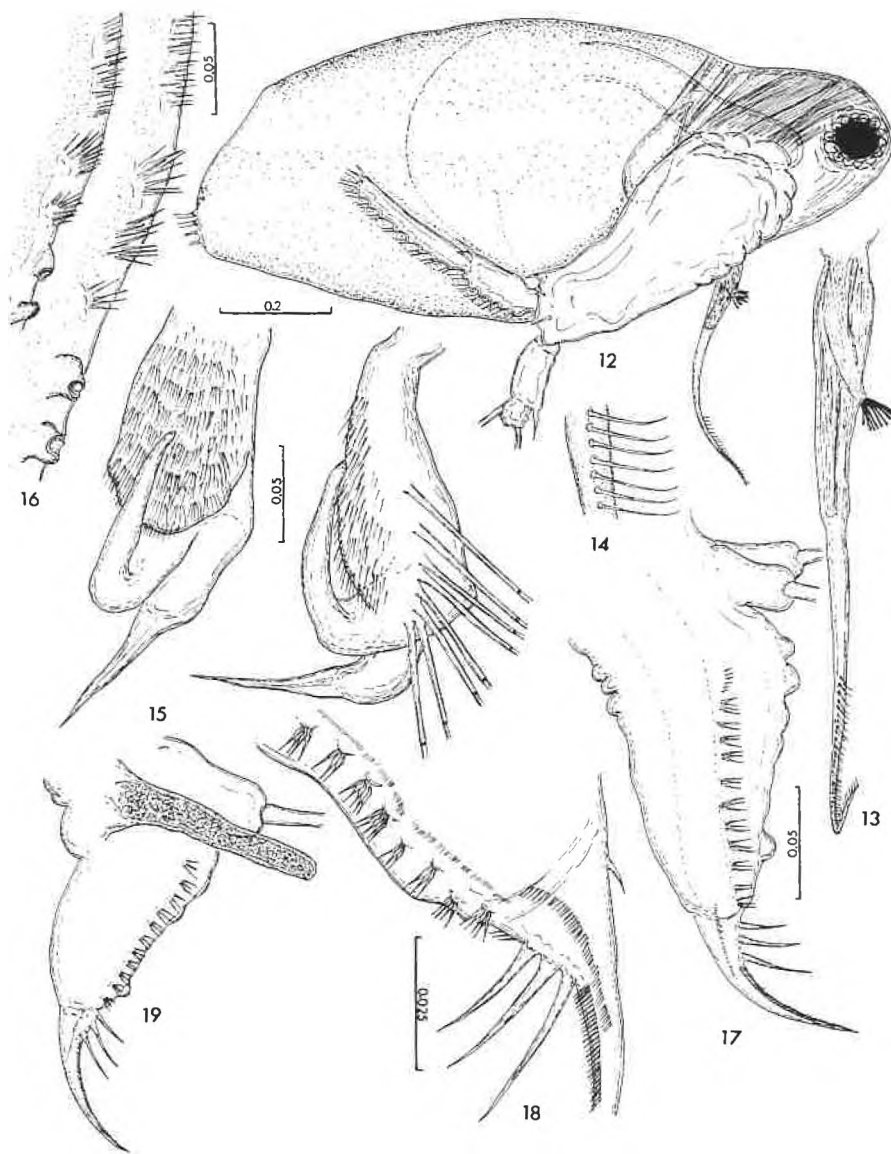
Comparative descriptions and remarks

Parthenogenetic female. Head high and separated by small dorsal impression from trunk (Fig. 1). Eye size



Figs 1–11 *Sarsilatonina serricauda*, parthenogenetic female, October 3, 1998 (1, 7–9 — Chicanna ponds, 2–6, 10, 11 — pond near Kohunlich): 1 — general lateral view, 2 — antennule, 3 — distal end of basipodite, outer side, 4 — distal part of first segment of upper 2-segmented antennal branch, 5 — distal part of second segment of the same branch, 6 — distal part of lower antennal branch (setae of distal segment broken), 7 — antennal basipodite, inner side, 8 — inner sensory setae on basal part of basipodite, 9 — deformed upper antennal branch, 10 — armament of posterior part of ventral valve margin, 11 — armament of middle part of ventral valve margin.

Рис. 1–11 *Sarsilatonina serricauda*, партеногенетическая самка, 3 октября 1998 (1, 7–9 — озера Chicanna, 2–6, 10, 11 — озеро у Kohunlich): 1 — общий вид с боковой стороны, 2 — антеннула, 3 — дистальный конец базиподита с внешней стороны, 4 — дистальная часть первого членика верхней двухчлениковой ветви антенны, 5 — дистальная часть второго членика той же ветви, 6 — дистальная часть нижней ветви антенны (щетинки дистального членика сломаны), 7 — базиподит антенны с внутренней стороны, 8 — внутренняя чувствительная щетинка на базальной части базиподита, 9 — деформированная верхняя ветвь антенны, 10 — вооружение задней части вентрального края створок, 11 — вооружение средней части вентрального края створок.

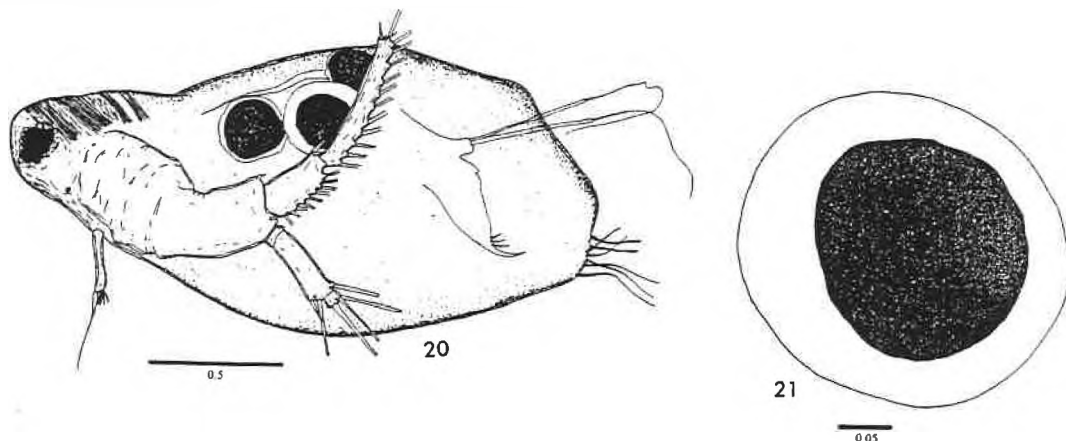


Figs 12–19. *Sarsilatona serricauda*, Chicanna ponds, October 3, 1998, male (12–15, 19), parthenogenetic female (16–18): 12 — general lateral view, 13 — antennule, 14 — spines on distal part of antennule, 15 — distal part of endopodite of first pair of thoracic limb (left — frontal view, right — lateral view), 16 — armament of postero-ventral valve margin, 17 — postabdomen, lateral view, 18 — distal part of postabdomen, 19 — postabdomen and copulatory appendage, lateral view.

Рис. 12–19. *Sarsilatona serricauda*, озерки Чиканна, 3 октября 1998, самец (12–15, 19), партеногенетическая самка (16–18): 12 — общий вид сбоку, 13 — антеннула, 14 — шипики дистальной части антеннулы, 15 — дистальная часть эндоподита первой пары торакальных конечностей (слева — вид спереди, справа — вид сбоку), 16 — вооружение задне-нижнего края створки, 17 — постабдомен, вид сбоку, 18 — дистальная часть постабдомена, 19 — постабдомен и копулятивный придаток, вид сбоку.

similar with that in specimens from South America and Florida (6.0–8.3, av. 7.1 % of body length). Antennules (Figs. 1, 2, 22) relatively short (19.8–23.3, av. 21.4%) with comparatively longer basal part (74–75 % of flagellum length). Swimming antennae massive (48.1–67.2, av. 56.0 %) with strong basipodite having inner long distally leathured seta near its base (Figs. 7, 8). Its distal dorsal end with sharp and rather thin curved spine and small prominence, one large spine on its outer side between bases of branches, one tiny prominence in front

of lower antennal branch, and another one on distal ventral corner (Fig. 3). First segment of upper 2-segmented antennal branch with broad proximal corner (Figs. 1, 23) bears 5–10 long swimming setae and 2 distal spines, one of which is longer than neighbouring one (Fig. 4, 24) but not so long as in specimens from Florida [see Korovchinsky, 1985]. Second segment of this branch with 9–12 setae and 2 sharp distal spines (Fig. 5). Formula of antennal setae (5–10) — (9–12)/0-1-4. One specimen possessed peculiar unisegmented



Figs 20–21. *Sarsilatonaserricauda*, Chicanna ponds, October 3, 1998: 20 — gamogenetic female with three resting eggs, 21 — resting egg with transparent sticky envelope.

Рис. 20–21. *Sarsilatonaserricauda*, озерки Чичанна, 3 октября 1998: 20 — гамогенетическая самка с тремя стойкими яйцами, 21 — стойкое яйцо с прозрачной липкой оболочкой.

upper antennal branch (Fig. 9). Ventral margin of valves bordered with small densely situated denticles (Fig. 11) and thin setules closer to posterior margin (Fig. 10). Two especially long (54.5–56.5 % of body length) naked setae are situated on larger and broader bases of ventro-posterior corner of each valve (Figs. 1, 16). Somewhat dorsally there are 2–5 (usually 2–3) clusters of minute spinules (Figs 16, 28). Sometimes the number of these clusters on valves of one specimen may be different (2/3, 3/4, etc.). Prominences on the dorsal side of postabdomen are comparatively small and roundish, lateral lanceolate anal teeth in 8–13 clusters (sometimes solitary), each cluster consists of 2–7, more often 2–5 teeth (Figs 17, 18, 26). Also up to 6–7 lateral rows of densely situated small spinules of different length are found here. Terminal claws thin, bearing 3 long basal spines, the proximal of which is only slightly shorter than others (Figs. 18, 25). Claw's armament is complex with four rows of spinules on its external and internal sides (Fig. 27). Setae natatoriae 55.3–57.8 % of body length. Body length up to 2.06 mm.

Gamogenetic female (Fig. 20) much resembles the parthenogenetic one, except of more convex dorsal side of shell caused by the presence of resting eggs. Body length 1.63–1.95 mm.

Male also resembles female in respect of primary diagnostic features. Eye comparatively large (7.8–8.2 %) (Fig. 12). Antennules long (38.0–42.4 %) with a row of slightly hooked, long, thin spines along their narrowed distal part (Figs 12–14). Antennal setal formula (6–8) — (9–11) / 0–1–4. Endopodites of first pair of thoracic limbs (Fig. 15) enlarged distally having long and massive naked clasper hook incurved upward. Endopodite's stem in front of this hook is covered by very numerous densely situated spinules. Thick outgrowth-like setae without setules near the base of clasper hook. Postabdomen with smoothed dorsal prominences (Fig. 19). Copulatory appendages comparatively short and

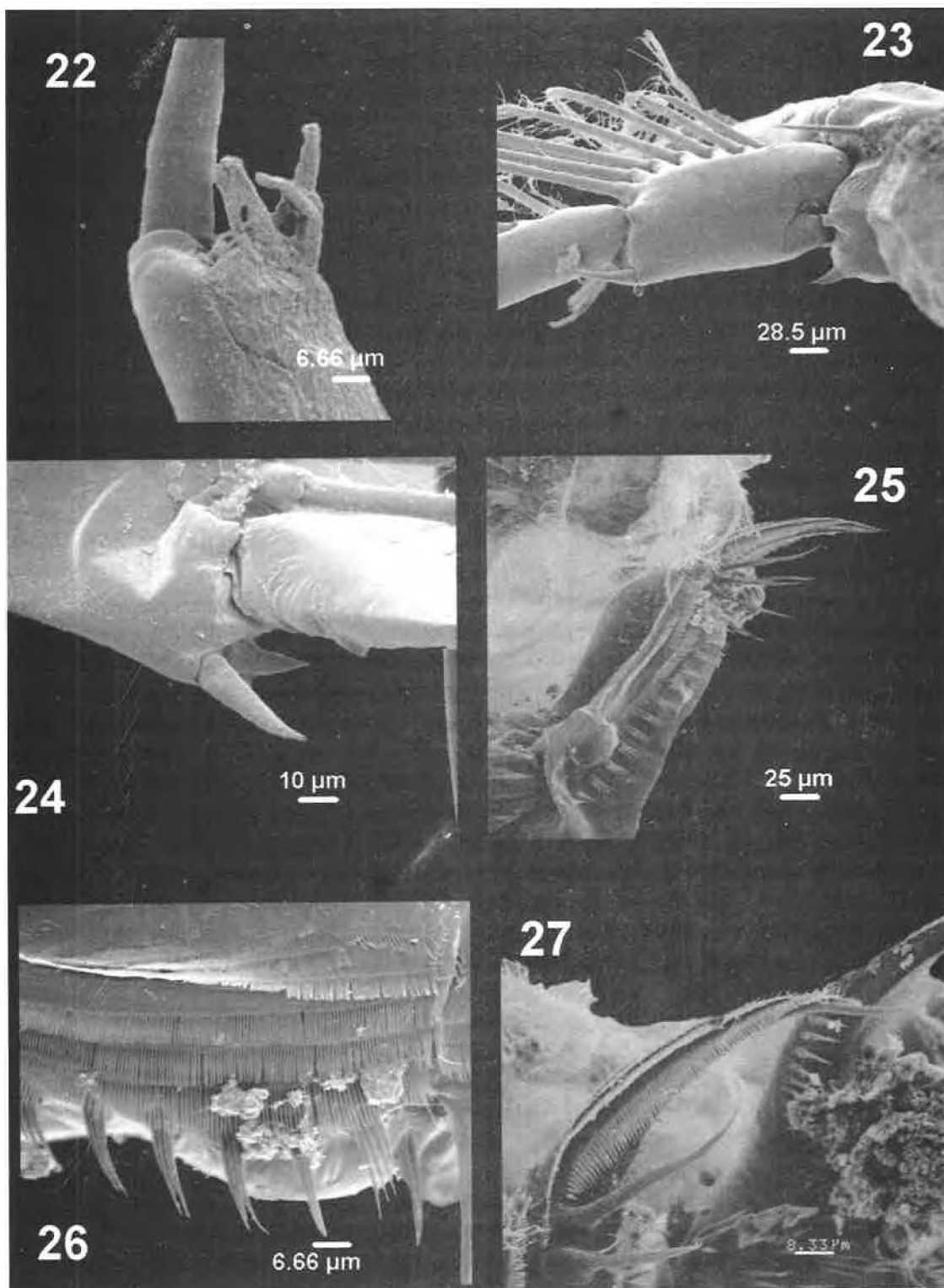
tube-like, slightly narrowed distally (Fig. 19). Body length 0.85–1.55 mm.

Juveniles. The smallest juveniles of body length 0.60–0.63 mm have two eyes and 3 and 7 setae on proximal and distal segments of upper antennal branch, respectively. Slightly larger specimens with one eye possess 4 and 8 setae on these segments. Postabdomen with inconspicuous dorsal prominences and 8–9 clusters of anal teeth having 2–3 spines in each.

Remarks. Studied Mexican specimens of *S. serricauda* possess the primary diagnostic features in common with those described earlier [Korovchinsky, 1985, 1992]. Only comparatively shorter antennules with long basal part and small roundish prominences on dorsal postabdominal side seem to be rather specific. On the other hand, these antennules are quite longer than in *S. behningi* while the dorsal prominences of postabdomen look like almost identical with those of the latter species. Other features (shape and armament of antennal parts, valves, and postabdomen) are quite characteristic of *S. serricauda*. At the same time, due to small number of previously studied specimens from South America and Florida [Korovchinsky, 1985], all numerical comparisons are tentative. Probably for this reason, some features of Mexican representatives look like intermediate (e.g., number of anal spines in each cluster, relative length of long naked posterior setae on the shell margin). Also many males had deformed body which made it impossible to determine their specific proportions.

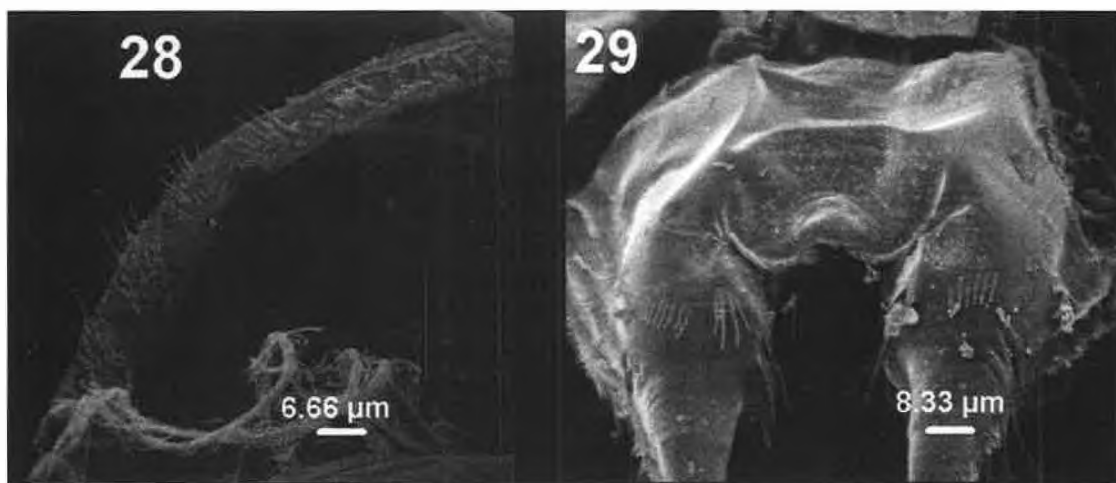
Population structure and notes on biology

The size-frequency distribution of specimens from Chicanna ponds is shown in Fig. 30. Majority of populations (79 %) consisted of females, the smallest adult of which with the parthenogenetic eggs in brood pouch had body length 1.33 mm. Only 5 females (5.9 %) bore 1–2



Figs 22–27. *Sarsilatona serricauda*, parthenogenetic female, Chicanna ponds, October 3, 1998, SEM micrographs: 22 — distal part of antennule base, 23 — first segment of upper 2-segmented antennal branch, 24 — distal end of first segment of upper 2-segmented antennal branch, 25 — postabdomen, lateral view, 26 — postabdomen, details of lateral armament, 27 — postabdominal claws.

Рис. 22–27. *Sarsilatona serricauda*, озёрки Chicanna, 3 октября 1998, снимки сканирующего электронного микроскопа: 22 — дистальная часть основания антеннулы, 23 — первый членик верхней двухчлениковой ветви антенны, 24 — дистальная часть первого членика верхней двухчлениковой ветви антенны, 25 — постабдомен, вид сбоку, 26 — постабдомен, детали вооружения боковой стороны, 27 — короткие постабдомена



Figs 28–29. *Sarsilatona serricauda*, male, Chicanna ponds, October 3, 1998, SEM micrographs: 28 — inner clusters of spinules near posterior valve margin, 29 — distal end of postabdomen, ventral view.

Рис. 28–29. *Sarsilatona serricauda*, самец, озерки Chicanna, 3 октября 1998, снимки сканирующего электронного микроскопа: 28 — внутренние пучки спикул у заднего края створки, 29 — дистальный конец постабдомена, вид с вентральной стороны.

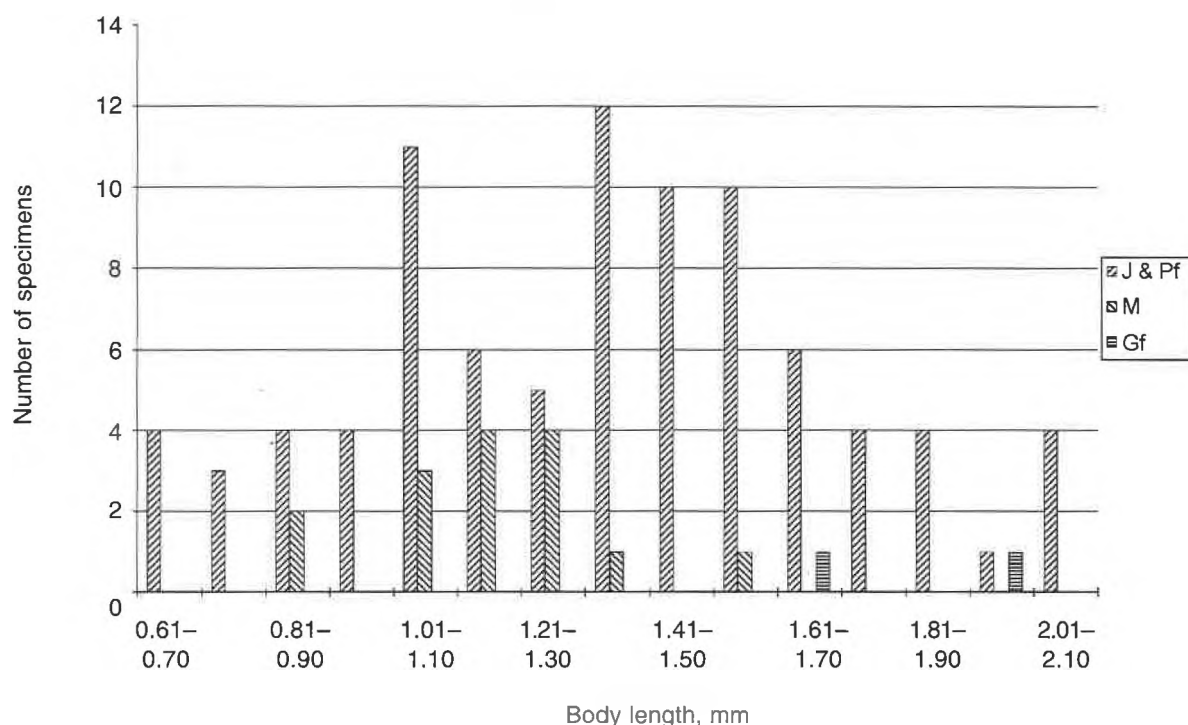


Fig. 30. Size-frequency distribution of specimens of *S. serricauda* from Chicanna ponds, October 3, 1998 ($n = 105$) (J & Pf — juvenile and parthenogenetic females, M — males, Gf — gamogenetic females).

Рис. 30. Размерно-частотное распределение особей *Sarsilatona serricauda* из озерков Chicanna, 3 октября 1998 ($n = 105$) (J & Pf — ювенильные и партеногенетические самки, M — самцы, Gf — гамогенетические самки).

such eggs of elliptic shape (approximately 0.14×0.30 mm).

Gamogenetic specimens formed 16% of general population number being mostly represented by males, whereas gamogenetic females numbered only 2 speci-

mens with 2 and 3 more roundish ($0.15\text{--}0.19 \times 0.18\text{--}0.21$ mm) resting eggs (Figs 20, 21) in their brood pouches covered by a transparent sticky envelope (together with the envelope the egg sized up to 0.25 mm). Egg mass is dark brown, lighter towards the margins. It



Fig. 31. Known localities of *S. serricauda* in Mexico: 1 — Chicanna, 2 — Kohunlich, 3 — Playa del Pozo, 4 — Laguna Estancia Vieja; assumed localities after Wilson [1936]: 5 — roadside pool near Pisté town, 6 — pool near Progreso town.

Рис. 31. Известные местонахождения *S. serricauda* в Мексике: 1 — Чиканна, 2 — Кохунлич, 3 — Лагуна Playa del Pozo, 4 — Лагуна Estancia Vieja; предполагаемые местонахождения по Wilson [1936]: 5 — придорожная лужа у города Pisté, 6 — лужа у города Progreso.

lacks vacuoles and contains small-grained yolk which indicate the possibility of the eggs to withstand drought [Korovchinsky & Boikova, 1996]. Presence of small fraction of males and sexual females suggests that the local population of *S. serricauda* probably fell into initial stage of gamogenetic reproduction occurring in autumn when the water bodies started to dry after the rainy season.

S. serricauda was found in small temporary fishless forest ponds where it associated with dead leaves. These water bodies were also populated by large number of tadpoles, two new species of *Mastigodiptomus* described by Suárez-Morales & Elías-Gutiérrez [in press], and an anostracan, *Streptocephalus* sp. It was also found in two shallow lagoons in association of water hyacinth's roots.

Main environmental variables in one of the localities (Playa del Pozo) were as follows: Secchi transparency — 0.59 m, water temperature — 28.5° C, pH — 6.38, and dissolved oxygen — 8.3 mg/l.

Geographical distribution in Mexico

S. serricauda was found only in 4 localities of about 75 surveyed in the southeast of Mexico: ponds in Chi-

canna (Campeche State) and near Kohunlich (Quintana Roo State) (18°24' 40"N; 88°48'W), and two lagoons: Playa del Pozo (18°00' N; 92°47' W, near Villahermosa City International Airport) and Laguna Estancia Vieja (17°52'N; 93°05' W, near the border between Chiapas and Tabasco States) (Fig. 31). If Wilson's [1936] records of "*Latonopsis fasciculata*" from two localities near Progreso town and Pisté town (Yucatan State) (see Fig. 31) really refer to *S. serricauda*, the species range much extends to the north of Yucatan Peninsula.

Acknowledgments

One of the authors (NMK) thanks Dr. A. A. Kotov (Institute of Ecology and Evolution, Moscow) for technical and information assistance. Also Prof. N. N. Smirnov and Dr. A. Smirnov assisted us with technical advice and collection of field material. Part of this research was funded by Comisión Nacional Para el conocimiento y Uso de la Biodiversidad (CONABIO S050). Alejandro Villalobos-Hiriart kindly supplied us with samples from the Laguna Estancia Vieja.

References

- Birge, E. A. 1910. Notes on Cladocera. IV // Transactions of the Wisconsin Academy of Sciences. Vol.16. P.1017–1066.
- Collado, C., C. H. Fernando & D. Sephton, 1984. The freshwater zooplankton of Central America and the Caribbean // Hydrobiologia. Vol.113. P.105–119.
- Elías-Gutiérrez, M., Ciro Pérez, J., Gutiérrez-Aguirre, M. & A. Cervantes-Martínez, 1997. Studies on littoral Cladocera (Anomopoda) from Mexican Neovolcanic Province // Hydrobiologia. Vol.360. P.67–93.
- Elías-Gutiérrez, M., N. N. Smirnov, E. Suárez-Morales & N. Dimas-Flores, 1999. New and little known cladocerans (Crustacea: Anomopoda) from southeastern Mexico, with the description of a new macrothricid // Abstracts of the Vth International Symposium on Cladocera, Plön (Germany), 14–18 September 1999. P.23.
- Korovchinsky, N. M. 1985. *Sarsilatona*, a new genus of the family Sididae (Crustacea, Cladocera) with two redescribed species and one new species // Internationale Revue der gesamten Hydrobiologie. Vol.70. P.397–425.
- Korovchinsky, N. M. 1992. Sididae and Holopediidae (Crustacea: Daphniiformes) // Guides to the identification of the Microinvertebrates of the Continental Waters of the World. Vol.3. The Hague: SPB Academic Publ. 82 pp.
- Korovchinsky, N. M. & O. S. Boikova. 1996. The resting eggs of the Ctenopoda (Crustacea: Branchiopoda): a review // Hydrobiologia. Vol.320. P.131–140.
- Sharma, B. K. & S. Sharma. 1990. On the taxonomic status of some cladoceran taxa (Crustacea: Cladocera) from Central India // Revue d'Hydrobiologie tropicale. Vol.23. P.105–113.
- Suárez-Morales, E., & M. Elías-Gutiérrez, (in press). Two new *Mastigodiptomus* (Copepoda, Diaptomidae) from southeastern Mexico, with a key for the identification of the known species of the genus // J. Nat. Hist.
- Wilson, C.B. 1936. Copepods from the cenotes and caves of the Yucatan Peninsula, with notes on cladocerans // (eds. A.S. Pearse, E.P. Creaser & F.G. Hall). The cenotes of Yucatán, a zoological and hidrographic survey. Carnegie Institution of Washington. P.77–88.