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Macrothrix smirnovi, a new species (Crustacea: Anomopoda: Macrothricidae) from Mexico, a member of the *M. triserialis*-group

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Abstract.—*Macrothrix smirnovi*, new species, is described from a small reservoir located at a transitional zone between neartic and neotropic regions in Mexico. It resembles taxa related to *M. triserialis*, mainly the South-American *M. superaculeata*, but parthenogenic females are characterized by differences in spinulation of the antennae. Trunk limb II has a unique lobe carrying a stout conical seta densely ciliated at its distal portion located at the external surface of the endopod, near to the insertion of scrapers 4 and 5. The postabdomen is also distinct. The ephippium has a structure similar to *M. rosea*. Adult males have a postabdomen fairly similar to females and a copulatory hook with one crescentic ridge at the tip of an irregular margin which gives a spoon-like appearance to this portion.

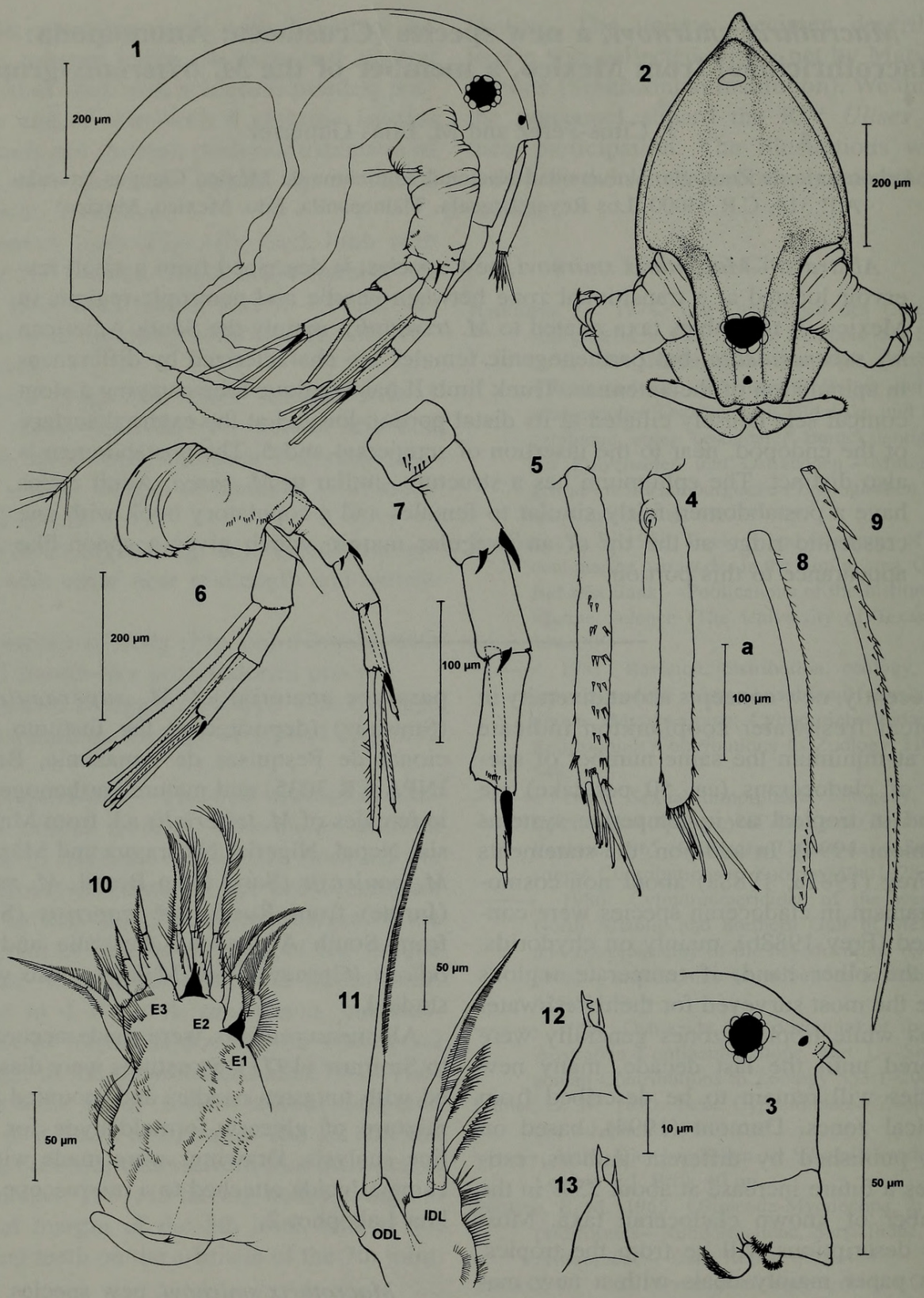
Recently, new concepts about diversity in tropical freshwater zooplankton indicate that at minimum the same number of species of cladocerans (ca. 50 per lake) are found in tropical as in temperate systems (Dumont 1994). In addition, the statements of Frey (1982a, 1988a) about non-cosmopolitanism in cladoceran species were confirmed (Frey 1988b), mainly on chydorids. On the other hand, if temperate regions were the most surveyed for their freshwater fauna while tropical zones generally were ignored until the last decade, many new species will remain to be described from tropical zones. Dumont (1994), based on data published by different authors, estimates a future increase at about 25% in the number of known cladoceran taxa. Most new descriptions will be from the tropics. This paper mainly deals with a new macrothricid cladoceran from central Mexico which is located at a transitional zone between neartic and neotropic regions.

Samples were collected from the littoral zone of water bodies, with a 50 μm-mesh plankton net and were fixed with sugar-formaldehyde (Haney & Hall 1973). The paratype material of *M. superaculeata* (Smirnov) (deposited at the Instituto Nacional de Pesquisas de Amazonia, Brazil INPA-CR 3035) and mature parthenogenetic females of *M. triserialis* s.l. from Malaysia, Nepal, Nigeria, Nicaragua and Mexico, *M. paulensis* (Sars) from Brazil, *M. rosea* (Jurine) from Russia, *M. capensis* (Sars) from South Africa and Australia and *M. odiosa* (Gurney) from Malaysia also were studied.

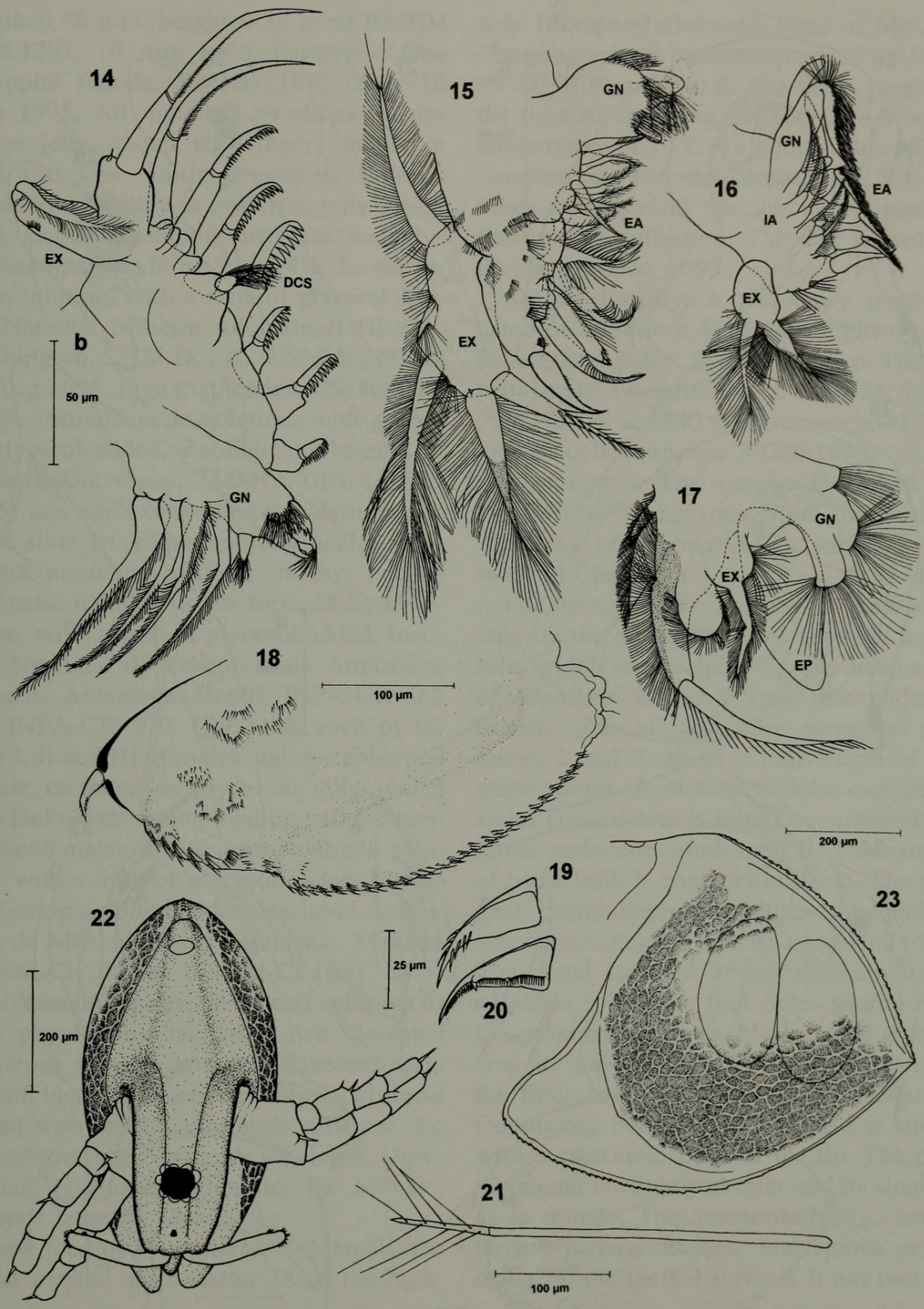
All measurements were made according to Smirnov (1971). Structures were dissected with tungsten needles and mounted in a mixture of glycerin-formaldehyde for the fine analysis. Drawings were made with a camera lucida attached to a microscope Nikon Labophot-2.

Macrothrix smirnovi, new species
Figs. 1–35

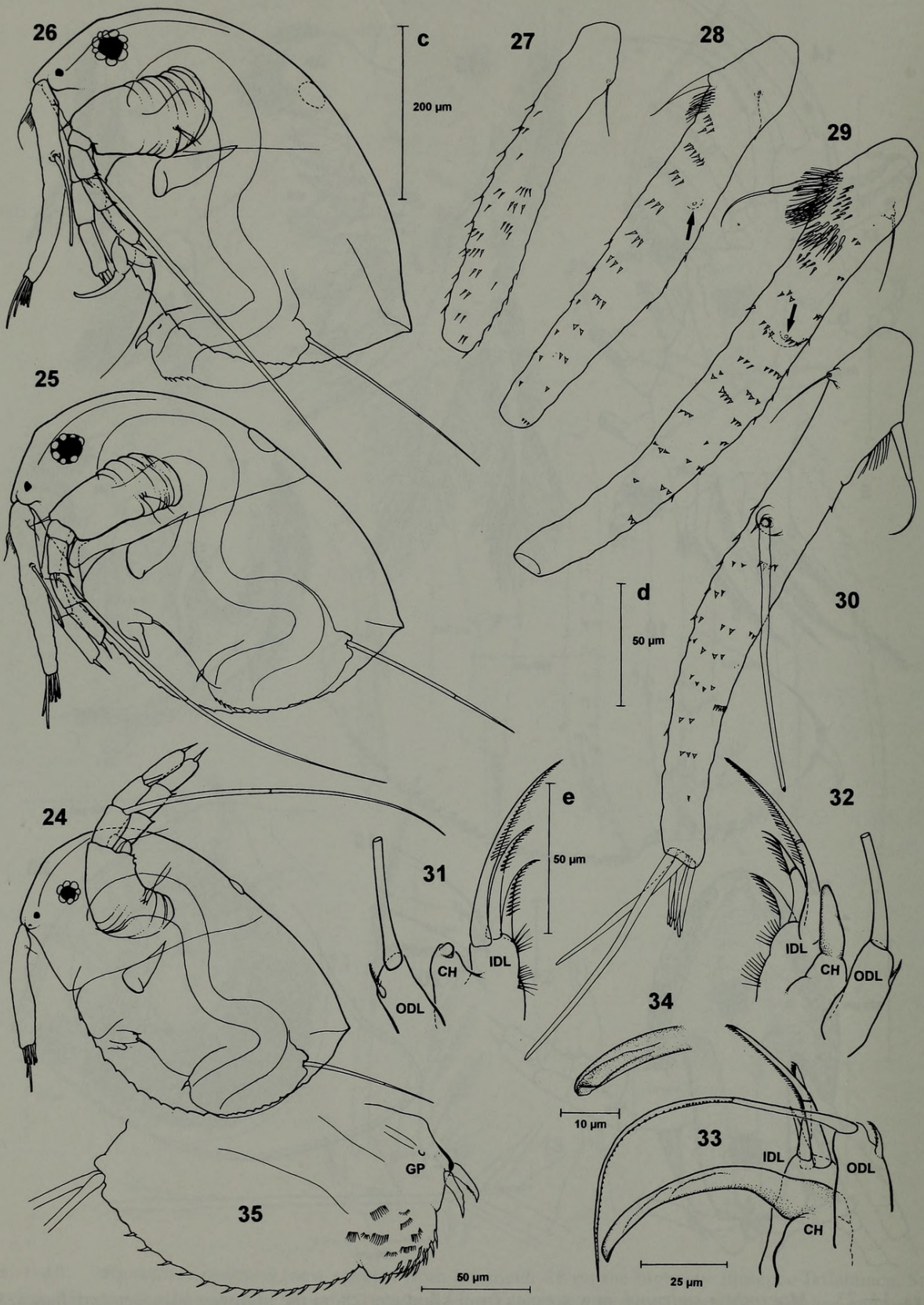
Material.—Holotype: One adult ovigerous female (total length 0.8 mm, height 0.5 mm), The Natural History Museum (BMNH), London, England, 1995.1290, 16 Aug 1995. Allotype: One adult male (total



Figs. 1–13. *Macrothrix smirnovi*, new species from kilometer 28 on the highway Jilotepec-Ixtlahuaca, State of Mexico, Mexico. Parthenogenetic female. 1, lateral view (distal segments of antennal setae are omitted); 2, frontal view of mature female; 3, ventral margin of the head and labrum; 4, AI lateral side; 5, AI medial side; 6, AII medial view (distal segments of setae are omitted); 7, antennal exopod, showing the spine armature; 8, proximal segment of seta on first endopod of AII; 9, distal segment of seta on first endopod of AII; 10, left trunk limb I, medial (ODL and IDL are omitted); 11, ODL (outer distal lobe or exopod) and IDL (inner distal lobe or endite 4) of trunk limb I; 12, inner spine of endite 1 on trunk limb I; 13, inner spine of endite 2 on trunk limb I. Scale bar "a" is for Figs. 4, 5, 8 and 9. Abreviations: E1, endite 1; E2, endite 2; E3, endite 3.



Figs. 14–23. *Macrothrix smirnovi*, new species from kilometer 28 on the highway Jilotepec-Ixtlahuaca, State of Mexico, Mexico. All are parthenogenetic female except Figs. 22 and 23 which are ephippial females. 14, left trunk limb II, lateral; 15, right trunk limb III, medial; 16, right trunk limb IV, lateral; 17, left trunk limb V, medial; 18, lateral view of postabdomen; 19, terminal claw of postabdomen, lateral; 20, terminal claw of postabdomen, medial; 21, seta natatoria of postabdomen; 22, frontal view of ephippial female; 23, lateral view of ephippial region of a sexual female, showing the slough line. Scale bar "b" is for Figs. 14, 15, 16 and 17. Abreviations: EX, exopod; EN, endopod; GN, gnathobase; DCS, densely ciliated seta; IA, inner armature; EA, external armature; EP, epipodite.



Figs. 24–35. *Macrothrix smirnovi*, new species from kilometer 28 on the highway Jilotepec-Ixtlahuaca, State of Mexico, Mexico. Males. 24, lateral view of instar-I male; 25, lateral view of instar-II male; 26, lateral view of mature male; 27, AI of instar-I male, medial (aesthetascs are omitted); 28, AI of instar-II male, medial (aesthetascs are omitted) arrow indicates point of insertion of external, medial seta; 29, AI of instar-II male, medial (aesthetascs are omitted), arrow indicates point of insertion of external medial seta; 30, AI of instar-II male, lateral; 31, part of trunk limb I of instar-I male; 32, part of trunk limb I of instar-II male, showing the

length 0.48 mm, height 0.32 mm) BMNH 1995.1291, 16 Aug 1995. Paratypes: One ephippial female, BMNH 1995.1292, 16 Aug 1995. All mounted on slides in glycerine jelly sealed with depict mounting medium. One adult ovigerous female, mounted on a slide in glycerine jelly sealed with DePeX mounting medium and five parthenogenetic females in 4% formaldehyde solution, with a drop of glycerol added, National Museum of Natural History, Washington, D.C., U.S.A., USNM 274176, 29 Aug 1995. Five parthenogenetic females in 4% formaldehyde solution, with a drop of glycerol added, Zoological Museum of Moscow University, ZMMU 4010, 14 Aug 1995; one adult ovigerous female mounted on a slide in glycerine jelly sealed with DePeX mounting medium and five parthenogenetic females in 4% formaldehyde solution, with a drop of glycerol added, Instituto Nacional de Pesquisas da Amazônia, Manaos, Amazonia, Brazil, INPA-CR 569 and INPA-CR 570. One slide each of instars I, II and III of males and one ephippial female mounted in glycerine jelly sealed with DePeX mounting medium; 10 parthenogenic females in 4% formaldehyde solution, with a drop of glycerol added, Museo de Zoología, Universidad Nacional Autónoma de México, Campus Iztacala, Mexico. UNAM-Cl 1047 to UNAM-Cl 1051.

All remaining specimens and ephippia of both populations, including two dissected ovigerous females and one dissected male of each instar, mounted on slides in glycerol sealed with DePeX mounting medium, are deposited at the Museo de Zoología, Universidad Nacional Autónoma de México, Campus Iztacala, Mexico.

Type locality and habitat.—A small reservoir located at kilometer 28 on the highway Jilotopec-Ixtlahuaca, State of Mexico. The geographical coordinates are 19°49′14″N, 99°41′50″W at 2740 m above sea level. At the time of sampling, we recorded a water temperature of 14°C (air temperature 19°C), conductivity 135 mS/cm and pH 7.0. No other macrothricid species were found at the time of collection. The date of collection was 3 Dec. 1993.

Second locality: A temporary pond located at kilometer 44 on the highway Toluca-Atlacomulco, State of Mexico. The approximate coordinates are 19°38′54″N, 99°47′24″W at 2540 m above sea level. The date of collection was 3 Dec 1993.

Etymology.—The species is named for Dr. Nikolai N. Smirnov, from the Russian Academy of Sciences, as a tribute to his work in Cladocera.

Diagnosis.—This species is characterized by the arrangement of antennal armature, which is one spine on the distal edge of segments 2 and 4 from the endopod branch, plus an accessory spine on segments 2 and 3, about a half length of the other spines. A distinctive lobe carrying a stout, conical seta is found on endopod external surface of trunk limb II. The exopod of trunk limb V has only one seta. The preanal postabdominal spinules subequal in size are arranged in a stripe of several rows. The distal segment of postabdominal seta natatoria is three to four times shorter than the proximal segment. Males are characterized by an ontogenetic development over the three instars; the last instar is mature. Copulatory hook on trunk limb I is strong with a crescentic ridge at the tip. The postabdomen is slightly shorter and its shape is as in female. The antennula has a characteristic pattern of setae and spines proximally on the medial surface. It has two ba-

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enlarging copulatory hook; 33, part of trunk limb I of mature male, showing the highly modificated setae on ODL and IDL; 34, detail of tip copulatory hook on trunk limb I of mature male; 35, lateral view of postabdomen of mature male. Scale bars: "c" is for Figs. 24, 25 and 26; "d" is for Figs. 27, 28, 29 and 30; "e" is for Figs. 31 and 32. Abreviations: ODL, Outer distal lobe; IDL, inner distal lobe; CH, copulatory hook; GP, genital pore.

sal sensory setae and a long seta attached at the middle region of the external surface. Ephippial female with two ephippial eggs; about the same shape in lateral view as parthenogenetic female. The ephippial surface has a mesh-like pattern and a dorsal margin with a row of sclerotized rounded papillae.

Measurements.—Mature parthenogenetic females: Total length of the body from 0.70 to 1.05 mm, height from 0.48 to 0.75 mm (n = 31).

Males: Instar I, length from 0.37 to 0.4, height from 0.24 to 0.26 (n = 3); instar II, length from 0.45 to 0.52, height from 0.27 to 0.32 (n = 25); mature, length from 0.45 to 0.55, height from 0.29 to 0.45 (n = 13). All measurements are in mm.

Description of parthenogenetic female.—Shape and shell: Body ovoid (length : maximum height = 1.45–1.60 mm). Dorsal margin is curved from the supraocular region to the posterior-dorsal angle, with a slight depression in the vicinity of the head pore (Fig. 1); a pointed keel at the top of the shell is evident, clearly shown from a frontal view of the animal (Fig. 2). The dorsal margin of the shell is without serration. The ventral margin is deeply serrated with two rows of movable spines which are inserted at the submarginal edge. The external row of sparse needle-like spines increases in length distally and are outwardly directed. The inner row of bilaterally spinulated spines is inwardly directed, with every two of these followed by one spine of the external series; close to the middle region, the proximal member of the spinulated spines starts becoming stout and longer, while the second decreases in size toward the posterior angle. The entire surface of the shell has dots and is striated with a polygonal pattern.

Head: Evenly rounded with a slight supraocular bulge, tapering to the rostral region. The frontal part of the rostrum is trilobed with a medial large lobe and two lateral, blunt tips (Fig. 2), widening from the tip of rostrum onwards. The lateral ridges begin from the rostral apex running above the ocellus and the eye until it reaches the dorsal margin of the headshield. The head pore is large and subcircular. The ventral margin of the head is even, slightly convex with a transversal squamose pattern. The labrum is cuneiform and continuous with the ventral margin of the head (Fig. 3). The labral apex is blunt. Compound eye is located close to the middle distance between the dorsal and the ventral edges. The ocellus is close to the apex of rostrum, from 4.75 to 5.6 times smaller than compound eye.

First antenna (Figs. 4, 5) rod-shape (body length : antennule length = 3.4–3.8) inserted subapically, barely dilated distally, reaching over half-way to the labrum tip. One basal sensory seta is located ventrolaterally. Distally with a row of relatively long spinules near the lateral side of aesthetascs insertion. The medial surface has 7 to 9 transverse rows of small spines on the two distal thirds. Lateral and anterior surface armed with several rows of minute scale-like spinules plus a subapical group of spines on the posterior side. Nine aesthetascs, unequal in length (longest member : shortest member = 2.0–2.2) with a bifurcated tip, the longest one is 2.6–3.0 times shorter than the antennular length.

Second antenna: Stout and long (Fig. 6). Coxa massive, the basal region appears annulated with several folds and provided with a row of tiny denticles at the ventral side; the middle region presents two ventrolateral, soft sensory setae and the distal one is made up of ventrolateral margin armed with some rows of sclerotized spinules. The external surface of the distal portion has a spine used for burrowing and a longer soft seta at the medial face extended well beyond the end of the second exopod segment. Swimming setae 0-0-1-3/1-1-3, spines 0-2-1-1/0-0-1. All exopod setae carry spines at the distal septum except for the innermost apical member. The exopod is characterized by one spine on the distal edge of segments 2 and 4, as in all the Macrothricidae taxa (Smirnov 1992), plus an accessory, internal curved spine on seg-

ments 2 and 3, both subequal in length (Fig. 7). The spine is attached to the second segment (2nd segment : spine = 2.2–3.2) which is about 1.8 to 3.0 times longer than the other one. The surface of all antennal segments includes rows of fine scale-like spinules.

The longest antennal seta (Figs. 8, 9) is on the first endopod segment, and is bisegmented (distal segment: proximal segment = 1.2–1.6) stout, sclerotized and long (body length : seta length = 1.2–1.4). Its convex margin is provided with a series of fine setules along the three proximal quarters of the first segment, followed by a row of stout spines, two or three of which are subequal in length and are attached to the proximal joint (Fig. 8). The remaining row of spines runs along the second segment, decreasing in size gradually toward the tip. Beyond the middle third of the seta, these spines form groups of different number. There is a row of sparse spinules that continues along the next segment on the external surface of distal quarter of the first segment (Fig. 9).

Trunk limb I (Fig. 10): The exopod (ODL) is slender, bearing a long apical seta unilaterally having fine setules along its distal portion, and a short lateral seta (Fig. 11). Endite 4 (IDL) has three setae unequal in length, the longest one with a pattern similar to seta of ODL, the other two setae posses a row of stout setules, increasing moderately in size distally (Fig. 11). The posterior surface of IDL is provided with groups of strong setae. There are four setae different in length on endite 3, two of them are more sclerotized and bisegmented. Endite 2 has three bisegmented setae, setulated along the distal portion and with a row of sparse stout setules through the proximal joint. Endite 1 presents two fine plumose setae (Fig. 10). The inner spines on endite 1 and 2 have two and one teeth respectively on a pointed apex and one lateral spinule (Figs. 12, 13).

Trunk limb II (Figs. 14): The exopod is reduced, with an apical soft seta bilaterally setulated. The endopod has a row of eight spine-scrapers, six similar in structure, with an enlarged base, and distally with a pecten of strong, sclerotized teeth. Scraper 4 has the largest and strongest pecten. Scrapers 7 and 8 are long with an armature similar to the seta of ODL from trunk limb I. There is a lobe carrying a stout conical seta densely ciliated on its distal portion, located at the external surface of the endopod, near the insertion of scrapers 4 and 5. The gnathobase presents a filtering comb composed of four short setae which are different in structure and with four long plumose setae.

Trunk limb III (Fig. 15): The exopod carries four setae. The two outermost are fine and bilaterally setulated, the third one is densely setulated in the distal portion. The last one is strong and provided with two rows of spiniform setules. The lateral surface of exopod is covered with some groups of needle-like setae. Endopod with a distalmost seta stout, sclerotized, with a hook-like shape and proximally followed by five setae, all of them different in structure. Setae of the external armature are straight, finely ciliated in the distal portion. The gnathobase is rounded and it has a setose outgrowth on the external surface and two blunt papillae.

Trunk limb IV (Fig. 16): There are two apical setae on the exopod, the outermost is bilaterally setulated, the other one is densely setulated at the distal portion. The medial armature consists of five equal setae; the lateral row bears four setae, the distal one is stout and spiniform, the remaining ones are strongly hairy. There is also a tubular sensillum between the gnathobase and the proximal endopod. The gnathobase is reduced, composed of a setose furry-like seta and a finger-like lobe.

Trunk limb V (Fig. 17): Exopod subobblong, reduced to a small flap, with one fine setulose seta. The endopod has a rounded hairy flap and three setae remarkably different in size, the two outermost are reduced and strongly ciliated; the third one is the longest, bisegmented, unilaterally setu-

lated along its distal portion. The gnathobase is composed of three well defined lobes, each one is armed with a series of long setae. The epipodite is large and subovoid.

Postabdomen (Fig. 18): Large, subovoid in lateral view (body length : postabdomen length = 2.8–3.4). The ventral margin is straight, somewhat convex with one or two groups of minute spinules. The dorsal margin is asymmetrically convex, non-bilobed, however, the preanal region is well differentiated from the rest of postabdomen (preanal portion : anal-postanal portion = 1.65–1.90). The preanal region has a dorsal stripe of needle-like spinules arranged in several transversal rows (ca. 25–30) which are subequal in length. The anus is bordered by 5 to 7 groups of larger spinules on each side with lateral surface covered with crescent rows of fine setae. The postanal portion has no setae. The claw is heavily sclerotized, evenly curved with a lateral face armed by two rows of small spinules on both concave and convex margins (Fig. 19). The medial side is provided with a row of three continuous pectens, obliquely arranged (Fig. 20) The two most proximal are composed of fine setae distributed along two thirds of the claw length, with a large and sclerotized member between them. The distal pecten is provided with a series of short, stout spinules, hardly sclerotized, the proximal member is stouter and longer than its companions. The setae natatoria arise from a sclerotized heel located at the proximal portion of the postabdomen (Fig. 21). The distal segment is shorter than the proximal one (proximal segment : distal segment = 3.0–4.0), having long, bristle-like setae.

Description of ephippial female and ephippium.—Female with two ephippial eggs is about the same shape in lateral view as parthenogenetic female (Fig. 22). The major difference is in cross section (Fig. 23) in which the pointed dorsal median keel of the parthenogenetic female is replaced by a broadly rounded median ridge. Dorsal profile of shell is higher than in parthenogenetic female, the maximum height is near the anterior slough line; the egg locule is well developed on each side. The shell surface of ephippial region is finely granulated with mesh-like pattern, weak and diffuse at egg locule and dorsal region. Dorsal margin with one row of chitinous rounded papillae. Slough line evidenced by a simple line that follows closely below the ephippium, so the entire anterior ventral portions of shell are lost after molting except for a small postero-ventral portion left in the ephippium. Portion of shell that sloughs has no punctae, meshes or pigmentation. Most of ephippial region is yellowish brown, mainly around the dorsal and the egg locule regions.

Description of males.—Two different prereproductive instars (Figs. 24, 25) and only one mature instar (Fig. 26). The functional male has a height somewhat lower than in female (length : height = 1.50-1.80). There are some appreciable ontogenetic changes over the three instars in shape of head. The rostrum of adults is directed more anteriorly than in immature instars, so the general outline of body has an attenuated ovoid aspect in lateral view. The two immature instars have a general shape similar to females (length : height of instar I and II = 1.45-1.70).

Antennula in instar I has a basal sensory seta and the setulation of internal surface is about as in female (Fig. 27). In instar II the antennula increases in size, and it has an additional sensory seta near its base, which arises from a rod-like projection, proximal to a characteristic group of long setae on the proximal internal portion (Fig. 28). In the adult male, the antennula is highly modified and is curved inwardly (Figs. 29, 30). The two basal sensory setae are well developed. One originates at the anterior margin and the other is located behind the former and close to the posterior margin. The latter is long and thin while the first is thicker and arises from a rod-like projection. On the external surface near the middle of antennular length (Fig. 30), there is a long soft seta (antennular length : seta

length = 2.0-2.4). It is evident from instar II. Proximally, on the medial surface, close to the rod-like projection, there is a group of long hair-like setae and three groups of spinules, the distal and proximal ones are made up of sparse minute members, while the medial one has long and stronger spinules (Fig. 29). Nine aesthetascs in all instars; instars I and II aesthetascs with bifurcated tips as that in female, but in instar III this character is lost or barely visible. There are two aesthetascs 2.25 to 3.3 times longer than the others, these latter ones are subequal in length (Fig. 30).

Trunk limb I with typical instar sequence of development of copulatory hook (Figs. 31–33); adults with a long, stout free portion, with one crescentic ridge at tip of irregular margin that gives a spoon-like appearance to this portion (Fig. 34). IDL of adult male with three setae shorter than in female, the shortest one modificated as a spine-like seta, naked and hardly sclerotized. ODL with a large seta provided with small tubercle-like setules along its distal portion (Fig. 33).

Postabdomen (Fig. 35) roughly similar in shape to that of female although smaller; ventral margin tends to be irregular, in part because of the presence of genital pores, which in mature male open near ventral midline at a notch, located about two basal postabdominal claw lengths from tip. The postabdominal claw is the same as in the female, except that it is relatively longer and somewhat stouter.

Differential diagnosis and relationship.—Macrothrix smirnovi is a member of the *M. triserialis*-group. It shares with this species-group the general shape of the body, structure of the antennulae, the postabdomen, and the largest seta of the antenna. *M. triserialis* Brady was described from Sri Lanka. Fryer (1974) and Smirnov (1992) mentioned that *M. triserialis* is a species with wide and complex distribution, but their conclusions were based on only general morphological aspects. Sometimes, finer scaled morphology has been used (e.g., Fryer 1974, Dumont & Van de Velde 1977, Korinek 1984), but the differences observed were considered as variations within a single species rather than differences between species. Through detailed morphological comparisons Smirnov (1976, 1992) and Brandorf et al. (1982) distinguished three separated geographically isolated species from this taxa-group: *M. gauthieri* from Africa, *M. superaculeata* from Brazil and *M. flabelligera* from Australia. In addition *M. rosea* (Jurine) is mentioned by Dumont & Van de Velde (1977) as a possible synonymy of *M. triserialis*.

This species differs from *M. triserialis* s. str. mainly because it lacks the two stout, hook-like spines on IDL of limb I, clearly shown by Fryer (1974: fig. 69) and pointed out by Korinek (1984); instead of hooks, these spines are not curved and they seem to be less strong, both armed with rows of setules (Fig. 11). The combination of characters suggests a closer relationship of this new species to *M. superaculeata* (Smirnov) described from Brazil and *M. rosea* (Jurine) from Central Europe than to the other species of the group. Parthenogenetic females can be easily distinguished from both related taxa, mainly because of the antennal formula, the structure and armature of postabdomen and some fine details of trunk limbs (Table 1). *M. smirnovi*, *M. capensis* (Sars), *M. paulensis* (Sars) and *M. gauthieri* Smirnov have accessory spines on the antennal exopod, but *M. capensis* can be distinguished by a hump-like protuberance on the ventral part of the head and the preanal region with very small spinules. *M. paulensis* and *M. gauthieri* as well as *M. odiosa* Gurney and *M. sioli* (Smirnov) differ from *M. smirnovi* because of the large spines along the antennulae and the structure of postabdomen (Brandorf et al. 1982, Smirnov 1992).

Detailed morphology of mature males also shows evident differences among *M. triserialis*-group species. There are no descriptions of *M. triserialis* males on populations from type locality (Sri Lanka), the

Table 1.—Comparison of *Macrothrix smirnovi,* new species with the related *M. superaculeata* (Smirnov) and *M. rosea* (Jurine).

Character	Mature parthenogenetic female		
	Macrothrix smirnovi, new species	*M. superaculeata*[a]	*M. rosea*[a]
Shell	Dorsal edge has no serration.	Dorsal edge has very fine serration.	Dorsal edge has no serration.
Head	Ventral margin even with a slightly transverse squamose pattern (Fig. 3).	Ventral margin with transversal step-like ridges each one armed with a spine.	Ventral margin with a slightly transverse squamose pattern.
Antennulae	Posterior side with a subapical group of 2–3 spinules (Fig. 5).	Both posterior and anterior sides with a group of 2–3 strong and sclerotinized spinules	No subapical strong spinules.
Antennae	Spines 0-2-1-1/ 0-0-1 (Figs. 6, 7).	Spines 1-2-1-1/ 0-0-1	Spines 0-1-0-1/ 0-0-1
	Largest seta has two to three spines subequal in length proximal to its joint (Fig. 8), and a series of several spines decreasing in size toward the tip on the distal segment (Fig. 9).	Largest seta has a small and a large spine proximal to its joint, and a large and several small spines distally of its joint.	Largest seta with two larger spines in the area of the joint between its proximal and distal segments, distally followed by several small spines.
Trunk limb I	Endite 4 (ODL) with three seta of different length; the shortest two with a row of setules, increasing moderately in size distally (Fig. 11).	Those setae with a row of setules increasing distinctively in size distally.	Those setae with a row of setules increasing distinctively in size distally.
	Inner spines on endites 1 and 2 having two and one teeth respectively on the pointed apex and one lateral spine (Figs. 12, 13).	Both inner spines with two teeth on pointed apex and one lateral spinule.	Both inner spines with one tooth on pointed apex; two and one lateral spinules respectively.
Trunk limb II	Distinctive lobe carrying a stout conical seta, densely ciliated on its distal region, located near scrapers 4 and 5 (Fig. 14).	No such lobe and seta.	No such lobe and seta.
	Scrapers 4 and 5 with teeth of same length (Fig. 14).	Scraper 4 and 5 with a subapical larger tooth followed by a tuft of small spinules.	Scraper 4 and 5 with a subapical larger tooth followed by a tuft of small spinules.
Trunk limb V	Exopod with one seta (Fig. 17).	No information.	Exopod with two setae.
Postabdomen	Preanal region with rows of small spinules subequal in size (Fig. 18).	Such rows of spinules are strong increasing in size proximally.	Such rows of spinules are small and fine only the most proximal rows are relatively stronger and larger.
Postabdominal setae natatoria	Proximal segment 3.0–4.0 times as long as distal segment (Fig. 21).	Proximal segment 11.0–16.5 times as long as distal segment.	Three times as long as distal segment.

Table 1.—Continued.

Character	*Macrothrix smirnovi*, new species	Mature males *M. superaculeata*[a]	*M. rosea*[a]
Copulatory hook	Strong, having one crescent ridge at tip giving to this portion a spoon-like appearance (Fig. 34).	Strong, carrying three subapical transversal crests.	Slender, tapering with only one subapical lamella.
Postabdomen	Shape somewhat similar to that in female (Fig. 35).	Extending distally into tubular projection, with scale-like subapical denticulate plate and basal sensillum.	Distal end of postabdomen conical without subapical scale-like plate and without basal sensillum.
Antennula	There are no clusters of spinules instead there are a group of long hairs-like setules and three groups of spinules proximally on the inner surface (FIg. 28).	Inner side covered with heavily sclerotinized clusters of strong spinules.	Antennular clusters of spinules not arranged in scales, less sclerotinized.
	Two basal sensory setae, one of which arises from a rod-like projection, and a long soft seta at the middle region (Fig. 30).	Two basal sensory setae.	One basal sensory seta and a long soft seta at the middle region.
		Ephippium	
	Finely granulated with a mesh-like pattern. Heavily sclerotinized. Dorsal margin with only one row of rounded papillae. Yellowish brown color (Fig. 23).	Sculpture of rounded cells. Feebly sclerotinized. Yellow color.	With thick lamellae of reticulation, surface coarsely granulated. Heavily sclerotinized. Dorsal margin with one to two rows of rounded papillae. Dark brown color.

[a] Information on mature males and ephippium obtained from published data in Korinek (1984).

only published data available is the *M. elegans* Sars. The description, which is a young synonym of *M. triserialis* according to Smirnov (1992), is featured by a long cylindrical distal part of postabdomen, no claws and a copulatory hook of trunk limb I with three transversal crests at tip. There are no described males of the related *M. superaculeata* from the type locality, but Korinek (1984) analyzed a population from Cuba that he assigned to this taxon, where males may be distinguished by the presence of three transversal crests at tip of copulatory hook and postabdomen, extending distally into a tubular projection, with a subapical scale-like plate and without any claws. *M. rosea* males are also different since there are a conical postabdominal distal part (Werner 1927) with terminal claws (Korinek 1984) and a slender copulatory hook tapering distally with only one subapical lamella.

Macrothrix rosea resembles the ephippial structure and reticulation of *M. smirnovi*, which is characterized by a mesh-like pattern on the surface and differs because the dorsal margin of the former has only one row of rounded papillae whereas *M. rosea* includes from one to two rows. However, the sculpture is markedly different in *M. superaculeata* which possesses rounded cells; it is feebly sclerotized and lightly colored (Korinek 1984).

There are five species of this genus reported from Mexico including *M. smirnovi* as well. The Mexican cladoceran fauna, as was monographed by Frey (1982b), included only two species: *M. laticornis* (Jurine) and *M. rosea* (Jurine). Recently, this number has increased because of the record of *M. triserialis* s.l. (Ciros & Elias 1995) and by the description of *M. mexicanus* (Ciros et al. 1995). However, it is worthwhile to point out that current knowledge of the taxonomy and geographical distribution of *Macrothrix* in this region is still scarce and some old reports should be analyzed with caution.

It is possible, according to the improvement in research on macrothricid cladocerans, that some species known in the past as cosmopolitan would be geographically restricted as was demonstrated by Frey for diverse chydorids. This statement is vindicated because macrothricids are the cladocerans most closely related to chydorids (Frey 1988). Future analysis should be based on larger samples containing ephippial females, males and females in all instars.

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