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Previous volumes (2010-2018): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

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NEW SPECIES OF ARRENURUS (ACARI : ARRENURIDAE) FROM MEXICAN LAKES

BY C. CRAMER 1 and D. R. COOK 2

ABSTRACT: Ten new species of Arrenurus are described from Mexican Lakes. Two species (tamaulipensis, xochimilcoensis) belong to the typical subgenus, seven species (alloexpansus, colitus, champayanus, anae, costeroae, catoi, apizanus) are members of Megaluracarus and the unusual species A. mexicanus is tentatively assigned to the subgenus Arrhenuropsis.


Several species belonging to the genus Arrenurus have previously been collected in either shallow ponds or streams in Mexico (Cook, 1980) but members of this group occurring in lakes of that country have received almost no attention. The present paper treats ten new species collected from lakes in Colima, Tamaulipas, or the Distrito Federal. Two of the species belong to the typical subgenus, seven in Megaluracarus, and one is tentatively assigned to the subgenus Arrhenuropsis.

In presenting measurements, those of the holotype and allotype are given first. If a series of paratypes is available, the measurements of these are in parentheses following the measurements of the primary types. Measurements are given in microns. The primary types are temporarily retained by the senior author. When possible, paratypes will be deposited in the Field Museum of Natural History, Chicago and the Biosystematics Research Institute, Ottawa. We wish to express our appreciation to Adriana Costero for permitting us to include material from her collections.

1. Arrenurus (?Arrhenuropsis) mexicanus, new species (Figs. 1-8)

Male: Body including petiole 844 (790-881) in length, 593 (562-638) in width; dorsal shield small, oval and located in anterior portion of the dorsum; dorsal shield 289 (289-319) in length, 350 (334-380) in width; dorsal shield bearing the postocularia and a pair of glandularia; two pairs of glandularia

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Acarologia, t. XXXIII, fasc. 4, 1992.
FIG. 1-8: *Arrenurus mexicanus*, new species.
located on the dorsal portion of the ventral shield closely flanking the posterolateral area of the dorsal shield (fig. 6); body rounded anteriorly but truncate posteriorly; pygal lobes only slightly indicated; anterior coxae projecting beyond body proper; posterior suture lines of fourth coxae forming pointed projections which extend well posteriorly; gonopore narrow and 81 (70-81) in length; acetabular plates extending posterolaterally from the gonopore (fig. 1) and bearing numerous acetabula; petiolar (116-119) in length, 89 (87-92) in width; a V-shaped portion of the ventral shield, bearing the excretory pore, incorporated into the petiolar; ventral portion of petiolar hyaline and oval in shape; the complete petiolar better illustrated (fig. 1, 6) than described; dorsal lengths of the palpal segments: P-I, 35 (32-37); P-II, 87 (81-89); P-III, 48 (46-49); P-IV, 85 (81-91); P-V, 35 (33-37); palp as described and illustrated for the female; dorsal lengths of the distal segments of the first leg: I-Leg-4, 108 (111-118); I-Leg-5, 130 (140-148); I-Leg-6, 155 (148-167); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 163 (168-177); IV-Leg-5, 174 (163-181); IV-Leg-6, 128 (118-120); IV-Leg-4 lacking the distal projection found in many members of other subgenera of *Arrenurus*, but IV-Leg-5 is noticeably expanded distally and projects beyond the insertion of IV-Leg-6; both IV-Leg-5 and 6 with numerous short heavy setae and swimming setae (fig. 7); capitulum 137 (137-141) in length; chelicera 148 (141-155) in length.

**FEMALE**: Body 851 (790-897) in length, 768 (729-790) in width; dorsal and ventral shields present; dorsal furrow complete; dorsal shield 718 (699-760) in length, 570 (540-608) in width; dorsal shield bearing the postocularia and three pairs of glandularia; body pores small, generally with three or more sharing a common opening on the inner side of the cuticle (fig. 5, subfigure); body oval, without dorsal humps and not concave at anterior end; anterior coxae extending slightly beyond body proper; fourth coxae with a slight development of posterior projections, but not nearly to the degree found in the male; gonopore somewhat angular, 148 (133-162) in length, 162 (152-159) in width; width between outer margins of acetabular plates 501 (440-487); acetabular plates extending somewhat posterolaterally and bearing numerous acetabula (fig. 8); dorsal lengths of the palpal segments: P-I, 37 (36-38); P-II, 89 (81-96); P-III, 52 (44-52); P-IV, 94 (91-95); P-V, 30 (29-35); palpal segments somewhat elongated, P-II noticeably concave ventrally, and P-IV rotated approximately 90 degrees relative to P-II and P-III; figure 3 shows the proportions and chaetotaxy of the palp; capitulum with a slightly developed rostrum; capitulum 155 (141-148) in length; chelicera 163 (163-166) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 111 (111-113); I-Leg-5, 141 (126-143); I-Leg-6, 162 (155-159); figure 4 illustrates I-Legs-5 and 6; segments 3, 4 and 5 of legs II, III and IV with swimming setae.

**TYPES**: Holotype male, allotype female, 1 male and 3 female paratypes, from the Laguna de Champayan, Altamira, Tamaulipas State, October 1985 (A. Corre, coll.); 2 paratype males, same area on 15 October 1985; 1 male, from Boca de Apiza, Colima State, October 1985 (A. Costero, coll.).

**DISCUSSION**: Karl Viets (1954) described three Brazilian *Arrenurus*-like species in the genera *Arrhe­nuropsis* and *Arrhenuropisdes*, both of which were later reduced to subgenera of *Arrenurus*. These three species posses a P-IV which is rotated relative to P-II and P-III. The neotropical genus *Dadayella* also possessess a rotated palpus but in the latter the medial margins of the fourth coxae are reduced to medial angles and there is a pair of glandularia immediately posterior to the acetabular plates in the female. *Arrhenuropisdes* is known only from a male specimen which is somewhat similar to the present male in proportions of the dorsal shield and arrangement of the dorsal glandularia. The former differs most noticeably in its rounded posterior end of the body and complete lack of a petiolar. In the family Arrenuridiae it is the male that best indicates subgenus or species group affinities and, unfortunately, the diagnosis of *Arrhenuropisdes* is based on only the female. The assignement of the present species to the latter subgenus is based on the very similar condition of the palpus in both the Mexican and Brazilian species. Whether they all actually are members of the same subgenus cannot be known with certainty until males of the South American.
species are collected. Females of the present species most closely resemble those of *A. clavilaminata* in proportions of the palp but differ in that the medial margins of the fourth coxae are reduced nearly to medial angles in the Brazilian species. The present species differs from *A. curvipalpis* in having the first coxae project beyond the body proper (fig. 8) and possessing a proportionally shorter palp.

2. *Arrenurus (Arrenurus) tamaulipensis*, new species (figs. 9-15)

**MALE**: Body including petiole 638 (684-790) in length, 456 (532-547) in width; pygal lobes moderately developed and directed posterolaterally; width between outer edges of pygal lobes 327 (334-349); noncauda portion of dorsal shield bearing two pairs of glandularia, the latter pair of which lie on rounded humps; cauda with a single medial hump posteriorly; structure of the dorsal humps best seen in lateral view (fig. 10); anterior end of body slightly projecting but without a concavity between the eyes; dorsal portion of ventral shield without pronounced lateral humps; pygal lobes broadly truncate in lateral view; petiole 98 (96-106) in length, 52 (59) in width; basal piece of petiole open dorsally and bearing a pair of posterior setae; central piece of petiole widest anteriorly and very narrow posteriorly; hyaline appendage very short and with a width slightly greater than width of petiole; gonopore narrow and 44 (44-46) in length; acetalbar plates extending laterally up sides of ventral shield beyond the associated glandularia; width between outer edges of acetalbar plates 310 (340-348); dorsal lengths of the palpal segments: P-I, 27 (29-30); P-II, 59 (66-68); P-III, 44 (37-43); P-IV, 64 (66-67); P-V, 37 (35-37); palp as illustrated for the female; dorsal lengths of the distal segments of the first leg: I-Leg-4, 96 (102-104); I-Leg-5, 100 (109-111); I-Leg-6, 148 (152-159); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 152 (166-170); IV-Leg-5, 91 (101-103); IV-Leg-6, 122 (136-141); distal end of IV-Leg-4 extending far beyond insertion of IV-Leg-5; figure 12 illustrates the proportions and chaetotaxy of these segments; segments three, four and five of legs III and IV with several long swimming setae; sixth segments of legs I and II with numerous short "swimming setae".

**FEMALE**: Body 744 in length, 653 in width; dorsal and ventral shields present; body nearly oval and without prominent humps; dorsal furrow incomplete, the dorsal and ventral shields being fused posteriorly; dorsal shield bearing the postocularia and three pairs of glandularia, and is 445 in width; anterior end of body somewhat projecting but not concave between the eyes; coxae not projecting beyond the body proper; few body pores present between second and third coxae and between the posterior coxal groups; acetalbar plates extending slightly posterolaterally; width between outer edges of acetalbar plates 440; gonopore somewhat angular and is 103 in length, 130 in width; dorsal lengths of palpal segments I-V, 29, 74, 44, 71, 37; palpal segments stocky, their proportions and chaetotaxy better illustrated (fig. 11) than described; capitulum 133 in length; chelicera 148 in length; dorsal lengths of segments 4-6 of the first leg, 108, 111, 131; segments 3, 4, and 5 of legs III and IV with a few long swimming setae.

**TYPES**: Holotype male, allotype female, two paratype males, from Lake Champa yan in Alta-mira City, Tamaulipas States, 14 October, 1989 (A. Cato and C. Cramer, coll.).

**DISCUSSION**: The present species belongs to a species group with three previously described species from southwestern United States, *A. texensis* Young, *A. harperae* Cook and *A. arizonensis* Cook. The latter two species were collected in streams, the former in a spring fed lake. The widely separated second pair of glandularia of the dorsal shield and morphology of the petiole relate the present species most closely to *A. arizonensis*, the latter described by Cook (1976) from West Clear Creek, Yavapai County, Arizona. Males of the Mexican species differ from those of *A. arizonensis* in possessing a proportionally wider body and more projecting pygal lobes when viewed dorsally. The dorsal surface of the dorsal shield has two humps when viewed laterally (fig. 10), rather than being more or less straight across as in the species from Arizona. The female is unknown for *A. arizonensis* and so comparisons of the two species is not possible for that sex.
FIG. 9-15: *Arrenurus tamaulipensis*, new species.

3. *Arrenurus (Arrenurus) xochimilcoensis*, new species
(Figs. 16-22)

**MALE**: Body including petiole 1200 (1245) in length, 851 (805) in width; pygal lobes well developed and directed posterolaterally; width between outer margins of pygal lobes 653 (669); dorsal furrow passing onto sides of body at base of pygal lobes; non cauda portion of dorsal shield bearing two pairs of glandularia, the more posterior of which lie on well developed humps; width between the gland openings of the latter pair 471 (440); humps of the dorsal shield appearing somewhat pointed when viewed laterally (fig. 17); anterior end of body projecting and somewhat concave between the eyes; dorsal portion of ventral shield without pronounced lateral humps; pygal lobes broadly truncate in lateral view; petiole 170 (159) in length, 89 (85) in width; basal piece of petiole open dorsally and with a pair of upturned setae near middle; central piece with a median keel which widens at posterior end (fig. 16); hyaline appendage very short but much wider than petiole; acetalubar plates extending laterally up sides of ventral shield somewhat beyond the associated glandularia; dorsal lengths of the palp segments: P-I, 37 (37); P-II, 89 (93); P-III, 80 (73); P-IV, 108 (100); P-V, 65 (59); palp as described and illustrated for the female; dorsal lengths of the distal segments of the first leg: I-Leg-4, 185 (163); I-Leg-5, 170 (163); I-Leg-6, 189; segments 3, 4 and 5 of legs II, III and IV with swimming setae. Types: Holotype male, allotype female, 1 paratype male, 1 paratype female, from Lake Xochimilco, Distrito Federal, June 1986 (C. Cramer, coll.).

**DISCUSSION**: *Arrenurus xochimilcoensis* does not seem closely related to any previously described species, although the petiole bearing a pair of setae suggests some affinities with other members of the typical subgenus found in Mexico and southwestern United States. The petiole of the male is simpler than in any of these other forms and the pointed dorsal humps of the present species are lacking. The comparatively large size of the body, relatively narrow third and fourth coxae and relatively small genital field area (fig. 20) should serve to distinguish the female.

4. *Arrenurus (Megaluracarus) allocapans*, new species
(Figs. 23-28)

**MALE**: Body 1124 in length, 638 in width; cauda distinctly set off from the body proper and is narrowest at this point; cauda long and gradually widening posteriorly when viewed dorsally; cauda 395 in width at posterior end; greatest width of dorsal shield 471; non cauda portion of dorsal shield bearing the postocularia and three pairs of glandularia, and is 820 (684) in width; coxae not projecting anterior to the body proper; two to three rows of body pores located between second and third coxae and between the posterior coxal groups; genital field relatively small with the acetalubar plates extending posterolaterally; width between outer edges of acetalubar plates 593 (577); gonopore rounded and is 152 (163) in length, 192 (192) in width; dorsal lengths of the palp segments: P-I, 37 (37); P-II, 98 (93); P-III, 76 (73); P-IV, 118 (111); P-V, 66 (60); palp segments stocky, medial surface of P-II with two long setae; figure 18 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, 185 (163); I-Leg-5, 170 (163); I-Leg-6, 189; segments 3, 4 and 5 of legs II, III and IV with swimming setae.

FIG. 23-28: *Arrenurus alloexpansus*, new species.

shield bearing the postocularia and two pairs of glandularia near periphery; the posterior pair of glandularia slightly farther apart than the anterior pair; posterior end of cauda with well developed posterolaterally directed lobes (fig. 23); a petiole absent; anterior end of body slightly projecting and not concave between the eyes; dorsal portion of ventral shield with a pair of relatively high humps; sides of ventral shield with well developed lateral projections immediately posterior to insertions of the fourth legs; dorsal furrow complete and passing ventrally at base of cauda and continuing immediately posterior to the acetabular plates; cauda with only a small hump when viewed laterally (fig. 24); dorsal lengths of palpable segments I-V, 44, 81, 42, 78, 42; palp not illustrated but P-II bears an extensive patch of setae as shown in figure 1772 of COOK (1980); capitulum 130 in length; chelicera 163 in length; dorsal lengths of segments 4-6 of first leg, 141, 148, 181; dorsal lengths of segments 4-6 of fourth leg, 220, 199, 266; IV-Leg-4 extending somewhat beyond insertion of IV-Leg-5; distal end of IV-Leg-6 noticeably downturned; figure 25 shows the proportions and chaetotaxy of these segments; second and third legs with stiff swimming setae, those of the fourth leg flexible.

FEMALE: Body 927 in length, 836 in width; dorsal and ventral shields present; dorsal furrow complete; dorsal shield 745 in length, 608 in width, and bearing the postocularia and three pairs of glandularia; anterior end of body with small rounded bulges in the region of the lateral eyes; edges of body with posterolateral bulges (fig. 28); approximately three rows of body pores between second and third coxae and between the posterior coxal groups; acetabular plates extending posterolaterally; width between outer edges of acetabular plates 425; gonopore more or less oval and 108 in length, 120 in width; dorsal lengths of palpable segments I-V, 37, 66, 44, 78, 42; structure of palp as listed under the male; capitulum 124 in length; chelicera 141 in length; dorsal length of segments 4-6 of first leg, 120, 133, 141; segments 3, 4 and 5 of legs II, III and IV with swimming setae.

TYPES: Holotype male, allotype female, from Lake Champayan in Altamira City, Tamaulipas State, 14 October, 1989 (C. CRAMER and A. CATO, coll.).

DISCUSSION: The present species is a member of the expansus species group which is characterized by males with lateral projections of the body immediately posterior to the insertions of the fourth legs, palp with a large setal patch on the medial surface of P-II and, for the majority of the species, a neotropical distribution. The group contains A. expansus Marshall (southeastern United States), A. muniesi Orghidan and Gruia (Cuba), A. neoexpansus Cook (Mexico), A. expansiformis Lundblad (southern Brazil), A. extensus Viets (Amazon region of Brazil), A. quadrituberculatus Viets (Amazon region of Brazil). One additional species shows affinities with this group, A. pugiunculatus Viets (Amazon region of Brazil), but this species possesses a narrow, pointed petiole, a character lacking in the typical members of the group. The South American species possess a comparatively much shorter and stockier cauda than the present species. The previously described forms from Mexico, Cuba and the United States have a long cauda as in the new species but do not exhibit the pronounced posterolaterally directed lobes at the end of the cauda (fig. 23) found in A. alloexpansus. The present species is probably most closely related to A. neoexpansus but the latter has a much higher dorsal hump on the cauda when viewed laterally. The female of A. neoexpansus does not show the somewhat three lobed condition of the anterior end of the body which is typical of the present species (fig. 28).

5. Arrenurus (Megaluracarus) colitus, new species (Figs. 29-35)

MALE: Body 753 in length, 434 in width; cauda distinctly set off from the body proper and is narrowest at this point; cauda long and 202 in width at widest point; cauda, when viewed dorsally, widens abruptly in region of dorsal hump, then narrows and widens once more before tapering somewhat at posterior end; cauda without a median cleft or petiole; non cauda portion of dorsal shield bearing two pairs of glandularia which are very close together on their respective sides; dorsal furrow complete and passing ventrally immediately posterior to the acetabular plates;
FIG. 29-35: *Arrenurus colitus*, new species.

cauda with a large pointed hump whose structure is best seen in lateral view (fig. 30); anterior end of body projecting but not concave between the eyes; first and second coxae long and sharply pointed, and project anterior to the body proper; gonopore narrow and 30 in length; width between outer margins of acetabular plates 251; dorsal lengths of palp segments I-V, 24, 52, 31, 55, 34; palp stocky with P-IV especially broad and noticeably expanded at distal end (fig. 32); capitulum 103 in length; chelicera 140 in length; dorsal lengths of segments 4-6 of first leg, 96, 94, 140; dorsal lengths of segments 4-6 of fourth leg, 157, 111, 96; IV-Leg-4 extending only slightly beyond insertion of IV-Leg-5; figure 31 illustrates the proportions and chaetotaxy of these segments; segments 3, 4 and 5 of legs II, III and IV with swimming setae; sixth segments of legs I and II with numerous short "swimming setae".

**FEMALE:** Body 623 (608-631) in length, 547 (517-536) in width; dorsal and ventral shields present; dorsal furrow complete; dorsal shield 525 (502-546) in length, 467 (456-471) in width, and bearing the postocularia and three pairs of glandularia; anterior end of body slightly projecting but not concave between the eyes; posterior end of body with rounded pointed projection (fig. 33); generally with two rows of body pores between second and third coxae and between the posterior coxal groups; acetabular plates extending decidedly posterolaterally; gonopore oval and is 78 (81-83) in length, 89 (89-96) in width; width between outer edges of acetabular plates 288 (266-280); first and second coxae sharply pointed but not extending anterior to body proper; dorsal lengths of palp segments: P-I, 20 (20-21); P-II, 48 (46-48); P-III, 36 (33-35); P-IV, 48 (48-52); P-V, 31 (30-31); palp as illustrated and described for the male; capitulum 103 (93-96) in length; chelicera 153 in length; dorsal lengths of segments 4, 5 and 6 of first leg, 155, 170, 237; lengths of segments 4, 5 and 6 of fourth leg, 222, 251, 207; IV-Leg-4 extending far beyond insertion of IV-Leg-

**DISCUSSION:** The present species is most closely related to the South American species *A. epimerosus* Marshall (Brazil, Argentina). The male of the Mexican form differs in having the cauda widest in the region of the dorsal hump (fig. 29) rather than at the posterior end of the cauda and the tips of the second coxae do not extend as far beyond the body proper. Females of the two species share the unusual projection at the posterior end of the body (fig. 33) but the present species has a more rounded posterior end of the body and the first and second coxae do not extend beyond the body proper (fig. 35). There is an additional related Brazilian species, *A. productus* Viets, which is known only from the male. It has proportionally longer and narrower cauda than in the present species.

6. *Arrenurus (Megalurusurus) champayanus,* new species
(Figs. 36-38, 40)

**MALE:** Body 927 in length, 593 in width; cauda distinctly set off from the body proper and is more or less the same width along entire length; greatest width of cauda 334; posterior margin of cauda scalloped and with a median indentation; non cauda portion of dorsal shield bearing the postocularia and two pairs of glandularia, with the second pair closer together medially than the first pair; dorsal furrow complete and passing ventrally immediately posterior to the acetabular plates; cauda with small humps whose structure are best seen in lateral view (fig. 37); anterior end of body somewhat projecting and concave between the eyes; a pair of low rounded humps on dorsal portion of the ventral shield; body pores relatively large, with to three rows present between second and third coxae and three to four rows between the posterior coxal groups; dorsal lengths of palp segments I-V, 38, 76, 45, 83, 42; palp stocky with a large patch of setae on the medial side of P-II (fig. 40); capitulum 137 in length, chelicera 153 in length; dorsal lengths of segments 4, 5 and 6 of first leg, 156, 170, 237; lengths of segments 4, 5 and 6 of fourth leg, 222, 251, 207; IV-Leg-4 extending far beyond insertion of IV-Leg-
FIG. 36-38, 40: *Arrenurus champayanus*, new species.


FIG. 39, 41-43: *Arrenurus anae*, new species.

39. — Distal segments of fourth leg, male. 41. — Palp, male. 42. — Dorsal view, male. 43. — Lateral view, male.
5; figure 38 shows the proportions and chaetotaxy of these segments; segments 4 and 5 of leg II and segments 3, 4 and 5 of legs III and IV with long swimming setae; sixth segments of legs I and II with numerous short “swimming setae”.

**FEMALE**: Unknown.

**TYPES**: Holotype male, collected in Lake Champayan, Altamira City, Tamaulipas State, 15 October 1989 (C. CRAMER, coll.).

**DISCUSSION**: The present species does not seem closely related to any previously described species.

7. *Arrenurus (megaluracarus) anae*, new species

**(Fig. 39, 41-43)**

**MALE**: Body 760 (714-760) in length, 425 (391-414) in width; cauda distinctly set off from the body and is narrowest at this point; cauda long and 190 (174-190) in width at widest point; cauda, when viewed dorsally, widens in region of dorsal hump, then narrows slightly and then widens slightly once more near posterior end; posterior end of cauda angular and slightly concave near middle (fig. 42); a petiole absent; dorsal shield 342 (327-373) in width; non cauda portion of dorsal shield bearing two pairs of glandularia which are very close together on their respective sides and are placed near periphery; dorsal shield relatively very wide compared to body width so that very little of the dorsal portion of the ventral shield is seen in a dorsal view (fig. 43); dorsal surface of ventral shield without humps; anterior end of body rounded and slightly projecting; gonopore narrow and 39 (37-39) in length; width between outer margins of acetabular plates 185 (185-192); dorsal lengths of the palp segments: P-I, 22 (19-22); P-II, 44 (42-44); P-III, 32 (30-34); P-IV, 46 (44-46); P-V, 30 (29-31); palp stocky with the distoventral portion of P-IV rounded (fig. 41); capitulum 89 (87-89) in length; chelicera 96 (89-93) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 89 (81-89); I-Leg-5, 100 (90-93); I-Leg-6, 137 (126-131); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 133 (126-140); IV-Leg-5, 104 (96-106); IV-Leg-6, 104 (96-111); distal end of IV-Leg-4 extending only very slightly beyond insertion of IV-Leg-5; figure 39 illustrates the proportions and chaetotaxy of these segments; segments 3, 4 and 5 of legs II, III and IV with swimming setae; sixth segments of legs I and II with numerous short “swimming setae”.

**FEMALE**: Unknown.

**TYPES**: Holotype male, 1 paratype male, from Lake Chairel, Tampico City, Tamaulipas State, 14 October 1989 (A. CATO and C. CRAMER, coll.); 4 paratype males, from Lake Champayan, Altamira City, Tamaulipas, 14 October, 1989 (A. CATO, coll.).

**DISCUSSION**: There are numerous species of *Megaluracarus* in the New World bearing a pointed hump on the cauda as shown in figure 43. The present species may be easily distinguished from all the others in having the dorsal shield very large relative to the remainder of the body, so that only a very narrow band of the ventral shield is visible in dorsal view (fig. 42).

8. *Arrenurus (Megaluracarus) costeroae*, new species

**(Figs. 44-51)**

**MALE**: Body 668 (638-653) in length, 442 (438-456) in width; cauda distinctly set off from the body proper and is widest at this point; cauda short and is 304 (289-312) in width; cauda with a large concavity near posterior end, this concavity appearing U-shaped in dorsal view (fig. 47) but somewhat oval in a posteroventral view (fig. 45); width of this concavity 96 (93-103); petiole absent; dorsal shield 380 (367-385) in width; non cauda portion of dorsal shield bearing two pairs of glandularia which are very close together on their respective sides; posterior pair of glandularia placed farther from each other than the first pair are from each other; a curved ridge-like hump located somewhat anterior to the posterior concavity; dorsal furrow complete and passing ventrally immediately posterior to the acetabular plates; figure 44 illustrates a lateral view of the body;
Fig. 44-51: Arrenurus costeroae, new species.

44. — Lateral view, male. 45. — Posterodorsal view of cauda, male. 46. — Posterior view of genital field, female. 47. — Dorsal view, male. 48. — Palp, female. 49. — Ventral view, female. 50. — 1-Leg-5 and 6, female. 51. — Dorsal view, female.
dorsal surface of ventral shield without humps; anterior end of body rounded; gonopore narrow and 27 (31) in length; width between outer margins of acetabular plates 310 (318); dorsal lengths of the palpal segments: P-I, 26 (26-28); P-II, 54 (48-52); P-III, 32 (30-34); P-IV, 59 (52-55); P-V, 28 (26-27); palp as illustrated and described for the female; capitulum 96 (103-111) in length; chelicera 118 (111-118) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 93 (87-89); I-Leg-5, 104 (96-97); I-Leg-6, 126 (111-124); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 163 (155-170); IV-Leg-5, 126 (118-122); IV-Leg-6, 104 (100-102); distal end of IV-Leg-4 extending only slightly beyond insertion of IV-Leg-5; chaetotaxy of legs as described for the female.

FEMALE: Body 608 (577-612) in length, 502 (486-502) in width; dorsal and ventral shields present; dorsal furrow complete; dorsal shield 475 (456-470) in length, 414 (396-414) in width, and bearing the postocularia and three pairs of glandularia; anterior end of body rounded, posterior end with a small median projection bearing the excretory pore (fig. 51); generally with two rows of body pores between second and third coxae, three rows between posterior coxal groups; gonopore nearly terminal and appearing greatly foreshortened in a ventral view (fig. 49); acetabular plates relatively short and extend anterolaterally; figure 46 shows a posterior view of the genital field region; gonopore 126 (126-128) in width; anterior end of body slightly projecting and not concave between the eyes; dorsal lengths of the palpal segments: P-I, 35 (33-35); P-IV, 59 (55-57); P-V, 28 (27-31); medial surface of P-II several thickened, slightly curved setae; distoventral portion of P-IV pointed; figure 48 illustrates the proportions and chaetotaxy of the palp; capitulum 96 (96-103) in length; chelicera 118 (111) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4,89 (81-87); I-Leg-5, 91 (85-89); I-Leg-6, 98 (96); segments 3, 4 and 5 of leg II each with a single swimming seta; these segments of legs III and IV with a few swimming setae.

TYPES: Holotype male, allotype female, 1 paratype male and two paratype females, from ponds at the biological station “El Morro de la Mancha” Veracruz State, 22 June 1990 (C. Cramer, coll.); 1 paratype male, from a canal, La Cienega El Callejon, Colima State, November 1985 (A. Costero, coll.).

DISCUSSION: The unusual concavity at the posterior end of the male cauda (fig. 45, 47) will distinguish the present species from all other New World members of the genus. The unusual genital field, with the gonopore nearly terminal and the acetabular plates extending anterolaterally, will easily distinguish the female. It resembles members of the subgenus Rhinophoracarus in this respect. This species probably should be thought of as a pond inhabitant rather than a lake inhabitant.

9. Arrenurus (Megaluracarus) catoi, new species
(Figs. 52-58)

MALE: Body 942 (927-1048) in length, 714 (684-730) in width; cauda distinctly set off from body proper and is narrowest at this point; cauda relatively short and scalloped at posterior end; cauda 456 (406-730) in width at widest point; a petiole absent; dorsal shield 486 (478-532) in width; non cauda portion of dorsal shield much higher than cauda portion (fig. 52); dorsal length of ventral shield without humps; dorsal furrow complete and passing ventrally immediately posterior to the acetabular plates; gonopore narrow and 63 (67-72) in length; anterior end of body slightly projecting and not concave between the eyes; dorsal lengths of the palpal segments: P-I, 35 (29-34); P-II, 71 (67-73); P-III, 37 (31-36); P-IV, 69 (67-72); P-V, 39 (37-41); palp as illustrated and described for the female; capitulum 118 (111-125) in length; chelicera 155 (148-163) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 126 (122-137); I-Leg-5, 141 (141-152); I-Leg-6, 244 (248-
FIG. 52-58: *Arrenurus catoi*, new species.
266); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 177 (173-185); IV-Leg-5, 159 (159-174); IV-Leg-6, 163 (155-177); IV-Leg-4 extending only slightly beyond insertion of IV-Leg-5; segments 3, 4 and 5 of legs II, III and IV with swimming setae but II-Leg-3 with only a single swimming seta; sixth segments of legs I and II relatively long compared to other segments and bearing numerous short "swimming setae".

**Female**: Body 1049 (942-1155) in length, 940 (851-1048) in width; dorsal and ventral shields present; dorsal furrow complete; dorsal shield 744 (699-897) in length, 684 (608-760) in width, and bearing the postocularia and three pairs of glandularia; anterior end of body slightly projecting and not concave between the eyes; posterior end of body slightly angular (fig. 56); typically with four rows of body pores between second and third coxae, five rows between posterior coxal groups; gonopore somewhat angular and is 133 (128-141) in length, 155 (142-148) in width; acatabular plates extending nearly directly laterally; width between outer margins of acatabular plates 532 (517-563); coxae not extending beyond the body proper; figure 53 illustrates the morphology of the ventral shield; dorsal lengths of the palpal segments: P-I, 37 (35-37); P-II, 78 (74-81); P-III, 40 (44); P-IV, 81 (81-83); P-V, 44 (39-44); medial surface of P-II typically with three long thickened setae; distoventral portion of P-IV somewhat pointed; figure 55 illustrates the proportions and chaetotaxy of the palp; capitulum 148 (135-141) in length; chelicera 170 (163) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 155 (151-158); I-Leg-5, 168 (163-170); I-Leg-6, 226 (215-229); segments 3, 4 and 5 of legs II, III and IV as described for the male.

**Types**: Holotype male, allotype female, 3 paratype males, 1 paratype female, from Lake Champanay, Altamira City, Tamaulipas State, 14 October, 1989 (A. Cato and C. Cramer, coll.); 1 male, 1 female paratypes, same area on 14 September, 1989 (A. Cato and C. Cramer, coll.); 1 male, 1 female paratypes, same area on 14 May, 1989 (A. Cato and C. Cramer, coll.); 1 paratype female, from Laguna del Chairel, Tampico, Tamaulipas State, 13 May, 1989 (C. Cramer, coll.); 1 paratype female, from a canal, La Cienega El Callejon, Colima State, November 1985 (A. Costero, coll.).

**Discussion**: The present species is closely related to several New World megaluracarids which are characterized by a relatively short cauda and few setae on the medial surface of P-II (fig. 55). The cauda is quite similar to *A. gricalus* Cook (Mexico) and *A. gibberimarginatus* Viets (Amazon region of Brazil) but males of these latter two species have roundly pointed projections anterior to the eyes and are concave between the eyes. The present species is similar to *A. crassus* Lundblad and *A. tumidus* Lundblad (both from southern Brazil) in structure of the anterior end of the body, but the latter two do not exhibit the pronounced scalloping of the posterior end of the cauda characteristic of the new species (fig. 58).

10. *Arrenurus (Megaluracarus) apizanus*, new species (Figs. 59-61)

**Male**: Body 881 (836) in length, 714 (653) in width; cauda distinctly set off from the body proper and is narrowest at this point; cauda very short and somewhat scalloped at posterior end (fig. 59); cauda 445 (433) in width as widest point; a petiole absent; dorsal shield 551 (517) in width; non-cauda portion of dorsal shield bearing two pairs of glandularia which are very close together on their respective sides; members of each glandularia pair approximately the same distance apart medially; non-cauda portion of dorsal shield somewhat higher than the cauda portion, but not to the degree exhibited by the previous species (compare figs. 52, 60); dorsal surface of ventral shield without humps; dorsal furrow complete and passing ventrally immediately posterior to the acatabular plates; gonopore narrow and 51 in length; anterior end of body somewhat projecting but not concave between the eyes; dorsal lengths of the palpal segments: P-I, 34 (30-34); P-II, 78 (70); P-III, 41 (37-43); P-IV, 76 (72-74); P-V, 44 (37-41); medial surface of P-III with three long thickened setae; distoventral portion of P-IV somewhat pointed; figure 61 shows the proportions and chaetotaxy of the palp; capitulum 133 (118) in length;
chelicera 150 (148) in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 133 (128-130); I-Leg-5, 152 (141-144); I-Leg-6, 217 (209-211); dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 163 (155-163); IV-Leg-5, 155 (143-145); IV-Leg-6, 170 (155-164); IV-Leg-4 extending only slightly beyond insertion of IV-Leg-5; these segments similar to those illustrated for the previous species (fig. 54); segments 3, 4 and 5 of legs II, III and IV with swimming setae, but II-Leg-3 with only a single swimming seta; sixth segments of legs I and II relatively long compared to the other segments and bearing numerous short “swimming setae”.

FEMALE: Unknown.

TYPES: Holotype male, 2 paratype males, from Boca de Apiza, Colima State, October, 1985.

DISCUSSION: The present species seems most closely related to the previous species, A. catoi, but possesses a comparatively much shorter and broader cauda and the anterior end of the body is more projecting (compare figs. 58, 59). The proportional differences in height between the cauda and non-cauda portion of the dorsal shield is much less pronounced in the present species (compare figs. 52, 60).

REFERENCES


