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RESEARCH ARTICLE

New water mite species of the genus *Rhyncholimnochares* Lundblad (Acariformes, Limnocharidae) from Central and South America, with a key to all known species of the genus

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Abstract – In the genus *Rhyncholimnochares*, a total of 11 species new to science is described, 10 representatives of the subgenus *Rhyncholimnochares* s. str. – *R. ursula* sp. n., *R. minuta* sp. n., *R. cooki* sp. n., *R. jicotea* sp. n., *R. lundbladi* sp. n. and *R. monikae* sp. n. from Costa Rica; *R. expansipalpis* sp. n., *R. petaliseta* sp. n, *R. tapiarum* sp. n., *R. glabra* sp. n. from Ecuador (the latter recorded also from Brazil and Chile), and one representative of the subgenus *Paralimnochares, R. chilensis* sp. n. from Chile. New records are given for *R.* (*s. str.*) *lamellipalpis* (O. Lundblad 1936. Dritte Mitteilung über neue Wassermilben aus Santa Catharina in Südbrasilien. *Zool Anz* 116 (7-8): 200–211.) from Chile. A determination key is given for all known species at the adult/deutonymphal stage.

Keywords: Water mites / Limnocharidae / *Rhyncholimnochares* / diversity / Neotropic

1 Introduction

Rhyncholimnocharinae Lundblad, 1936 is a monotypic subfamily of limnocharid water mites including the two genera *Rhyncholimnochares* Lundblad, 1936 (11 described species, Nearctic, Neotropic) and *Austrolimnochares* Harvey, 1998 (monotypic, Australia). All known species were collected from running waters, where they are often found in accumulations of organic detritus, dead wood and leaf litter of pools, or in mosses at stronger flow velocity. Larvae of the only species studied so far under this aspect, *R.* (*s. str.*) *kittatinniana* Habeeb, 1954, were found parasitic in the subelythral space of adult Elmidae – the only known case of water mite larvae parasitizing these relatively small, generally stream-dwelling beetles (Smith, 1989).

The aim of this paper is to enlarge our knowledge of the diversity of *Rhyncholimnochares*, adding new records of almost known species, and giving the first records of species of the genus from Costa Rica, Ecuador and Chile. In summary, these new collections made during the past decades result in nearly a doubling of the number of known species. The determination key elaborated on the base of the new state of knowledge should be helpful in detecting the surely by far larger diversity of rhyncholimnocharine mites, mainly in the Neotropics. Furthermore, we hope to stimulate additional studies on the life cycles and host relationships of these interesting mites.

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2 Material and methods

All material derives from hand netting in various stream substrata, followed by material sorting on the spot. Water mites were preserved in Koenike's fluid (in some cases after a passage in denaturated ethanol), and later dissected and slide mounted in the laboratory. For methodological details see *e.g.* Gerecke and Di Sabatino (2008).

The following abbreviations are used (see also Tuzovskij 1987; Tuzovskij & Gerecke 2009, for setal terminology see also Fig. 2): *Fch* – setae of the cheliceral segment; *Fp* – setae of the palpal segment; dp – dorsal plate; *Vi* – verticales internae; *Oi* – occipitales internae; I-Leg 1–6 = first leg, segment 1–6 (trochanter, basifemur, telofemur, genu, tibia and tarsus); P-1–3 = pedipalp, segment 1–3; IBIW – Papanin Institute for Biology of Inland Waters; SMF – Senckenberg Museum Frankfurt.

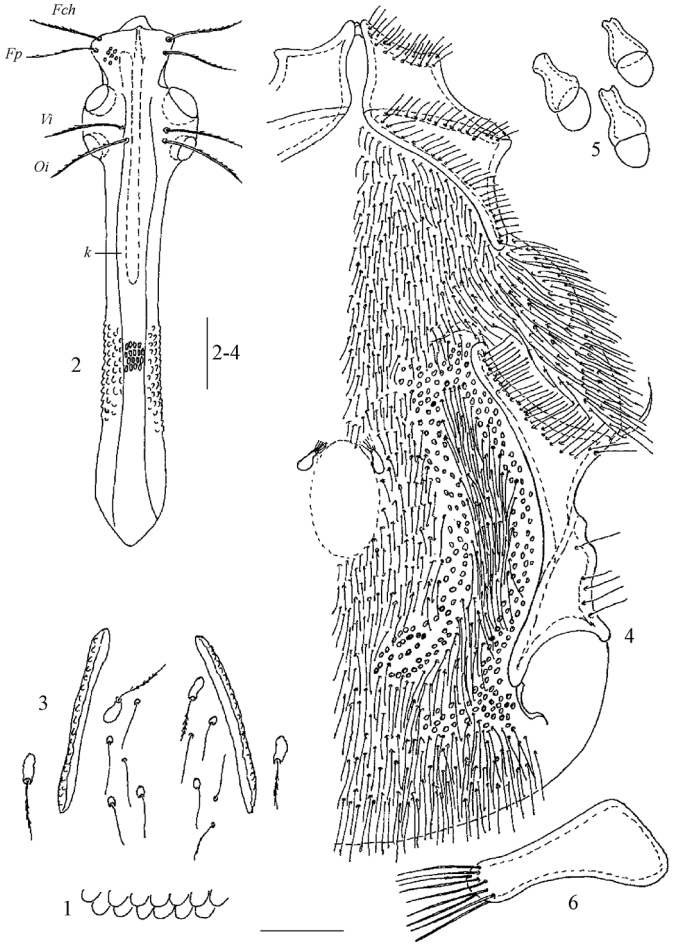
Most of the material treated is deposited at SMF, a minor part at IBIW, as indicated in the specific paragraphs.

3 Results and discussion

3.1 Genus *Rhyncholimnochares* Lundblad, 1936

Diagnosis: Both sexes: Character states of the subfamily Rhyncholimnocharinae (after Cook 1974, modified): Capitulum attached to a protrusible tubular extension of membranous integument; palp typically three-segmented, proximal and distal segments extremely shortened, occasionally partly or

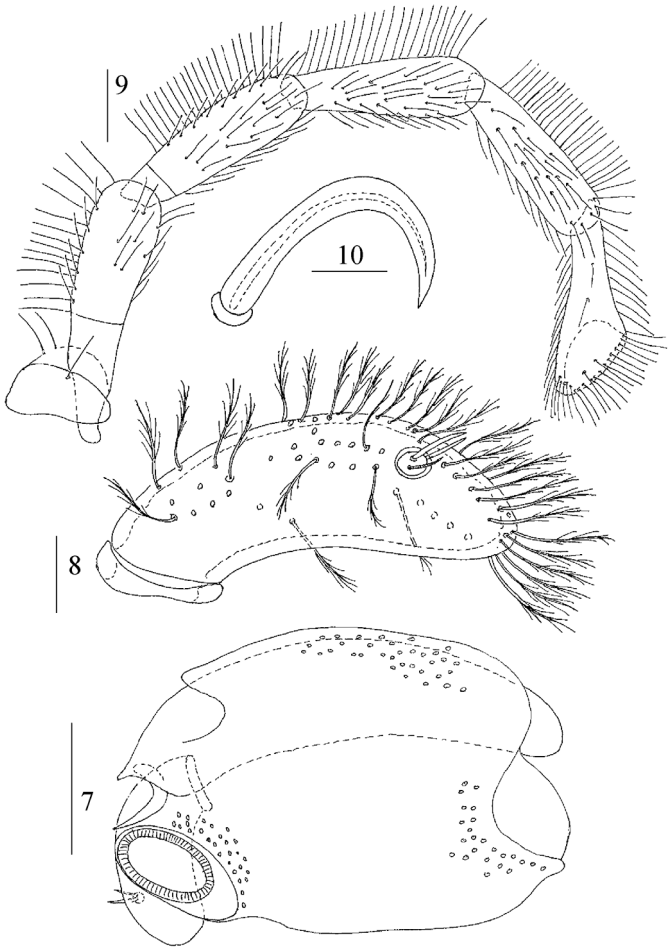
Fig. 0. *Rhycholimnochares minuta* n. sp., slide mounted female, ventral habitus. Detail: enlarged view of gnathosomal tube.



Figs. 1–6. *Rhycholimnochares ursula* n. sp., female. 1 – fragment of integument, lateral view, 2 – frontal plate (Fch = *frontalis chelicerarum*; Fp = *frontalis pedipalporum*; Vi = *verticalis interna*; Oi = *occipitalis interna*; k = keel), 3 – dorsal plates, 4 – ventral view, 5 – genital acetabula, 6 – genital plate. Scale bars: 1 = 5, 5–6 = 50, 2–4 = 100 μm.

completely fused; dorsum with or without paired sclerites. Second palp segment with straight dorsal margin.

General characterization: Red water mites, idiosoma extremely soft and deformable, integument papillate (*e.g.*, Fig. 1), with either a constant number of setae associated with large glandularia, or variously arranged additional setae (without, or with small glandularia). Dorsum with an unpaired frontal plate with a ventral keel and four pairs of setae (Fch, Fp, Vi, Oi – *e.g.*, Fig. 2), occasionally a median eye visible near anterior margin (dashed area in Fig. 15); in some species a pair of additional, rod shaped plates (Figs. 3, 138). Membranous parts of idiosoma usually with a constant number of paired setae (orthotrichy), but some species (Figs. 4, 17, 27) with numerous additional setae (neotrichy). Coxae in four groups: anterior coxal plate with numerous short setae arranged along anterior margins of both coxae; coxae I trapezoidal, with anterior margin shorter than posterior, anteromedial corners close together and in most species connected by a narrow bridge; coxae II triangular, in most species medially pointed, but a slightly convex medial margin may be developed; posterior coxal plate elongate, with a row of setae at anterior margin of coxae III and scattered lateral setae, anterior margin of coxae III wider than posterior margin of coxae IV. Leg basifemur and telofemur with suture lines subdividing segments into short proximal and long distal parts; leg tarsi (often strongly) enlarged distally, with simple claws. Genital field with a short, often barely visible gonopore flanked by variously developed groups of setae, in females also a pair of elevated, longish sclerites with an apical tuft of setae. Acetabula very numerous, on short, distally widened stalks in the soft integument, on each side of the genital area arranged in an acetabular field extending along the medial margin of coxae III+IV. Often, this field with a setose, acetabula-free central part. Gnathosoma attached to a long, membranous, tubular extension (Fig. 0). Capitulum with a cylindrical or conical rostrum, terminating in a circular mouth disk with a frilled ring surrounding the mouth opening; chelicera with medially fused basal segments, but separate small and pointed claws. Palps usually three-segmented, consisting of trochanter (first segment, short and ring-shaped, without setae), [femur+genu] (second segment, distinctly the largest, and [tibia+tarsus] (third segment, extremely reduced in size, often knob-shaped); further fusions are possible: dorsal and ventral edges of trochanter may merge with the second segment (*R. expansiseta* Cook, 1980) or all segments fuse together (*R. tapiarum,* Fig. 104); palp tarsus greatly reduced, usually provided with a relatively long terminal seta, one solenidion, and one or several simple setae; legs without swimming setae, basifemur and telofemur of all legs with a fine transverse suture line dividing the segments into a proximal and a distal part.



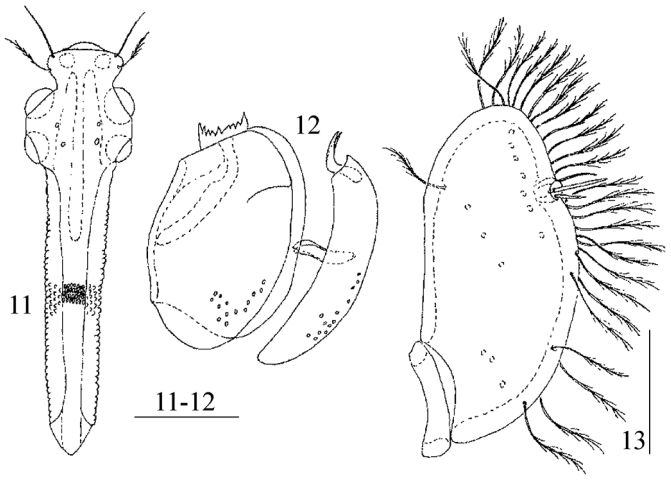
Figs. 7–10. *Rhyncholimnochares ursula* n. sp., female. 7 – capitulum, ventrolateral view, 8 – pedipalp, lateral view, 9 – leg IV, 10 – claw. Scale bars: 7, 9 = 100; 8, 10 = 50 μm.

Remark: The genus *Rhyncholimnochares* is divided into two subgenera, *Rhyncholimnochares* s.str. with 9 previously described species, and *Paralimnochares* Lundblad, 1937 with two known species – the attribution of *R. dispersiai* Ferradás, 1975 to this subgenus by K.O. Viets (1987) is not supported by morphological evidence. The only species reported under the genus name *Rhyncholimnochares* from outside the Americas, *R. womersleyi* (Lundblad, 1952), was later placed in its own genus *Austrolimnochares* Harvey, 1998. It differs from *Rhyncholimnochares* in a strongly curved second palp segment; males are furthermore characteristic in the presence of four palp segments (tarsus and tibia separate) – in females these terminal segments may fuse to various degree.

3.2 *Rhyncholimnochares (s. str.) ursula* sp. n.

Figures 1–13

Type material: Holotype female, SMF: Costa Rica 3b, Cartago, Turrialba, Rio Jicotea near village Jicotea, 780 m, 9.811755, −83.535329, 24.03.1991, leg. Springer. Paratype deutonymph, SMF: Costa Rica 6d, Cartago, Turrialba, Jicotea, Rio Jicotea, bosque, 1000 m, 9.793589, −83.541611, 09.06.1991, leg. Springer.



Figs. 11–13. *Rhyncholimnochares ursula* n. sp., deutonymph. 11 – frontal plate, 12 – capitulum and chelicera, lateral view, 13 – pedipalp, lateral view. Scale bars: 11–12 = 100, 13 = 25 μm.

Description: Female (male unknown). Integument papillae rounded (Fig. 1). Frontal plate anterior part with distinctly diverging lateral margins, anterior margin slightly convex, with a small central protrusion (Fig. 2); separation of lateral eye lenses equal to posterior lens diameter; all setae finely plumose, Fch and Oi slightly thicker than Fp and Vi; Fch and Fp near anterior margin, Vi between anterior and posterior eye lenses, Oi on the level of anterior part of posterior lenses; posterior part of frontal plate long, with parallel lateral margins, covered by numerous small tubercles; keel relatively long, approximately half the length of frontal plate. Dorsum near centre with a pair of rod-shaped dorsal plates (Fig. 3), a constant number of plumose setae with large glandularia arranged in a fixed pattern, and, in addition, more numerous and irregularly arranged setae with small glandularia or without glandularia.

Ventral surface (Fig. 4) with membranous parts densely covered by fine setae without glandularia (shorter on the medial surface, longer in lateral and caudal parts); anteromedial corners of anterior coxal group connected by a narrow bridge. Anterolateral corner of coxae III and posteromedial end of coxae IV with narrow projections. Acetabula numerous, small, on rather long stalks (Fig. 5), arranged parallel to medial margin of coxae III+IV in two long, anteriorly touching and slightly curved strips; genital plates (Fig. 6) with an enlarged base, bearing 9–11 terminal setae.

Capitulum with short rostrum, mouth opening directed ventrally (Fig. 7). Palp (Fig. 8) second segment large with numerous subequal setae, ratio length/height 2.9–3.0; third segment located far proximal from distal end of second segment, very small, with one solenidion and two unequal simple setae.

Trochanter of all legs short and high, with several setae; remaining segments with numerous setae, dorsally rather long and forming a longitudinal row; IV-L: Figure 9, leg claw: Figure 10.

Measurements ($n = 1$). Idiosoma length/width about 2000/1600. Frontal plate length 1050, distal part 137; anterior width 160, width anterior to eyes 112, width at level of eye capsule 225; eye capsule length 155–160; length/width of proximal part 773/146, keel length 535. Dorsal plates

length/width 475–500/45; coxae I+II length medial margin 220, lateral margin 525, width anterior margin 225, posterior margin 500; coxae III+IV length medial margin 850, width anterior margin 485, width posterior margin 275. Acetabula diameter 12–16, stalk length 19–22. Capitulum length/height 310/225, rostrum length 30, mouth disk diameter 65; chelicera length basal segment 337, claw 50. Palp segments 1-3 length: 13, 145, 10, segment 2 height 50. Leg segments 1–6 length: I-Leg, 140, 435, 350, 300, 310, 310; II-Leg, 140, 475, 400, 335, 350, 360; III-Leg, 175, 485, 400, 350, 375, 360; IV-Leg, 185, 510, 435, 400, 410, 400.

Deutonymph. Similar to female but smaller in dimensions. Frontal plate (Fig. 11) with setae Fch smooth, but Fp plumose. Capitulum with convex ventral margin, mouth disc slightly turned to ventral side (Fig. 12). Second palp segment (Fig. 13) with subequal setae in lower number, ratio length/height 2.2–2.3.

Measurements ($n = 1$). Idiosoma length/width about 1000/775. Frontal plate length 550, distal part 62, anterior width 100, width anterior to eyes 75, width at level eye capsule 105; eye capsule length 100; keel length 260. Dorsal plates length/width 250/12; coxae I+II length medial margin 160, lateral margin 275, width anterior margin 135, posterior margin 250; coxae III+IV length medial margin 485, width anterior margin 235, width posterior margin 135. Acetabula diameter 9–10, stalk length 13; Capitulum length/height 185/135, rostrum length 30, mouth disk diameter 60; chelicera length basal segment 175, claw 35. Palp segments 1–3 length: 6, 110, 6. Leg segments 1–6 length: I-Leg, 60, 185, 160, 180, 160, 200; II-Leg, 16, 60, 225, 175, 180, 200, 200; III-Leg, 60, 215, 200, 165, 190, 225; IV-Leg, 65, 260, 235, 200, 250, 215.

Derivatio nominis: "*ursula*" (Latin) = little bear. The fur-like dense setation remembers such an animal.

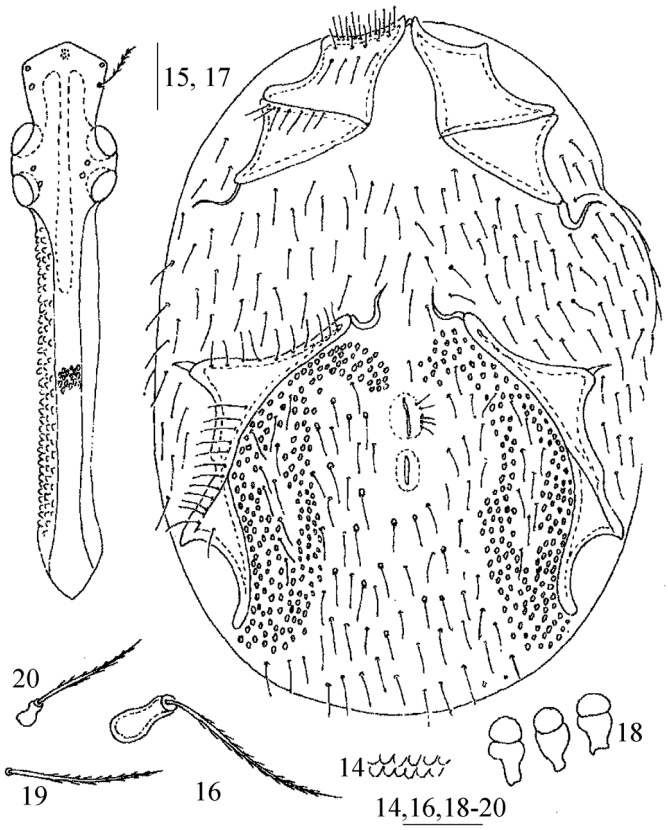
Remarks. *Rhyncholimnochares ursula* differs from all known species of the genus in the extreme neotrichy of membranous idiosoma surfaces. Leaving this character apart, the adult agrees in the presence of a pair of dorsal sclerites with *R. glabra* sp. n., a species differing in the shape of the capitulum, with the mouth disk directed dorsally. In the shape of frontal plate and palps, it is furthermore similar to *R. lamellipalpis* Lundblad, 1941, a species differing in a relatively shorter posterolateral corner of coxae II (Fig. 123) and the mouth disk in terminal position on the capitulum, directed anteriorly (Fig. 121).

3.3 *Rhyncholimnochares (s. str.) minuta* sp. n.

Figures 0, 14–24

Type material: Holotype female, SMF: Costa Rica 5d, Cartago, Turrialba, Jicotea, Rio Jicotea, zacate, 850 m, 9.795400, −83.540833, 09.06.1991. leg. Springer.

Female. Integument papillae rounded (Fig. 14). Frontal plate (Fig. 15) anterior part with slightly diverging lateral margins, anterior margin forming an obtuse angle, here a slightly developed medial eye; separation of lateral eye lenses less than lens diameter; setae Fch and Fp anterior to eye capsules, Fp noticeable plumose; Vi between anterior and posterior eye lenses, Oi at the level of anterior part of posterior eye lenses; posterior part of frontal plate long, with parallel lateral margins, densely covered with small tubercles; keel



Figs. 14–20. *Rhyncholimnochares minuta* n. sp., female. 14 – fragment of integument, lateral view, 15 – frontal plate, 16 – dorsal idiosomal seta, 17 – ventral view, 18 – genital acetabula, 19 – ventral genital seta without glandularium, 20 – ventral genital setae with small glandularium. Scale bars: 14, 16, 18–20 = 50; 15,17 = 100 μm.

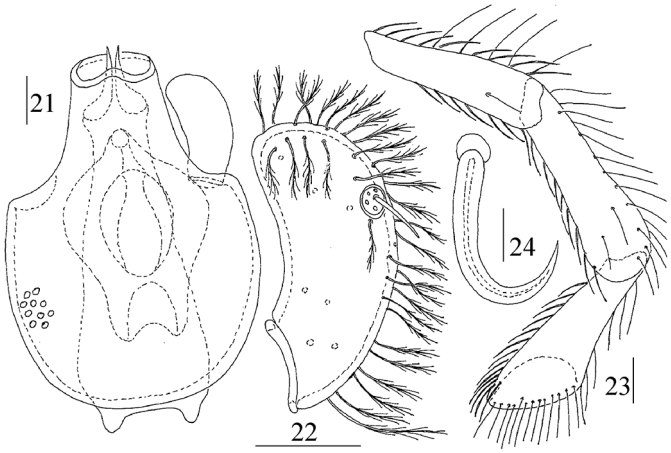
rather long, but shorter than one half frontal plate. Dorsum without paired sclerites, provided with a constant set of setae associated with large glandularia (Fig. 16).

Membranous parts of venter with numerous simple setae. Anteromedial angles of coxae I connected by a narrow bridge (Fig. 17). Acetabula numerous, on basally narrowed stalks (Fig. 18), on each side in a bowed field parallel to medial margin of posterior coxae; genital field without genital plates, gonopore flanked by a line of setae; between the acetabular fields an area with rather numerous setae, most of them simple (Fig. 19), some associated to small glandularia (Fig. 20), but not arranged in a constant pattern.

Capitulum (Fig. 21) with a large base, its surface porous, posterior margin with two small projections; rostrum relatively narrow, half as wide as capitular base; mouth disk directed slightly ventrally; chelicera basal segment large, posterior margin medially straight. Palp (Fig. 22) second segment relatively large and high (ratio length/height 2.3), with numerous uniform plumose setae; third segment small, with five setae, situated rather far proximal from distal end of second segment.

Legs with rather dense setation, basifemur, telofemur and genu of all legs with a few relatively long dorsal setae; distal segments of IV-L: Figure 23, leg claw: Figure 24

Measurements ($n = 1$). Idiosoma length/width about 1300/870. Frontal plate length 710, distal part 100, anterior width 112, width anterior to eyes 75, width at level of eye capsule



Figs. 21–24. *Rhyncholimnochares minuta* n. sp., female. 21 – capitulum, ventral view, 22 – pedipalp, lateral view, 23 – genu, tibia and tarsus of leg IV, 24 – claw. Scale bars: 21, 24 = 50, 22 = 50, 23 = 100 µm.

137; eye capsule length 100–112, proximal part length/width 530/65-70; keel length 310. Coxae I+II length medial margin 235, lateral margin 325, width anterior margin 175, posterior margin 275; coxae III+IV length medial margin 550, width anterior margin 335, width posterior margin 160. Acetabula diameter 9–13, stalk length 16–19. Capitulum length/width 205/145, rostrum length 60, mouth disk diameter 48; chelicera length basal segment 170, claw 38; Palp segments 1-3 length: 6, 95, 9. Legs segments 1-6 length: I-Leg, 85, 310, 285, 235, 250, 210; II-Leg, 85, 360, 310, 260, 275, 235; III-Leg, 85, 300, 325, 250, 285, 275; IV-Leg, 100, 375, 335, 325, 335, 285.

Derivatio nominis: "*minuta*" (Latin) = reduced in size, with reference to the small dimensions of the species.

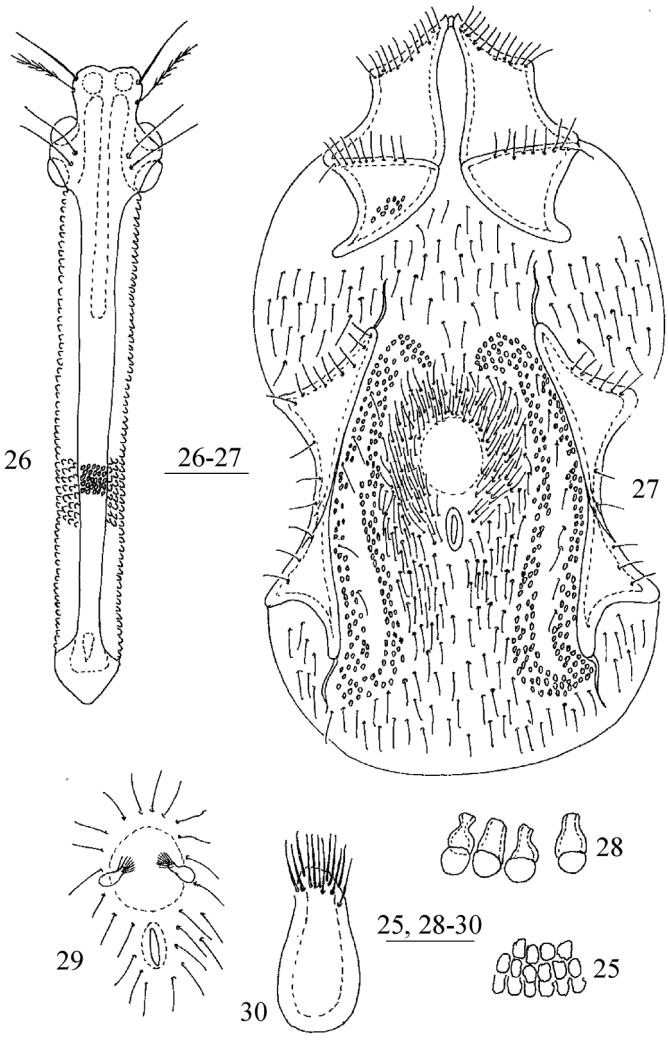
Remarks. The female of *R. minuta* is most similar to *R. globirostris* Cook, 1980, described from Mexico, in the compact shape of the gnathosoma, but differs in the following character states (data for *R. globirostris* in parentheses): (1) distinctly minor size of idiosoma, its sclerites and appendages – *e.g.* idiosoma length 1300 (2750), frontal plate length 710 (1170) capitulum length 205 (289), I-L-4-6 length 235-250-210 (333-340-355); (2) anterior margin of frontal plate obtuse angled, Figure 15 (straight, with a pair of fine indentations near centre); (3) posterior part of frontal plate relatively shorter, 70% plate length (78%).

3.4 *Rhyncholimnochares (s. str.) cooki* sp. n.

Figures 25–39

Type material: Holotype male, SMF: Costa Rica Cartago, Turrialba. Rio Jicotea, zacate, 850 m, 5d, 9.795400, −83.540833, 09.06.1991, leg. Springer. Paratypes, SMF: Male, same locality and collector, 5b, 26.03.1991; 2 males, 2 females, same area and collector, 4a, Rio Jicotea, finca, 810 m, 9.798759, −83.537668, 07.02.1991.

Male: Integument papillae rounded (Fig. 25). Frontal plate (Fig. 26) anteriorly only slightly enlarged, anterior margin with a small median incision, medial eye not visible; separation of lateral eye lenses less than lens diameter; setae Fch and Fp near anterior margin, Fp plumose; Vi between anterior and posterior eye lenses, setae Oi on the level of anterior part posterior eye

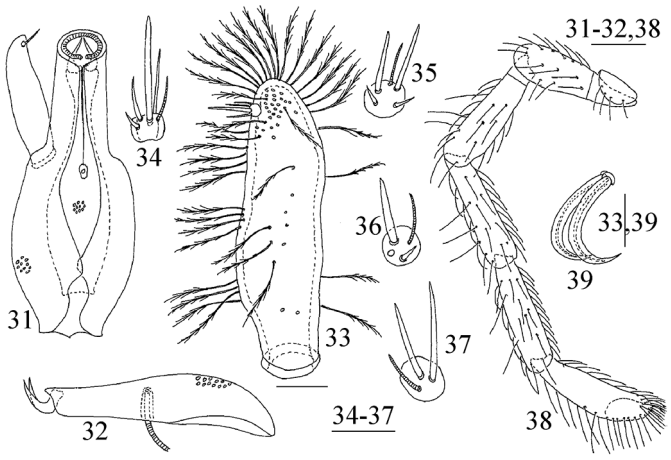


Figs. 25–30. *Rhyncholimnochares cooki* n. sp., adults. 25 – fragment of integument, lateral view, 26 – frontal plate, 27 – ventral view, 28 – genital acetabula, 29 – genital and anal opening, 30 – genital plate; 25–28 – male, 29–30 female. Scale bars: 25, 28–30 = 50, 26–27 = 100 µm.

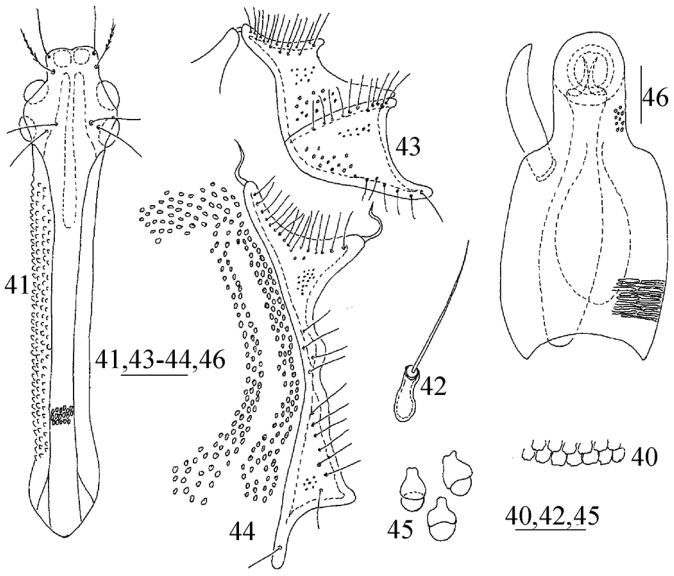
lens; posterior part long, with parallel lateral margins, densely covered by small tubercles; keel distinctly shorter than half frontal plate. Dorsum without paired plates.

Ventral surface (Fig. 27) with membranous areas bearing numerous uniform fine setae without glandularia; anteromedial corners of anterior coxal group connected by a narrow bridge (Fig. 27). Anterior coxal group with a relatively low number of setae. Gonopore surrounded by numerous setae more densely arranged than in other parts of the venter; interspace between acetabular fields with rather numerous irregularly arranged fine setae, some of them with glandularia; acetabula: Figure 28.

Capitulum (Fig. 31) slender, its surface porous, rostrum long and narrow, but considerably shorter than capitular base; mouth disk slightly turned to dorsal side of the rostrum, chelicera (Fig. 32) with rather large basal segment, but shorter than capitulum. Palp (Fig. 33) with rather large and slender second segment (ratio length/height 3.3), with numerous uniformely plumose setae; segment 3 near distal end of second segment, with one solenidion and 2–4 unequal simple setae (Figs. 34–37).



Figs. 31–39. *Rhyncholimnochares cooki* n. sp., female. 31 – capitulum, dorsal view, 32 – chelicera, lateral view, 33 – pedipalp, lateral view, 34–37 – pedipalpal tarsus, 38 – leg IV, 39 – claw. Scale bars: 31–32, 38 = 100; 33, 39 = 50, 34–37 = 15 μm.



Figs. 40–46. *Rhyncholimnochares jicotea* n. sp., female. 40 – fragment of integument, lateral view, 41 – frontal plate, 42 – dorsal idiosomal seta, 43 – coxae I+II, 44 – coxae III+IV, 45 – genital acetabula, 46 – capitulum, ventral view. Scale bars: 40, 42, 45 = 50; 41, 43–44, 46 = 100 μm.

Legs with a few long dorsal setae on basifemur, telofemur and genu; IV-L: Figure 38; leg claws: Figure 39.

Measurements ($n = 3$). Idiosoma length/width 1315–1875/870–1100. Frontal plate length 760–875, distal part 62, anterior width 80–100, width anterior to eyes 75–100, width at level of eye capsules 150–225, eye capsule length 90–110, length/width of proximal part 605/85; keel length 300–350. Coxae I+II length medial margin 275–350, lateral margin 400–440, anterior width 150–190, posterior width 200–250; coxae III+IV length medial margin 650–700, anterior width 235–310, posterior width 175–200. Acetabula diameter 9–11, stalk length 12–16. Capitulum length/width 385–400/185–250, rostrum length 160–175, mouth disk diameter 40–75; chelicera length basal segment 310–350, claw 35–50. Palp segments 1–3 length: 6, 185–205, 9–10 Leg segments 1–6 length: I-Leg, 85–100, 310–325, 275–300, 210–300, 250–285, 210–260; II-Leg, 85–100, 335–375, 285–315, 270–300, 250–290, 235–275; III-Leg, 100–165, 275–365, 260–315, 250–300, 285–315, 235–290; IV-Leg, 100–120, 325–400, 320–375, 325–340, 335–375, 325–340.

Female. Similar to male, differing in larger size, and genital field with gonopore surrounded by a lower number of setae (Fig. 29), genital plates with 10–12 setae (Fig. 30).

Measurements ($n = 2$). Idiosoma length 2750. Frontal plate length 1185–1325, distal part 45–60, anterior width 110–125, width anterior to eyes 100–115, width at level of eye capsules 210–240, length eye capsule 140–155, proximal part length/width 950–1050/125–185, keel length 475–540. Coxae I+II length medial margin 275–350, lateral margin 500–575, width anterior margin 250–265, posterior margin 360–400; coxae III+IV length medial margin 935–1015, width anterior margin 335–400, posterior margin 250–265. Acetabula diameter 9–13, stalk length 12–16. Capitulum length/width 535–565/210–280, rostrum length 220–225, mouth disk diameter 100–140; chelicera length basal segment 400–425, claw 50–85. Palp segments 1-3 length: 12–15, 230–250, 9–13. Leg segments 1-6 length: I-Leg, 100–165, 375–450, 375–390, 325–340, 300–315; II-Leg, 100–165, 460–475, 400–415, 370–390, 360–375, 300–315; III-Leg, 100–185, 430–460, 405–420, 400–415, 375–400, 350–365; IV-Leg, 150–190, 510–525, 500–515, 460–525, 485–500, 410–425.

Derivatio nominis: In honour of Dave Cook (Paradise Valley, U.S.A., 1922-2020) who made the most important contributions to the knowledge of the genus in Latin America.

Remarks. The adult of *R. cooki* is similar to *R. gracilirostris* Lundblad, 1953 in the shape of the capitulum and the frontal plate. Differences between the two species are found in the following character states (*R. gracilirostris* in parentheses, after Lundblad, 1953): (1) rostrum distinctly shorter than capitular base, Figure 31 (rostrum and capitular base almost equal in length); (2) posteromedial margins of coxae II convex, Figure 27 (straight); (3) anterior margin of coxae III 1.3 times as long as posterior margin of coxae IV (almost 2.0 times).

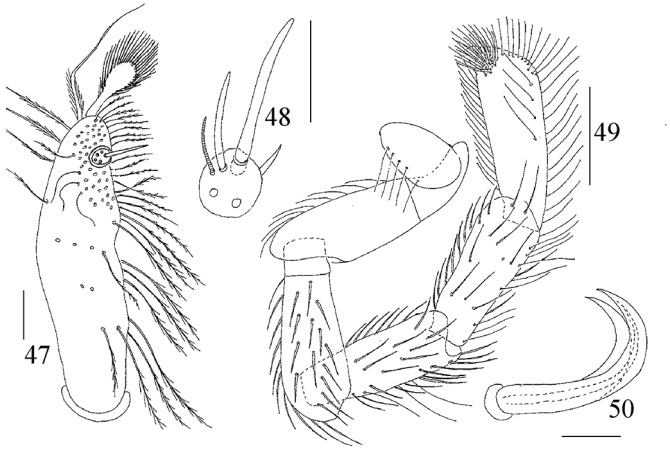
3.5 *Rhyncholimnochares (s. str.) jicotea* sp. n.

Figures 40–50

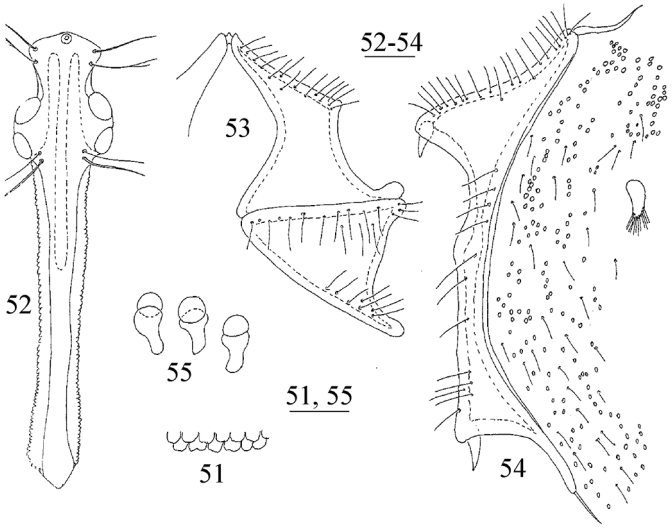
Type material: Holotype adult, SMF: Costa Rica 5b, Cartago, Turrialba, Jicotea, Rio Jicotea, zacate, 850 m, 9.795400, –83.540833, 26.03.1991, leg. Springer.

Description: Adult of uncertain sex: Integument papillae rounded (Fig. 40). Frontal plate (Fig. 41) with short anterior part, anterior margin straight or slightly concave in the centre; medial eye not visible; separation of lateral eye lenses less than lens diameter; setae Fch and Fp located anterior to the eye capsules, Fp plumose; Vi and Oi on the level of anterior part of posterior eye lenses; posterior part long, lateral margins parallel, densely covered by small tubercles; keel distinctly shorter than half frontal plate length. Dorsum without paired sclerites, dorsal setae associated with glandularia (Fig. 42).

Anteromedial corners of coxae I connected by a narrow bridge (Fig. 43). Coxae II medially not sharply pointed, with a



Figs. 47–50. *Rhyncholimnochares jicotea* n. sp., female. 47 – pedipalp, lateral view, 48 – pedipalpal tarsus, 49 – leg I, 50 – claws. Scale bars: 47, 50 = 50; 48 = 25; 49 = 100 μm.

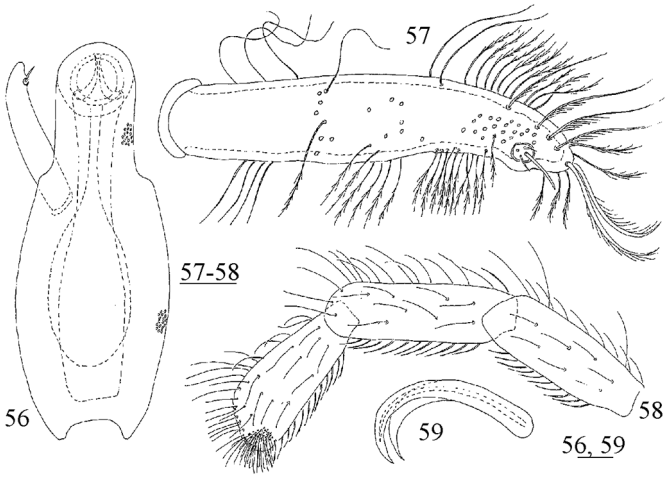


Figs. 51–55. *Rhyncholimnochares lundbladi* n. sp., female. 51 – fragment of integument, lateral view, 52 – frontal plate, 53 – coxae I+II, 54 – coxae III+IV, 55 – genital acetabula. Scale bars: 51, 55 = 50; 52–54 = 100 μm.

slightly convex medial margin, coxae III+IV (Fig. 44) elongate, anterior margin of coxae III only slightly wider than posterior margin of coxae IV; membranous interspace between coxal groups without setae. Legs with rather numerous setae (Fig. 49); claws: Figure 50. Acetabula on short stalks (Fig. 45).

Capitulum (Fig. 46) with large base, its surface porous (pores on the base transverse, on rostrum round); rostrum relatively narrow and short, about half the length of capitular base; mouth disk directed dorsally; chelicera with large basal segment.

Palp (Fig. 47) with slender second segment (ratio length/width 3.8) bearing numerous plumose setae various in shape: a dense group of short setae around insertion of segment 3, longer setae on proximoventral and dorsodistal margin (here 2–3 stronger and very long), one apical seta consisting of a relatively long and thick proximal part and a club-shaped, plumose, distal expansion – proximal and distal parts nearly



Figs. 56–59. *Rhyncholimnochares lundbladi* n. sp., female. 56 – capitulum, ventral view, 57 – pedipalp, lateral view, 58 – genu, tibia and tarsus of leg I, 59 – claw. Scale bars: 56, 59 = 50; 57–58 = 100 μm.

equal in length; third segment (Fig. 48) inserting distinctly proximal to distal end of second segment, small, with one solenidion and 4–5 unequal simple setae.

Measurements ($n = 1$). Idiosoma length/width about 1500/970. Frontal plate length 800, anterior part 62, anterior width 75, width anterior to eyes 75, width at level of eye capsules 160, eye capsule length 100–105, posterior part length/width 650/100, keel length 285. Coxae I+II length medial margin 310, lateral margin 350, with anterior margin 170, posterior margin 225; coxae III+IV length medial margin 750, width anterior margin 260, posterior margin 210. Acetabula diameter 9–10, stalk length 15. Capitulum length/width 560/285, rostrum length 185, mouth disk diameter 125; chelicera length basal segment 425, claw 75. Palp segments 1–3 length: 17, 225, 16. Leg segments 1–6 length: I-Leg, 135, 325, 235, 260, 235, 275; II-Leg, 135, 335, 285, 250, 260, 275; III-Leg, 150, 315, 300, 280, 275, 260; IV-Leg, 160, 375, 335, 360, 260, 260.

Derivatio nominis: Named after the Costa Rican stream that produced many of the species described in this paper.

Remarks. The adult of *R. jicotea* is similar to *R. expansiseta* Cook, 1980 in the presence of an expanded terminal seta on palp segment 2; it differs in the following character states (*R. expansiseta* in parentheses, after Cook 1980): (1) first and second palp segment separate, Figure 47 (fused dorsally and ventrally); (2) second palp segment with 2-3 elongated dorsodistal setae (without such setae); (3) expanded, plumose seta with proximal and distal part subequal in length (expanded distal part three times longer than basal part); (4) anterior coxal group medially connected by a narrow bridge, but not fused, Figure 43 (slightly fused medially).

3.6 *Rhyncholimnochares (s. str.) lundbladi* sp. n.

Figures 51–59

Type material: Holotype female, SMF: Costa Rica 6b, Cartago, Turrialba, Jicotea, Rio Jicotea, bosque, 1000 m, 9.793589, -83.541611, 28.03.1991. leg. Springer.

Comparison material examined: *Rhyncholimnochares longipalpis*, Agriculture and Agri-Food Canada (AAFC), coll.

Cook, Costa Rica: DC-07-73, Guanacaste, stream 11 km south of Cañas, 13-XII-1973 (0/0/1); DC-13-73, Puntarenas, small stream on Highway 14, 14 km from Golfito, 17-XII-1973 (0/0/1); DC-18-73, Guanacaste, Rio Javillos 4 km south of Cañas, 20-XII-1973 (1/0/1).

Female (male unknown). Integument papillae flattened (Fig. 51). Frontal plate (Fig. 52) anterior part approximately as long as eye capsules, with anteriorly diverging lateral margins, anterior margin bluntly protruding, medial eye visible near centre; separation of lateral eye lenses less than half lens diameter; setae Fch and Fp on distal part, Fp bi- or trifurcate; Vi and Oi on the level of posterior margin of posterior eye lenses; posterior part of frontal plate long, lateral margins parallel, densely covered with small tubercles; keel about half the length of frontal plate. Dorsum without paired plates.

Ventral surface without setae in the interspace between coxae. Anteromedial angles of anterior coxal group connected by a narrow bridge (Fig. 53); posterior coxal group (Fig. 54) elongate. Gonopore area and excretory pore destroyed, but genital plate visible (Fig. 54); acetabular stalks rather long (Fig. 55).

Capitulum (Fig. 56) elongate with large base, its surface porous; rostrum relatively short, half the length of capitular base; mouth disk directed dorsally; chelicera with narrow, proximally truncate basal segment.

Palp (Fig. 57) with very slender second segment (ratio length/height 4.1), bearing numerous plumose setae concentrated to distal part, apically 6–7 of them particularly long, two of these thickened, in terminal position, in proximal part several long and thin smooth setae; third segment slightly distanced from tip of second segment, small, with one solenidion and three unequal setae.

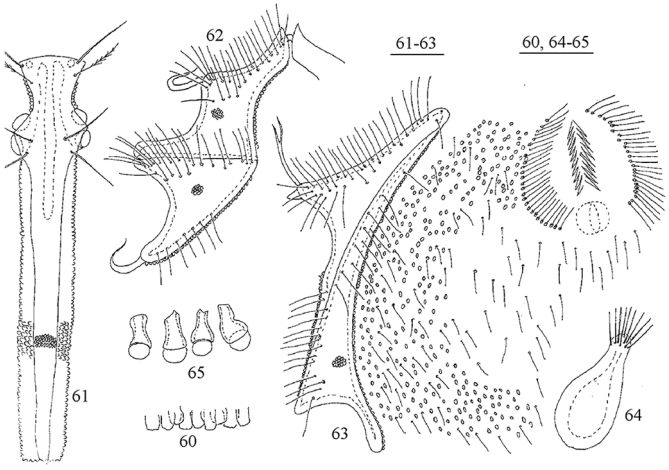
Legs with rather numerous setae (Fig. 58); claws: Figure 59.

Measurements ($n = 1$). Idiosoma length/width about 2250/1185. Frontal plate length 960, anterior part 135, anterior width 160, width anterior to eyes 140, width at level of eye capsules 218, eye capsule length 135, posterior part length/width 720/115, keel length 500. Coxae I+II length medial margin 410, lateral margin 535, width anterior margin 285, posterior margin 385; coxae III+IV length medial margin 1000, width anterior margin 410, posterior margin 275. Acetabula diameter 11–13, stalk length 16–19. Capitulum length/width 775/450, rostrum length 250, mouth disk diameter 160; chelicera length basal segment 685, claw 75. Palp segments 1–3 length: 13–16, 300, 12. Leg segments 1–6 length: I-Leg, 120, 510, 410, 435, 400, 360; II-Leg, 125, 510, 450, 435, 425, 375; III-Leg, 175, 500, 460, 460, 475, 425; IV-Leg, 185, 585, 560, 560, 575, 500.

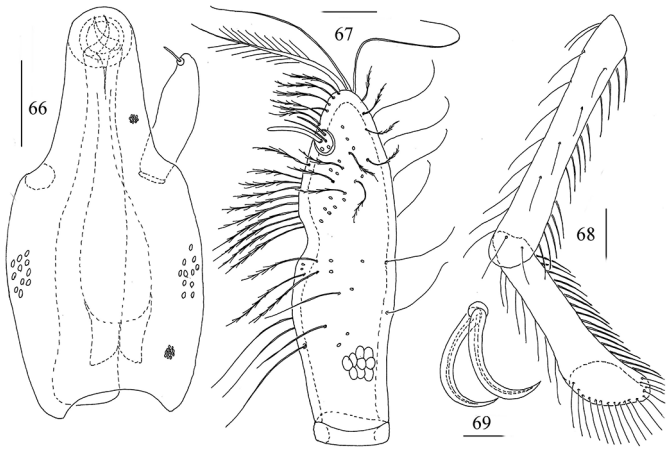
Derivatio nominis: In honour of Olov Lundblad (Stockholm) who gave the first description of the type spcies of *Rhyncholimnochares* in 1936.

Remarks. The adult of *R. lundbladi* is most similar to *R. longiscuta* Lundblad, 1941 and *R. monikae* n. sp. in the combination of a frontal shield without anterior incision, and a rather large mouth disk, but differs in the following character states (the two compared species in parentheses, after Lundblad 1953): (1) frontal plate with medial eye, Figure 52 (without medial eye); (2) capitular base very large, two times the length of rostrum (1.5 time rostrum length).

The Costa Rican specimens attributed to *R. longipalpis* by Cook (1980) resemble *R. longiscuta* in a shortened keel of the frontal plate and the presence of only one thick plumose distal seta on palp segment 2, but agree with *R. lundbladi* in three important character states: (1) presence of a medial eye; (2) capitular base large; (3) presence of additional long smooth terminal setae on second palp segment.



Figs. 60–65. *Rhyncholimnochares monikae* n. sp., female. 60 – fragment of integument, lateral view, 61 – frontal plate, 62 – coxae I+II, 63 – coxae III+IV and fragment of genital field, 64 – genital plate, 65 – genital acetabula. Scale bars: 60, 64–65 = 50; 61–63 = 100 μm.



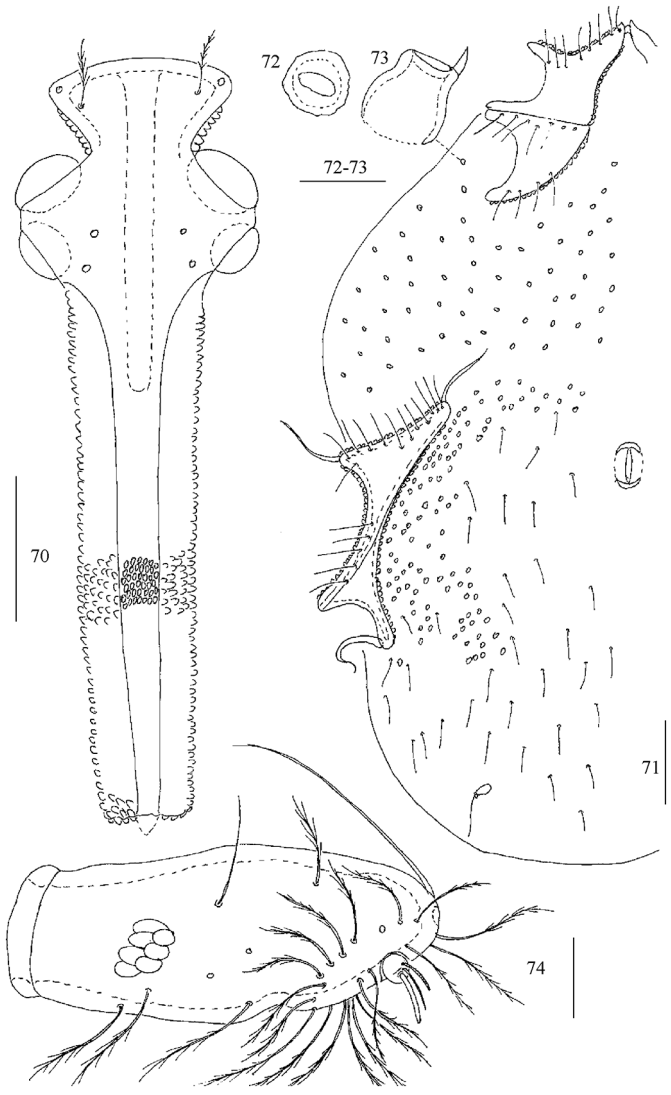
Figs. 66–69. *Rhyncholimnochares monikae* n. sp., female. 66 – capitulum, ventral view, 67 – pedipalp, lateral view, 68 – tibia and tarsus of leg IV, 69 – claws. Scale bars: 66, 69 = 100; 67–68 = 50 μm.

3.7 *Rhyncholimnochares (s. str.) monikae* sp. n.

Figures 60–74

Type material: Holotype female, SMF: Costa Rica 3a, Cartago, Turrialba, Rio Jicotea near village Jicotea, 780 m, 9.811755, −83.535329, 07.02.1991, leg. Springer. Paratypes, SMF: Female and deutonymph, same site, date and collector.

Description. Female (male unknown): Integument papillae rather long, apically blunt (Fig. 60). Frontal plate (Fig. 61) anterior part longer than eye capsules, with lateral margins distinctly diverging, anterolaterally acute-angled, anterior margin convex; median eye not visible; separation of lateral eye lenses less than half lens diameter; setae Fch and Fp near



Figs. 70–74. *Rhyncholimnochares monikae* n. sp., deutonymph. 70 – frontal plate, 71 – ventral view, 72 – glandularia, dorsal view, 73 – glandularia, lateral view, 74 – pedipalp, lateral view. Scale bars: 70–71 = 100; 72–74 = 50 μm.

anterolateral angles, Fp plumose; Vi on the level of centre, Oi on the level of posterior margin of posterior eye lenses; posterior part of frontal plate long, with parallel lateral margins densely covered by small tubercles, posterior margin straight; keel distinctly shorter than half frontal plate. Dorsum without paired plates.

Anteromedial angles of coxae I connected by a narrow bridge (Fig. 62). Coxae I+II with weakly convex to straight posteromedial margin. Membranous interspace between coxal groups without setae. Genital field (Fig. 63) with gonopore surrounded by a dense row of setae, further setae scattered all over the area embraced by posterior coxae, also between acetabula. Genital plates (Fig. 64) with 9–11 terminal setae. Acetabula on rather long stalks (Fig. 65).

Capitulum (Fig. 66) elongate, its surface porose (pores on base distinctly larger than on rostrum); capitular base almost twice as long as rostrum; mouth disk on dorsal side of rostrum; chelicera with basal segment long and narrow, slightly shorter than capitulum.

Palp (Fig. 67) with second segment rather slender (ratio length/height 3.5), distally with three particularly long setae – one thick and plumose, the others finer and smooth; third segment not far from distal end of second segment, bearing one solenidion, one thick long seta and three thin setae.

Legs with rather numerous setae; IV-L terminal segments: Figure 68; claws: Figure 69.

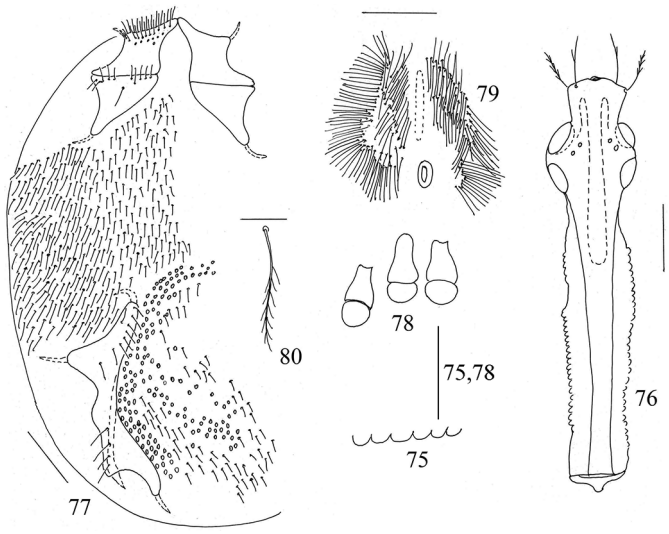
Measurements ($n = 2$). Idiosoma length/width 2250–2500/ 1400–1500. Frontal plate length 1125–1650, anterior part 155–210, anterior width 200–260, width anterior to eyes 125–162, width at level of eye capsules 235–325, eye capsule length 125–162, posterior part length/width 800–920/85–175, keel length 460–730. Coxae I+II length medial margin 300–560, lateral margin 560–850, width anterior margin 325–415, posterior margin 435–615; coxae III+IV length medial margin 1000–1775, width anterior margin 500–735, posterior margin 260–435. Acetabula diameter 10–13, stalk length 19–22. Capitulum length/width 415–585/300–385, length of rostrum 210–275, mouth disk diameter 100-135; chelicera length basal segment 500–610, claw 75. Palp segments 1-3 length: 12–13, 180–280, 10–12. Leg segments 1–6 length: I-Leg, 150–160, 560–625, 400–425, 450–525, 335–425; II-Leg, 150–160, 525–615, 435–610, 450–585, 475–535, 400–485; III-Leg, 185–200, 525–585, 435–575, 475–490, 460–490, 410–515; IV-Leg, 160–170, 600–625, 560–690, 575–650, 585–640, 425–540.

Deutonymph. Similar to female, but differing in smaller size absence of gonopore and acetabula, as well as palp and leg setae reduced in number. Frontal plate (Fig. 70) short, with convex anterior and straight posterior margin; anterior part shorter than eye capsules, keel shorter than half frontal plate. Interspace between anterior and posterior coxal groups (Fig. 71) without setae, but with numerous glandularia-like structures with short, nail-like setae (Figs. 72–73). Palp (Fig. 74) second segment relatively short and thickened (ratio length/height 2.6–2.7), with one long smooth terminal seta; segment 3 with three setae – one solenidion, one thick and one thin seta.

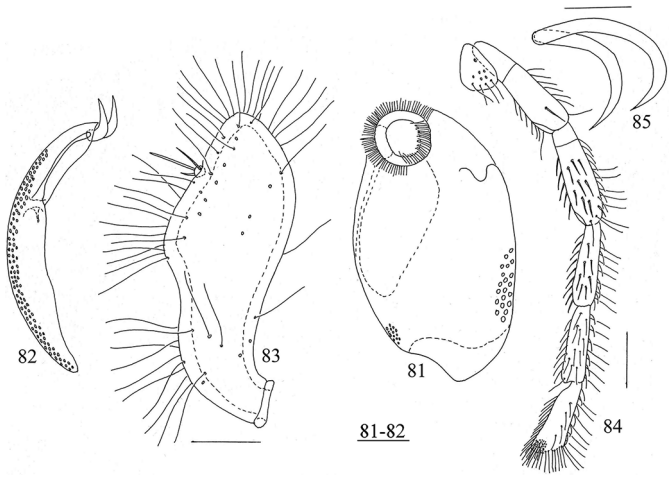
Measurements ($n = 1$). Idiosoma length/width 1435/ 1060. Frontal plate length 510, anterior part 62, anterior width 125, width anterior to eyes 75, at level of eye capsules 165, eye capsule length 87, posterior part length/width 350/75, keel length 215. Coxae I+II length medial margin 250, lateral margin 285, width anterior margin 150, posterior margin 225; coxae III+IV length medial margin 510, width anterior margin 260, posterior margin 150. Acetabula diameter 10–13, stalk length 16–19. Capitulum length 310, rostrum 125, mouth disk diameter 63; chelicera length basal segment 275, claw 40. Palp segments 1-3 length: 11, 130, 10. Leg segments 1-6 length: I-Leg, 80, 225, 185, 175, 185, 175; II-Leg, 80, 260, 205, 185, 185, 185; III-Leg, 85, 225, 205, 185, 210, 200; IV-Leg, 100, 260, 225, 235, 250, 210.

Derivatio nominis: In honour of Monika Springer (San José, Costa Rica). She collected an important part of the species described in this paper during her studies on the invertebrate fauna of Jicotea river (Cartago, Costa Rica).

Remarks. The adult of *R. monikae* is similar to *R. longiscuta* Lundblad, 1941 in the shape of the capitulum (base not more than 1.5 time as long as rostrum, the latter with subparallel lateral margins and large mouth disk, no median eye visible in frontal plate), but differs from it in the following character states (*R. lundbladi* in parentheses): (1) anterior part



Figs. 75–80. *Rhyncholimnochares expansipalpis* n. sp., male. 75 – fragment of integument, lateral view, 76 – frontal plate, 77 – ventral side, 78 – genital acetabula, 79 – perigenital setae, 80 – genital seta. Scale bars: 76, 79 = 300; 77 = 500; 75, 78 = 50; 80 = 100 μm.



Figs. 81–85. *Rhyncholimnochares expansipalpis* n. sp., male. 81 – capitulum, ventral view, 82 – chelicera, lateral view, 83 – pedipalp, lateral view, 84 – leg I, 85 – claws. Scale bars: 81–82 = 100; 83, 85 = 50; 84 = 300 μm.

of frontal plate longer than eye capsules, Figure 61 (shorter than eye capsules); (2) second palp segment wit several long terminal setae, Figure 67 (without long terminal setae).

A striking feature that merits further attention is the presence of numerous densely-arranged glandularia-like structures in the membranous interspace between coxal plates of deutonymphs.

3.8 *Rhyncholimnochares (s. str.) expansipalpis* sp. n.

Figures 75–85

Type material: Holotype male, SMF: Ecuador Ecu 65, Napo (NA), Sumaco. Rio Chaloyacu at Puente Chaloyacu, 1000 m, (02–22–99–20), 12.01.1995, leg. Gerecke.

Description. Male (female unknown). Integument papillae small and flattened (Fig. 75). Frontal plate (Fig. 76) anterior part shorter than eye capsules, with slightly diverging lateral margins, anterior margin convex, median eye hardly visible in its centre; separation of lateral eye lenses less than lens diameter; setae Fch and Fp at anterolateral edges, Fch bifurcated, Fp plumose; Vi and Oi close together between anterior eye lenses; posterior part long, with subparallel, somewhat irregular lateral margins; keel shorter than half frontal plate. Dorsum without paired plates.

Venter with numerous simple setae in the membranous areas between coxal groups. Coxae I with anterior angles medially connected by a narrow bridge (Fig. 77), anterior margin with numerous setae in multiple lines, coxae II anterior margin with a few setae in a single line; posterior coxal group with few setae. Genital field with very numerous setae and acetabula on rather long stalks (Fig. 78); gonopore surrounded by very numerous setae (Fig. 79); all genital setae uniform, plumose (Fig. 80).

Capitulum (Fig. 81) with relatively large base and short rostrum, porous, pores of dorsal base enlarged; mouth disk large, directed ventrally, at right angle to the longitudinal axis. Basal segments of chelicera large, curved dorsoventrally (Fig. 82).

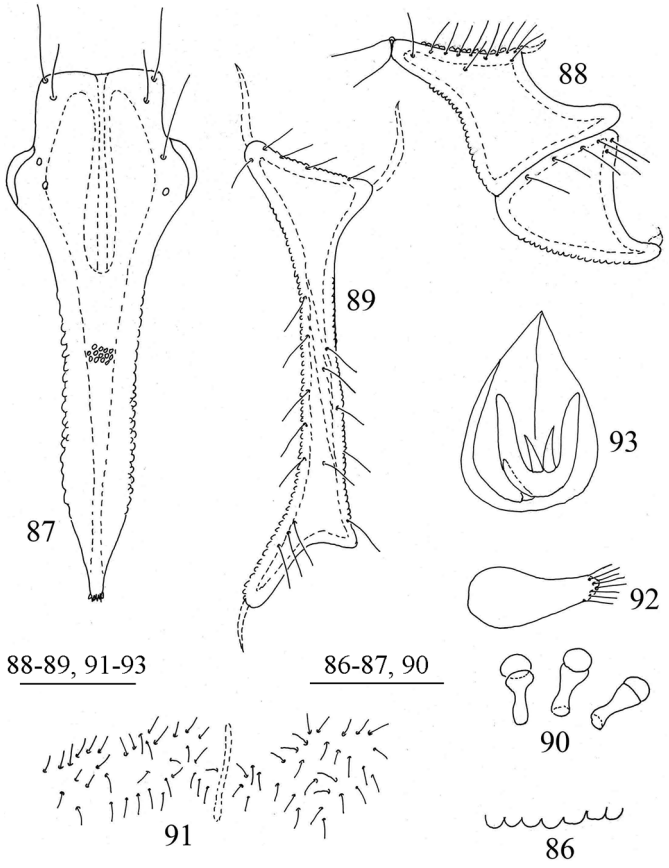
Palp (Fig. 83) second segment expanded in distal half (ratio length/height 2.8) with numerous and subequal thin setae; third segment distanced from distal end of second segment, small, with one solenidion and two setae, one long and one short.

Legs with numerous thin setae (Fig. 84), but longer dorsal setae on basifemur, telofemur, genu, tibia and tarsus of all legs reduced in number (6–7 per segment); claws: Figure 85.

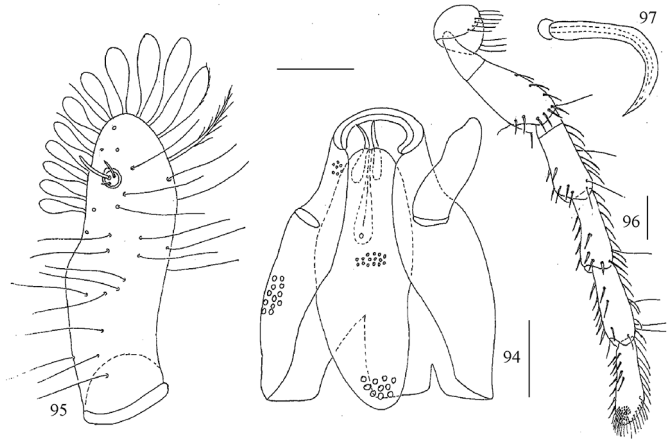
Measurements ($n = 1$). Idiosoma length/width about 3750/2500. Frontal plate length 1750, anterior part 175, anterior width 250, width anterior to eyes 224, at level of eye capsules 385, eye capsule length 250, posterior part length/width 1340/250, keel length 785. Coxae I+II length medial margin 435, lateral margin 750, width anterior margin 375, posterior margin 585; coxae III+IV length medial margin 1260, width anterior margin 650, posterior margin 350. Acetabula diameter 12–15, stalk length 16–19. Capitulum length/width 525/335, mouth disk diameter 125; chelicera length basal segment 500, claw 100. Palp segments 1-3 length: 16, 250, 11. Leg segments 1-6 length: I-Leg, 255, 710, 650, 560, 550, 460; II-Leg, 260, 775, 725, 615, 575, 465; III-Leg, 260, 715, 685, 625, 625, 550; IV-Leg, 275, 825, 825, 800, 815, 625.

Derivatio nominis: Combining "*expansus*" (Latin) with "palp", with reference to the shape of the second segment of this appendage.

Remarks. *Rhyncholimnochares expansipalpis* resembles *R. lamellipalpis* in the second palp segment with uniform setation, without specialized distal setae, and the proximal insertion of the third segment, but differs in the following character states (*R. lamellipalpis* in parentheses): (1) frontal plate anterior margin convex with rudimentary median eye, Figure 76 (straight, with a tiny median projection, but no median eye visible, Fig. 120); (2) setae Fch bifurcate (smooth); (3) second palp segment expanded in distal half, Figure 83 (parallel-sided and distally narrowed, Fig. 122); (4) setae on second palp segment smooth (plumose).



Figs. 86–93. *Rhyncholimnochares petaliseta* n. sp., female. 86 – fragment of integument, lateral view, 87 – frontal plate, 88 – coxae I+II, 89 – coxae III+IV, 90 – genital acetabula, 91 – perigenital setae, 92 – genital platelet, 93 – ovipositor. Scale bars: 86–87, 90 = 50; 88–89, 91–93 = 25 μm.



Figs. 94–97. *Rhyncholimnochares petaliseta* n. sp., female. 94 – capitulum, dorsal view, 95 – pedipalp, lateral view, 96 – leg I, 97 – claws. Scale bars: 94 = 25; 95, 97 = 50; 96 = 100 μm.

3.9 *Rhyncholimnochares (s. str.) petaliseta* sp. n.

Figures 86–97

Type material: Holotype female, SMF: Ecuador Ecu 51, Esmeraldas, E1 Placer. Rio Carolina, upper course N El Placer, 650 (07—67/01—02), 28.12.1994, leg. Gerecke.

Description. Female (male unknown). Integument papillae flat, rounded (Fig. 86). Frontal plate (Fig. 87) anterior part subrectangular, wider than posterior part, anterior margin straight, no medial eye visible; lateral eye lenses on each side completely fused to each other; all setae thin and hair-like, Fch and Fp near anterolateral angles, Vi and Oi between eye capsules; posterior part long and relatively narrow, posteriorly pointed; keel less than half the plate length. Dorsum without paired plates.

Venter with rather numerous simple setae in the membranous area between coxal groups; anteromedial angles of coxae I closely together and connected by a narrow bridge (Fig. 88); Posterior coxal group elongate, anterior margin of coxae III and posterior margin of coxae IV subequal in width (Fig. 89). Genital field with numerous setae and acetabula on long stalks (Fig. 90); gonopore flanked by two transverse patches of genital setae (Fig. 91); genital platelets relatively large, apically with 7 thin setae (Fig. 92); ovipositor (Fig. 93) with two rather large and three small projections.

Capitulum (Fig. 94) with large base and short rostrum, with small pores which are larger on proximal parts of base; mouth disk large, directed slightly dorsally; chelicerae with large basal segment, proximal margin convex. Palp (Fig. 95) second segment elongate (ratio length/height 3.2) with numerous setae, one plumose, on level of third segment insertion, 10-12 club-shaped, at distal margin, the remaining thin and smooth; third segment distanced from distal end of second segment, with one short solenidion and two unequal simple setae.

Legs with numerous thin and mostly short setae (Fig. 96); one to three longer setae on basifemur, telofemur, genu, and tibia; claws: Figure 97.

Measurements ($n = 1$). Idiosoma length about 2500. Frontal plate length 510, distal part 62, anterior width 125, width anterior to eyes 125, width at level of eye capsules 200, eye capsule length 50, proximal part length/width 400/170, length of keel 185. Coxae I+II length medial margin 250, lateral margin 335, width anterior margin 170, posterior margin 225; coxae III+IV length medial margin 625, width anterior margin 200, posterior margin 150. Acetabula diameter 12–13, stalk length 16–19. Capitulum length 325, mouth disk diameter 125; chelicera length basal segment 335, claw 75. Palp segments 1-3 length: 30, 530, 38. Leg segments 1–6 length: I-Leg, 125, 325, 190, 200, 185, 185; II-Leg, 125, 335, 210, 190, 200, 190; III-Leg, 115, 290, 200, 160, 190, 185; IV-Leg, 115, 315, 235, 200, 215, 225.

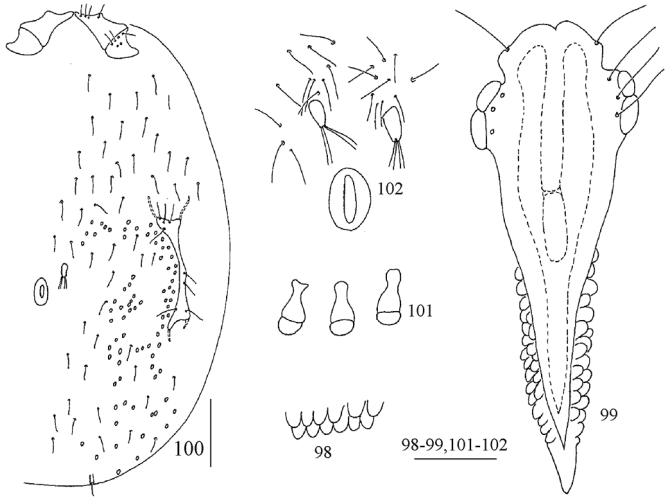
Derivatio nominis: combining the stem of "*petalon*" (Greek: πέταλον = leaf) with "seta".

Remarks. *Rhyncholimnochares petaliseta* sp. n. differs from all other species of the genus *Rhyncholimnochares* in the combination of the following characters: (1) frontal plate anterior part subrectangular, with a wide and straight anterior margin; (2) lateral eye lenses completely fused to each other on each side; (3) second palp segment with 10–12 club-shaped distal setae.

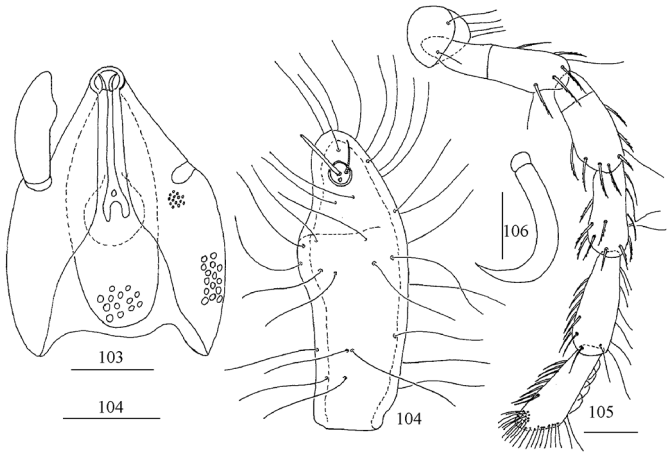
3.10 *Rhyncholimnochares (s. str.) tapiarum* sp. n.

Figures 98–106.

Type material: Holotype deutonymph, SMF: Ecuador Ecu 75, Cotopaxi, Otonga, upper course Rio Damas in Reserva



Figs. 98–102. *Rhyncholimnochares tapiarum* n. sp., female-deutonymph. 98 – fragment of integument, lateral view, 99 – frontal plate, 100 – ventral side, 101 – genital acetabula, 102 – perigenital setae. Scale bars: 98–99, 101–102 = 25; 100 = 300 μm.



Figs. 103–106. *Rhyncholimnochares tapiarum* n. sp., female-deutonymph. 103 – gnathosoma, dorsal view, 104 – pedipalp, lateral view, 105 – leg I, 106 – claw. Scale bars: 103–104 = 25; 105 = 50; 106 = 25 μm.

Otonga, 1700 m (07—22/99-54), 24.01.1995, leg. Arturo Tapia & Gerecke. Paratype: deutonymph, IBIW 9447: Ecuador ECU 61, Pastaza (PA), Canelos, Rio Ushilla Zazapi, 470 m, (01—96/98-27), 09.01.1995, leg. Gerecke.

Description. Deutonymph. Integument papillae rather long, apically rounded (Fig. 98). Frontal plate (Fig. 99) anterior part shortened, anterior margin prominent, divided into two convex parts by a small median incision, median eye not visible; lateral eye lenses on each side close together, but not fused; all setae thin and hair-like, Fch near anterior margin, Fp, Vi and Oi between eye capsules; posterior part long, tapering, lateral margins with strong tubercles, keel length approximately half frontal plate. Dorsum without paired plates.

Venter with simple setae scattered all over the membranous parts; number of coxal setae low; coxae I with anteromedial projections closely together, but not fused (Fig. 100). Genital field with approximately 50 pairs of acetabula on long stalks (Fig. 101); provisional gonopore area surrounded by a few perigenital setae (10–12 pairs – Fig. 102); genital platelets with four thin distal setae.

Capitulum (Fig. 103) with a large base and conic rostrum, surface structure with pores larger on proximal base than in distal part; mouth disk small, directed dorsally; chelicera with large basal segment, proximal margin convex.

Palp (Fig. 104) two-segmented, first segment (trochanter) obviously fused to second segment, resulting in a large proximal segment with a slight thickening in distal part (ratio length/height 2.5), but distally narrowed and rounded, bearing numerous thin, smooth setae; terminal segment located close to distal end of proximal segment, with short solenidion and two unequal simple setae.

Legs with numerous thin and short setae (Fig. 105); basifemur, telofemur, genu, tibia and tarsus with one single, or several relatively long dorsal setae; claws: Figure 106.

Measurements ($n = 1$). Idiosoma length about 2600. Frontal plate length 340, anterior part 50, anterior width 75, width at level of eye capsules 125, eye capsule length 62, posterior part length/width 260/90, keel length 165. Coxae I+II length medial margin 235, lateral margin 290, anterior margin 150, posterior margin 175; coxae III+IV length medial margin 500, width anterior margin 150, width posterior margin 125. Acetabula diameter 9–10, stalk length 16–19. Capitulum length 315, diameter or width of mouth disk 35; chelicera length basal segment 180, claw 37. Palp segments 1-2 length: 118, 6. Leg segments 1-6 length: I-Leg, 100, 225, 165, 150, 1175, 165; II-Leg, 100, 250, 150, 150, 165, 165; III-Leg, 100, 225, 165, 150, 175, 165; IV-Leg, 100, 265, 185, 175, 210, 190.

Derivatio nominis: Dedicated to the Tapia family (Ecuador, San Francisco Las Pampas) remembering their hospitality and engagement for the protection of the Otonga Nature Reserve.

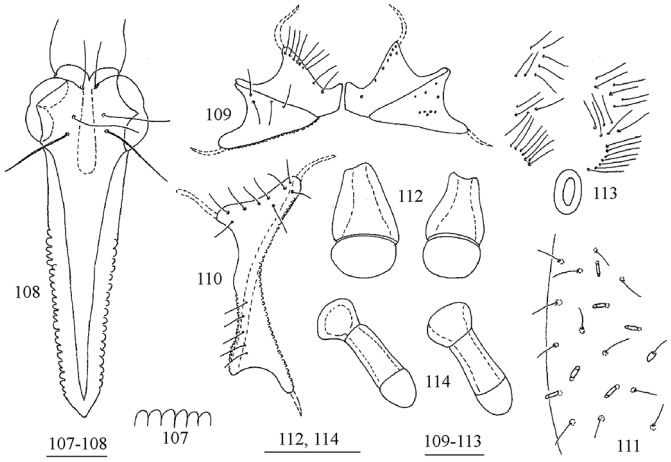
Remarks. *Rhyncholimnochares tapiarum* sp. n. differs from all other species of the genus in the following character state combination: (1) frontal plate with a small median incision dividing the anterior margin into two convex parts; (2) setae Fp located together with Vi and Oi between eye capsules (in all other species more anteriorly, near Fch); (3) lateral eye lenses on each side situated closely together but not fused; (4) capitulum with conical rostrum, mouth disc small and directed dorsally; (5) palps two-segmented due to fusion of first and second segment.

3.11 *Rhyncholimnochares* (*Paralimnochares*) *chilensis* sp. n.

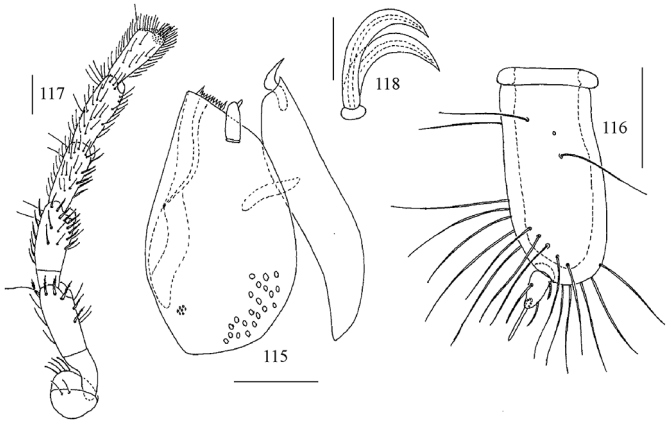
Figures 107–118

Type material: Holotype male, SMF: Chile, TG 5, Río Cabuyal, VI 1995, 590 m, leg. Gonser. Paratypes, SMF: 2 males, same site, date and collector; one male, IBIW 9445, TG 9 Chile Est, Magallaris, VI 1995, 130 m, leg. Gonser.

Description. Male (female unknown). Integument papillae rather long, apically rounded (Fig. 107). Frontal plate (Fig. 108) anterior part extremely reduced, anterior margin divided by a median incision into two convex parts, medial eye not visible; lateral eye lenses fused to each other on each side, but origin from two separate structures visible; all setae simple, hair-like; Fch and Fp near anterior margin, Vi and Oi between eye capsules; posterior part of frontal plate long, lateral



Figs. 107–114. *Rhyncholimnochares chilensis* n. sp., male. 107 – fragment of integument, lateral view, 108 – frontal plate, 109 – anterior coxal groups, 110 – coxae III+IV, 111 – fragment of interspace between anterior and posterior coxal groups, 112 – genital acetabula, 113 – perigenital setae, 114 – secondary genital acetabula. Scale bars: 107–108 = 50; 109–111, 113 = 50; 112, 114 = 25 μm.



Figs. 115–118. *Rhyncholimnochares chilensis* n. sp., male. 115 – gnathosoma, lateral view, 116 – pedipalp, lateral view, 117 – leg I, 118 – claws. Scale bars: 115 = 100, 116 = 25, 117 = 100, 118 = 50 μm.

margins converging, with fine tubercles, posterior end pointed; keel short, about 1/3 length of frontal plate. Dorsum without paired plates; but membranous areas of both dorsum and venter with structures similar in shape to genital acetabula, each on a long stalk and associated with secondary, small glandularia (Figs. 111, 114).

Venter with membranous areas bearing numerous simple setae (Fig. 111), coxae with a few setae only; coxae I anteromedial edges closely together, but not fused (Fig. 109); posterior coxal plate elongate with anterior and posterior margin subequal in width (Fig. 110). Genital field with > 70 pairs of stalked acetabula (Fig. 112); 18–19 pairs of perigenital setae (Fig. 113).

Capitulum (Fig. 115) with convex ventral margin, its surface structure with pores in basal part larger than distally; mouth disk slightly turned to dorsal side; chelicera with very large basal segment.

Palp strongly shortened (Fig. 116), second segment robust (ratio length/height 2.5), with numerous uniform smooth setae; third segment near distal end of second segment, with a short solenidion in proximal part, a rather large terminal seta and two unequal simple setae.

Legs with numerous thin and short setae (Fig. 117); basifemur, telofemur, genu, tibia and tarsus of all legs with a few, or one single, long dorsal seta(e); claws: Figure 118.

Measurements ($n = 4$). Idiosoma length about 2190–2500. Frontal plate length 375–535, anterior part 37–50, anterior width 75–125, width anterior to eyes 80–117, width at level of eye capsules 125–190, eye capsule length 75–100, posterior part length/width 290–410/90–145, keel length 100–175. Coxae I+II length medial margin 100–125, lateral margin 300–400, width anterior margin 160–235, posterior margin 210–235; coxae III+IV length medial margin 460–665, width anterior margin 185–315, posterior margin 125–200. Acetabula diameter 12–14, stalk length 16–21. Capitulum length 300–415, rostrum length 62–75, mouth disk diameter 50–75; chelicera length basal segment 285–400, claw 75–85. Palp segments 1–3 length: 6–9, 41–64, 12–16; length of leg segments 1-6: I-Leg, 100–125, 250–375, 185–275, 135–240, 210–240, 160–215; II-Leg, 100–150, 275–385, 200–290, 160–250, 175–250, 185–250; III-Leg, 100–140, 235–340, 175–290, 160–225, 185–265, 185–250; IV-Leg, 90–140, 260–390, 235–340, 210–300, 235–340, 225–260.

Derivatio nominis: Refering to the country of origin.

Remarks. *Rhyncholimnochares chilensis* is most similar to *R. mexicana Cook*, 1980 in the shape and setation of the palp (second segment stout and shortened, with uniform smooth setae, third segment subterminal), from which it differs in the following character states (*R. mexicana* in parentheses, after Cook 1980): (1) frontal plate with setae Fp on the level of anterior eye capsule margin, Figure 108 (more proximal, on the level of posterior margin of anterior eye lense); (2) lateral eye lenses on each side completely fused (separated); (3) palp tarsus with short solenidion in proximal position, Figure 116 (not reported for *R. mexicana*); (4), integument with secondary stalked structures associated to secondary glandularia, Figure 114 (without such structures).

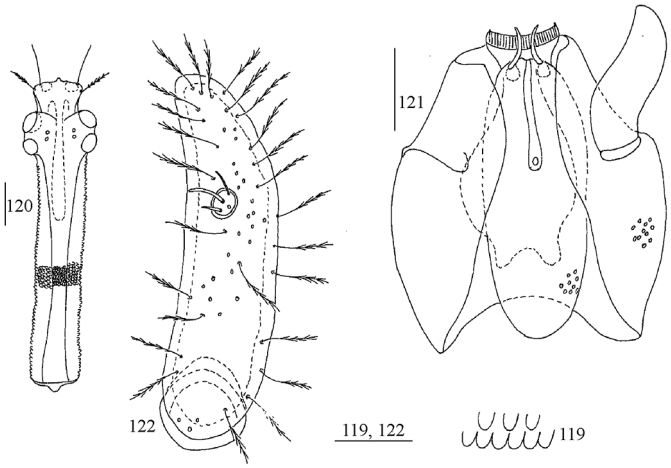
3.12 *Rhyncholimnochares* (*s. str.*) *lamellipalpis* Lundblad, 1936

Figures 119–129

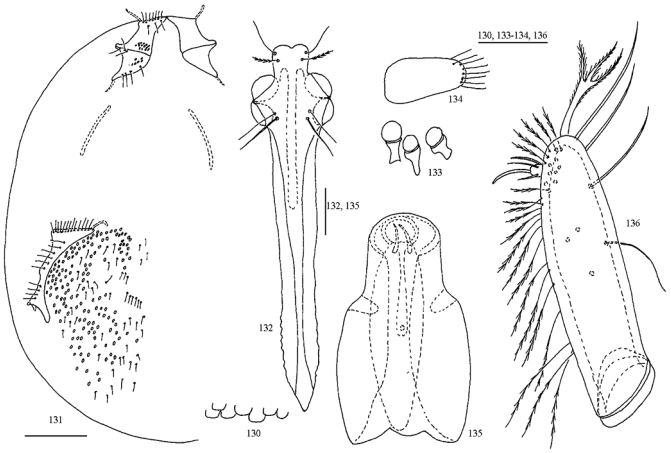
Material examined: Chile, TG 3, T. T., Río Caoni, VI 1995, 160 m, leg. Gonser, 2 males SMF, one male IBIW Nr. 9446.

Description. Male. Integument papillae rather long, apically rounded (Fig. 119). Frontal plate (Fig. 120) anterior part slightly shorter than eye capsules, with slightly diverging lateral margins; anterior margin straight, with a small median projection, medial eye not visible; separation of lateral eye lenses less than lens diameter; setae Fch and Fp near anterolateral edges, Fp plumose, Vi and Oi located between eye capsules; posterior part of frontal plate long with parallel lateral margins covered by fine tubercles; keel shorter than half length of frontal plate. Dorsum without paired plates.

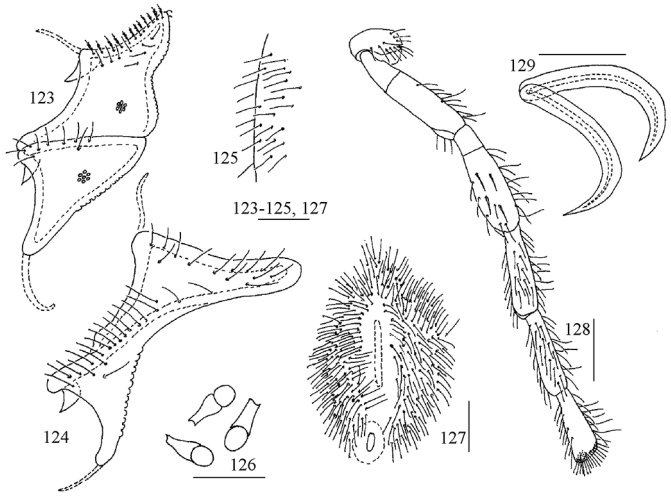
Venter with membranous areas bearing rather numerous simple setae (Fig. 125); coxae I with arrow of plumose setae at anterior margin (Fig. 123); anteromedial edges connected by a narrow bridge. Genital field with numerous acetabula on



Figs. 119–122. *Rhyncholimnochares lamellipalpis,* male. 119 – fragment of integument, 120 – frontal plate, 121 – gnathosoma, dorsal view, 122 – pedipalp, lateral view. Scale bars: 119, 122 = 50; 120 = 100, 121 = 25 μm.



Figs. 130–136. *Rhyncholimnochares glabra* n. sp., deutonymph. 130 – fragment of integument, 131 – ventral side, 132 – frontal plate, 133 – genital acetabula, 134 – genital sclerite, 135 – capitulum and chelicera, ventral view, 136 – pedipalp, lateral view. Scale bars: 130, 133–134, 136 = 50; 131 = 300, 132, 135 = 100 μm.



Figs. 123–129. *Rhyncholimnochares lamellipalpis,* male. 123 – coxae I+II, 124 – coxae III+IV, 125 – fragment of interspace between anterior and posterior coxal groups, 126 – genital acetabula, 127 – perigenital setae, 128 – leg I, 129 – claws. Scale bars: 123–125, 127 = 100; 126 = 50, 128 = 300, 129 = 25 μm.

relatively long stalks (Fig. 126); gonopore surrounded by dense perigenital setation (Fig. 127).

Capitulum massive (Fig. 121) with relatively short rostrum, surface structure with small pores; mouth disk in terminal position; chelicera with large basal segment, proximal margin strongly convex.

Palp (Fig. 122) with slender second segment (ratio length/height 3.0–3.9), slightly curved, with parallel ventral and dorsal margins, bearing numerous uniform, thin and plumose setae; third segment small, distanced from distal end of second segment, bearing one short proximal solenidion and three setae, two differently short and one long, in terminal position.

Legs with numerous thin setae (Fig. 128); no particularly long dorsal setae developed; claws: Figure 129.

Measurements ($n = 3$). Idiosoma length about 3700. Frontal plate length 1150–1375, distal part 150–175, anterior width 175–215, width anterior to eye capsules 170–190, width at level of eye capsules 310–340, eye capsule length 175–190, proximal part length/width 850–1010/185–215, keel length 525–625. Coxae I+II length medial margin 335–415, lateral margin 560–665, width anterior margin 250–300, posterior margin 425–490; coxae III+IV length medial margin 875–1075, width anterior margin 485–590, posterior margin 285–350. Acetabula diameter 9–13, stalk length 12–22.

Capitulum length 275–315, mouth disk diameter 100–125; chelicera length basal segment 260–300, claw 62–75. Palp segments 1–3 length: 12–17, 135–190, 12–14.

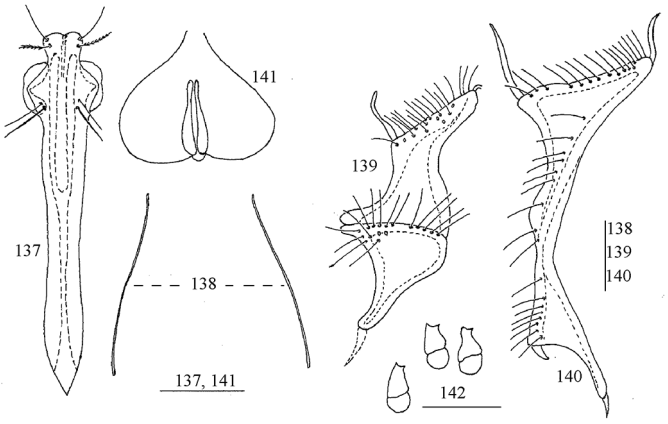
Leg segments 1–6 length: I-Leg, 160–190, 525–615, 435–540, 350–440, 325–415, 300–350; II-Leg, 175–215, 585–675, 485–575, 400–490, 360–475, 310–375; III-Leg, 185–215, 525–600, 450–500, 400–500, 425–490, 335–390; IV-Leg, 200–240, 575–675, 525–625, 475–590, 450–565, 350–475.

Remark: This is the first record of the species after its original description from Southern Brazil (Lundblad 1936).

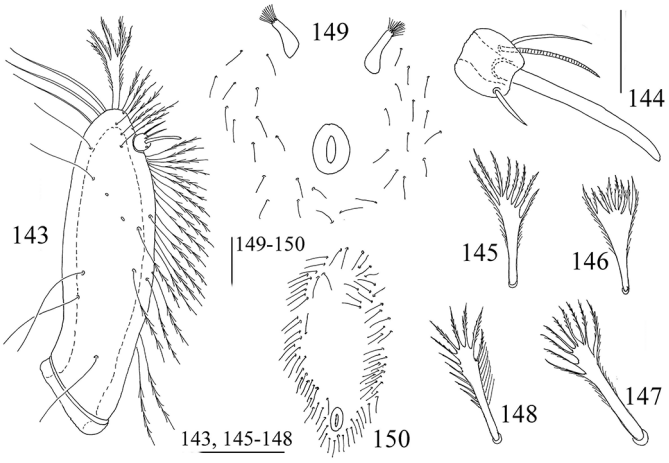
3.13 *Rhyncholimnochares* (*s. str.*) *glabra* sp. n.

Figures 130–150

Type material: Ecuador: Holotype female, IBIW 9449: ECU 09, Cotopaxi, Sto. Domingo, San Francisco las Pampas; Rio Esmeraldas, 1650 m, 23 54 (C1, 3892-IV), 07.11.1992, leg. Gerecke; Paratypes, SMF: one male ECU 49, Esmeraldas, El Dorado, stream E of railway bridge Rio Carolina, 500 m, (07-64/01-01), 27.12.1994, leg. Gerecke (deutonymph, same site and date IBIW 9450); two females, ECU 62, Pastaza (PA), Puyo. Santa Clara, Rio Llaudio Chico, 600 m (01-79/98-60), 10.01.1995, leg. Gerecke; one male, one deutonymph, ECU 74a, Cotopaxi, S. Francisco Las Pampas, Rio Esmeraldas downstream Finca Tapia, 1320 m, (07-27/99-53), 23.01.1995, leg. Arturo Tapia & Gerecke; (one male, IBIW 9451, ECU 75, Cotopaxi, Otonga, upper course of Rio Damas in Reserva Otonga, 1700 m, (07-22/99-54), 24.01. 95, leg. Arturo Tapia & Gerecke).



Figs. 137–142. *Rhyncholimnochares glabra* n. sp., female. 137 – frontal plate, 138 – dorsal platelets, 139 – coxae I+II, 140 – coxae III+IV, 141 – ovipositor, 142 – genital acetabula . Scale bars: 137, 141 = 100, 138–140 = 200, 142 = 50 μm.



Figs. 143–150. *Rhyncholimnochares glabra* n. sp., adults: 143 – pedipalp, lateral view, 144 – pedipalpal tarsus; 145 – 148 – tree-like seta, 149–150 – genito-anal area; 143–149 – female, 150 – male. Scale bars: 143–148 = 50, 144 = 25, 149–150 = 100 μm.

Further material (not part of the type series): one deutonymph SMF, Brazil: BRA 24 Mato Grosso, Cuiabá, Rio Cuiabá, stream near Huite Caite, 25.07.1994, leg. Schwoerbel; one deutonymph, IBIW 9448, Brazil: BRA 8, CTA 1, Mato Grosso, Cuiabá, Rio Cuiabá, Córrego Tenente Amaral in gallery forest, 750 m, 15°49′16″S 55°13′3″ W, 23.09.1994, leg. Wantzen; one male, two deutonymphs, SMF, Chile: TG 14, Est, Salamandra, VI 1995, 140 m, leg. Gonser.

Description. Deutonymph: Integument papillae flat, rounded (Fig. 130). Dorsum in anterior half with one pair of rod-shaped, slightly curved plates (visible in transparency in Fig. 131). Frontal plate (Fig. 132) anterior part shorter than eye capsules, lateral margins subparallel, anterior margin with a small median incision separating two convex parts; lateral eye lenses on each side fused to each other; setae Fch and Fp near anterolateral edge, Vi and Oi between posterior eye lenses; Fch, Vi and Oi smooth, Fp plumose; posterior part of frontal plate long, with nearly parallel lateral margins, keel shorter than half length of frontal plate.

Venter without setation of membranous areas; coxal setae in low numbers and short; coxae I with anteromedial corners connected by a narrow bridge.

Genital field with numerous acetabula on relatively short, basally narrow stalks (Fig. 133); genital sclerites in a deutonymph developing to female distally not very narrowed, apically with 8–9 thin setae (Fig. 134).

Capitulum with relatively long rostrum, mouth disc large, directed dorsally (Fig. 135); chelicerae with relatively slender basal segment, sharply rounded at posterior margin.

Palp (Fig. 136) with long and slender second segment (ratio length/height 4.0–4.3), in addition to numerous plumose setae "dorsally" (on the side of segment three insertion) and near distal end, apically with a tree-like seta and ventrally with 3–4 smooth setae (the longest near terminal edge); third segment not far from tip of second segment, very small, with one solenidion and three setae, one rather large terminal, two unequal and short.

Leg segments with numerous short setae; basifemur, telofemur, genu, tibia and tarsus each with one or a few relatively long dorsal setae.

Measurements ($n = 2$). Idiosoma length/width 1135–2575/1060–1125. Frontal plate length 375–825, proximal part 35–75; anterior margin width 110–175, width anterior to eyes 112, width at level of eye capsules 120–170, eye capsule length 55–125, posterior part length/width 330–500/70–100, keel length 160–385; length/width of paired dorsal plates 150–335/6–8. Coxae I+II length medial margin 125–285, lateral margin 185–385, width anterior margin 110–175, posterior margin 135–265; coxae III+IV length medial margin 335–650, width anterior margin 160–250, posterior margin 85–200. Acetabula diameter 12–16, stalk length 9–12. Capitulum length 300–550, rostrum length 100–185, mouth disk diameter 100–165; chelicera length basal segment 235–435, claw 40–65. Palp segments 1–3 length: 10–12, 125–215, 10–12; height of second segment 50–75. Leg segments 1–6 length: I-Leg, 65–115, 185–350, 150–285, 125–230, 125–250, 125–225; II-Leg, 75–115, 185–375, 135–290, 125–225, 125–250, 135–235; III-Leg, 75–125, 175–335, 135–285, 125–265, 150–290, 150–250; IV-Leg, 75–125, 210–375, 185–390, 175–335, 185–350, 185–300.

Female. Frontal plate (Fig. 137) anterior part only slightly enlarged, anterior margin with a small median incision, medial eye not visible; lenses of lateral eyes on each side fused to each other, eye capsules longer than anterior part of frontal plate; setae Fp plumose, Vi and Oi between posterior part of eye lenses, posterior part long, with subparallel lateral margins, distally pointed distally; keel slightly shorter than half plate length. Dorsum with paired narrow plates (Fig. 138).

Interspace between anterior and posterior coxal groups without setae or glandularia. Coxal plates with a relatively low number of setae, medial margins of coxae I (Fig. 139) and III+IV (Fig. 140) moderately concave. Gonopore surrounded by a few setae, more densely arranged than in other parts of the venter (Fig. 149), interspace between acetabular fields with rather numerous irregularly arranged fine setae. Ovipositor (Fig. 141). Genital field with numerous acetabula on relatively short, basally narrow stalks (Fig. 142).

Capitulum and chelicerae are similar to deutonymph but larger. Palp (Fig. 143) with numerous uniformely plumose setae; segment 3 near distal end of second segment, with one

solenidion and 2–4 unequal simple setae (Figs. 143–144). Terminal seta on P-2 with ramifications (Figs. 145–148).

Measurements ($n = 2$). Idiosoma length 3500–4185. Frontal plate length 1135–1535, anterior part 62, anterior margin width 110–150, width anterior to eyes 75–100, width at level of eye capsules 235–300, eye capsule length 135–185, length of posterior part 100–125; keel length 485–600; dorsal plates length/width 385–510/10–13. Coxae I+II length medial margin 385–525, lateral margin 485–650, width anterior margin 235–315, posterior margin width 310–425; coxae III+IV length medial margin 875–1150, width anterior margin 350–475, posterior margin 250–315. Acetabula diameter 10–13, stalk length 19–23. Capitulum length/width 700–890/410–500, rostrum length 235–275, mouth disk diameter 185–225; chelicera length basal segment 575–715, claw 100–125. Palp segments 1–3 length: 12–15, 235–335, 12–15. Leg segments 1–6 length: I-Leg, 125–165, 435–575, 360–515, 335–450, 325–465, 285–425; II-Leg, 125–185, 435–635, 350–500, 335–450, 350–475, 300–415; III-Leg, 115–120, 525–590, 340–500, 350–475, 385–475, 325–400; IV-Leg, 135–240, 475–665, 435–625, 435–590, 475–590, 375–465.

Male. Similar to female, differing in smaller size, and gonopore surrounded by numerous fine setae (Fig. 150).

Measurements ($n = 2$). Idiosoma length 2000–3500. Frontal plate length 990–1200, anterior margin width 100–135, width anterior to eyes 75–100, width at level of eye capsules 210–215, eye capsule length 110–125, length of proximal part of frontal plate 100–115; keel length 375–465; dorsal plates length/width 275-415/9-12. Coxae I+II length medial margin 330–400, lateral margin 435–540, width anterior margin 185–275, posterior margin 310–390; coxae III+IV length medial margin 735–990, width anterior margin 285–390, posterior margin 210–275. Acetabula diameter 9–15, stalk length 19–26. Capitulum length/width 600–685/370–380, rostrum length 200–225, mouth disk diameter 175–250; chelicera length basal segment 510–590, claw 85–100. Palp segments 1–3 length: 12–15, 225–285, 12–15. Leg segments 1–6 length: I-Leg, 110–150, 385–625, 325–425, 285–375, 300–390, 260–325; II-Leg, 110–185, 385–640, 310–425, 285–425, 275–415, 260–375; III-Leg, 135–185, 385–490, 325–425, 285–415, 335–475, 285–365; IV-Leg, 150–200, 450–575, 400–535, 350–565, 400–550, 360–415.

Derivatio nominis: From *glaber*, f. *glabra* (Latin = glabrous), referring to the membranous idiosoma surface without fine hairs.

Remarks: *Rhyncholimnochares ursula*, the only other species of the genus with rod shaped dorsal plates, differs not only in a particular, fur-like setation of the venter between coxal plates, but also in the shape of the capitulum (with mouth disk on the ventral side) and the separation of lateral eye lenses on each side.

3.14 Key to the water mite species of the genus *Rhyncholimnochares*

1 Terminal segment of palp short, not tapering distally, as long as high or wide, or shorter (Fig. 13). Subgenus *Rhyncholimnochares* Lundblad, 1936..... 2

- Terminal segment of palp elongate, tapering distally, longer than high or wide (Fig. 116). Subgenus *Paralimnochares* Lundblad, 1937..... 20

2 (1) Dorsum, posterior to frontal plate, with a pair of elongate plates. 3

- Dorsum without paired plates..... 4

3 (2) Space between anterior and posterior coxal groups with dense, fur-like setation (Fig. 2); mouth disk on ventral side of capitulum (Fig. 7), eye lenses separated on each side of frontal plate (Fig. 2). ... ***R. (s. str.) ursula*** sp. n. (Costa Rica)

- Space between anterior and posterior coxal groups without setation; mouth disk on dorsal side of capitulum (Fig. 135), eye lenses fused on each side of frontal plate (Figs. 132, 137). ***R. (s. str.) glabra*** sp. n. (Ecuador, Brazil, Chile)

4 (2) Capitulum compact, only slightly longer than high or wide. 5

- Capitulum elongated, considerably longer than high or wide. 6

5 (4) Frontal plate large, length/width >1000/200 μm; anterior margin straight, near middle with a pair of fine indentations; anterior part relatively longer (78% plate length). ..... ***R. (s. str.) globirostris*** Cook, 1980 (Mexico)

- Frontal plate minor in size, length/width < 800/150 μm; anterior margin obtuse-angled, near middle with a pair of fine indentations; anterior part relatively shorter (70% plate length)..... ***R. (s. str.) minuta*** sp. n. (Costa Rica)

6 (4) Mouth disk directed anteriorly, at distal end of capitulum (Fig. 121). 7

- Mouth disk directed (antero)dorsally, on dorsal side of capitulum..... 9

7 (6) Second palp segment in distal third expanded (Fig. 83). .... ***R. (s. str.) expansipalpis*** **sp. n.** (Ecuador)

- Second palp segment not expanded. 8

8 (7) Anterior margin of frontal plate straight, with a very small median projection, anterior part not narrowed, posterior margin with a blunt central tip (Fig. 120). ....***R. (s. str.) lamellipalpis*** Lundblad, 1936 (Brazil, Chile)

- Anterior margin of frontal plate convex, anterior part narrowed, posterior margin pointed. .... *R. (s. str.) kittatinniana* Habeeb, 1954 (USA)

9 (6) First and second palp segments completely or partially fused to each other. 10

- First and second palp segments separate. 11

10 (9) First and second palp segment slightly fused dorsally and ventrally, with suture lines locally visible; largest palp segment with an expanded terminal seta. .... ***R. (s. str.) expansiseta*** Cook, 1980 (Argentina)

- First and second palp segment completely fused to each other (Fig. 104); largest palp segment without an expanded terminal seta (Fig. 104). ***R. (s. str.) tapiarum*** sp. n. (Ecuador)

11 (9) Basal part and rostrum of capitulum subequal in length. ..... *R. (s. str.) gracilirostris* Lundblad, 1953 (Colombia, Guatemala: K.O.Viets 1977)

- Basal part of capitulum considerably longer than rostrum. 12

12 (11) Second palp segment distally with numerous (10–12) expanded setae (Fig. 35). .... ***R. (s. str.) petaliseta*** sp. n. (Ecuador)

- Second palp segment distally with at most one modified seta. 13

13 (12) Second palp segment distally with a modified (tree-like or expanded) seta. 14

- Second palp segment without a modified distal seta. 16

14 (13) Modified distal seta of second palp segment at the base of its ramifications expanded (Fig. 47). .... ***R. (s. str.) jicotea*** sp. n. (Costa Rica)

- Modified distal seta of second palp segment tree-like.

(15) Anterior part of frontal plate tapering; terminal seta of second palp segment three-furcated .... ***R. (s. str.) dispersiai*** Ferradás, 1975 (Argentina)

- Anterior part of frontal plate with parallel lateral margins, terminal seta of second palp segment simple (not furcated). ..... *R. (s. str.) longipalpis* Lundblad, 1953 (Colombia)

16 (14) Anterior margin of frontal plate with two convex parts separated by a median incision (Fig. 26). .... ***R. (s. str.) cooki*** sp. n. (Costa Rica)

- Anterior margin of frontal plate forming an obtuse angle or convex, without incision. 17

17 (16) Capitular rostrum conical; mouth disc small. .... ***R. (s. str.) andina*** Lundblad, 1953 (Colombia)

- Capitular rostrum with subparallel margins; mouth disc large. 18

18 (17) Posterior part of frontal plate with median eye (Fig. 52); capitular base twice as long as rostrum (Fig. 56). ..... ***R. (s. str.) lundbladi*** sp. n. (Costa Rica)

- Posterior part of frontal plate without median eye; capitular base not more than 1.5 times as long as rostrum. 19

19 (18) Anterior part of frontal plate longer than eye capsules (Fig. 61); second palp segment with three long terminal setae (one plumose and two smooth – Fig. 67). ..... ***R. (s. str.) monikae*** sp. n. (Costa Rica)

- Anterior part of frontal plate shorter than eye capsules, second palp segment without long terminal setae. .... ***R. (s. str.) longiscuta*** Lundblad, 1941 (Brazil)

20 (1) Anterior margin of frontal plate with blunt protrusion; posteromedial corners of coxae I and anteromedial corners of coxae II close to each other. ....***R. (P.) sursumhians*** Lundblad, 1937 (Brasilia)

- Anterior margin of frontal plate with medial incision; anteromedial corners of coxae II situated laterally to posteromedial corners of coxae I. 21

21 (20) Lenses of lateral eyes on each side of frontal plate completely fused to each other (Fig. 108); setae Fp situated on the level of anterior margin of eye capsules. .... ***R. (P.) chilensis*** sp. n. (Chile)

- Lenses of lateral eyes on each side of frontal plate separate; setae Fp situated on the level of posterior margin of anterior eye lenses .... ***R. (P.) mexicana*** Cook, 1980 (Mexico)

4 Outlook

In *Rhyncholimnochares*, in addition to shape and setation of mouthparts, species recognition requires a careful investigation of the formation and setation of the frontal plate, structures of the membranous integument, and shape of ventral sclerites and genital area.

In terms of species numbers, this study, based on the rather low number of 38 specimens collected from 17 different sites (at 21 different dates) has duplicated our knowledge of the genus. In Costa Rica, alone the study of 14 specimens from three sites in the river Jicotea produced 6 species new to science. In consequence, our data suggests that the Neotropical fauna harbours a very high diversity of further, still undetected, *Rhyncholimnochares* species.

The genus *Rhyncholimnochares* is unique among water mites in its larval parasitism on adult Elmid beetles. In view of the extreme diversification of this insect family in the tropics (as documented in Jäch *et al*., 2016), we would expect interesting insight into the coevolution of mites and their hosts when more attention is paid to mite larvae parasitic on elmids. On their hosts, they are not easily detected because their preferred attachment sites are in the subelythral space (Smith 1989). In addition to interesting data on life cycle coordination and host preference, from a study of *Rhyncholimnochares* larval morphology we expect also important additional taxonomical information for the mite genus: In fact, in representatives of Eylaoid mites, morphological diversification may be more developed at the larval stage than in deutonymphs or adults.

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