

Studies on Latin American water mites of the genus *Torrenticola* Piersig, 1896 (Torrenticolidae, Hydrachnidia, Acari)

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In this paper the Latin American species of the water mite genus *Torrenticola* are presented and discussed comprehensively for the first time. All 21 previously known species from Central and South America are portrayed in detail, descriptions are given for 36 new species from Costa Rica: *Torrenticola adunca*, *T. alargada*, *T. alexandra*, *T. alticola*, *T. altifontana*, *T. amalgamada*, *T. ambigua*, *T. australis*, *T. baderi*, *T. chicacoxalis*, *T. chirripoensis*, *T. collina*, *T. conopalpis*, *T. corta*, *T. cortobrazo*, *T. costaricense*, *T. cumbrensis*, *T. delgada*, *T. dispersa*, *T. elhachensis*, *T. esferica*, *T. esquinada*, *T. fastigata*, *T. flexirostris*, *T. fontinale*, *T. guanacastensis*, *T. harpagophora*, *T. levicoxalis*, *T. menudopalpis*, *T. monticola*, *T. pervagata*, *T. rapidensis*, *T. ratoncitoi*, *T. rubella*, *T. tilaranensis* and *T. torpebrazo*. The Latin American species of *Torrenticola* are subdivided in a clear, robust system of ten species groups – five of these are regarded as phylogenetic entities, five as rather artificial groups. An identification key to these species groups is given, as well as keys, measurement tables, figures and detailed descriptions of all species within these groups. The males of *T. gennada* Cook, 1980 and *T. keesdavidsi* Cramer, 1992, as well as the female of *T. amala* Cook, 1980 are described for the first time. Descriptions and figures of the genital skeleton of nine formerly described species are given for the first time. All information available on the habitat preferences (habitat type, stream velocity, altitudinal distribution, choriotope types, temperature and conductivity) and the geographical distribution of the species is presented. Zoogeographical characteristics, endemism and habitat preferences of the 42 species of *Torrenticola* found in Costa Rica are analysed. The main object of this study is to facilitate further systematic and ecological work on this important genus and to make it accessible for general limnological surveys. © 2007 The Linnean Society of London, *Zoological Journal of the Linnean Society*, 2007, 150, 443–678.

ADDITIONAL KEYWORDS: Central and South America – Costa Rica – distribution patterns – habitat preferences – identification keys – neotropical – new species – running waters – springs.

INTRODUCTION

DIVERSITY AND DISTRIBUTION PATTERNS

The family Torrenticolidae Piersig, 1902 is one of the most species-rich water mite families, with more than 370 species described world-wide (K.O. Viets, 1987; H. Smit, unpubl. data). The first neotropical torrenticolid species were described by Lundblad (1953) from Colombia [the names had already been given preliminarily 12 years before (Lundblad, 1941)]. Until now, 40 species of the family have been known from Central America – 16 from Mexico (Cook, 1980; Cramer, 1988,

1992; Cramer & Cook, 2000), 21 from Guatemala (K.O. Viets, 1977, 1977/78) and nine from Costa Rica (Cook, 1980); as well as eight species from South America – all from Colombia (Lundblad, 1953), and two of them also from Argentina (Cook, 1980). Until now, 19 species of the main genus *Torrenticola* have been known from Central America and three from South America; the two regions have only one species in common. Most Central American species have been described from very few streams in Mexico and Guatemala. Up to eight different species of *Torrenticola* have been found in one stream in Guatemala (Böttger, 1980). In total, 12 species are known from Guatemala, six from Mexico and four from Costa Rica; with each of these countries having one species in common with

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each of the others. Hitherto, the New World fauna of this group has only been documented by few, scattered, mostly not detailed species descriptions.

Members of the family have been found on all continents except Antarctica, with the highest diversity in the Tropics. In Europe a decrease in species diversity is documented from the Mediterranean to northern temperate regions (K. O. Viets, 1978; Cicolani & Di Sabatino, 1990; Gerecke, 2002; Di Sabatino, Cicolani & Gerecke, 2003a). A similar decrease of species numbers has been observed in the southern hemisphere (Africa: K.O. Viets & Böttger, 1974; South America: Böttger, 1980; Cook, 1980). As far as the torrenticolid fauna of the New World is known, the family seems to be of Laurasian origin, colonizing South America from the north (Böttger, 1980, 1984; Cramer & Cook, 2000). However, detailed analysis on the torrenticolid fauna of Central and South America have still been missing.

ABUNDANCE AND ECOLOGY

In many regions, *Torrenticola* is the dominant water mite genus in running waters and springs (Bader, 1988; Di Sabatino, Gerecke & Cicolani, 1992; Gerecke & Di Sabatino, 1996; Wiles, 1997a). In limnological studies on two mountain streams in Guatemala, water mites proved to be the most abundant second-order consumers (Böttger, 1984), with *Torrenticola* being the most diverse genus, representing one-third of all water mite species (Böttger, 1980). The assemblages of *Torrenticola* species in the two streams (distinct in their water chemistry, especially conductivity) differed significantly (Böttger, 1980). In streams in Argentina, *T. columbiana* is one of the most abundant water mite species with a frequency of up to 50% at some localities (Fernández, 1991, 2003). In the material of the present study from running waters and springs in Costa Rica, *Torrenticola* is also the dominant water mite genus, present in 56% of all samples, and representing 19% of all specimens collected (Goldschmidt, 2004, 2006).

Most species of *Torrenticola* are rheobiont or crenobiont, depending on well-oxygenated substrates as refuges for the inactive proto- and tritonymphal stages (Di Sabatino *et al.*, 2003a). Whereas several European species have preferences for interstitial habitats (Di Sabatino *et al.*, 1992, 2003a; Gerecke & Di Sabatino, 1996), until now, no interstitial species has been found in Latin America. The geographical distribution of the species of *Torrenticola* also seems to depend upon the microhabitat-binding of the species (Cicolani & Di Sabatino, 1990). As far as is known, the larvae of torrenticolid mites are parasitic mainly on Chironomidae; the nymphal and adult stages are predators mainly on Ostracoda and Cladocera (A. Di Sabatino,

unpubl. data), but little is known of their feeding habits. Nevertheless, considerable variability would be expected, as the mouth-parts of the different groups exhibit great variation. Owing to the complex and differentiated habitat demands of the different species of torrenticolid mites, their study provides valuable information on the ecological characteristics of their habitats.

SYSTEMATICS OF THE FAMILY TORRENTICOLIDAE

The presently recognized taxonomic scheme of the Torrenticolidae (Wiles, 1997a; Cramer & Cook, 2000) comprises five genera in two subfamilies: Testudacarinae (*Testudacarus*) and Torrenticolinae (*Monatractides*, *Torrenticola*, *Pseudotorrenticola* and *Neoatractides*). Compared with older schemes (Cook, 1974; K. O. Viets 1987; Bader, 1988), in the new division by Wiles (1997a) the subfamily Neoatractinae is synonymized with the Torrenticolinae and the subgenus *Monatractides* is raised to genus level. Several formerly separated subgenera have been rejected in this system, and the genus *Neoatractides* has been separated in three subgenera (*Neoatractides*, *Heteratractides* and *Allotorrenticola*). The subgenera *Pinquicola* (*Monatractides*) and *Megapalpis* (*Torrenticola*) have been described or re-instated (Gerecke & Di Sabatino, 1996).

The older schemes to characterize the subgenera often had been based on the pattern of the fusion of some or all dorsal platelets with the main plate (Bader, 1988). This separation of subgenera according to the degree of plate fusion has been rejected by Wiles (1997a), as this character is regarded as phylogenetically irrelevant because of its multiple independent development. However, even though Bader (1988) strongly emphasized the importance of the pattern of dorsal platelets, also in older taxonomic schemes, the separation of the genera (and also some subgenera) had already mainly been based on characters of the palps and the capitulum (Lundblad, 1956; Cook, 1974; Bader, 1988).

In the cladistic analysis of Asian torrenticolid species, upon which the above-mentioned recent taxonomic scheme is based, main emphasis has been laid on differences in the structure of the mouth-parts (Wiles, 1997a). According to the phylogenetic interpretation of these data, differences in the structure of the mouth-parts were driven by changes in feeding ecology (Wiles, 1997a). However the seeming objectivity of this cladistic analysis is doubtful, as 74% of the unweighted characters used in the analysis again refer to the structure of the mouth-parts.

Nevertheless, in the analysis of the Latin American species of *Torrenticola* presented herein, differences in the shape of the rostrum and characters of the

palps (ventral projections at P2 and P3, length relations of the palp segments and length/height relations of the palp segments) also proved to be some of the most characteristic features separating species groups and species. Additionally, within a large collection of torrenticolid mites from Costa Rica several specimens showed intermediate grades of fusion of the anterior platelets with each other as well as the main dorsal plate. However, the pattern of the antero-lateral dorsal platelets remains a characteristic and useful feature to separate certain species groups.

The genital skeleton, often shaped in a highly characteristic way and representing valuable diagnostic information, until now has been neglected in phylogenetic interpretations – also in the cladistic analysis mentioned above – and even in most species descriptions. In the present paper, this character is documented for all new species (where the male is known) as well as many species that have already been described.

Members of all five presently recognized genera of Torrenticolidae are known to occur in the Neotropics: *Testudacarus* (two species), *Torrenticola* (57 species, 36 of these newly described here), *Monatractides* (ten species), *Neoatractides* (subgenera *Neoatractides* and *Heteratractides*, 12 species) and *Pseudotorrenticola* (two species). The present paper deals only with the most abundant and species-rich genus *Torrenticola*. All species of this genus described here from Costa Rica are placed in the subgenus *Torrenticola*. Several names of older as well as recognized subgenera (*Synaptia*, *Rusetria*, *Megapalpis*) are used for practical reasons, in order to describe and characterize species groups. However, in the present paper these names are set (and should be understood) in quotation marks. They are not meant to re-establish *Synaptia* or *Rusetria* as systematic units, nor should the new species *T. flexirostris* be assigned to the subgenus *Megapalpis* known from Europe and Asia (see relevant discussion below).

MATERIAL AND METHODS

MUSEUM COLLECTIONS

Slide preparations were revised from the water mite collections in Stockholm, Sweden (collection Olov Lundblad, SMNH); Frankfurt, Germany (collections Karl and Kurt Otto Viets, SMF); Chicago, USA (collection David Cook, FMC) and Ottawa, Canada (collection David Cook, CNC). Some incomplete descriptions were supplemented based on that material and several measurements not available from the descriptions as far as possible were re-measured in the slides. Types of the species described from Mexico by

Cristina Cramer (*T. keesdavidsi*, *carlbaderi*, *esbelta* and *kurtvietsi*) could not be loaned; however, due to the help of Gerardo Rivas, Mexico, additional slide material of *T. keesdavidsi* Cramer, 1992 and *T. carlbaderi* Cramer, 1992 could be investigated. The slides of the Lundblad, K. and K.O. Viets, collection are still in very good condition. Unfortunately, all torrenticolid slides of the Cook collections have suffered from precipitation of fine crystals and oil-like droplets that cover the surface of the embedded subjects; it has therefore not been possible to investigate fine body-parts in detail.

The following acronyms are used for these collections: CNC, Canadian National Collection; FMC, Field Museum Chicago; SMF, Senckenberg Museum Frankfurt; SMNH, Swedish Museum of Natural History; UNAM, Universidad Nacional Autónoma de México.

NEW MATERIAL FROM COSTA RICA

Sampling and preservation

Besides the slide material of the species known until now, 3263 specimens of the genus *Torrenticola* from Costa Rica were investigated. This material was collected in 1995, 1996 and 1997 at 275 different sites representing all different regions, elevations and habitats of Costa Rica. Numbers of sample sites (CR 1–350, 1-5AA-MM-96) given in the species descriptions refer to the numbers of these samples in the database of the author. Samples were taken by hand netting (mesh size 250 µm), washed through a sieve with a mesh size of approximately 2 mm, transferred to a white plate and sorted in the field. The water mites were picked up individually using eye droppers and fine tweezers and were fixed and preserved in Koenike's fluid (glycerine/acetic acid/water, 10 : 3 : 6).

Ecological data on the sample sites were taken in the field in order to investigate habitat preferences of the collected mites: Habitat type – running waters, according to their size distinguished as: spring brooks (average water-level width < 1 m), small streams (1–5 m), streams (5–10 m) and rivers (> 10 m); springs, distinguished according to their structure and out-flow characteristics as: helocrenes, rheocrenes, rheohelocrenes and rheopsammocrenes (Steinmann, 1915; Thienemann, 1925; Schwoerbel, 1959; Gerecke, 1991); permanently moistened splash zones besides waterfalls or on rocks above the water line of turbulent flowing rivers were described as hygropetric areas; stream velocity – registered in four relative classes; elevation – measured in the field using an altimeter (Altitrek, 0–5000 m asl, Thommen, Switzerland); substrate (listed according to their abundance) – the classification of the choriotores largely follows the system of Braukmann (1987), distinguishing the

following microhabitats: mineral substrates according to their size [macrolithal (boulders, rock), mesolithal (stones), akal (gravel) and psammal (sand)], dead organic matter of different size (macro- and micro-pelal) and living plants (phytal, lithophyal, roots of riparian trees and submerged terrestrial vegetation); temperature and conductivity – both measured by means of a conductivity meter (WTW LF 91).

Preparation

For detailed analysis, identification and species description (including measurement and drawing) 694 specimens were slide-mounted in Hoyer's fluid (50 mL water, 30 g gummi arabicum, 200 g chloral hydrate, 20 g glycerine). Hoyer's fluid provides very good optical properties, although in many cases the legs of the mounted specimens tended to clench over the idiosoma while drying. The specimens were dissected in Koenike's fluid with fine tweezers, minute pins and preparation needles: dorsal and ventral shield were separated, the genital skeleton of males as well as the gnathosoma were removed and one palp (in most cases the left) was separated from the capitulum. Dorsum and venter were mounted separately from the genital skeleton and the gnathosoma under a separate coverslip on the same slide. The mouth-parts were orientated in such a way that the capitulum with the remaining palp became visible from lateral and the removed palp from medial. The genital skeleton – as far as possible – was orientated vertically on the posterior side (in order to be visible directly from anterior). Detailed descriptions of preparation techniques of water mites have been given by various authors (K. Viets, 1936; Cook, 1974; Gerecke, 1991; Smith & Cook, 1991). The specimens selected for SEM investigation were washed in distilled water, dehydrated in a graded series of acetone and critical point dried. The dried specimens were glued to small plates, sputter-coated with silver and examined with a 'Leo Gemini' SEM. The number of specimens examined is given as males/females/deutonymphs. The number of mounted specimens considered in the descriptions of each sex is given in parentheses.

MEASUREMENTS

The morphology of the genus *Torrenticola* is very characteristic, but also relatively uniform in its general characters; however, length relations as well as length/height (or width) ratios of several body parts in many cases provide valuable features to distinguish the species. Hence, the measurement of a large variety of body parts is essential in the description (and also the identification) of the species. Unfortunately, published data often contain only very few measurements

and authors rarely provide precise descriptions of their methodology (e.g. maximal or dorsal length, exact position of measurement spans). In the study presented here the width of the coxal field was measured besides the insertion of III-leg (Fig. 1); the length of palp segments was measured as dorsal length between the vertex of the proximal and distal edge of the segment (Fig. 3), the length of P5 was measured without distal thick bristles; the height of palp segments was measured as maximal height, vertical to the longitudinal axis, but without ventral projections (Fig. 3). The total length of the palps was calculated by addition of the dorsal length of the single segments, and total length of the chelicera was determined by addition of the length of the basal segment and the claw. Measurements of the total length of the genital skeleton refer to the distance between the apical end of the brachia distalia (without setae apicales) and the proximal base of the cella proximalis (Fig. 4). The width of the genital skeleton (the distance between the lateral tips of the brachia distalia) was only measured when it was mounted in straight anterior position. An overview of the exact end-points of all measurement spans is given below (Figs 1–4).

As far as available, ten specimens of each species and sex were measured. However, as many species were only found in very few specimens, often fewer than ten could be measured. Whenever more than two specimens were available, in the measurement tables mean, minimum, maximum and standard deviation are given as well as the individual measurements of the holotype. If just two specimens from one site were available, holotype and paratype are separated. In the descriptions the measurements of the holotype are given, followed by the minimum and maximum values of all specimens measured in parentheses. Measurements of body parts are generally given without decimal places, but ratios are generally given to two decimal places. In the calculation of these ratios, the 'raw' data (with all available decimal places) of the measurement were used in order to obtain the 'correct' figures of the calculated ratios. Even though small differences in the ratios of certain measurements can be significant in certain species, precaution should be taken in the extensive use of these 'accurate' ratios in diagnosis and identification.

The following abbreviations are used (mainly for body parts): ac, acetabula; ACG, Area de Conservación Guanacaste; a-m, a-l pl, antero-medial, antero-lateral dorsal platelets; bs, basal segment of chelicera; c, capitulum; cb, capitular bay; chel, chelicera; Cx-I–IV, coxae (epimera *sensu* Wiles, 1997a, b), numbered from rostral to caudal; Cxgl-2, glandularia close to the postero-lateral edge of Cx-II (E2 *sensu* Wiles, 1997a, b); Cxgl-4, glandularia on tips of Cx-I (E4 *sensu* Wiles, 1997a, b); Dgl-1–6, dorsoglandularia, Dgl-1 and -2

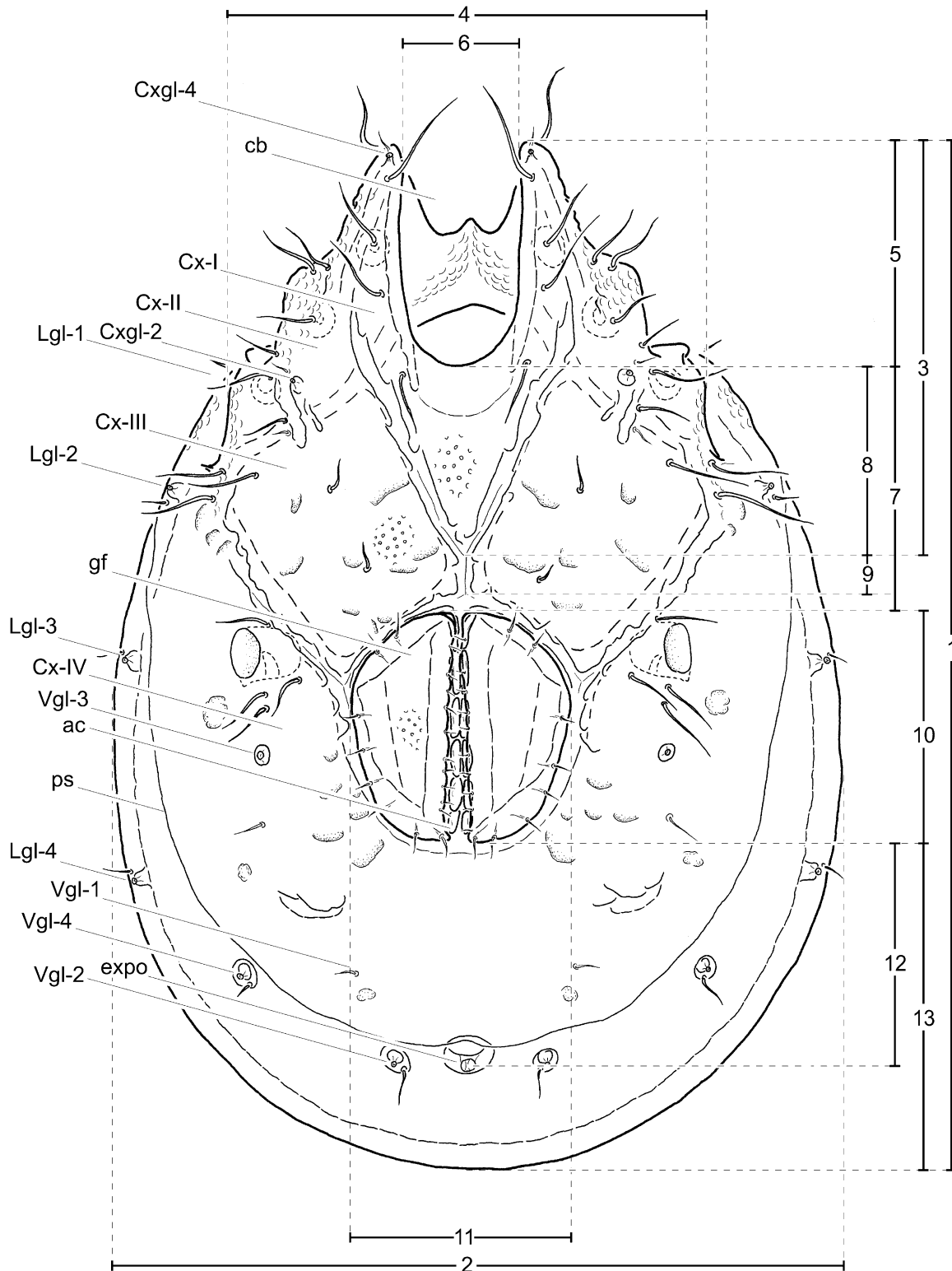


Figure 1. General morphology of water mites of the genus *Torrenticola* and measured distances; ventral view of the idiosoma. *Torrenticola amala*, female. See text for abbreviations of body parts. Measurements: 1 – idiosoma L; 2 – idiosoma W; 3 – Cx-I tL; 4 – Cx-III W; 5 – capitular bay L (depth); 6 – capitular bay W; 7 – distance capitular bay – genital field; 8 – Cx-I mL; 9 – Cx-II + III mL; 10 – genital field L; 11 – genital field W; 12 – distance genital field – excretory pore; 13 – distance genital field – cauda.

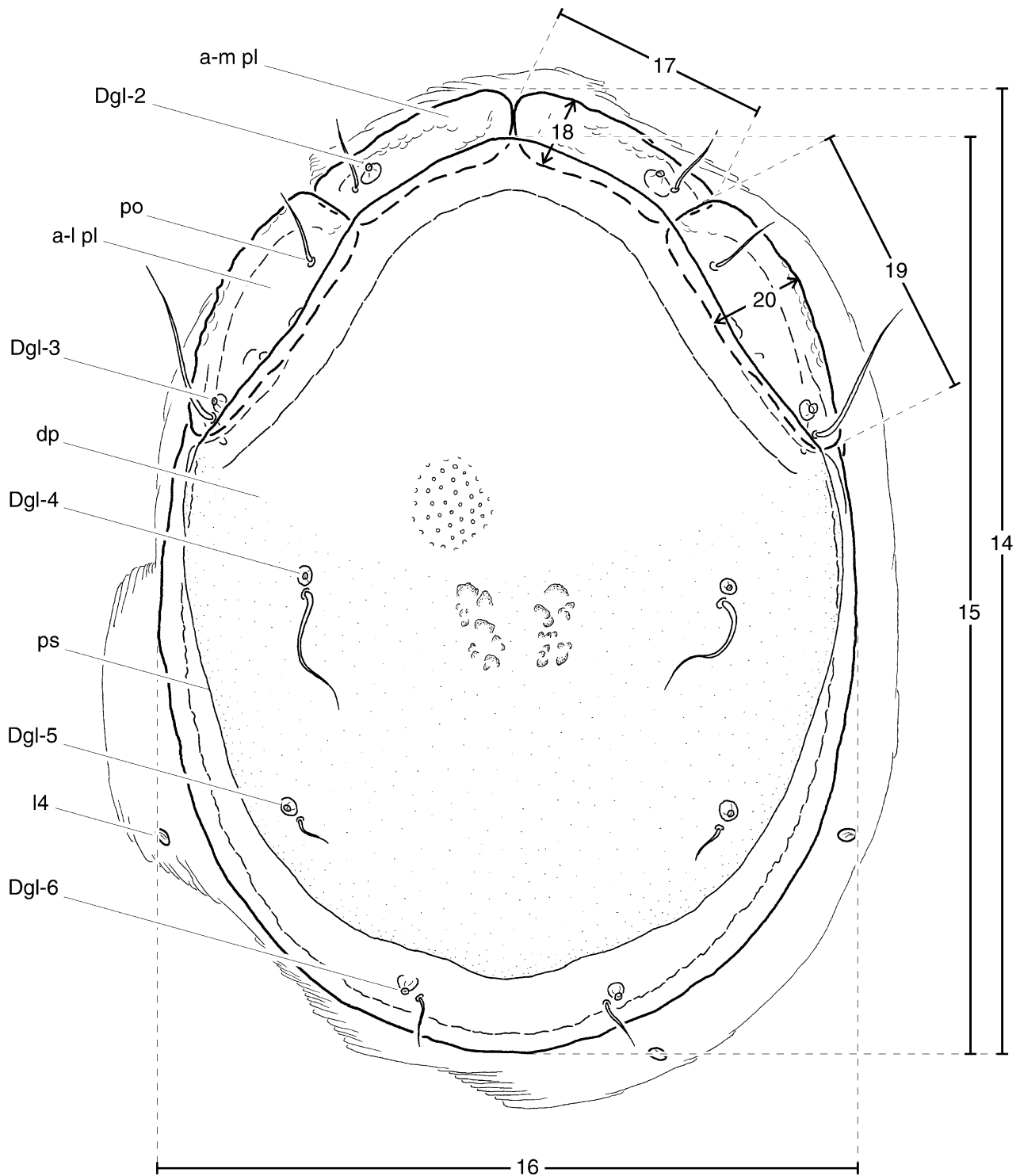


Figure 2. General morphology of water mites of the genus *Torrenticola* and measured distances; dorsal view of the idiosoma. *Torrenticola amala*, female. See text for abbreviations of body parts. Measurements: 14 – dorsal shield L; 15 – dorsal plate L; 16 – dorsal shield W; 17 – antero-medial platelet L; 18 – antero-medial platelet W; 19 – antero-lateral platelet L; 20 – antero-lateral platelet W. Eyes, dgl-1, pr and most lyrifissures are lost in preparation.

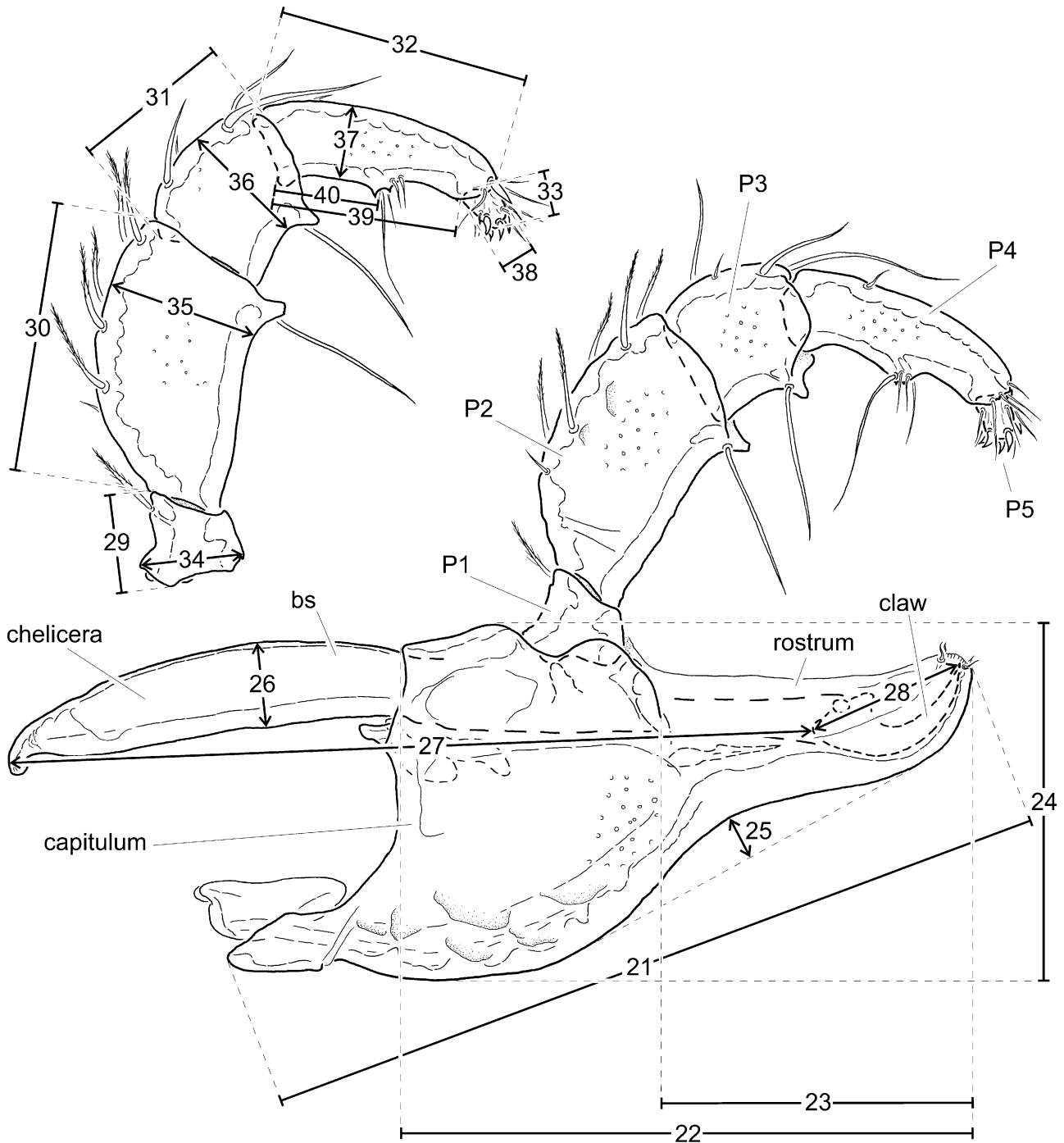


Figure 3. General morphology of water mites of the genus *Torrenticola* and measured distances; lateral view of the capitulum with right palp and chelicera, medial view of left palp. *Torrenticola amala*, female. See text for abbreviations of body parts. Measurements: 21 – capitulum vL; 22 – capitulum dL; 23 – rostrum L; 24 – capitulum H; 25 – capitular bend depth; 26 – chelicera H; 27 – chelicera bs L; 28 – cheliceral claw L; 29 – P1 dL; 30 – P2 dL; 31 – P3 dL; 32 – P4 dL; 33 – P5 dL; 34 – P1 H; 35 – P2 H; 36 – P3 H; 37 – P4 H; 38 – P5 H; 39 – P4 vL; 40 – P4 vL to proximal seta.

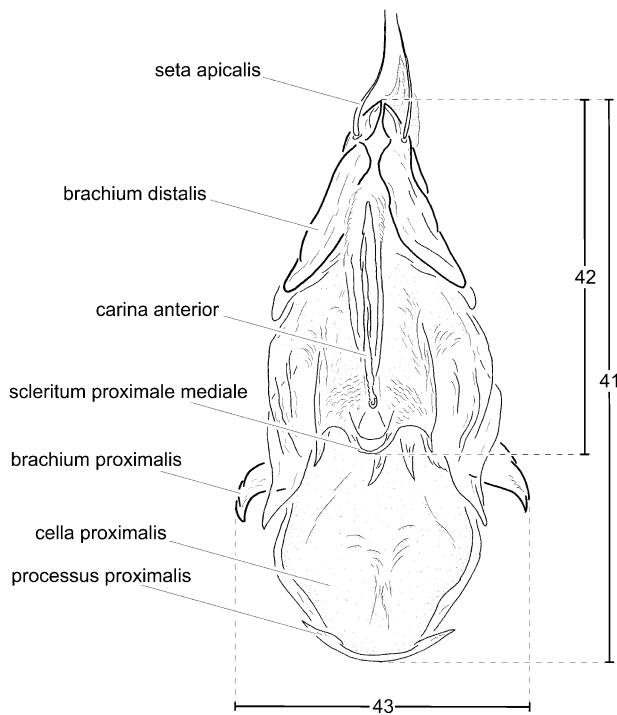


Figure 4. General morphology of water mites of the genus *Torrenticola* and measured distances; anterior view of the genital skeleton. *Torrenticola amala*, male. Measurements: 41 – genital skeleton tL; 42 – genital skeleton aL; 43 – genital skeleton W.

correspond to pre- and post-antennal glandularia (Wiles, 1997a, b), respectively, pre-, post-antenniforme (Bader, 1988), all glands are numbered from rostral to caudal; dist, distance; dp, dorsal plate; ds, dorsal shield; expo, excretory pore; gf, genital field; gn, gnathosoma; gs, genital skeleton; H, height; ht, holotype; Id, idiosoma; l1–5, lyrifissures (slit organs *sensu* Di Sabatino *et al.*, 2002), numbered rostral to caudal; L, length (aL, apical length, dL, dorsal length, mL, medial length, rel L, relative length, tL, total length, vL, ventral length); Lgl-1–4, lateroglandularia; min, minimum; max, maximum; NP, National Park; OTS, Organization for Tropical Studies; P1–5, palp segments (numbered from proximal to distal); po, postocularia (seta) (R2 *sensu* Wiles, 1997b); pr, preocularia (seta) (R1 *sensu* Wiles, 1997b); prep, preparation; ps, posterior margin of primary sclerotization; pt, paratype; r, rostrum; sd, standard deviation; SEM, scanning electron microscope; Vgl-1–4, ventroglandularia; W, width.

GENUS *TORRENTICOLA* PIERSIG, 1896

Diagnosis: Idiosoma completely sclerotized, dorsal and ventral shield only separated by narrow dorsal furrow; dorsum with large postero-central plate and

four smaller anterior platelets, these may show various degrees of fusion, in some species to unique dorsal plate; Dgl-2 to -6 fused with dorsal plate; coxal plates fused with secondary sclerotization to complete ventral shield, coxal sutures form characteristically Y-shaped structure; insertion of leg-IV without condyles, legs without swimming hairs; genital field with six pairs of acetabula under movable flaps; capitulum not attached to protrusible tube, posterior dorsal apodemes short, rostrum mostly well developed; palp five segmented, usually P2 and P4 longer than P1 and P3, P2 and P3 typically with ventro-distal protrusions.

GENERAL MORPHOLOGY

Adults of the genus are characterized by completely sclerotized dorsal and ventral shields, separated by striated soft integument (Fig. 5A). The dorsal shield consists of a large dorsal plate and two pairs of anterior platelets (Figs 2, 5A, B). In some species the antero-lateral or all platelets are fused with the main plate – this feature has formerly been used to separate different subgenera (Bader, 1988); occasional specimens show partly or complete fusion of the anterior platelets with each other. The dorsal shield bears five pairs of glandularia: Dgl-2 on the antero-medial platelets, Dgl-3 (and the postocular setae) on the antero-lateral platelets, and Dgl-4, -5 and -6 on the main dorsal plate (Figs 2, 5A, B). The glandularia Dgl-6 are located at the caudal margin of the primary sclerotization or slightly posterior. All glandularia consist of a pore and a seta (Fig. 5C), Dgl-3 and Dgl-4 are accompanied by relatively large setae (compared with shorter setae at Dgl-2, -5 and -6). The main dorsal plate centrally bears two muscle attachment sites with a rough sculpture; as in all parts of the armour, the surface is regularly perforated by fine porous channels (Figs 2, 5D). The dorsal plate is yellow, reddish to red or with various red patterns (Fig. 6). In combination with other morphological features the colour patterns can provide important indications for species identification, as they are easily visible without slide mounting. However, similar patterns are found in different species and species groups. The general colour patterns are more or less constant within one species, whereas the intensity can vary considerably. In heavily coloured specimens, apart from the dorsal plate, reddish patches are also found on the anterior dorsal platelets as well as the genital flaps. Several types of dorsal colour patterns were considered in the species descriptions and are referred to the numbers given in Figure 6; colour patterns developed only very pale are usually just given in the descriptions, not reproduced in the figures. The lateral eyes are embedded

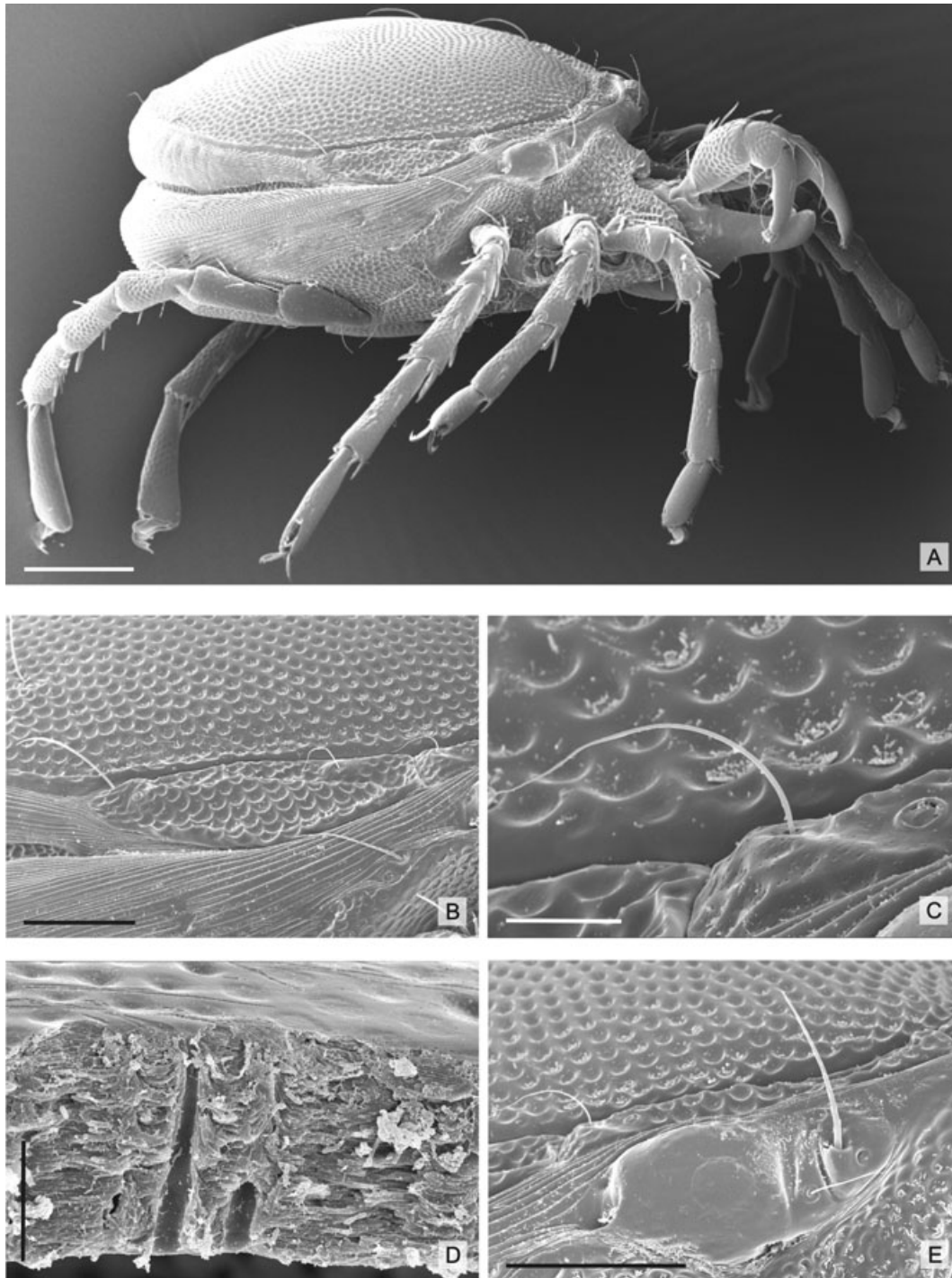


Figure 5. SEM photographs of *Torrenticola pervagata*. A, antero-lateral view of idiosoma (dorsal armour, anterior part of the ventral armour, legs) and gnathosoma, magnification 275 \times , scale bar = 100 μ m; B, antero-lateral platelet bearing Dgl-3 and postocular seta, in the background dorsal plate with Dgl-4, in the foreground striated soft integument between dorsal and ventral armour bearing Lgl-1 and lyrifissure l2, at right margin antero-medial platelet with Dgl-2, at left margin postero-lateral platelet, magnification 1250 \times , scale bar = 50 μ m; C, detail of antero-medial platelet with Dgl-2, in the background dorsal plate, magnification 5500 \times , scale bar = 10 μ m; D, cross-section through dorsal plate, in the foreground layered structure of integument and porous channels, in the background dorsal surface, magnification 6500 \times , scale bar = 10 μ m; E, frontal platelet bearing the lateral eyes, preocular seta, Dgl-1 and lyrifissure l1, in the background dorsal plate and antero-medial platelet with Dgl-2, magnification 2000 \times , scale bar = 50 μ m.

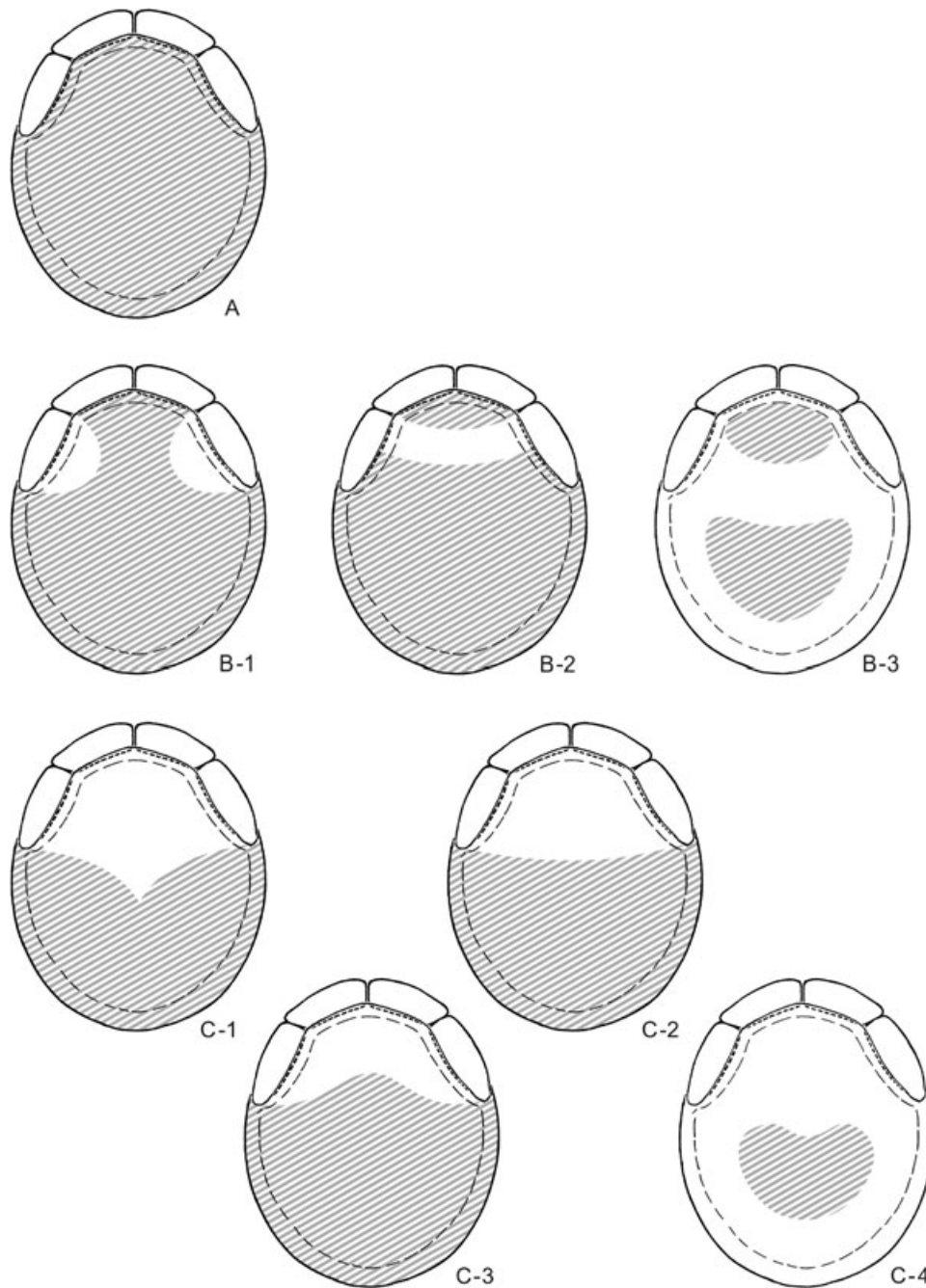


Figure 6. Colour patterns on the dorsal plates of *Torrenticola* (schematic). A, complete dorsal plate reddish to red (e.g. *T. amalgamada*, *T. gradaticoxalis*, *T. fontinale*, *T. ratoncitoi*, *T. menudopalpis*, *T. elhachensis*, *T. flexirostris*, *T. lamellipalpis*, *T. obliquipalpis*, *T. cirratipalpis*, *T. australis*, *T. monticola*, *T. brevicoxalis*, *T. conipalpis*, *T. conirostris*, *T. semicolor* (partim), *T. cortobrazo*, *T. altifontana*, *T. esferica*, *T. ambigua* (partim), *T. torpebrazo*, *T. fastigata*, *T. chicacoxalis*, *T. rubella*, *T. levi-coxalis*, *T. collina*); B, hour-glass-shaped with pale 'shoulder-patches' (B-1), in paler specimens reduced to larger posterior and smaller anterior reddish to red patch (B-2, B-3) (e.g. *T. harpagophora*, *T. costaricense*, *T. guanacastensis*, *T. keesdavidsi*, *T. ambigua* (partim)); C, posterior 1/2–2/3 red, margin (sharp to unclear) slightly V-shaped indented (C-1) (e.g. *T. gennada*, *T. amala*, *T. semicolor* (partim), *T. pervagata* (partim)), +/- straight (C-2) (e.g. *T. alargada*, *T. columbiana*, *T. semicolor* (partim), *T. maceripalpis*, *T. acuticoxalis*, *T. bicolor*, *T. curtipalpis*), with rostral extension (C-3) (e.g. *T. alexandra*, *T. carlbaderi*) or reduced to crescent-shaped, pale red patch in posterior half (C-4) (e.g. *T. esquinada*, *T. tilaranensis*, *T. pervagata* (partim)).

in the soft integument antero-laterally to the dorsal shield, on each side joint in sclerotized capsules; a median eye is absent. The eye capsules antero-medially are fused with platelets bearing the glandularia Dgl-1 and the preocular setae (Fig. 5E). In most cases these structures anterior to the dorsal shield are lost during preparation and not visible in the slide material (see also Fig. 2). Therefore, the shape of the rostro-dorsal margin of the idiosoma – illustrated in older species descriptions – recently has merely been documented (exceptions are Bader, 1988; Tuzovskij, 2003). Five pairs of lyrifissures (mechanoreceptors) are embedded in the dorsal furrow laterally and posterior to the main shield (the first pair is fused with the eye-capsules, Fig. 5E). In SEM photographs these organs appear as more or less slit-shaped openings in the membranous integument (Fig. 5B, E) whereas under the light microscope they appear as small, sclerotized oval platelets with a central elongated structure (Fig. 2). In most cases only some of them can be found in the slide preparations. Several postero-lateral platelets are embedded in the dorsal furrow or ventrally fused with the margin of the main dorsal plate, probably depending on the age of the specimens (Fig. 5A, B). In most cases these platelets are not visible in the slide preparations, although in some species descriptions they are documented (Gerecke & Di Sabatino, 1996; Tuzovskij, 2003).

In the *Torrenticolidae*, by means of secondary sclerotization, a complete ventral armour is present, incorporating the coxae, genital field, ventro-glandularia and the excretory pore (in the area of secondary sclerotization, only occasionally fused with the caudal margin of the primary sclerotization); a suture line mostly remains visible between the primary and the posterior secondary sclerotization (Figs 1, 7A). The secondary sclerotization is often covered by fine striated integument (Figs 7A, 14A, 29A, 78A, etc.). The antero-medial margins of Cx-II and the medial margins of Cx-II/III form a characteristic Y-shaped suture line (Fig. 1). The Cx-I medially are completely fused, the suture lines between Cx-II and Cx-III are visible only far laterally, and the posterior margin of Cx-IV is often relatively indistinct (Fig. 1). The capitular bay is very variable in depth and width (e.g. Figs 21A, 27A, 47A). Two pairs of coxal glands are present: Cxgl-4 at or near the tip of Cx-I [generally the pore is spout-shaped, and the length of the spout varies between different species (Fig. 7B, C) – these glands have largely been neglected in previous species descriptions and illustrations; Bader (1988) even refused the existence of Cxgl-4 in the genus] and Cxgl-2 close to the postero-lateral edge of Cx-II (Figs 1, 7D). Three pairs of functional ventroglandularia can be found (Fig. 1): Vgl-3 posterior to the

insertion of IV-leg, Vgl-2 and Vgl-4 lateral to the excretory pore (in the area of the secondary sclerotization, very rarely on the caudal edge of the primary sclerotization). The Vgl-1 is reduced to a very small seta close to the caudal margin of the primary sclerotization (Fig. 1); these setae are not always visible under the light microscope. Four pairs of lateroglandularia are embedded in the dorsal furrow (Fig. 5B) or fused with the ventral armour (Fig. 1) on the very dorso-lateral edge of the ventral shield (Wiles, 1997a,b). The insertion of IV-leg is without condyles; all legs are without swimming hairs, terminating in well-developed claws with ventral clawlets (Fig. 7E). The genital field bears six pairs of rectangular-oval acetabula (osmoregulatory organs; Alberti, 1977; Goldschmidt, Alberti & Meyer, 1999) with a porous surface (Fig. 7F); the plesiomorphic grouping in three pairs is mostly still visible. The gonopore is covered by genital flaps, bearing fine setae at their margins (at the medial margin mostly only visible at high magnification) (Figs 1, 7F).

The genital skeleton – a partly sclerotized structure dorsally to the genital opening in the male (Fig. 4, 8A, B) – is mostly +/- elongated drop-shaped, in some species heavily elongated (Figs 88, 103E, 106E, F) in others more rounded (Figs 13E, 50H). In general the brachia distalia and proximalia are well developed, directed from antero-medial to postero-lateral. The carina anterior is well developed, in some species relatively high. In general, the scleritum proximale mediale is well developed, handle-shaped. The cella proximalis represents 25–75% of the total length of the genital skeleton, mostly bearing pointed processus proximalia (Fig. 4). Even though the genital skeleton bears many morphological details valuable for species differentiation, it is difficult to demonstrate and often damaged during preparation. However, in most cases the shape of the scleritum proximale mediale and the relative size of the cella proximalis are still very characteristic (even in weak preparations); the genital skeleton should therefore always be taken into account and illustrated in species descriptions.

The gnathosoma is not attached to an extensible tube, basely high and compact or more elongated, flat (Figs 3, 9A). The postero-dorsal apodemes of the capitulum are short, the basal part postero-ventrally extended (Fig. 3). The rostrum is variable in size (short, compact to long and slender), bluntly pointed (Figs 9A, 53C, 114C, etc.), dorsally forming a membrane-covered groove containing the chelicera (Fig. 9D). Soft, tentacle-like structures form the mouth-opening, which is accompanied by four hair-like setae (Fig. 9E). The chelicera are rather uniform in shape, with a mostly straight, slender basal part and a curved claw (Figs 3, 9D) – in some species the

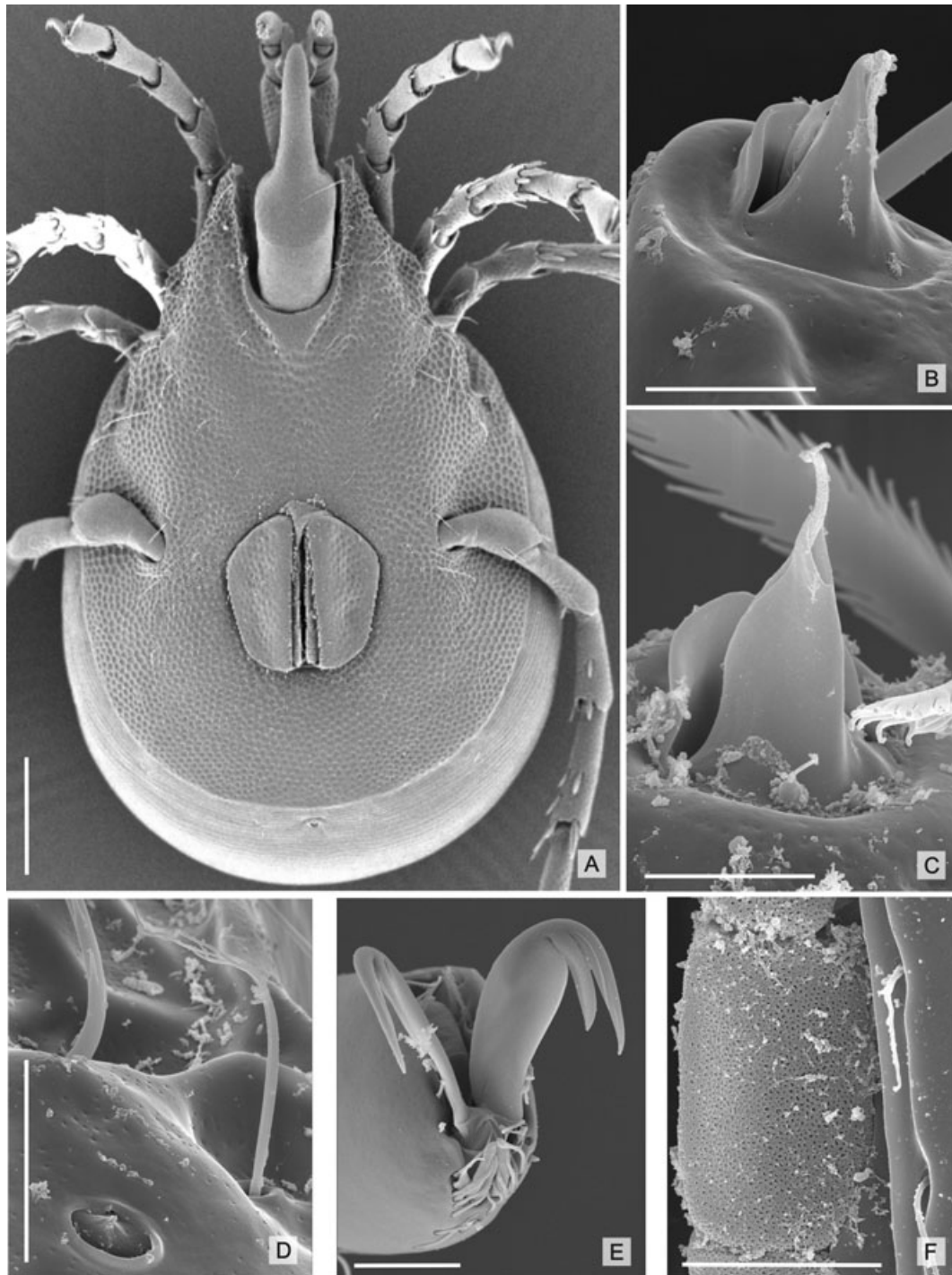


Figure 7. SEM photographs of *Torrenticola*. A, ventral view of idiosoma and gnathosoma of *Torrenticola pervagata* female; gnathosoma, legs, complete ventral armour, genital field, margin of primary sclerotization and excretory pore clearly visible, magnification 200 \times , scale bar = 100 μ m; B, spout-shaped opening of Cxgl-4 at tip of Cx-I, *Torrenticola pervagata* female, magnification 15 000 \times , scale bar = 5 μ m; C, spout-shaped opening of Cxgl-4 at tip of Cx-I, *Torrenticola conirostris/rala*-complex male, magnification 18 000 \times , scale bar = 5 μ m; D, Cxgl-2, gland opening and seta between Cx-II and Cx-III (the seta accompanying the gland is terminally frayed in three fibres), *Torrenticola pervagata* female, magnification 12 000 \times , scale bar = 10 μ m; E, terminal claws with clawlets at leg-I-6, *Torrenticola pervagata* female, magnification 6000 \times , scale bar = 10 μ m; F, posterior acetabula (see porous surface), setae at medial margin of genital flap, *Torrenticola pervagata* female, magnification 12 000 \times , scale bar = 10 μ m.

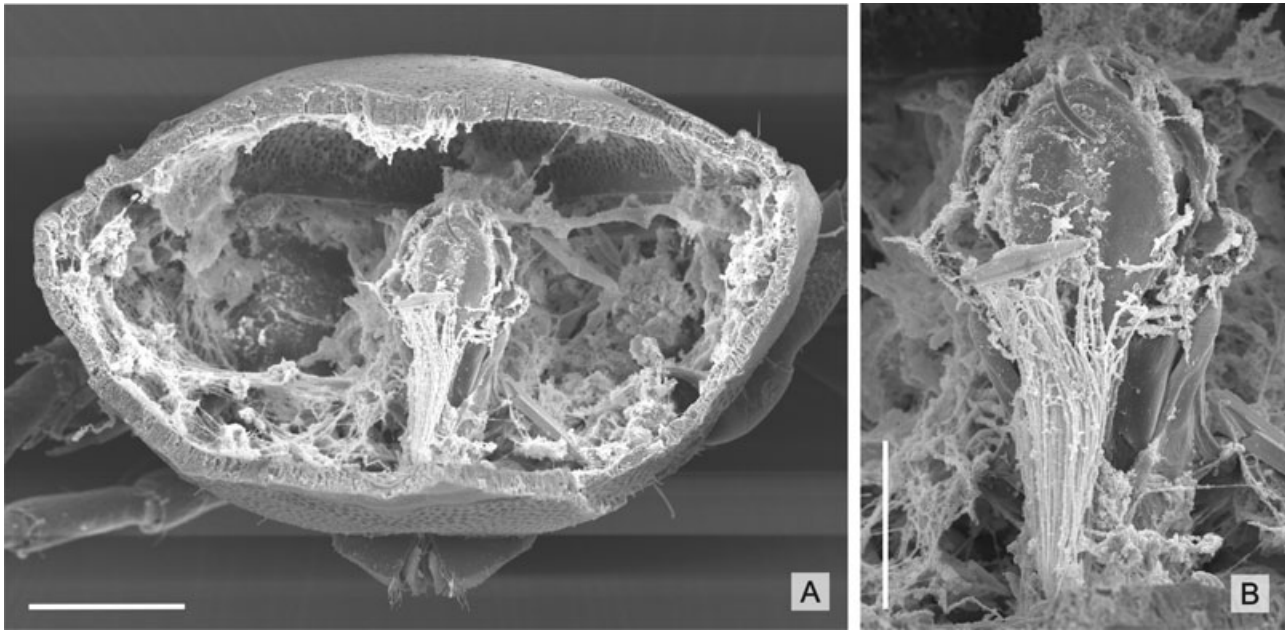


Figure 8. SEM photographs of *Torrenticola conirostris/rala*-complex, male. A, cross-section of the idiosoma, view from posterior, position of the genital skeleton inside the idiosoma as well as genital field (ventrally) are visible, magnification 450 \times , scale bar = 100 μ m; B, genital skeleton from posterior (detail of A), magnification 1400 \times , scale bar = 50 μ m.

claw is straightened or elongated (Fig. 25C). The palp is five segmented, mostly robust (Figs 3, 9A–C). The palp segments are variable in size, typically P2 and P4 longer than P1 and P3, P5 is short with compact distal bristles. The chaetotaxy of the palps is relatively uniform within the genus (Figs 3, 9A–C): P1 bears one strong dorso-distal seta; P2 in general bears five strong and one hair-like dorsal setae and one long ventro-distal seta; the strong dorsal setae at P1 and P2 are pinnate (Figs 3, 9A–C, F); P3 dorsally bears three strong (the two distal ones in some species are very long; Fig. 9C) and one small dorsal setae, ventro-distally one long seta; P4 centro-dorsally bears one or two small setae, distally several (4–6) small setae and one short, thick bristle, ventrally four setae (in general one long and three smaller) on a more or less developed (in some cases bifurcated) hump (Figs 3, 9B); P5 distally bears four very strong, thick bristles and several (mostly four) small setae (Fig. 9G). In most species the P2 and P3 bear ventro-distal projections: cone- (Fig. 9A), blade- or lamella-shaped (Fig. 9B); however, in some species the ventro-distal margin of P2 and P3 is smooth (Fig. 9C).

A clear sexual dimorphism is present in the shape of the genital field (+/– rectangular-oval in males, +/– trapezoid in females) and the medial length of Cx-II/III (relatively shorter in females). No further sexual differences are developed in the general shape of the idiosoma or the gnathosoma.

These general features (except of characteristic variations from the common pattern) are not repeated in the individual species descriptions.

The holotypes of the new species described here will be deposited at the Natural History Museum in Basel (Switzerland); paratypes will be deposited in the Senckenberg Museum Frankfurt (Germany) and the Canadian National Collection in Ottawa (Canada).

KEY TO THE SPECIES GROUPS OF THE GENUS *TORRENTICOLA*

The species group system presented below is partly based upon probable phylogenetic groups. These hypothetical phylogenetic entities (as the ‘*boettgeri* – group’) are mainly defined according to the characteristic shape of their gnathosoma (see above, Wiles, 1997a). Furthermore, using several morphological characteristics, rather artificial groups (characterized by the term ‘-like’, as in the *columbiana*-like species) were constructed for practical reasons, in order to deal with the diversity of this species-rich genus. The names of the groups are mainly derived from the first described neotropical species of the respective group.

In some cases several features indicate close relations or transitions between the groups: e.g. the ‘*Rusetria*’-like mites (especially *T. costaricense*) in the shape of the body and the structure of their genital skeleton are very similar to *T. esferica* and *T. ambigua* of the

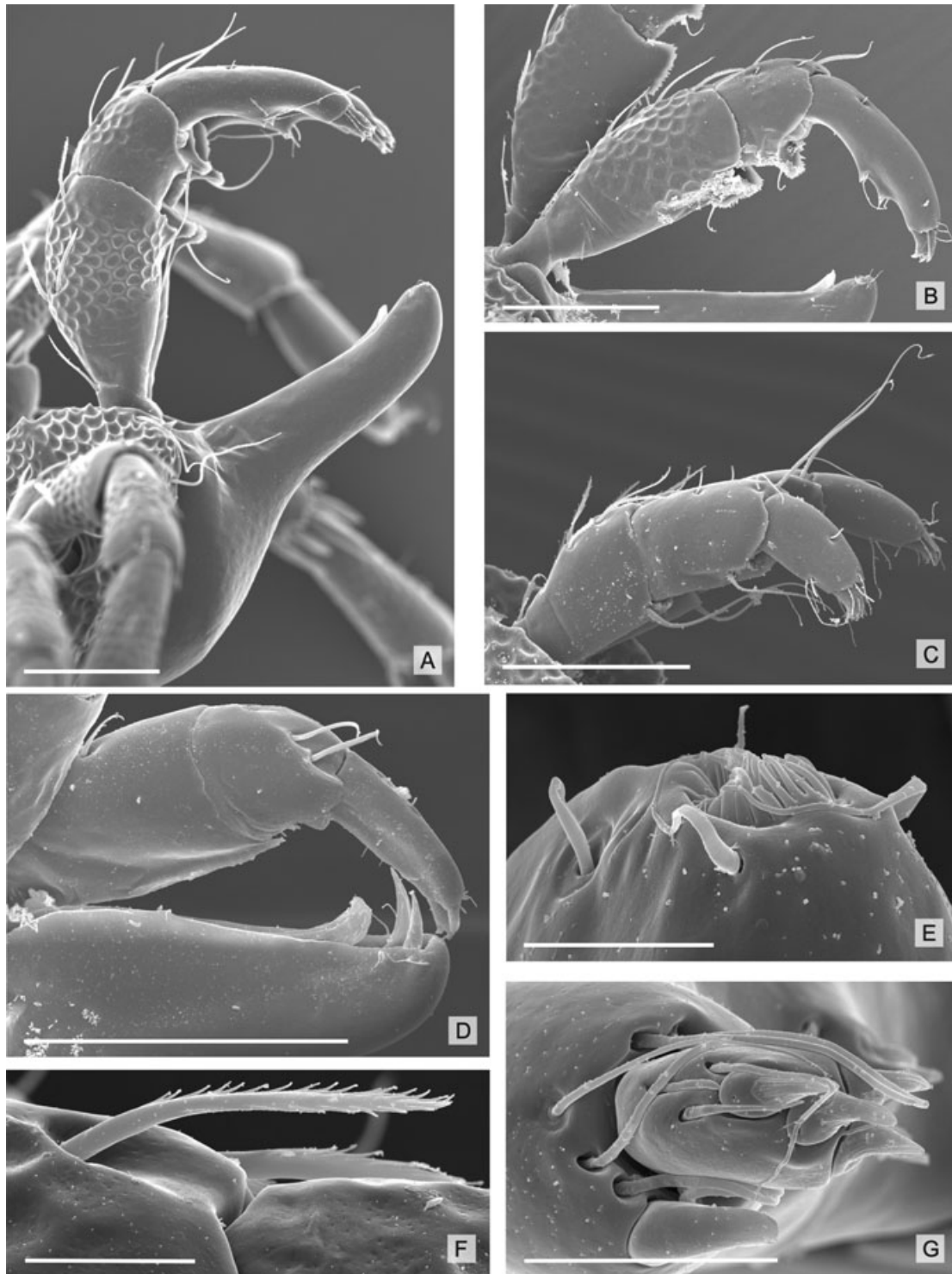


Figure 9. SEM photographs of the gnathosoma of *Torrenticola*. A, lateral view of gnathosoma, *Torrenticola pervagata*, magnification 950 \times , scale bar = 50 μ m; B, lateral view of right palp, *Torrenticola alargada*, magnification 1500 \times , scale bar = 50 μ m; C, lateral view of right palp, *Torrenticola ratoncitoi*, female, magnification 1800 \times , scale bar = 50 μ m; D, lateral view of rostrum, medial view of left palp, *Torrenticola guanacastensis*, magnification 3000 \times , scale bar = 50 μ m; E, mouth-opening at tip of rostrum, *Torrenticola pervagata*, magnification 22000 \times , scale bar = 5 μ m; F, dorsal bristle at P2, *Torrenticola pervagata*, magnification 9000 \times , scale bar = 10 μ m; G, antero-dorsal view of palp, P5 and distal tip of P4, magnification 13 520 \times , scale bar = 10 μ m.

columbiana-like mites. Furthermore, in single specimens of several other species tendencies towards a fusion of the antero-lateral platelets with the main dorsal plate are visible, as well as partly fusion of the two antero-medial platelets.

Especially between the most species-rich groups – the *columbiana*-like species and the *bicolor*-like species – the separation of the groups in some cases is not very clear. These two groups are only separated by the relative length of the rostrum (L rostrum/vL capitulum), which is 0.35–0.45 (mostly 0.38–0.41, one species 0.28) within the *columbiana*-like and 0.37–0.47 within the *bicolor*-like species. However, generally within the *bicolor*-like species, the rostrum appears longer, as it is more slender and more clearly separated from the basal part of the capitulum; yet *columbiana*-like species with a ‘relatively slender’ rostrum remain difficult to separate from *bicolor*-like species. Therefore, in unclear cases both species-keys should be tried.

- | | | |
|----|---|---|
| 1a | All dorsal platelets fused with the main dorsal plate; Cx-I/II very short, tips of coxal field merely surpassing idiosoma (Fig. 10A); palp very short and compact (Fig. 10C)..... | ‘Synaptia’-like (only species <i>T. amalgamada</i>) |
| b | Antero-lateral platelets fused with large dorsal plate..... | ‘Rusetria’-like |
| c | Antero-medial and antero-lateral platelets free..... | 2 |
| 2a | Capitular bay very narrow and deep (L/W > 3.3); palp short, especially P4 strikingly short (Figs 17C, 21C, 23C, etc.), P2/P3 without ventral projections (cones, lamellae) | boettgeri-group |
| b | Capitular bay not noticeably narrow (L/W < 3.0); palp different (Figs 31E, 66C, etc.) | 3 |
| 3a | Rostrum curved upwards (Fig. 25C); chelicera claws straightened, long (bs/claw L 3.3); lateral margin of Cx-I/II not graded, straight, anterior part of Cx-I/II therefore triangular; lateral margin of Cx-II/III merely graded (Fig. 25A) | ‘Megapalpis’-like (only species <i>T. flexirostris</i>) |
| b | Rostrum +/- straight, not up-curved (Fig. 26C, etc.); chelicera claws more hooked (or completely straight, see <i>brevicoxalis</i>), generally shorter; lateral margins of Cx-I/II/III +/- graded (Fig. 26A, etc.) | 4 |
| 4a | Ventro-distal projections at P2/P3 lamella-shaped, medial lamellae various in shape (in some cases only visible at high magnification, medial margin should be regarded carefully); mostly capitulum ventrally flat, rostrum long (Figs 28C, D, 36C,D, etc.) | 5 |
| b | Ventro-distal projections at P2/P3 cone-shaped (sometimes with small denticles) or missing; capitulum ventrally with +/- clearly curved ventral margin or short rostrum (Fig. 58C, etc.) | 6 |
| 5a | Lamella at ventral margin of P2 smooth, distally extending far on P3 (Fig. 28D, etc.); genital skeleton with large cella proximalis (Fig. 28E), apically short (gs aL/tL 0.28–0.40)..... | lamellipalpis-group |
| b | Lamella at ventral margin of P2 and P3 frayed, mostly short (Fig. 36D); genital skeleton with smaller cella proximalis (Fig. 36E), apically longer (gs aL/tL 0.49–0.81) | serratipalpis-group |
| 6a | Rostrum mostly short, blunt cone-shaped, basally high, highly attached to basal part of capitulum; ventral margin of capitulum mostly without a sharp bend; palps mostly compact, P2/3 ventrally without or with short cone-shaped projections (Figs 47D, 47F, 51C, etc.) | 7 |
| b | Rostrum medium to long, slender, clearly separated from basal part of capitulum by a sharp bend, palps more slender, P2/3 mostly with clear cone-shaped ventral projections, P4 mostly with ventral seta-bearing hump (Fig. 57C, etc.) | 8 |
| 7a | Rostrum short, capitulum ventrally with sharp bend; capitular bay V-shaped; Cx-I/II very short; cheliceral claws straight; P2/3 without ventral projections (Fig. 47) | brevicoxalis-group (only species <i>T. brevicoxalis</i>) |
| b | Rostrum short, highly attached to basal part of capitulum; capitular bay narrow to wide, but not V-shaped; cheliceral claws clearly curved/hooked; P2/3 mostly with small ventral projections (Fig. 48, etc.) | conirostris-like |
| 8a | Rostrum medium-long, basally relatively high (Fig. 59C, etc.) | columbiana-like |
| b | Rostrum long, slender, clearly separated from basal part of capitulum by a sharp bend (Fig. 92C, etc.) .. | bicolor-like |

SPECIES DESCRIPTIONS

In the following all 21 species of the genus *Torrenticola* so far known from Central and South America as well as 36 new species from Costa Rica are described, documented and discussed. In some unclear cases differences within certain species are discussed and doc-

umented; however, only in clear cases have different species have been described.

‘SYNAPTIA’-LIKE SPECIES

New species from Costa Rica: T. amalgamada.

Differential diagnosis of the group: Antero-medial and antero-lateral dorsal platelets completely fused with dorsal plate.

***TORRENTICOLA AMALGAMADA* SP. NOV.**

(FIG. 10A–D; TABLE 1)

Type series: Holotype female, CR 201, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Los

Migueles, rheopsammocrene, 150 m asl, 23.iii.1996, mounted.

Habitat: Slow flowing rheopsammocrene at 150 m asl; akal; temperature 24.9 °C; conductivity 194 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Peninsula de Osa, only known from type locality).

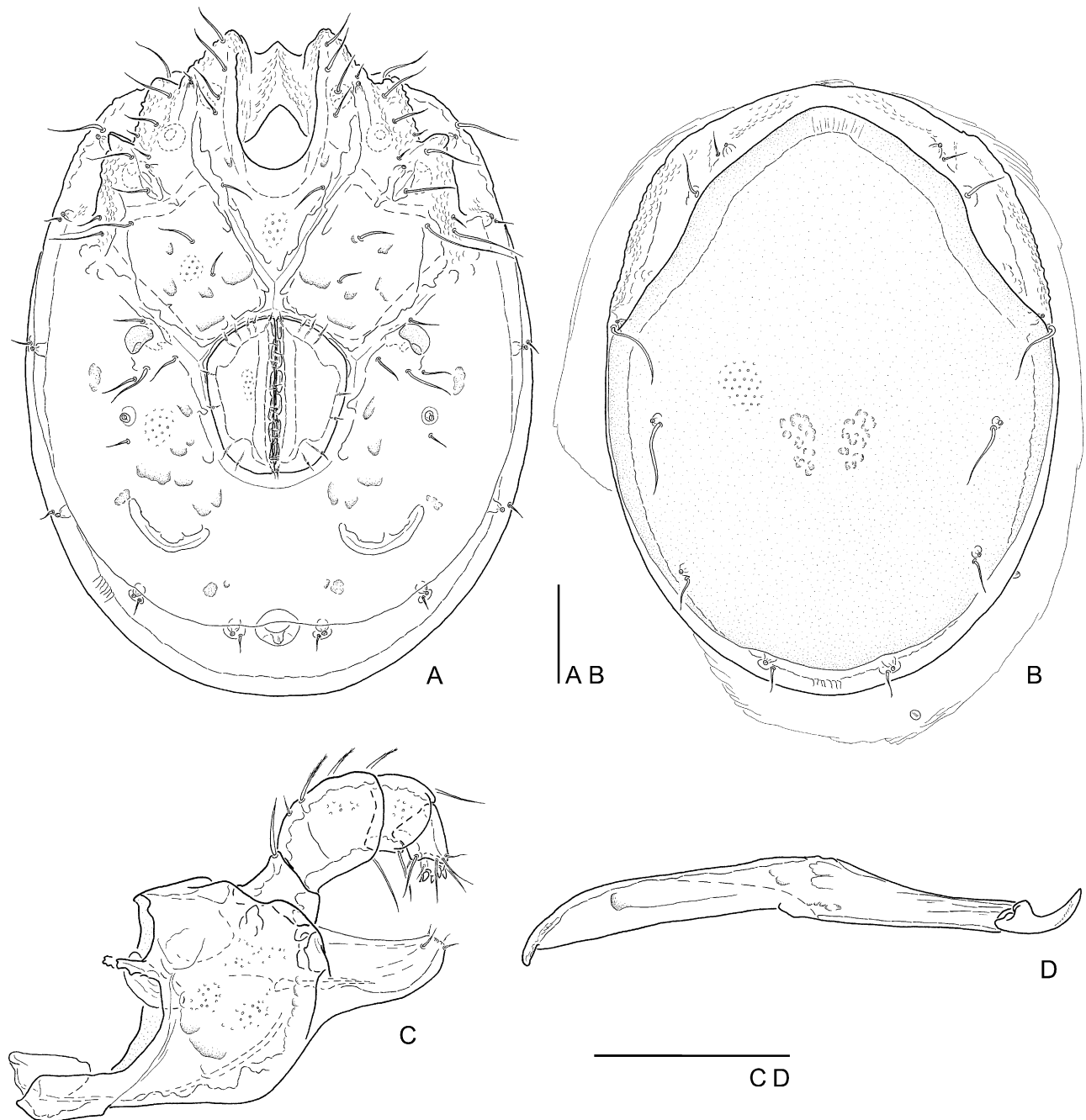


Figure 10. *Torrenticola amalgamada*. A–D, holotype female (CR 201). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, chelicera, lateral view. Scale bars = 100 μm .

Table 1. Measurements (μm) of *Torrenticola amalgamada*; $N = 1$ (female, holotype)

Idiosoma L	667	Cx-I tL/Cx-II + III mL	9.65	Gn bend depth	13	P1 rel L	0.19
Idiosoma W	515	Cx-I/Cx-II + III mL	4.45	Chelicera L	288	P2 rel L	0.36
Idiosoma L/W	1.30	Genital field L	165	Chelicera H	26	P3 rel L	0.21
Cx-I tL	260	Gf L/Cx-II + III mL	6.14	Chelicera L/H	11.19	P4 rel L	0.18
Cx-III W	363	Genital field W	145	Chelicera bs L	244	P5 rel L	0.07
Cx-I tL/Cx-III W	0.72	Genital field L/W	1.14	Chelicera claw L	44	P1 H	45
Ds L	618	Gf L/Id L	0.25	Chel bs/claw L	5.53	P2 H	47
Dp L	618	Gf L/dist cb – gf	1.09	P1 dorsal L	33	P3 H	39
Ds W	461	Dist gf – expo	169	P2 dL	64	P4 H	27
Ds L/W	1.34	Dist gf – cauda	216	P3 dL	37	P5 H	13
Dp L/W	1.34	Capitulum vL	233	P4 dL	32	P1 L/H	0.73
Capitular bay L	140	Capitulum dL	162	P5 dL	12	P2 L/H	1.37
Capitular bay W	86	Rostrum L	61	Palp total L	178	P3 L/H	0.94
Cb L/W	1.63	Capitulum H	118	P4 vL	21	P4 L/H	1.18
Dist cb – gf	152	R L/c dL	0.38	P4 vL to seta	20	P5 L/H	0.91
Cx-I mL	120	R L/c vL	0.26	P4 vL/L to seta	1.06	P2/P4 L	2.00
Cx-II + III mL	27					P3/P4 L	1.15

Derivatio nominis: *amalgamar* (Spanish = to fuse); referring to the antero-dorsal platelets completely fused with the dorsal plate.

Diagnosis (only 1 female): As for the ‘*Synaptia*’-like species. Coxal field very short and blunt, anterior coxae (Cx-I/II) merely surpassing idiosoma, antero-laterally sharply graded; capitulum with short rostrum, separated from basal part of capitulum by sharp ventral and lateral bends; palp very characteristic, compact, especially P4 very short; P2/3 without ventral projections.

Description – Male: Unknown.

Female ($N = 1$): Idiosoma compact oval-shaped; dorsal plate reddish, antero-medial and antero-lateral platelets fused with dorsal plate; Dgl-4, lateral to Dgl-5 (Fig. 10B); coxal field very short, blunt, merely protruding anterior margin of idiosoma; Cx-I/II and Cx-II/III laterally sharply graded, antero-lateral corners of Cx-II and Cx-III pointing to anterior; Cxgl-4 far posterior, at margin of Cx-I and Cx-II, capitular bay wide U-shaped; posterior margin of Cx-IV far behind genital field; genital field large (gf L/Id L 0.25), broad-rhombic, anteriorly rounded, laterally nearly straight, posteriorly tapering; excretory pore slightly posterior Vgl-2, pore and glands partly under caudal margin of primary sclerotization (Fig. 10A); capitulum high, ventral margin with sharp bend towards short rostrum, separated by a sharp lateral ridge; palp very compact, especially P4 very short (L/H 1.18, P2/P4 2.00, P3/P4 1.15), P2/3 without ventral projections, ventral setae at P4 subterminal (Fig. 10C); chelicera relatively stout (Fig. 10D).

Discussion: *Torrenticola amalgamada* is separated from all other species of the genus so far known, in the completely fused anterior platelets. This character is also found in several species of *Monatractides*: *M. gorda* Cook, 1980 and *M. golfitensis* Cook, 1980, both described from Costa Rica, as well as in the old world species *M. synapta* (Viets, 1935), *M. synapta luctae* Lundblad, 1971, *M. amabilis* (Lundblad, 1941), *M. magnipharynx* (Lundblad, 1941) and *M. magnipharynx rostrata* Lundblad, 1971 from Java, *M. uniscutata* (Viets, 1925) from Cameroon and *M. maryellenae* Cook, 1966 from Liberia. Bader (1988) proposed the subgenus ‘*Synaptia*’ for these species, which has been refused by Wiles (1997a) based on phylogenetic analysis (see above). The finding of *T. amalgamada* also bearing this feature demonstrates that this character may have developed convergently also in the sister genus *Monatractides* and does not support the separation of an independent subgenus. Nevertheless, the species group is named according to Bader’s suggestion. Apart from the very obvious feature of a completely fused dorsal shield, the structure of the gnathosoma is very characteristic, especially the extremely short P4 and the sharply graded (ventrally and laterally) capitulum. Furthermore, the position of the Cxgl-4 far posterior of the ‘normal’ position at the tip of Cx-I is remarkable. This species probably represents a separate phylogenetic entity. However, as only one species (in one specimen) is yet known, no phylogenetic group is defined at the present state of knowledge. With regard to the very short coxal field and the shape of the capitulum, *T. amalgamada* is similar to *T. brevicoxalis* (see below).

'Rusetria'-like SPECIES

Previously known species: *T. gradaticoxalis* K. O. Viets, 1977 (Guatemala).

New species from Costa Rica: *T. costaricense*, *T. fontinale*, *T. harpagophora*.

Differential diagnosis of the group: Antero-lateral dorsal platelets fused with main dorsal plate; dorsal plate reddish to red or with pale colour pattern (Figs 6A, 6B-2, 6B-3); idiosoma mid-sized to large, rounded to rounded-oval; capitulum with mid-sized to long rostrum; palp with +/- cone-shaped ventral projections at P2/3; genital skeleton apically relatively short, cella proximalis relatively large.

Discussion: These species are characterized (and clearly separated from all other neotropical species) by the fusion of the antero-lateral dorsal platelets with the large dorsal plate. Until now, no *Torrenticola* species with these characters has been documented from Latin America. Even though the fusion of the antero-lateral dorsal platelets of *T. gradaticoxalis* from Guatemala has not been recognized (or at least not mentioned in the description) by K.O. Viets (1977/78 Teil I), this species also clearly belongs to the

'Rusetria'-like species (see discussion there). In the material from Costa Rica three new species were found. Originally species from the old world with this feature were placed in a subgenus *Rusetria* (K. Viets, 1956), which has been synonymized with the subgenus *Torrenticola* by K.O. Viets (1987). Bader (1988) re-established the subgenus, however, in a cladistic analysis Wiles (1997a) stated that variations in the number of free dorsal platelets evolved independently in different clades and should therefore not be used to differentiate subgenera. In the present paper, the name *'Rusetria'* is used only for practical reasons to separate a group of species easy to recognize from all the others. Hence, the use of the term *'Rusetria'* in this study does not aim at the reintroduction of this subgenus. The – apart from the organization of the dorsal plates – quite variable morphology (regarding palps, rostrum and coxal field) of the four species known so far emphasizes the opinion of an independent fusion of the antero-lateral dorsal platelets with the main dorsal plate. Furthermore, in several specimens of other species partly fused antero-dorsal platelets can be found. Therefore, most probably the *'Rusetria'-like species* do not comprise a phylogenetic group.

Key to the species

- | | |
|---|--------------------------|
| 1a Lateral margins of Cx-I/II/III very sharply graded, antero-lateral corner of Cx-II forming an anterior pointed edge, medial margin of Cx-II/III in male very short, in female pointed (Cx-I nearly extended to genital field) (Fig. 15A, E) | <i>T. gradaticoxalis</i> |
| b Lateral margins of Cx-I/II/III various in shape, but antero-lateral corner of Cx-II never forming a pointed edge, medial margin of Cx-II/III in male mostly longer, in female short but present (Figs 11A, 12A, 13A, 14A) | 2 |
| 2a Antero-medial platelets long and narrow; rostrum relatively short; P4 strongly curved, ventral setae on distinct tubercle (Fig. 16) | <i>T. harpagophora</i> |
| b Antero-medial platelets medium to short, broad (Fig. 11B); rostrum mid-sized to long (Figs 11C, 13C); P4 only distally curved, ventral setae on flat hump | 3 |
| 3a Idiosoma large (> 650 µm); coxal field broad, Cx-I tips triangular, slender, antero-lateral corner of Cx-III directed rostro-laterally; capitular bay elongated U-shaped; ventral margin of capitulum with sharp bend, rostrum mid-sized (Figs 11, 12) | <i>T. costaricense</i> |
| b Idiosoma mid-sized (< 650 µm); coxal field slender, however, Cx-I tips broad, truncated, antero-lateral corner of Cx-III directed laterally; capitular bay wide-U-shaped, lateral margins +/- convex; ventral margin of capitulum sigmoid, rostrum elongated; P2 and P3 relatively long (Figs 13, 14) | <i>T. fontinale</i> |

***TORRENTICOLA COSTARICENSE* SP. NOV.**

(FIGS 11A–E, 12A–D; TABLE 2)

Type series: Holotype male, CR 142, Guanacaste, ACG, Maritza, Quebrada Mata Redonda, small stream, 700 m asl, 28.ii.1996, mounted; paratypes, same locality and date, 1/0/0 mounted, 2/0/0 unmounted; CR 152, Guanacaste, ACG, Maritza, Quebrada Marilin, small stream, 560 m asl, 02.iii.1996, 0/1/0 mounted; CR 234, Guanacaste, ACG, Maritza, affluent to Laguna Mata Redonda (outlet of springs CR 233, 80 m below), small stream, 520 m asl, 04.iv.1996, 2/1/0 mounted, 5/3/0

unmounted; CR 234-IIa, Guanacaste, ACG, Maritza (outlet of springs CR 233, 10 m below) spring brook, 530 m asl, 21.ii.1997, 1/0/0 mounted, 0/2/0 unmounted; CR 234-IIb, Guanacaste, ACG, Maritza, affluent Laguna Mata Redonda (outlet of springs CR 233, 100 m below), small stream, 520 m asl, 21.ii.1997, 1/0/0 mounted.

Additional specimens examined: CR 5, Alajuela, stream, 900 m asl, 17.vi.1995, 0/1/0 mounted; CR 8, Alajuela, helocene, 1600 m asl, 18.vi.1995, 1/0/0,

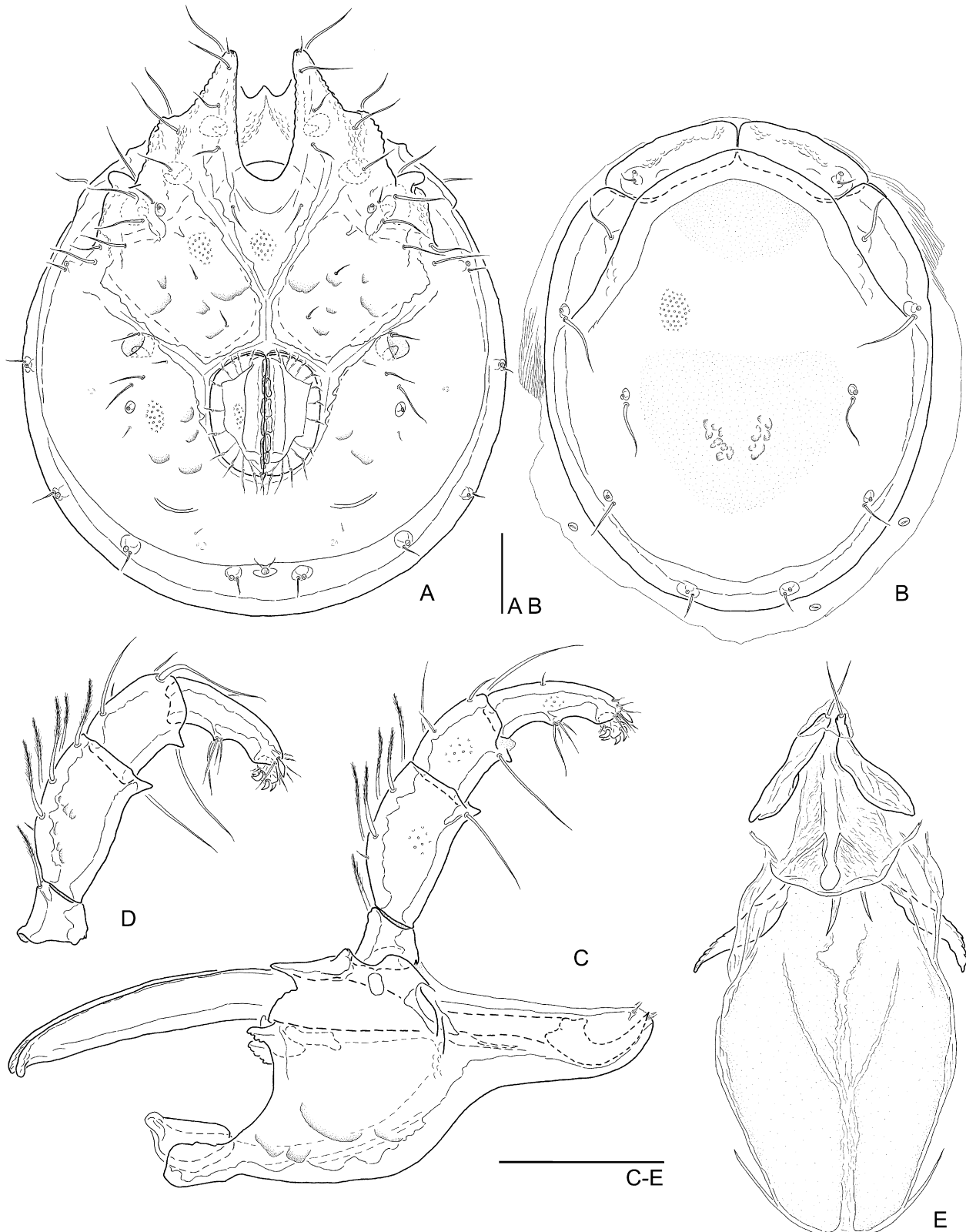


Figure 11. *Torrenticola costaricensis*. A–D, holotype male (CR 142); E, male (CR 25). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

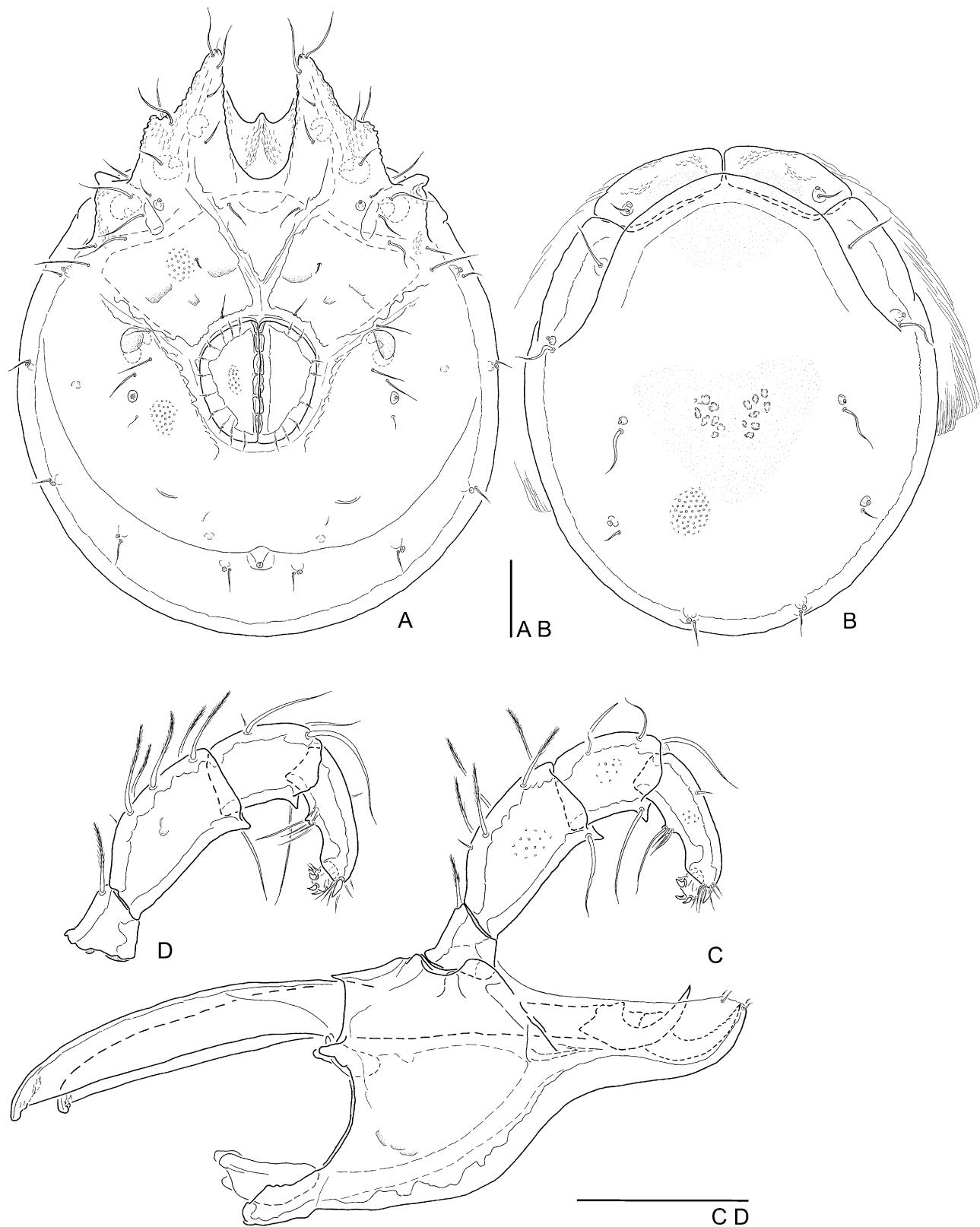


Figure 12. *Torrenticola costaricense*. A–D, paratype female (CR 152). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

mounted; CR 10, Heredia, El Tirol, stream, 1780 m asl, 19.vi.1995, 2/1/0 mounted; CR 25, Puntarenas, Ecolodge San Luis, spring next to Quebrada Alondra, rheocrene, 1020 m asl, 26.vi.1995, 4/0/0 mounted, 3/6/0 unmounted; CR 27, Puntarenas, Ecolodge San Luis, affluent to Río San Luis, spring brook, 1000 m asl, 27.vi.1995, 0/1/0 mounted; CR 28, Heredia, Varablanca, spring brook, 1960 m asl, 29.vi.1995, 1/0/0 mounted, 0/1/0 unmounted; CR 34, Alajuela, Río Sardinal, stream, 420 m asl, 30.vi.1995, 1/0/0 mounted; CR 40, Alajuela, Río Barranca, small stream, 1540 m asl, 01.vii.1995, 1/0/0 mounted; CR 45, Limón, Río Corinto, stream, 500 m asl, 04.vii.1995, 1/0/0 unmounted; CR 49, Cartago, affluent Río Coliblanco, small stream, 1540 m asl, 05.vii.1995, 1/0/0 unmounted; CR 51, Cartago, 5 km north Capellades, small stream, 1660 m asl, 05.vii.1995, 1/1/0 unmounted; CR 57, Alajuela, San Ramon Field Station, hygropetric area below waterfall at Río San Lorencito, 1040 m asl, 09.vii.1995, 2/0/0 mounted, 2/2/0 unmounted; CR 58, Alajuela, San Ramon Field Station, small stream, 940 m asl, 10.vii.1995, 1/0/0 mounted; CR 59, Alajuela, San Ramon Field Station, left affluent Río San Lorencito, small stream, 1000 m asl, 10.vii.1995, 3/0/0 mounted, 1/3/0 unmounted; CR 60, Alajuela, San Ramon Field Station, right affluent to Río San Lorencito, spring brook, 1080 m asl,

10.vii.1995, 5/2/0 mounted, 13/2/0 unmounted; CR 66, Puntarenas, Ecolodge San Luis, bank of Río San Luis, rheopsammocrene, 1230 m asl, 16.vii.1995, 1/1/0 mounted; CR 107, Puntarenas, Las Alturas Field Station, Río Colon, stream, 1340 m asl, 01.viii.1995, 1/0/0 mounted, 0/1/0 unmounted; CR 123, Guanacaste, ACG, Gongora, Río La Yengua, small stream, 560 m asl, 22.ii.1996, 2/0/0 mounted, 0/3/0 unmounted; CR 136, Guanacaste, ACG, Cacao, Quebrada Florcita, spring brook, 1180 m asl, 27.ii.1996, 2/0/0 mounted, 2/1/0 unmounted; CR 137, Guanacaste, ACG, Cacao, rheocrene, 1260 m asl, 27.ii.1996, 2/0/0 mounted, 1/3/0 unmounted; CR 138, Guanacaste, ACG, Cacao, spring brook, 1170 m asl, 27.ii.1996, 3/0/0 mounted, 3/0/0 unmounted; CR 139, Guanacaste, ACG, Cacao, rheocrene, 1150 m asl, 27.ii.1996, 1/0/0 mounted, 1/0/0 unmounted; CR 140, Guanacaste, ACG, Cacao, Quebrada Florcita, small stream, 740 m asl, 28.ii.1996, 2/0/0 mounted, 1/2/0 unmounted; CR 145, Guanacaste, ACG, Las Pailas, Rincon de la Vieja, small sulphurous stream, 740 m asl, 29.ii.1996, 0/1/0 mounted; CR 158, Cartago, NP Tapanti, small stream, 1420 m asl, 06.iii.1996, 1/2/0 mounted; CR 160, Cartago, NP Tapanti, Quebrada Palmitas, flowing small stream, 1500 m asl, 06.iii.1996, 1/0/0 mounted; CR 164, San José, La Fonda, Carretera Braulio, spring brook, 1480 m asl, 09.iii.1996, 2/0/0 mounted, 2/10/0

Table 2. Measurements (μm) of *Torrenticola costaricense*; $N = 46$ (male), 12 (female)

	Male					Female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	701	753	667	849	44.3	800	746	868	40.2
Idiosoma W	594	618	544	755	52.6	672	613	721	34.8
Idiosoma L/W	1.18	1.20	1.11	1.30	0.05	1.18	1.13	1.29	0.05
Cx-I tL	314	314	284	358	14.5	321	304	329	8.4
Cx-III W	412	412	368	500	28.9	432	417	461	12.9
Cx-I tL/Cx-III W	0.76	0.75	0.67	0.82	0.04	0.73	0.69	0.77	0.03
Ds L	608	652	559	760	46.6	706	628	731	35.7
Dp L	574	618	525	706	44.8	666	594	697	35.7
Ds W	481	527	461	628	38.8	570	520	613	28.5
Ds L/W	1.27	1.24	1.16	1.29	0.03	1.23	1.17	1.27	0.03
Dp L/W	1.19	1.17	1.08	1.23	0.03	1.16	1.11	1.20	0.03
A-m platelet L	184	189	159	218	13.1	187	169	206	10.7
A-m platelet W	61	69	58	83	5.9	71	64	76	4.0
A-m platelet L/W	3.00	2.69	2.44	3.00	0.1	2.71	2.46	2.93	0.1
Capitular bay L	164	164	135	181	10.2	178	159	184	9.2
Capitular bay W	69	76	64	102	8.1	87	74	98	7.6
Cb L/W	2.39	2.13	1.51	2.44	0.2	2.07	1.63	2.38	0.2
Dist cb – gf	216	224	203	279	15.7	181	174	191	5.6
Cx-I mL	152	157	135	194	10.6	145	132	153	5.6
Cx-II + III mL	54	59	39	78	8.0	27	25	42	5.0
Cx-I tL/Cx-II/III mL	5.82	5.35	4.00	8.63	0.9	11.83	7.42	13.41	1.7
Cx-I/Cx-II + III mL	2.82	2.67	1.87	4.25	0.4	5.50	3.41	5.90	0.8

Table 2. *Continued*

	Male					Female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Genital field L	159	172	147	206	14.2	176	164	191	7.6
Gf L/Cx-II + III mL	2.95	2.91	2.12	4.63	0.5	6.31	3.94	7.80	1.0
Genital field W	141	145	131	162	7.2	170	157	179	6.8
Genital field L/W	1.13	1.19	1.09	1.33	0.1	1.03	0.99	1.07	0.02
Gf L/Id L	0.23	0.23	0.22	0.26	0.01	0.22	0.20	0.23	0.01
Gf L/dist cb – gf	0.74	0.81	0.69	0.88	0.1	0.97	0.86	1.04	0.1
Dist gf – expo	120	147	110	164	14.9	181	157	209	14.5
Dist gf – cauda	167	196	164	250	24.7	255	238	336	33.7
Gs L	250	292	228	326	27.3				
Gs aL		100	81	127	11.0				
Gs W	125	147	115	208	20.8				
Gs aL/tL		0.35	0.28	0.44	0.04				
Gs tL/W	2.00	1.95	1.31	2.46	0.3				
Capitulum vL	312	319	282	331	10.7	338	317	353	10.0
Capitulum dL	238	238	211	252	9.6	247	238	263	9.1
Rostrum L	127	127	104	137	7.1	137	127	147	6.1
Capitulum H	143	147	125	164	8.5	159	145	164	5.4
R L/c dL	0.54	0.53	0.49	0.58	0.02	0.53	0.52	0.56	0.01
R L/c vL	0.41	0.40	0.36	0.42	0.02	0.40	0.36	0.43	0.02
Gn bend depth	20	22	17	27	2.3	23	20	25	1.8
Chelicera L	386	390	343	413	14.5	410	396	431	12.7
Chelicera H	31	29	27	37	2.3	34	32	37	1.9
Chelicera L/H	12.60	12.88	10.67	14.36	0.8	11.79	11.00	13.27	0.7
Chelicera bs L	322	326	287	347	12.6	343	326	360	11.7
Chelicera claw L	64	64	56	67	2.5	69	66	71	1.9
Chel bs/claw L	5.06	5.12	4.76	5.48	0.2	5.00	4.67	5.27	0.2
P1 dorsal L	39	39	36	45	2.5	42	37	44	1.8
P2 dL	92	94	81	105	5.0	103	96	113	4.7
P3 dL	62	64	56	71	3.0	68	64	71	1.9
P4 dL	82	86	76	100	5.1	91	83	98	4.8
P5 dL	15	17	15	20	1.1	17	16	20	1.0
Palp total L	290	299	265	337	14.5	321	301	338	10.9
P4 vL	59	59	51	74	5.3	65	56	71	4.8
P4 vL to seta	32	34	27	45	4.0	36	31	42	3.7
P4 vL/L to seta	1.85	1.75	1.58	1.93	0.1	1.79	1.65	1.92	0.1
P1 rel L	0.14	0.13	0.12	0.14	0.01	0.13	0.12	0.14	0.01
P2 rel L	0.32	0.31	0.30	0.33	0.01	0.32	0.31	0.33	0.01
P3 rel L	0.22	0.21	0.20	0.22	0.01	0.21	0.20	0.22	0.01
P4 rel L	0.28	0.29	0.27	0.30	0.01	0.28	0.28	0.30	0.01
P5 rel L	0.05	0.06	0.05	0.06	0.00	0.05	0.05	0.06	0.00
P1 H	38	39	32	44	2.7	40	37	47	3.1
P2 H	49	49	44	56	2.6	54	50	56	1.6
P3 H	42	44	39	47	2.0	45	44	49	1.4
P4 H	29	29	27	32	1.5	32	29	32	1.0
P5 H	12	12	10	15	0.6	12	12	12	0.00
P1 L/H	1.03	1.00	0.88	1.23	0.1	0.99	0.92	1.10	0.1
P2 L/H	1.88	1.90	1.75	2.00	0.1	1.91	1.86	2.00	0.05
P3 L/H	1.50	1.47	1.35	1.65	0.1	1.47	1.42	1.53	0.03
P4 L/H	2.79	2.91	2.69	3.30	0.2	2.86	2.69	3.33	0.2
P5 L/H	1.20	1.40	1.00	1.60	0.1	1.40	1.30	1.60	0.1
P2/P4 L	1.12	1.10	1.03	1.18	0.03	1.12	1.05	1.18	0.04
P3/P4 L	0.76	0.74	0.68	0.80	0.03	0.74	0.68	0.81	0.03

unmounted; CR 208, Alajuela, San Ramon Field Station, left affluent to Río San Lorencito, small stream, 1000 m asl, 26.iii.1996, 9/2/0 mounted, 55/29/0 unmounted; CR 211, Alajuela, San Ramon, small stream, 700 m asl, 27.iii.1996, 5/1/0 mounted, 8/17/0 unmounted; CR 212, Alajuela, 12 km north San Ramon, Río Balsa, stream, 960 m asl, 27.iii.1996, 1/0/0 mounted; CR 216, Alajuela, Arenal, Río Agua Caliente, stream, 620 m asl, 29.iii.1996, 0/1/0 mounted; CR 223, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1100 m asl, 31.iii.1996, 1/0/0 mounted; CR 233, Guanacaste, ACG, Maritza, rheopsammocrene, 530 m asl, 04.iv.1996, 1/2/0 mounted, 0/1/0 unmounted; CR 233-II, Guanacaste, ACG, Maritza, rheopsammocrene, 530 m asl, 21.ii.1997, 4/4/0 mounted, 5/6/2 unmounted; CR 288, Guanacaste, Dos Ríos, Quebrada La Gato, small stream, 520 m asl, 03.ii.1997, 2/0/0 mounted; CR 289, Guanacaste, ACG, Nueva Zelandia, Río Cucaracho, small stream, 640 m asl, 03.ii.1997, 1/0/0 mounted, 0/2/0 unmounted; CR 291, Guanacaste, Río Sabalo, small stream, 540 m asl, 06.ii.1997, 1/0/0 unmounted; CR 299, Heredia, Zona Norte, affluent to Río Toro, small stream, 35 m asl, 09.ii.1997, 1/0/0 mounted, 1/4/0 unmounted; CR 309, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 0/1/0 unmounted; CR 310, Limón, Hitoy Cerere, small stream, 200 m asl, 12.ii.1997, 4/4/1 unmounted; CR 311, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 2/0/0 mounted, 13/8/1 unmounted; CR 312, Limón, Hitoy Cerere, left bank of Río Hitoy Cerere, rheopsammocrene, 190 m asl, 13.ii.1997, 2/0/0 mounted, 1/3/1 unmounted; CR 314, Limón, Hitoy Cerere, left affluent to Río Hitoy Cerere, small stream, 190 m asl, 13.ii.1997, 1/1/0 unmounted; CR 321, Limón, Bribri, waterfall, 110 m asl, 15.ii.1997, 1/0/0 mounted, 1/2/0 unmounted; CR 323, Guanacaste, ACG, Cacao, Quebrada San Josecito, small stream, 980 m asl, 20.ii.1997, 3/1/1 unmounted; CR 324, Guanacaste, ACG, affluent Quebrada San Josecito, small stream, 1000 m asl, 20.ii.1997, 0/2/0 unmounted; CR 325, Guanacaste, ACG, Cacao, bank of affluent to Quebrada San Josecito, rheopsammocrene, 1000 m asl, 20.ii.1997, 1/0/0 mounted, 1/0/0 unmounted; 01AA-MM-96, Guanacaste, ACG, Maritza, small stream, 05.v.1996, 1/5/0 unmounted, 02AA-MM-96, Guanacaste, ACG, Maritza, helocrene, 05.v.1996, 1/1/0 mounted, 3/3/0 unmounted; 03AA-MM-96 Guanacaste, ACG, Maritza, small stream, 05.v.1996, 77/79/0 unmounted; 05AA-MM-96, Guanacaste, ACG, Maritza, rheohelocrene, 05.v.1996, 11/12/0 unmounted.

Habitat: Mainly slow to fast flowing spring brooks, small streams, streams (also one polluted stream), rheocrenes, rheopsammocrenes, rheohelocrenes, some very fast flowing small streams, streams and waterfalls, some hygropetric areas and standing helocrenes

(the only species also found in standing water!) at 35–1960 m asl (mainly 500–1500 m asl); mesolital, akal, psammal (to lower proportions: macropelal, micropelal, macrolital, lithophyal, leaf packages, terrestrial vegetation, phytal); temperature 15.0–30.8 °C; conductivity 17–146 $\mu\text{S cm}^{-1}$ (one site 1047 $\mu\text{S cm}^{-1}$).

Distribution: Costa Rica (in all regions, mainly at mid elevations of the Cordillera de Guanacaste and Cordillera de Tilarán, also some sites in the Cordillera Central, northern, southern and Caribbean slope of the Cordillera de Talamanca).

Derivatio nominis: *costaricensis* (Spanish = Costa Rican); referring to the wide distribution of the species all over the country.

Diagnosis: Characters of the '*Rusetria*'-like species; relatively variable species: idiosoma +/- rounded, mid-sized to large; antero-medial dorsal platelets large; coxal field broad, relatively short, medial margin of Cx-II/III relatively short; genital field compact; capitulum high, ventrally with sharp bend, posterior part ventrally straight; P2/P3 with strong cone-shaped projections, P4 distally curved; genital skeleton with elongated cella proximalis.

Description – Male ($N = 78$): Idiosoma mid-sized to relatively large [L 701 μm (667–849 μm)], rounded to oval [L/W 1.18 (1.11–1.30)]; dorsal plate reddish or with pale red pattern (Fig. 6B-3), antero-medial platelets large, medially straight to convex, laterally slightly oblique; Dgl-4 medial to Dgl-5 (Fig. 11B); Cx-I tips relatively short, rounded, Cx-I/II/III laterally sharply graded; Cxgl-4 at the anterior tip of Cx-I; capitular bay U-shaped, lateral sides +/- straight, basely rounded; medial margin of Cx-II/III short (Fig. 11A, Table 2); posterior margin of Cx-IV postero-lateral of caudal end of genital field, directed slightly from postero-medially to antero-laterally; excretory pore between Vgl-2, slightly posterior caudal margin of primary sclerotization; genital field anterior truncated, lateral margins slightly convex, posterior rounded, slightly tapering (Fig. 11A); genital skeleton relatively large, apically short, cella proximalis large with long, slender processus proximalia (aL/tL 0.28–0.44), brachia distalia strong and short, brachia proximalia long (Fig. 11E); capitulum basely high, ventrally with sharp bend, rostrum mid-sized, basely high; palp strong, P2 ventrally slightly convex, dorsally convex in the proximal, straight in the distal part, ventro-distal projection strong, cone-shaped, pointed towards distal, P3 relatively long, ventro-distal projection smaller than projection of P2, cone-shaped, pointed towards ventral, P4 distally slightly tapering, slightly curved, ventral setae on flat hump (Fig. 11C, D).

Female ($N = 22$): Idiosoma similar to male (Table 2, Fig. 12A, B), on an average slightly larger (L 746–868 μm); medial margin Cx-II/III short; genital field rounded-rhombic (Fig. 12A); gnathosoma similar to male (Fig. 12C, D).

Discussion: This widespread species is relatively variable (Table 2) and very euryoecious. According to the measurements no clear differentiation between populations are visible. A wide variety exists in the width of the capitular bay (L/W 1.51–2.44), the proportions of the genital field (L/W 1.09–1.33 in males, 0.99–1.07 in females), the palp segments and the genital skeleton. However, these differences are continuous and cannot be related to certain habitats (springs, streams), elevations or different geographical regions.

TORRENTICOLA FONTINALE SP. NOV.

(FIGS 13A–E, 14A–D, TABLE 3)

Type series: Holotype male, CR 201, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Los Migueles, rheopsammocrene, 150 m asl, 23.iii.1996, mounted; paratypes, same locality and date, 2/3/0 mounted, 4/7/0 unmounted.

Additional specimens examined: CR 184, Puntarenas, Peninsula de Osa, Finca de Juan Francisco Sanchez, rheocrene, 130 m asl, 17.iii.1996, 1/0/0 mounted.

Habitat: Slow flowing rheopsammocrenes and rheocrenes at low elevations (130–150 m asl) in rainforest; akal, psammal, mesolital; temperature 24.9 °C; conductivity 160–194 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Peninsula de Osa).

Derivatio nominis: *fontinale* (Latin = dedicated to the god of springs); as the species has exclusively been found in several springs.

Diagnosis: Characters of the '*Rusetria*'-like species; idiosoma oval; antero-medial dorsal platelets relatively long; dorsal plate reddish; coxal field slightly elongated, anterior tips of Cx-I noticeably truncated, very broad; capitular bay very wide, lateral margins slightly convex; rostrum elongated (especially in males, female bear thicker rostrum), ventral margin of capitulum flatly sigmoid curved; P2 with strong cone-shaped ventro-distal projection.

Description – Male ($N = 4$): Idiosoma mid-sized [L 613 μm (628–647 μm)], oval [L/W 1.36 (1.32–1.35)]; dorsal plate rounded-oval [L/W 1.18 (1.15–1.18)], antero-medial platelets relatively large, medially rounded, laterally straight, slightly oblique, Dgl-4 lateral to Dgl-5 (Dgl-3, -4, -5 lay on a straight line) (Fig. 13B); coxal field elongated [Cx-I tL/Cx-III W 0.86 (0.84–0.87)], especially Cx-II/III elongated, Cx-I more compact, anterior tips truncated, very broad; Cxgl-4

antero-laterally on the truncated Cx-I tips; capitular bay large, very wide, lateral margins slightly convex; medial margin of Cx-II/III relatively short; posterior margins of Cx-IV postero-lateral of genital field, oblique towards antero-lateral; excretory pore on caudal margin of primary sclerotization, slightly anterior to the very close Vgl-2; genital field in posterior half of ventral shield, small [L/Id L 0.22 (0.21–0.22)], elongated, anterior truncated, lateral margins straight, posterior tapering (Fig. 13A); genital skeleton apically small, triangular, cella proximalis large, without processus proximalia [aL/tL 0.36 (0.25–0.34)], brachia proximalia well developed, elongated, brachia distalia very weak, merely visible (Fig. 13E); capitulum ventrally flatly curved, basally nearly straight, at base of rostrum heavily sculptured, rostrum straight, long; P2 and P3 very long, ventro-distal projection of P2 large cone-shaped, that of P3 smaller, truncated; P4 relatively small [P2/P4 1.44 (1.44)], without ventral projections, distally tapering, relatively straight (Fig. 13C, D).

Female ($N = 3$): Idiosoma similar to male, larger (L 647–726); dorsal plate broader (L/W 1.12–1.15), anterior truncated (Fig. 14B); coxal field wider than in male (Cx-I tL/Cx-III W 0.75–0.85), Cx-II/III laterally more graded; capitular bay even wider, lateral margin clearly convex; medial margin of Cx-II/III very short (Table 3, Fig. 14A); genital field large, rhombic, anterior truncate, laterally +/- straight, posterior tapering; excretory pore between to slightly posterior Vgl-2, pore and glands posterior to caudal margin of primary sclerotization (Fig. 14A); capitulum and rostrum higher, shorter than in males (Fig. 14C), palp similar to male (Fig. 14C, D).

Discussion: The combination of a '*Rusetria*'-like dorsal shield and a long and slender rostrum characterizes this species, furthermore, it is typified by the very wide capitular bay and the very broad truncated anterior tips of the Cx-I. The absence of processus proximalia at the cella proximalis is also very characteristic. Together with *T. amalgamada* these are the only species of the genus in their distribution restricted to rainforest springs on the Peninsula de Osa in south-western Costa Rica. These two species can be regarded as relicts of the ancient fauna of the Nicoya Complex, the oldest geological formation in southern Central America (Savage, Flowers & Porras, 2005).

TORRENTICOLA GRADATICOXALIS K.O. VIETS, 1977
(FIG. 15A–E, TABLE 4)

Type series: Holotype male, Guatemala, km 148 road Guatemala Ciudad to Cobán, at Niño Perdido, Quebrada del Niño, 11.vii.1974, leg. Böttger, prep. no.

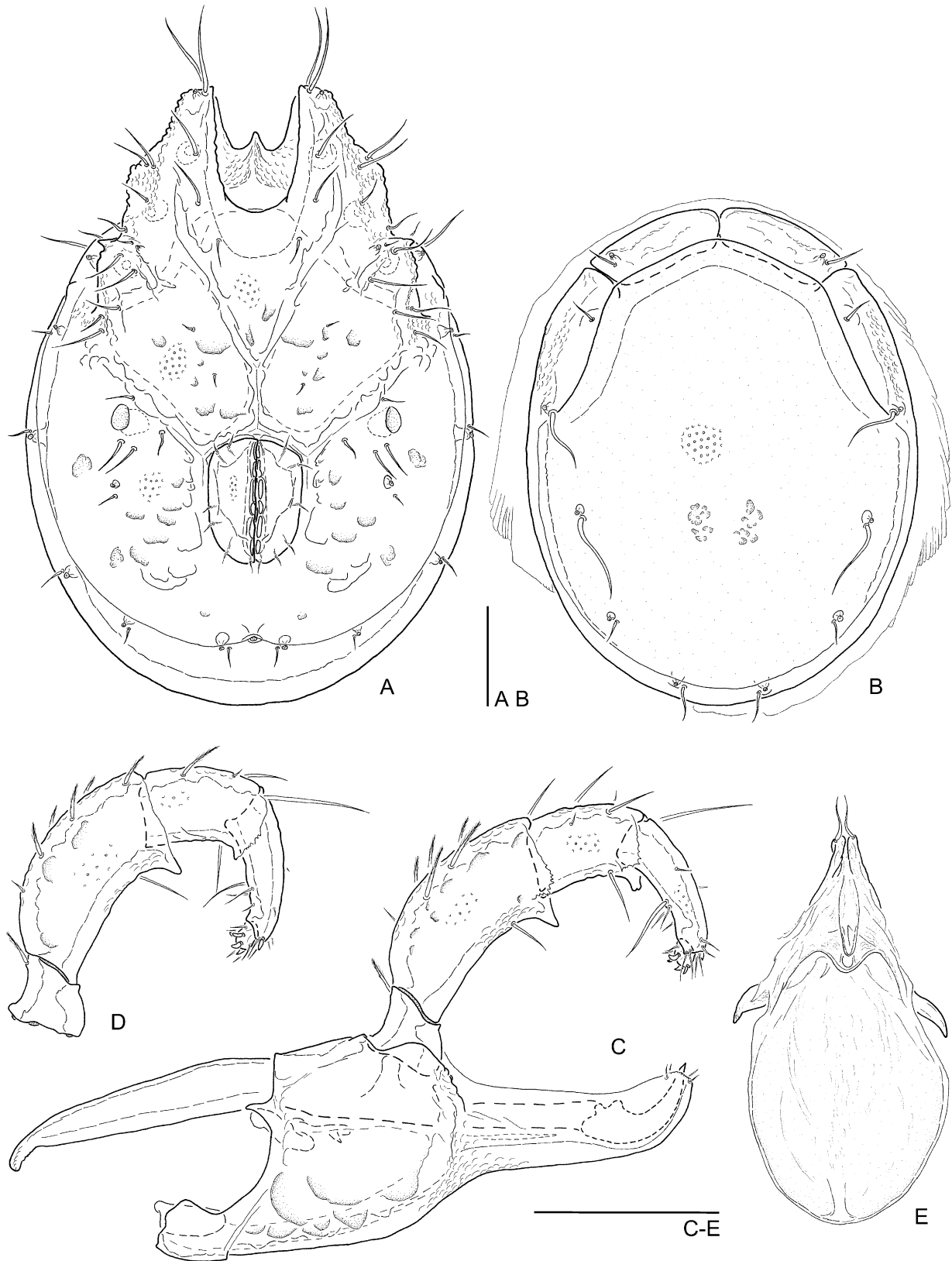


Figure 13. *Torrenticola fontinale*. A–E, holotype male (CR 201). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 μ m.

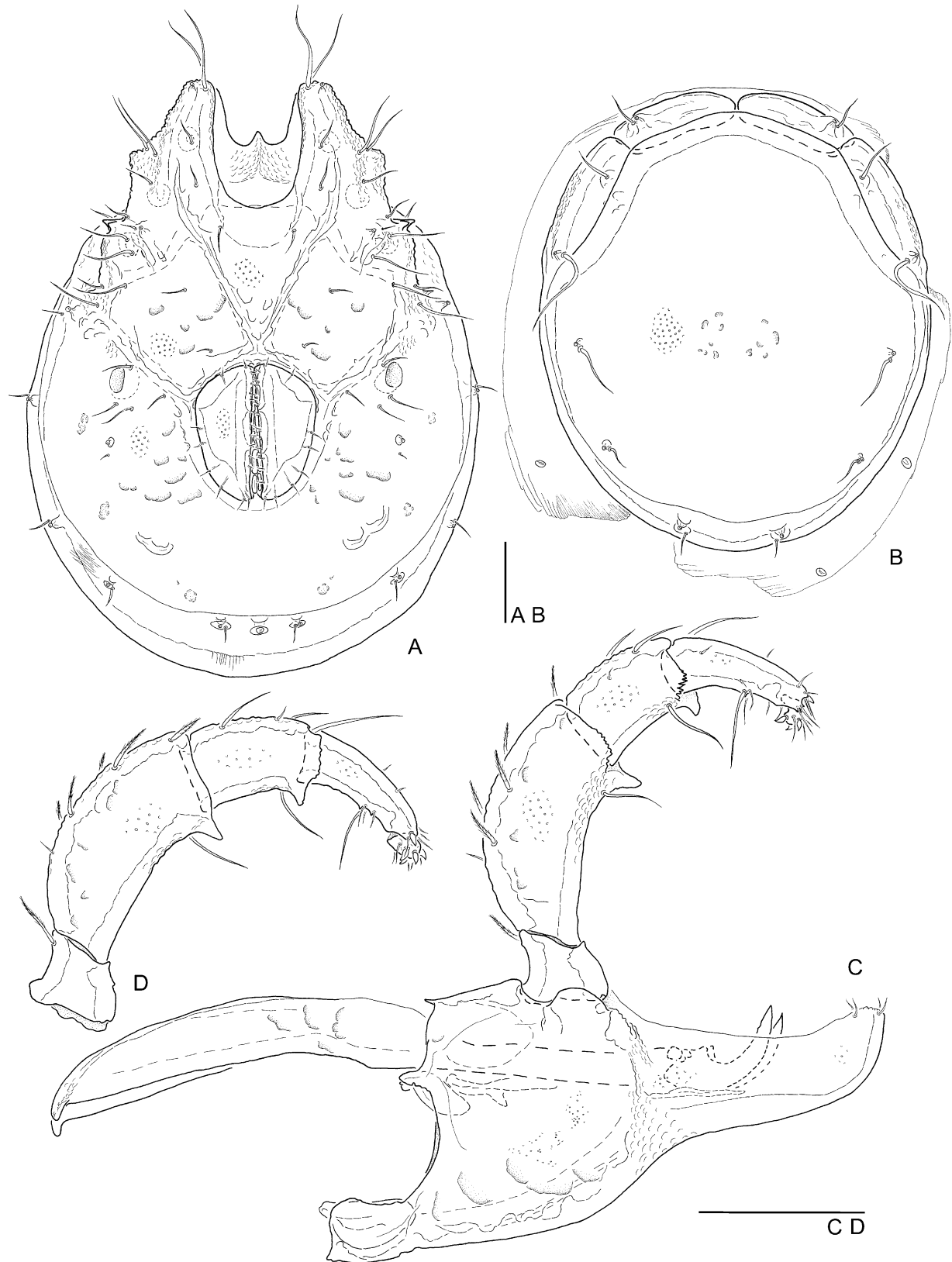


Figure 14. *Torrenticola fontinale*. A–D, paratype female (CR 201). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 3. Measurements (μm) of *Torrenticola fontinale*; $N = 4$ (male), 3 (female)

	Male					Female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	613	633	613	647	14.6	716	647	726	42.8
Idiosoma W	451	468	451	491	16.2	540	520	549	15.0
Idiosoma L/W	1.36	1.35	1.32	1.36	0.02	1.30	1.25	1.35	0.1
Cx-I tL	280	284	280	289	5.7	309	280	324	22.5
Cx-III W	324	334	324	343	8.0	383	373	383	5.7
Cx-I tL/Cx-III W	0.86	0.85	0.84	0.87	0.01	0.81	0.75	0.85	0.05
Ds L	491	510	491	530	17.9	559	520	579	30.0
Dp L	461	483	461	500	17.2	540	495	549	28.7
Ds W	392	414	392	432	16.2	481	432	481	28.3
Ds L/W	1.25	1.24	1.21	1.25	0.02	1.20	1.16	1.20	0.02
Dp L/W	1.18	1.17	1.15	1.18	0.01	1.14	1.12	1.15	0.01
A-m platelet L	135	142	135	149	6.3	154	152	156	1.9
A-m platelet W	49	53	49	54	2.3	51	51	54	1.4
A-m platelet L/W	2.75	2.75	2.59	2.77	0.1	2.95	2.86	3.02	0.1
Capitular bay L	123	129	123	132	4.2	147	145	152	3.7
Capitular bay W	81	85	81	91	4.2	108	105	110	3.5
Cb L/W	1.52	1.51	1.46	1.54	0.04	1.35	1.33	1.37	0.03
Dist cb – gf	225	232	221	243	10.3	191	172	192	11.7
Cx-I mL	159	158	145	164	8.3	162	142	176	17.2
Cx-II + III mL	59	70	59	71	5.8	18	17	20	1.7
Cx-I tL/Cx-II/III mL	4.75	4.07	4.07	4.75	0.3	16.03	15.77	16.30	0.4
Cx-I/Cx-II + III mL	2.71	2.26	2.11	2.71	0.3	8.27	8.25	8.29	0.0
Genital field L	132	134	130	140	4.2	159	147	174	13.5
Gf L/Cx-II + III mL	2.25	1.93	1.89	2.25	0.2	8.35	8.13	8.57	0.3
Genital field W	96	102	96	105	5.1	147	140	152	6.2
Genital field L/W	1.38	1.33	1.28	1.38	0.04	1.08	1.05	1.15	0.05
Gf L/Id L	0.22	0.21	0.21	0.22	0.01	0.23	0.22	0.24	0.01
Gf L/dist cb – gf	0.59	0.58	0.57	0.59	0.01	0.86	0.83	0.91	0.04
Dist gf – expo	74	92	74	105	15.9	152	135	159	12.6
Dist gf – cauda	137	142	130	147	8.3	208	186	233	23.3
Gs L	213	216	211	221	4.5				
Gs aL	76	69	54	76	9.5				
Gs W	118	116	108	137	12.6				
Gs aL/tL	0.36	0.32	0.25	0.36	0.05				
Gs tL/W	1.81	1.85	1.54	2.05	0.2				
Capitulum vL	299	313	299	321	9.2	363	341	363	12.7
Capitulum dL	225	232	225	238	5.1	274	257	274	9.9
Rostrum L	126	128	120	132	5.3	140	132	142	5.1
Capitulum H	115	121	115	125	4.2	157	145	159	7.9
R L/c dL	0.56	0.56	0.52	0.56	0.02	0.51	0.51	0.52	0.00
R L/c vL	0.42	0.41	0.38	0.42	0.02	0.39	0.39	0.39	0.00
Gn bend depth		15	15	15					
Chelicera L	360	376	360	380	9.2	443	436	451	10.4
Chelicera H	29	31	29	32	1.4	34	32	39	3.7
Chelicera L/H	12.25	12.09	11.69	12.92	0.5	12.60	11.50	13.69	1.6
Chelicera bs L	301	314	301	316	6.6	366	360	372	8.7
Chelicera claw L	59	61	59	66	3.7	78	76	81	2.4
Chel bs/claw L	5.13	5.04	4.74	5.33	0.3	4.75	4.74	4.75	0.01
P1 dorsal L	37	37	37	38	0.6	44	44	44	0.00
P2 dL	116	120	116	120	1.8	142	132	145	6.5
P3 dL	64	67	64	69	2.3	78	74	78	2.8
P4 dL	81	83	81	83	1.2	93	88	93	2.8

Table 3. Continued

	Male					Female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P5 dL	17	18	13	20	2.6	22	22	22	0.00
Palp total L	315	325	315	327	5.5	380	360	382	12.1
P4 vL		60	59	61	1.7				
P4 vL to seta		35	33	37	2.6				
P4 vL/L to seta		1.72	1.67	1.78	0.1				
P1 rel L	0.12	0.11	0.11	0.12	0.00	0.12	0.12	0.12	0.00
P2 rel L	0.37	0.37	0.37	0.37	0.00	0.37	0.37	0.38	0.01
P3 rel L	0.20	0.21	0.20	0.21	0.00	0.21	0.20	0.21	0.00
P4 rel L	0.26	0.26	0.25	0.26	0.00	0.24	0.24	0.25	0.00
P5 rel L	0.05	0.06	0.04	0.06	0.01	0.06	0.06	0.06	0.00
P1 H	44	44	44	47	1.2	54	49	54	2.8
P2 H	51	53	51	54	1.4	64	59	64	2.8
P3 H	39	42	39	42	1.2	47	44	49	2.4
P4 H	28	29	27	29	1.2	33	32	34	1.2
P5 H	10	11	10	12	1.4	12	12	12	0.00
P1 L/H	0.83	0.83	0.79	0.86	0.03	0.82	0.82	0.90	0.05
P2 L/H	2.26	2.24	2.23	2.33	0.05	2.25	2.23	2.27	0.02
P3 L/H	1.63	1.64	1.59	1.65	0.03	1.67	1.60	1.68	0.04
P4 L/H	2.87	2.85	2.83	3.09	0.1	2.77	2.71	2.81	0.1
P5 L/H	1.75	1.68	1.10	1.88	0.3	1.80	1.80	1.80	0.00
P2/P4 L	1.44	1.44	1.44	1.44	0.00	1.53	1.50	1.55	0.03
P3/P4 L	0.79	0.81	0.79	0.82	0.02	0.84	0.83	0.84	0.01

5678 SMF; allotype female, Guatemala, km 150–151 Road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 16.viii.1974, leg. Böttger, prep. no. 5727 SMF.

Further material: Guatemala, leg. Böttger: near Finca Sacté, north-west Cobán, Río Cuxja, 800 m asl, 24.vii.1974, 1/0/0 mounted, prep. no. 5963 SMF; km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 17.viii.1974, 1/0/0 mounted, prep. no. 6274 SMF. (According to slide material at SMF, not all mentioned in K.O. Viets, 1977/78 Teil I).

Habitat: Small mountain streams.

Geographical distribution: Guatemala.

Published records: K.O. Viets 1977/78 Teil I.

Diagnosis: Characters of the ‘*Rusetria*’-like species; idiosoma rounded-oval; dorsal plate reddish, antero-medial dorsal platelets large; lateral margins of coxal field very sharply graded, antero-lateral corner of Cx-II forms an anterior pointed edge, medial margin of Cx-II/III in male very short, in female Cx-III medially meet at genital field; capitulum basely high, ventral margin proximally oblique, with sharp bend towards mid-sized rostrum.

Description: See K.O. Viets 1977/78 Teil I.

Discussion: The species is clearly characterized by the shape of the lateral margin of the coxal field. In the description of *T. gradaticoxalis*, K.O. Viets (1977/78 Teil I) mentioned that the caudal end of the antero-lateral dorsal platelets would be unclear, actually – according to new investigations of the slide material at the SMF (see above) – these platelets are completely fused with the main dorsal plate.

***TORRENTICOLA HARPAGOPHORA* SP. NOV.**

(FIG. 16A–D; TABLE 4)

Type series: Holotype female, CR 162, Limon, right affluent of Río Corinto, spring brook, 500 m asl, 07.iii.1996, mounted.

Additional specimens examined: CR 215, Alajuela, Finca Cerro Chato, affluent Río Agua Caliente, small stream, 760 m asl, 29.iii.1996, 0/1/0, mounted; CR 227, Guanacaste, Tenorio, spring brook, 1000 m asl, 02.iv.1996, 0/1/0 unmounted; CR 285, Guanacaste, ACG, Sta. Maria, Rincon de la Vieja, spring at right bank of Río Negro, rheopsammocrene, 750 m asl, 31.i.1997, 0/1/0, mounted.

Habitat: Fast flowing spring, slow and fast flowing spring brooks and small stream at mid elevations

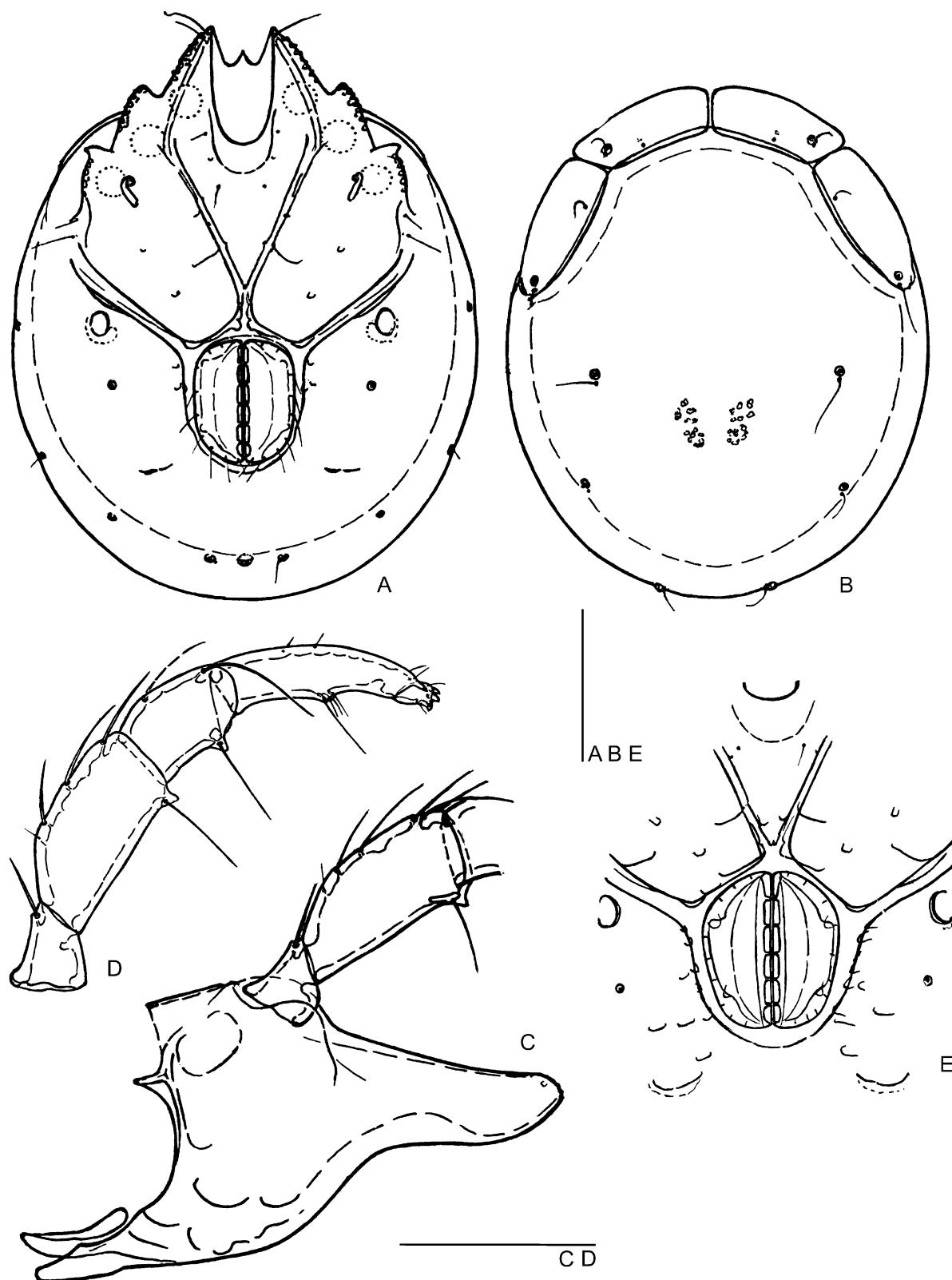


Figure 15. *Torrenticola gradaticoxalis*. A–D, holotype male, prep. no. 5678 SMF, Viets collection; E, allotype female, prep. no. 5727 SMF, Viets collection; after K.O. Viets (1977/78, Teil I). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, left palp, medial view; E, genital field and central part of coxal field. Scale bars = 100 μ m.

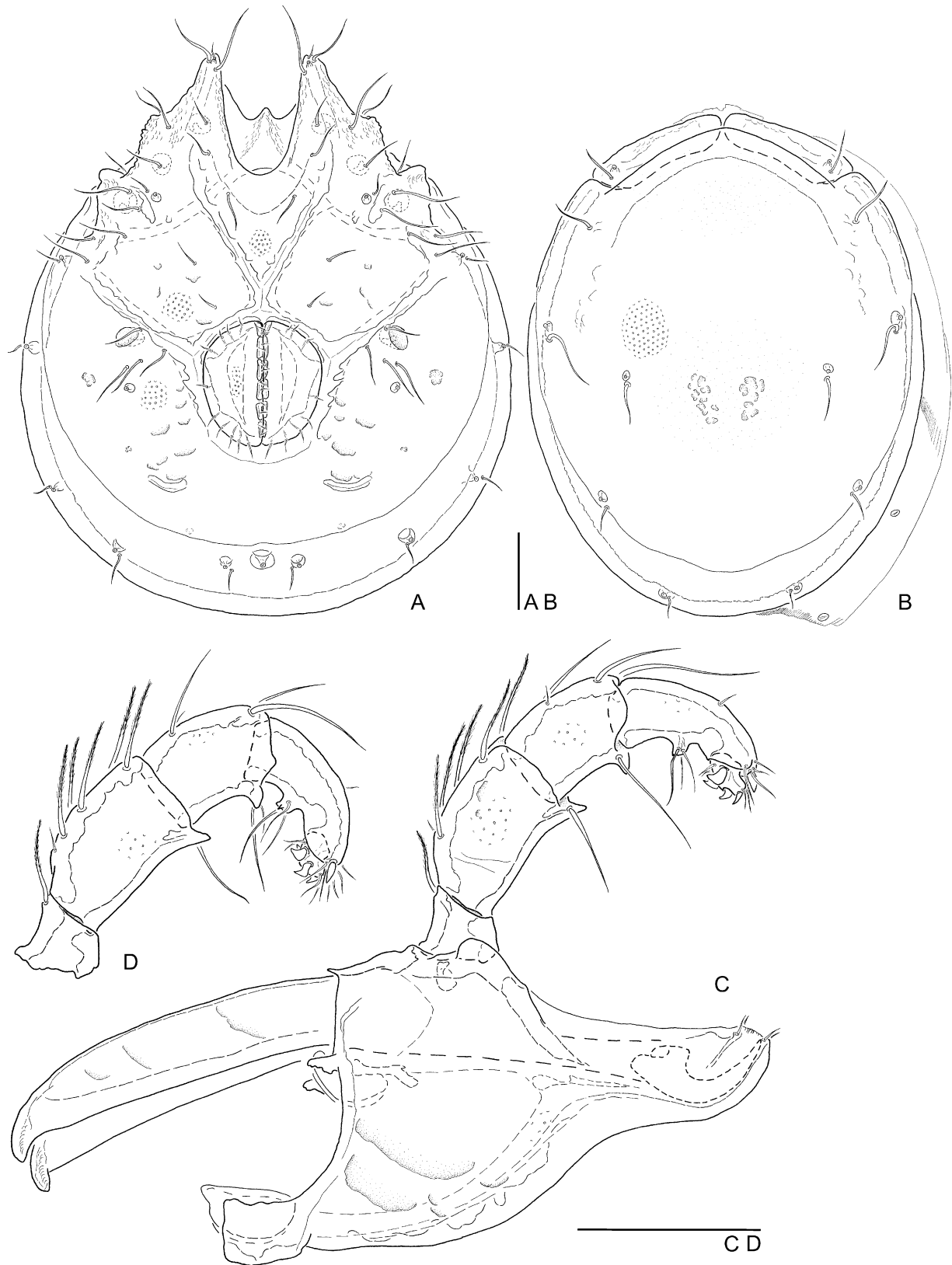


Figure 16. *Torrenticola harpagophora*. A–D, holotype female (CR 162). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 4. Measurements (μm) of *Torrenticola gradaticoxalis*; $N = 1$ (male, holotype), 1 (female, paratype – designated as allotype) and *T. harpagophora*; $N = 3$ (females). The measurements for *T. gradaticoxalis* not given in the original description (K.O. Viets, 1977/78 Teil I) were completed by new measurements of the preparations of the type specimens (SMF, Viets collection)

	<i>gradaticoxalis</i>		<i>harpagophora</i>				
	male	female	female				
	ht	pt	ht	mean	min.	max.	SD
Idiosoma L	780	932	706	765	706	780	38.9
Idiosoma W	647	824	618	652	618	677	29.6
Idiosoma L/W	1.20	1.13	1.14	1.15	1.14	1.17	0.02
Cx-I tL	353	358	294	314	294	324	15.0
Cx-III W	441	471	422	446	422	456	17.7
Cx-I tL/Cx-III W	0.80	0.76	0.70	0.70	0.70	0.71	0.01
Ds L	697	814	638	687	638	716	39.6
Dp L	643	755	618	662	618	677	30.6
Ds W	589	652	505	525	505	544	19.6
Ds L/W	1.18	1.25	1.26	1.31	1.26	1.32	0.03
Dp L/W	1.09	1.16	1.22	1.24	1.22	1.26	0.02
A-m platelet L	201	218	181	186	181	191	6.9
A-m platelet W	78	86	49	54	49	59	6.9
A-m platelet L/W	2.56	2.54	3.70	3.48	3.25	3.70	0.3
Capitular bay L	164	172	152	162	152	164	6.5
Capitular bay W	74	88	103	100	96	103	3.7
Cb L/W	2.23	1.94	1.48	1.61	1.48	1.72	0.1
Dist cb – gf	255	212	186	189	186	194	3.7
Cx-I mL	196	194	149	154	149	162	6.2
Cx-II + III mL	51	15	27	25	20	27	3.7
Cx-I tL/Cx-II/III mL	6.86	24.36	10.92	12.81	10.92	16.52	2.8
Cx-I/Cx-II + III mL	3.81	13.17	5.55	6.30	5.55	8.25	1.4
Genital field L	181	213	167	174	167	174	4.2
Gf L/Cx-II + III mL	3.52	14.50	6.18	7.10	6.18	8.88	1.4
Genital field W	147	184	154	163	154	165	5.8
Genital field L/W	1.23	1.16	1.08	1.07	1.05	1.08	0.01
Gf L/Id L	0.23	0.23	0.24	0.23	0.22	0.24	0.01
Gf L/dist cb – gf			0.89	0.90	0.89	0.92	0.01
Dist gf – expo	145	230	149	154	149	174	13.0
Dist gf – cauda	186	338	208	240	208	252	22.8
Gs L	252						
Gs aL	96						
Gs aL/tL	0.38						
Capitulum vL	292	319	317	337	317	355	19.0
Capitulum dL	225	223	240	265	240	270	15.8
Rostrum L	120	108	105	113	105	123	8.6
Capitulum H	149		167	176	167	176	5.7
R L/c dL	0.53	0.48	0.44	0.44	0.43	0.45	0.01
R L/c vL	0.41	0.34	0.33	0.33	0.33	0.34	0.01
Gn bend depth	22		12	17	12	18	3.2
Chelicera L	360		412	439	412	451	20.1
Chelicera H	27		42	42	40	42	0.7
Chelicera L/H	13.36		9.88	10.82	9.88	10.85	0.6
Chelicera bs L	296		343	365	343	380	18.5
Chelicera claw L	64		69	71	69	74	2.5

Table 4. Continued

	<i>gradaticoxalis</i>		<i>harpagophora</i>				
	male	female	female				
	ht	pt	ht	mean	min.	max.	SD
Chel bs/claw L	4.65		5.00	5.00	4.97	5.34	0.2
P1 dorsal L	40	47	38	39	38	43	2.6
P2 dL	98	107	91	100	91	102	6.0
P3 dL	62	66	74	76	74	81	3.7
P4 dL	104	110	88	91	88	96	3.7
P5 dL	12	15	25	22	20	25	2.4
Palp total L	317	344	315	326	315	343	14.2
P4 vL	81	88	49	51	49	51	1.4
P4 vL to seta	49	51	29	29	28	29	0.7
P4 vL/L to seta	1.65	1.71	1.67	1.75	1.67	1.83	0.1
P1 rel L	0.13	0.14	0.12	0.12	0.12	0.13	0.00
P2 rel L	0.31	0.31	0.29	0.30	0.29	0.31	0.01
P3 rel L	0.20	0.19	0.23	0.23	0.23	0.24	0.00
P4 rel L	0.33	0.32	0.28	0.28	0.28	0.28	0.00
P5 rel L	0.04	0.04	0.08	0.06	0.06	0.08	0.01
P1 H	39	44	45	49	45	49	2.1
P2 H	49	56	56	60	56	64	3.7
P3 H	43	48	48	49	48	54	3.2
P4 H	27	31	37	37	37	42	2.8
P5 H	12	12	17	17	17	17	0.00
P1 L/H	1.03	1.06	0.84	0.84	0.80	0.88	0.04
P2 L/H	2.00	1.89	1.61	1.61	1.60	1.67	0.04
P3 L/H	1.46	1.38	1.54	1.54	1.50	1.55	0.03
P4 L/H	3.86	3.60	2.40	2.40	2.29	2.47	0.1
P5 L/H	1.00	1.20	1.43	1.29	1.14	1.43	0.1
P2/P4 L	0.94	0.97	1.03	1.06	1.03	1.11	0.04
P3/P4 L	0.60	0.60	0.83	0.84	0.83	0.85	0.01

(500–1000 m asl); mesolithal, akal, leaf packages, macropelal, psammal, lithophyal, macrolithal and micropelal; temperature 20.1–21.1 °C; conductivity 21–86 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (scattered on the Caribbean and Pacific slope of the Cordillera Central, Cordillera de Tilarán and Cordillera de Guanacaste).

Derivatio nominis: *harpago* (Latin = grapnel), *phor-* (Greek = carry); referring to the curved P4 and hook-shaped P5-bristles.

Diagnosis (only females): Characters of the ‘*Rusetria*’-like species; idiosoma rounded; dorsal plate reddish or with reddish pattern; antero-medial dorsal platelets long and narrow; coxal field short and broad, Cx-II/III medial margin relatively short, capitular bay relatively wide; capitulum ventrally curved with deep bend, rostrum relatively short; chelicera compact; P3 relatively long, P4 compact, curved, with ventral bris-

cles on a strong, characteristic tubercle, bristles at P5 strong.

Description – Male: Unknown.

Female ($N = 3$): Idiosoma medium sized, very broad, rounded, nearly circular [L 706 μm (765–780 μm), L/W 1.14 (1.15–1.17)] (Fig. 16A); dorsal plate with reddish pattern (Fig. 6B-1, 6B-3, very pale in one specimen), antero-medial platelets long and narrow (Table 4), medially rounded, laterally oblique (Fig. 16B) (in one specimen fused medially); Dgl-4 clearly medial to Dgl-5 (Fig. 16B); coxal field wide [Cx-I tL/Cx-III W 0.70 (0.70–0.71)]; Cx-II/III laterally sharply graded; Cxgl-4 slightly posterior the anterior tip of Cx-I; capitular bay +/- U-shaped, diverging, basely rounded; medial margin of Cx-II/III short; posterior margin of Cx-IV postero-lateral of caudal end of genital field, across (Table 4, Fig. 16A); excretory pore between Vgl-2; genital field nearly rounded, broad, only slightly tapering poste-

rior (Fig. 16A); ventral margin of capitulum sigmoid curved, rostrum relatively short and thick; palp strong, P1 short, P2 with nearly straight ventral and dorsal margin, ventro-distal projection strong, triangular, distally pointed, P3 relatively long, ventro-distal projection of equal size as projection of P2, hook-shaped, curved to proximal, P4 compact, strongly curved, ventral bristles inserted on a strong, truncated cone, P5 inserted ventro-distally at P4, strong with heavy, hooked claws, inserted nearly ventro-distally at P5 (Fig. 16C, D); chelicera strong, compact (Table 4, Fig. 16C).

Discussion: At each of the four sample sites only one female specimen was found. Nevertheless, the very slender antero-medial dorsal platelets as well as the characteristic shape of the P4 clearly differentiate this species.

BOETTGERI-GROUP

Previously known species: *T. boettgeri* K.O. Viets, 1977 (Guatemala), *T. esbelta* Cramer, 1992 (Mexico), *T. kurtvietsi* Cramer, 1992 (Mexico).

New species from Costa Rica: *T. elhachensis*, *T. menudopalpis*, *T. ratoncitoi*.

Differential diagnosis of the group: Coxal field (especially Cx-I/II) elongated, lateral margins of Cx-I/II smooth (not graded); capitular bay deep and narrow; palp short, especially P4 noticeably short, P3 relatively long (L similar P2), P2/P3 without ventral projections.

Discussion: The species descriptions of this group available until now did not provide much information: *T. esbelta* and *T. boettgeri* are only known in single females; no capitulum is illustrated in the description of *T. boettgeri* – unfortunately in the only slide of this species (prep. no. 6381 SMF, Viets collection, holotype, female) the capitulum is positioned oblique. As far as visible, the shape of the capitulum is similar to the other species of the group. No type material was available of the two Mexican species. Nevertheless, the shape of the capitular bay and the palps are characteristic and very similar in all species of the group and due to these unique characters, the *boettgeri*-group is regarded as a phylogenetic entity. The Costa Rican species of the *boettgeri*-group were found in small populations in small streams, spring brooks and springs.

Key to the species

- | | | |
|----|---|------------------------|
| 1a | Idiosoma very slender (L/W 1.7–1.8) (only known in female)..... | 2 |
| b | Idiosoma oval [L/W 1.3–1.6 (mostly ~1.4)]..... | 3 |
| 2a | P4 very short (rel L 0.16, P2/P4 2.0, P3/P4 1.8), tapering; genital field shorter (gf L/Id L 0.20) (Fig. 17)..... | <i>T. boettgeri</i> |
| b | P4 short (longer than in <i>T. boettgeri</i>) (rel L 0.20, P2/P4 1.6, P3/P4 1.5); genital field longer (gf L/Id L 0.28) (Fig. 19)..... | <i>T. esbelta</i> |
| 3a | Palp relatively long (tL ~190 µm) (with relatively smaller idiosoma), P2 long (rel L 0.37–0.38); rostrum elongated; genital field long (gf L/Id L 0.28–0.29); genital skeleton apically long (aL/tL 0.69) (Fig. 20)..... | <i>T. kurtvietsi</i> |
| b | Palp shorter (tL ~150–170 µm), P2 mostly shorter (rel L 0.29–0.37); rostrum shorter; genital field short (gf L/Id L 0.19–0.23); genital skeleton apically shorter (aL/tL 0.46–0.62) (Figs 18, 21–24)..... | 4 |
| 4a | Genital skeleton apically short (aL/tL 0.46–0.51); P2 short (rel L 0.29–0.32, L/H 1.45–1.67); P4 relatively longer (rel L 0.21–0.24, L/H 1.87–2.14, P2/P4 1.31–1.50, P3/P4 1.13–1.29); posterior margin of antero-medial dorsal platelets oblique; female genital field elongated, male genital field rectangular-oval (Figs 23, 24)..... | <i>T. ratoncitoi</i> |
| b | Genital skeleton apically mid-sized (aL/tL 0.54–0.55); P2 moderately long (rel L 0.34–0.37, L/H 1.77–1.91); P4 extremely short (rel L 0.16–0.18, L/H 1.57–1.75, P2/P4 2.00–2.19, P3/P4 1.31–1.71); posterior margin of antero-medial dorsal platelets more straight; female genital field more compact (shorter and broader), male genital field anterior slightly broader, posterior tapering (Figs 21, 22)..... | <i>T. menudopalpis</i> |
| c | Genital skeleton apically longer (aL/tL 0.62); P2 long (rel L 0.37, L/H 1.85); P4 short (rel L 0.20, L/H 1.63, P2/P4 1.85, P3/P4 1.23); posterior margin of antero-medial dorsal platelets straight, male genital field broad, laterally convex, diverging to posterior (Fig. 18)..... | <i>T. elhachensis</i> |

TORRENTICOLA BOETTGERI K.O. VIETS, 1977
(FIG. 17A–C; TABLE 5)

Type series: Holotype female, Guatemala, near San Juan Chamelco, south-east Cobán, Río Chilax, 1350 m asl, 15.viii.1975, leg. Böttger, prep. no. 6381 SMF.

Geographical distribution: Guatemala.

Habitat: Stream at 1350 m asl.

Published records: K.O. Viets (1977).

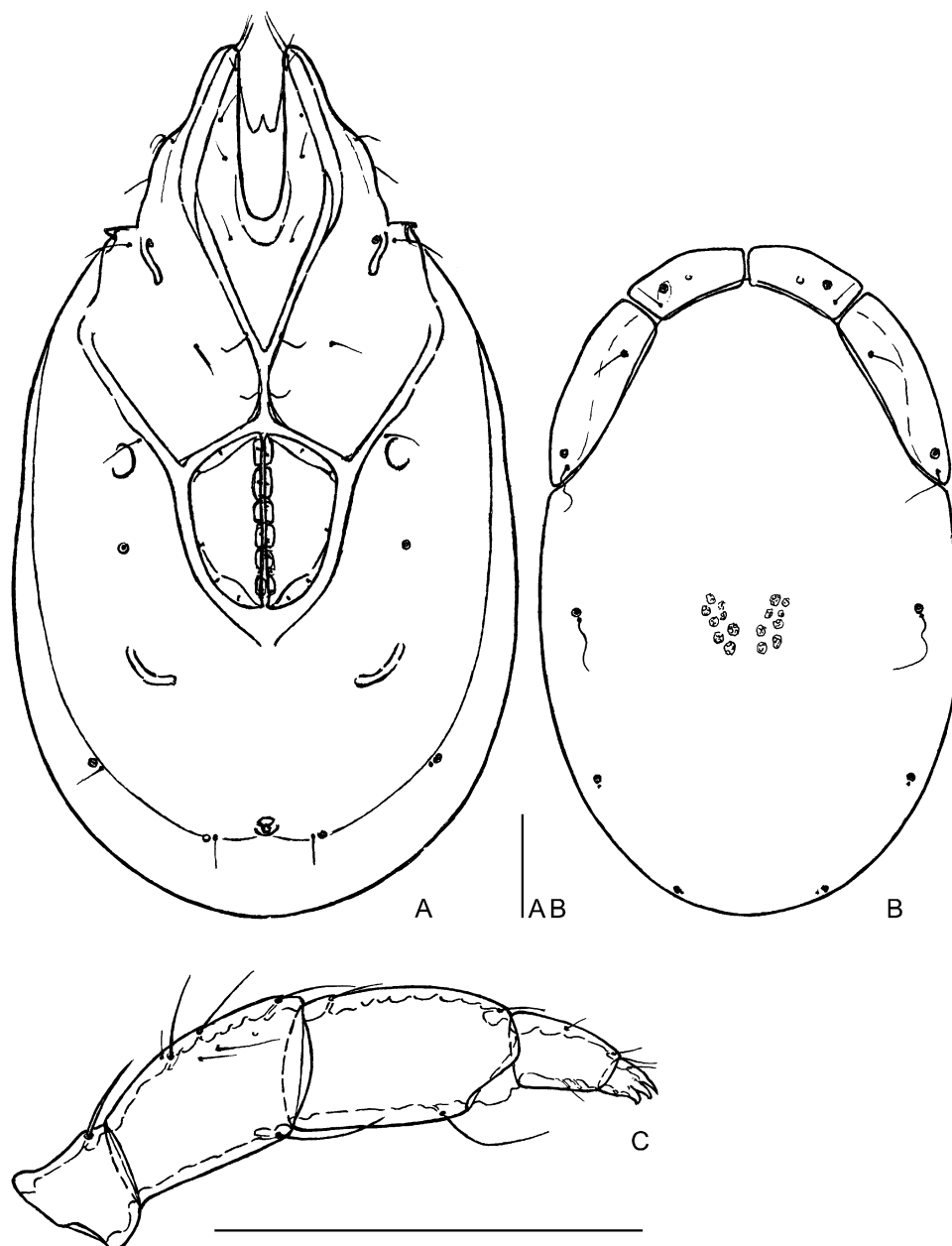


Figure 17. *Torrenticola boettgeri*. A–C, holotype female, prep. no. 6381 SMF Viets collection; after K.O. Viets (1977). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, right palp, lateral view. Scale bars = 100 µm.

Diagnosis (only one female): Characters of the *boettgeri*-group; idiosoma elongated (L/W 1.7); antero-lateral dorsal platelets long; genital field relatively short (gf L/Id L 0.20); P4 very short (rel L 0.16, P2/P4 2.0, P3/P4 1.8).

Description: See K.O. Viets (1977).

Discussion: The two species *T. boettgeri* and *T. esbelta* (see below) are clearly separated from the other species of the group by the elongated shape of their idio-

soma. *Torrenticola boettgeri* is characterized due to a very short P4 and shorter genital field.

***TORRENTICOLA ELHACHENSIS* SP. NOV.**

(FIG. 18A–E; TABLE 6)

Type series: Holotype, male, CR 248, Guanacaste, ACG, El Hacha, small stream, 380 m asl, 17.i.1997, mounted.

Habitat: Fast flowing small stream at 380 m asl; mesolihal, lithophyal; temperature 23.3 °C; conductivity 172 µS cm⁻¹.

Table 5. Measurements (μm) of *Torrenticola boettgeri*; $N = 1$ (female, holotype)

Idiosoma L	845	Capitular bay L	164	Gf L/Id L	0.20	Palp total L	168
Idiosoma W	500	Capitular bay W	47	Gf L/dist cb – gf	0.83	P1 rel L	0.15
Idiosoma L/W	1.69	Cb L/W	3.49	Capitulum vL	245	P2 rel L	0.32
Ds L	675	Dist cb – gf	206	Rostrum L	70	P3 rel L	0.29
Dp L	642	Cx-I mL	133	R L/c vL	0.29	P4 rel L	0.16
Ds W	440	Cx-II + III mL	73	Chelicera L	342	P5 rel L	0.08
Ds L/W	1.53	Cx-I/Cx-II + III mL	1.82	P1 dorsal L	26	P2/P4 L	2.00
Dp L/W	1.46	Genital field L	170	P2 dL	54	P3/P4 L	1.78
A-m platelet L	126	Gf L/Cx-II + III mL	2.33	P3 dL	48		
A-l platelet L	199	Genital field W	148	P4 dL	27		
A-m pl L/a-l pl L	0.63	Genital field L/W	1.15	P5 dL	13		

Table 6. Measurements (μm) of *Torrenticola elhachensis*; $N = 1$ (male, holotype)

Idiosoma L	692	Cx-I mL	159	Rostrum L	78	P1 rel L	0.14
Idiosoma W	491	Cx-II + III mL	113	Capitulum H	98	P2 rel L	0.37
Idiosoma L/W	1.41	Cx-I/Cx-II + III mL	1.41	R L/c dL	0.45	P3 rel L	0.25
Cx-I tL	294	Cx-I tL/Cx-II/III mL	2.61	R L/c vL	0.30	P4 rel L	0.20
Cx-III W	329	Genital field L	159	Gn bend depth	17	P5 rel L	0.05
Cx-I tL/Cx-III W	0.90	Gf L/Cx-II + III mL	1.41	Chelicera L	306	P1 H	31
Ds L	540	Genital field W	135	Chelicera H	20	P2 H	32
Dp L	505	Genital field L/W	1.18	Chelicera L/H	15.63	P3 H	29
Ds W	427	Gf L/Id L	0.23	Chelicera bs L	262	P4 H	20
Ds L/W	1.26	Gf L/dist cb – gf	0.62	Chelicera claw L	44	P5 H	7
Dp L/W	1.18	Dist gf – expo	69	Chel bs/claw L	5.94	P1 L/H	0.72
A-m platelet L	123	Dist gf – cauda	115	P1 dorsal L	22	P2 L/H	1.85
A-m platelet W	56	Gs L	240	P2 dL	59	P3 L/H	1.33
A-l platelet L	189	Gs aL	149	P3 dL	39	P4 L/H	1.63
A-l platelet W	62	Gs W	105	P4 dL	32	P5 L/H	1.00
A-m pl L/a-l pl L	0.65	Gs aL/tL	0.62	P5 dL	7	P2/P4 L	1.85
Capitular bay L	142	Gs tL/W	2.28	Palp total L	159	P3/P4 L	1.23
Capitular bay W	37	Capitulum vL	260	P4 vL	23		
Cb L/W	3.87	Capitulum dL	174	P4 vL to seta	16		
Dist cb – gf	257			P4 vL/L to seta	1.46		

Distribution: Costa Rica (Guanacaste, only known from type locality).

Derivatio nominis: *elhachensis*, named after the sample site at the Cerro El Hacha in the Area de Conservación Guanacaste, north-west Costa Rica.

Diagnosis (only one male): Characters of the *boettgeri*-group; idiosoma oval; antero-medial dorsal platelets small, posterior margins straight, dorsal plate reddish; male genital field broad, rounded, laterally convex, diverging to posterior; P4 short, tapering; genital skeleton apically long.

Description – Male ($N = 1$): Idiosoma mid-sized, rounded-oval (L 692 μm , L/W 1.41); dorsal plate very pale reddish, antero-medial dorsal platelets short, broad, medially convex, laterally straight, merely

oblique, antero-lateral platelets longer, medially straight, posterior tapering (a-m L/a-l L 0.65), Dgl-4 slightly lateral to Dgl-5 (Fig. 18B); coxal field moderately elongated, lateral margins rounded (without sharp lateral corners), Cx-I slender, apically rounded, Cxgl-4 slightly posterior tips of Cx-I; capitular bay deep and narrow, in caudal half slightly widened; posterior margins of Cx-IV weakly developed, laterally besides caudal end of genital field, orientated from postero-medial to antero-lateral; genital field relatively large, rounded, anterior truncated, nearly straight, lateral margins convex diverging, caudally rounded; excretory pore between Vgl-2, in indentation of primary sclerotization, glands and pore slightly posterior caudal margin of primary sclerotization (Fig. 18A); genital skeleton apically long and slender, elongated triangular, cella proximalis small, with

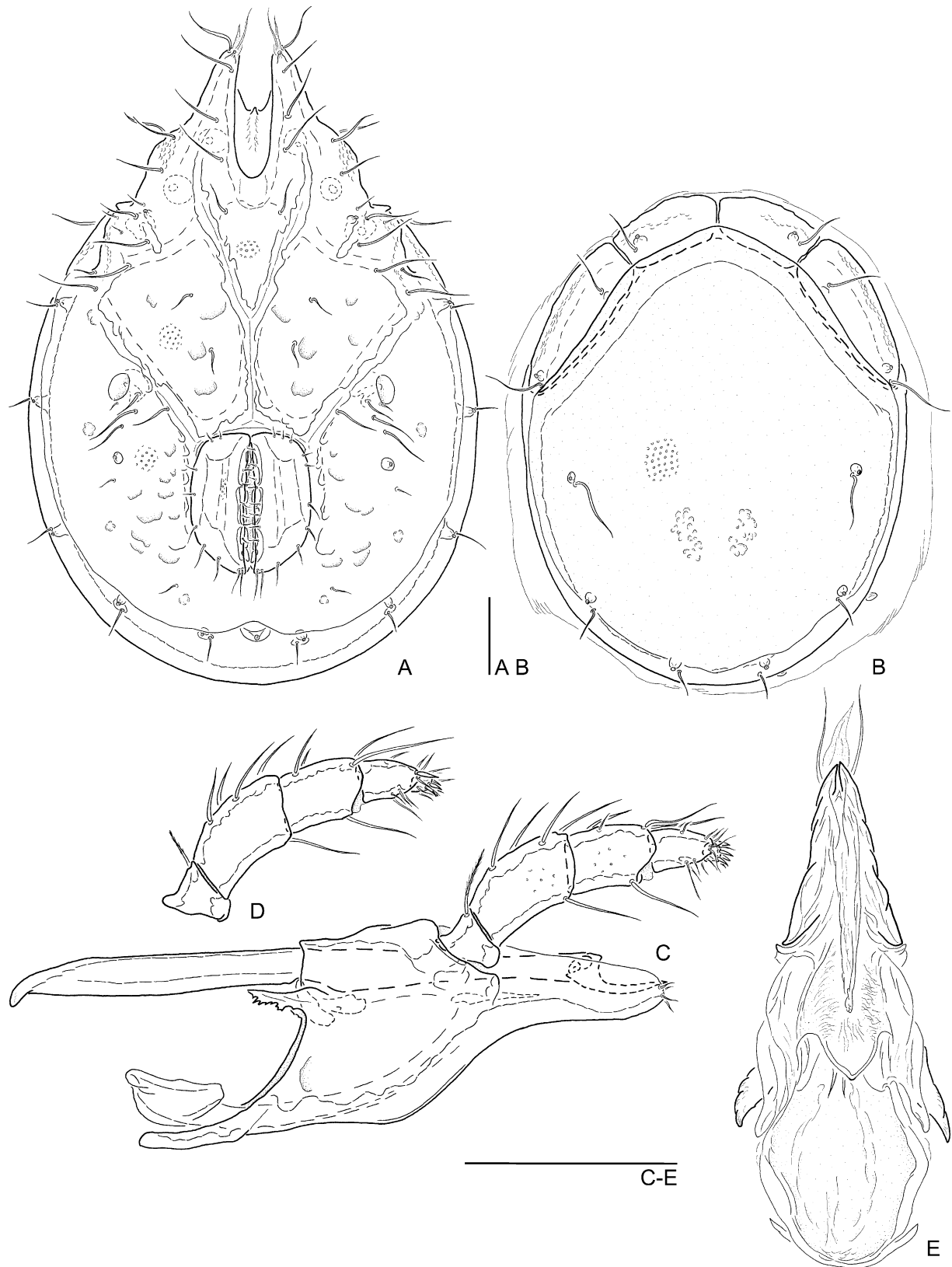


Figure 18. *Torrenticola elhachensis*. A–E, holotype male (CR 248). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

small processus proximalia (aL/tL 0.62), brachia distalia and proximalia well developed, orientated towards posterior (Fig. 18E); capitulum elongated, postero-ventral projection extended far to posterior, ventral margin concave, relatively sharp bent, rostrum straight, relatively slender, ventral margin slightly concave; palp small, without ventral projections, P2 relatively long; P3 straight, dorsal margin slightly convex; P4 very small, nearly cone-shaped (Fig. 18C, D).

Female: Unknown.

Discussion: *Torrenticola elhachensis* is mainly characterized by an elongated genital skeleton and a broad, slightly rounded genital field. However, all characteristics have to be regarded with caution, as only one specimen has been found. The differential diagnostic measurements of the very similar species *T. elhachensis*, *T. menudopalpis* and *T. ratoncitoi* from Costa Rica as well as *T. kurtvietsi* from Mexico are compiled in Table 10.

TORRENTICOLA ESBELTA CRAMER, 1992
(FIG. 19A–D; TABLE 7)

Type series: Holotype female, México, Estado de México, Municipio de Temascaltepec, San Francisco Oxtotilpan, arroyo Peña Blanca 1800 m asl, 09.i.1985, leg. Cramer, coll. Cristina Cramer, Instituto de Biología, UNAM; paratype 0/1/0, same locality, 24.iii.1985.

Geographical distribution: Mexico.

Habitat: Small stream at 1800 m asl.

Published records: Cramer (1992).

Diagnosis: Characters of the *boettgeri*-group; idiosoma elongated (L/W 1.8); dorsal shield yellowish; genital field relatively long (gf L/Id L 0.28); P4 short (rel L 0.20, P2/P4 1.6, P3/P4 1.5).

Description: See Cramer (1992).

Discussion: This species is characterized by its very slender, elongated idiosoma [even more elongated than in *T. boettgeri* (see above)] and its elongated genital field.

TORRENTICOLA KURTVIETSI CRAMER, 1992
(FIG. 20A–G; TABLE 7)

Type series: Holotype female, México, Estado de México, Municipio de Temascaltepec, San Francisco Oxtotilpan, arroyo Peña Blanca 1800 m asl, 16.xi.1984, leg. Cramer, coll. Cristina Cramer, Instituto de Biología, UNAM; allotype male, same locality, 07.iii.1984.

Geographical distribution: Mexico.

Table 7. Measurements (μm) of *Torrenticola esbelta*, from the original description by Cramer (1992); $N = 1$ (female, holotype), and *T. kurtvietsi*; $N = 1$ (male, paratype – designated as allotype), 1 (female, holotype)

	<i>esbelta</i>	<i>kurtvietsi</i>	
	female	male	female
	ht	pt	ht
Idiosoma L	668	659	630
Idiosoma W	452	612	583
Idiosoma L/W	1.79	1.08	1.41
Ds L	668	602	565
Ds W	367	527	508
Ds L/W	1.82	1.14	1.11
A-m platelet L	103	141	141
A-m platelet W	38	70	70
A-l platelet L	179	207	198
A-l platelet W	47	75	75
A-m pl L/a-l pl L	0.58	0.68	0.71
Capitular bay L	193	185	178
Capitular bay W	50	52	
Cb L/W	3.86	3.56	
Genital field L	188	188	179
Genital field W	160	141	141
Genital field L/W	1.18	1.33	1.27
Gf L/Id L	0.28	0.29	0.28
Gs L		169	
Gs aL		116	
Gs aL/tL		0.69	
Capitulum vL		310	
Chelicera L	329		320
P1 dorsal L	26	26	31
P2 dL	57	71	71
P3 dL	55	47	47
P4 dL	36	38	31
P5 dL	10	9	9
Palp total L	184	191	189
P1 rel L	0.14	0.14	0.16
P2 rel L	0.31	0.37	0.38
P3 rel L	0.30	0.25	0.25
P4 rel L	0.20	0.20	0.16
P5 rel L	0.05	0.05	0.05
P2/P4 L	1.55	1.85	2.38
P3/P4 L	1.53	1.24	1.52

Habitat: Small stream at 1800 m asl.

Published records: Cramer (1992).

Diagnosis: Characters of the *boettgeri*-group; idiosoma rounded-oval (L/W 1.1–1.4); genital field long (gf L/Id L 0.28–0.29); genital skeleton apically long (apL/tL 0.69); palp long (tL ~190 μm); P2 long (rel L 0.37–0.38), P3 relatively short (rel L 0.25).

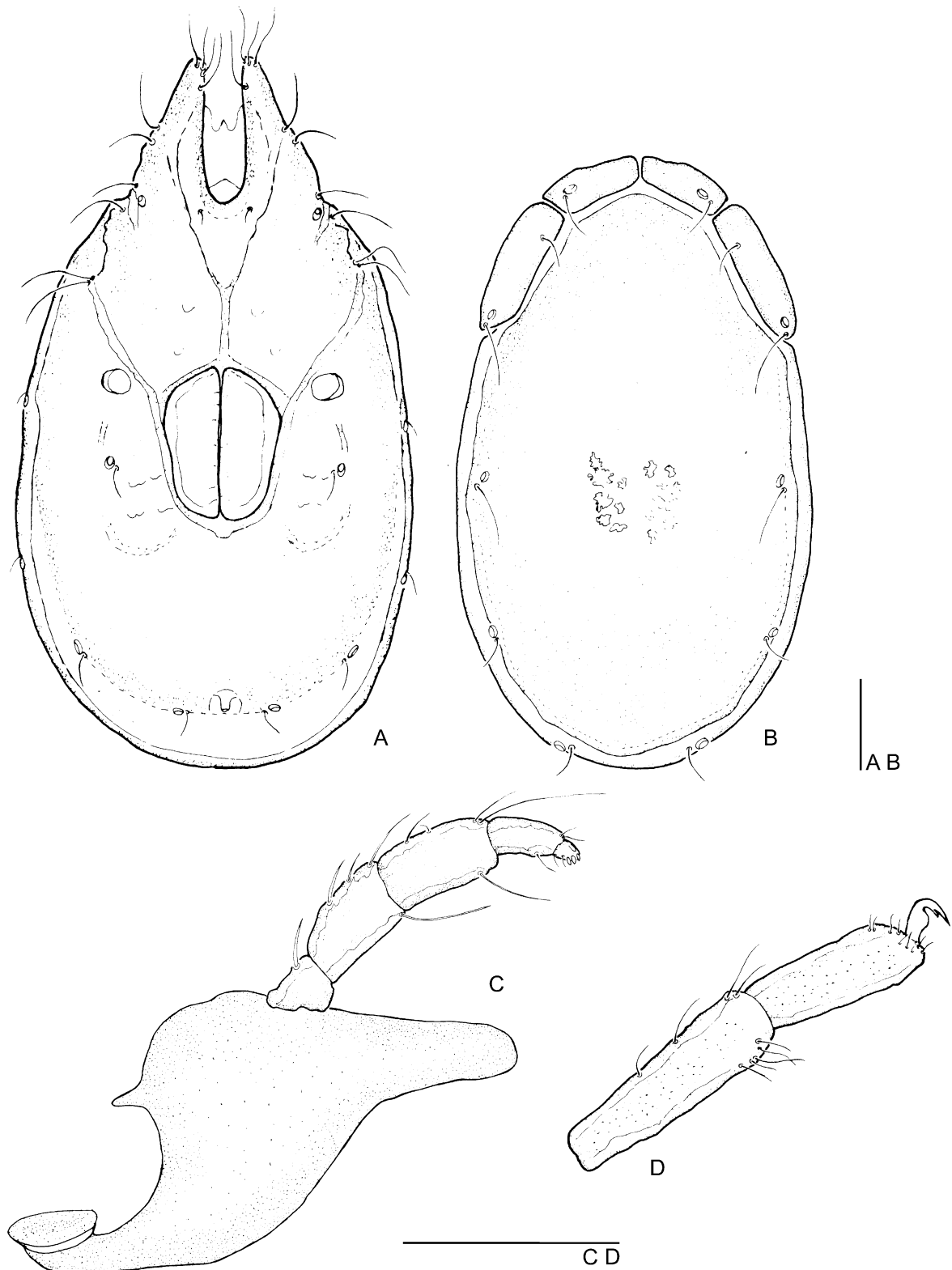


Figure 19. *Torrenticola esbelta*. A–D, female, prep. Cramer; after Cramer (1992). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, first leg distal segments. Scale bars = 100 μ m. In the original publication of these figures, no scale bar has been given for the dorsal plate; therefore, B has been reduced to the (probably) same scale as the ventrum, in order to use the respective scale bar for both.

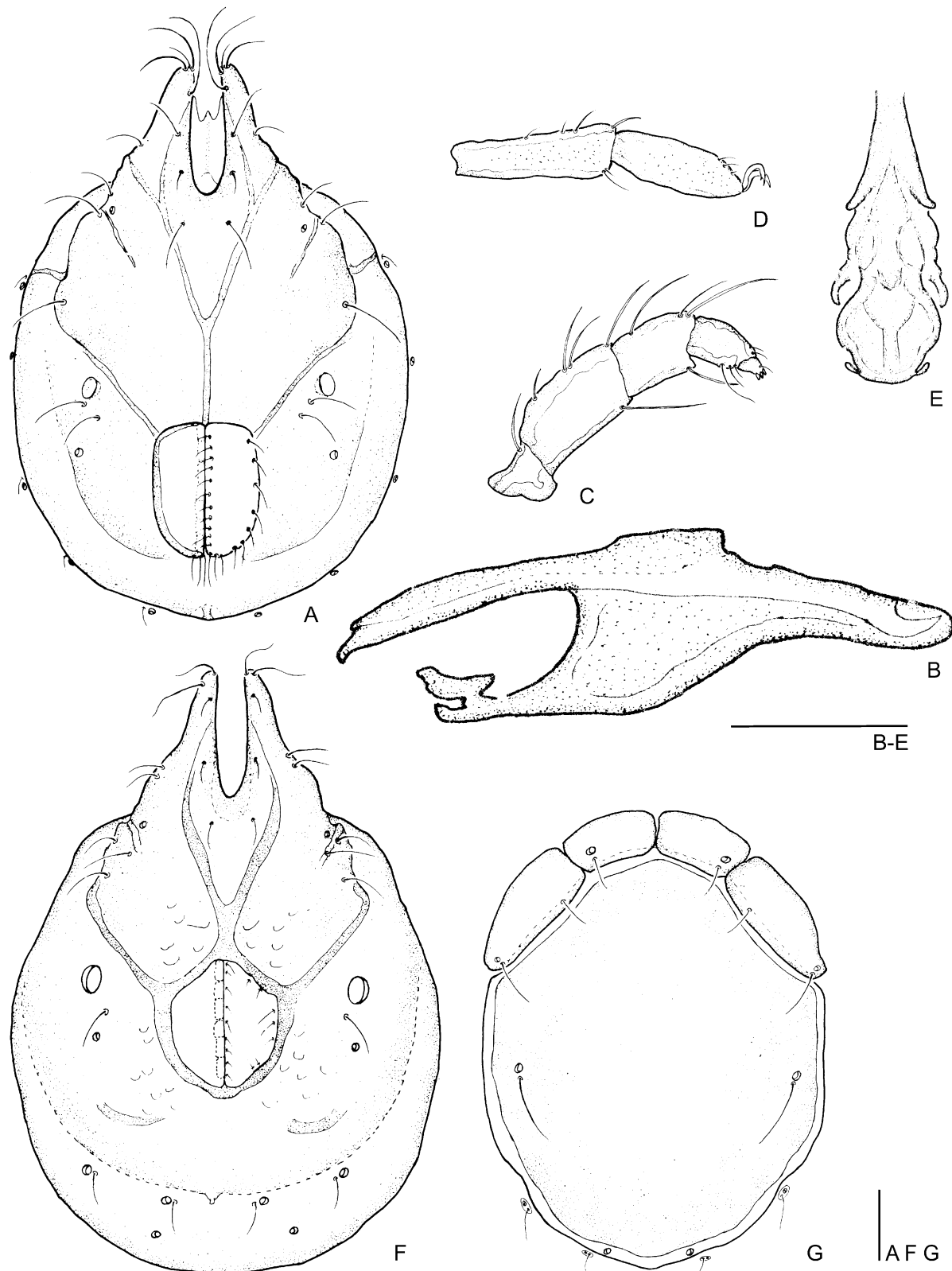


Figure 20. *Torrenticola kurtvietsi*. A–E, male, prep. Cramer; F, G, female, prep. Cramer; A, C, D, F, G after Cramer (1992); B, E after Cramer (1988). A, F, idiosoma, ventral view; B, capitulum, lateral view; C, right palp, lateral view; D, first leg distal segments; E, genital skeleton, anterior view; G, idiosoma, dorsal view. Scale bars = 100 μ m.

Description: See Cramer (1992).

Discussion: *Torrenticola kurtvietsi* has obviously been described based on immature specimens, and therefore comparability of the measurements of this specimen has to be regarded critically. The rostrum of this species is relatively long, separating it clearly from all other species of the group – a figure showing the gnathosoma of *T. kurtvietsi* (Fig. 20B) is given in the PhD thesis of Cristina Cramer (1988), but not in the original description of the species (Cramer, 1992). Furthermore, it seems to be the only species without a ventral lamina at the terminal claws of the first legs (Fig. 20D). Differential diagnostic measurements of *T. kurtvietsi* and the very similar species *T. elhachensis*, *T. menudopalpis* and *T. ratoncitoi* from Costa Rica are given in Table 10.

TORRENTICOLA MENUDOPALPIS SP. NOV.

(FIGS 21A–E, 22A–D; TABLE 8)

Type series: Holotype, male, CR 137, Guanacaste, ACG, Cerro Cacao, rheocene, 1260 m asl, 27.ii.1996, mounted; paratypes: same locality and date as holotype, 1/0/0 mounted, 1/1/0 unmounted.

Additional specimens examined: CR 7, Alajuela, Río Sarchí, small stream, 1580 m asl, 18.vi.1995, 0/1/0 mounted; CR 72, Puntarenas, Monteverde, Quebrada Máquina, small stream, 1440 m asl, 18.vii.1995, 0/1/0 unmounted; CR 208, Alajuela, San Ramon field station, left affluent to Río San Lorencito, small stream, 900 m asl, 26.iii.1996, 1/0/0 mounted, 1/1/0 unmounted; CR 238, Guanacaste, ACG, Playa Naranjo, riffle in spring brook, 160 m asl, 06.iv.1996, 0/1/0 mounted, 0/1/0 unmounted.

Habitat: Slow flowing rheocene and spring brook, slow to very fast flowing small streams at 160–1580 m asl; mesolitoral, akal, psammal, macropelal, macro-litoral; temperature 17.3–27.5 °C; conductivity 30–177 µS cm⁻¹.

Distribution: Costa Rica (Cordillera Central, Cordillera de Tilarán, Cordillera de Guanacaste and Península de Santa Elena).

Derivatio nominis: *menudo* (Spanish = small), *palpo* (Spanish = palp); referring to the short palps, especially the very short P4 of this species.

Diagnosis: Characters of the *boettgeri*-group; idiosoma oval; antero-medial dorsal platelets short and broad, posterior margins nearly straight, antero-lateral platelets longer, dorsal plate pale reddish; genital field small; capitulum elongated, ventral margin slightly bent, rostrum ventrally nearly straight, P2/P3 relatively long, P4 very small; genital skeleton with rela-

tively small cella proximalis and elongated apical part.

Description – Male ($N = 3$): Idiosoma mid-sized, rounded-oval [L 765 µm (643–741 µm), L/W 1.41 (1.39–1.40)]; dorsal plate very pale reddish to reddish, antero-medial dorsal platelets medially nearly straight, laterally merely oblique, antero-lateral platelets longer, medially straight, posterior tapering [a-m L/a-l L 0.74 (0.69–0.71)], Dgl-4 directly anterior to Dgl-5 (Fig. 21B); lateral margins of coxal field rounded (without sharp lateral corners), Cx-I elongated slender, antero-lateral margins straight, anterior tips rounded, Cxgl-4 posterior tips of Cx-I; capitular bay very deep and narrow; posterior margins of Cx-IV postero-lateral of caudal end of genital field, orientated from postero-medial to antero-lateral; genital field small, anterior truncated, lateral margins slightly convex gradually tapering in caudal half; excretory pore shortly anterior to Vgl-2, glands and pore well anterior to caudal margin of primary sclerotization (Fig. 21A); genital skeleton apically mid-sized, pointed triangular, cella proximalis mid-sized, only slightly inflated, with small processus proximalis and pointed lateral apodemes [aL/tL 0.55 (0.54–0.55)], brachia distalia and proximalia well developed, orientated straight from anterior towards postero-lateral, carina anterior short (Fig. 21E); capitulum elongated, postero-ventral projection extended far to posterior, ventral margin bent, rostrum straight, basely high, ventral margin slightly concave; palp small, without ventral projections, P2 relatively long, dorsal margin convex, with only three dorsal setae, ventral and distal straight; P3 straight, dorsal margin slightly convex, medio-distally rounded, P4 very small, gradually tapering in distal half (Fig. 21C, D).

Female ($N = 2$): Idiosoma similar to male, larger (L 780–873 µm); medial margin of Cx-II/III shorter; genital field larger, broad rhombic, anterior rounded, lateral margins straight, posterior truncate; excretory pore, Vgl-2 and Vgl-4 clearly posterior to caudal margin of primary sclerotization (Fig. 22A); capitulum basely higher than in male, P3 shorter (Fig. 22C, D).

Discussion: *Torrenticola menudopalpis* shows a clear sexual dimorphism in the position of the excretory pore, Vgl-2 and Vgl-4 as well as the shape of the capitulum and palp. Such a strong sexual dimorphism is unusual in the genus, but the females are clearly separated from the other species of the group and fit to the species diagnosis. The male, in particular, is characterized by a very small P4. Differential diagnostic measurements of *T. menudopalpis* and the very similar species *T. elhachensis*, *T. kurtvietsi* and *T. ratoncitoi* are given in Table 10.

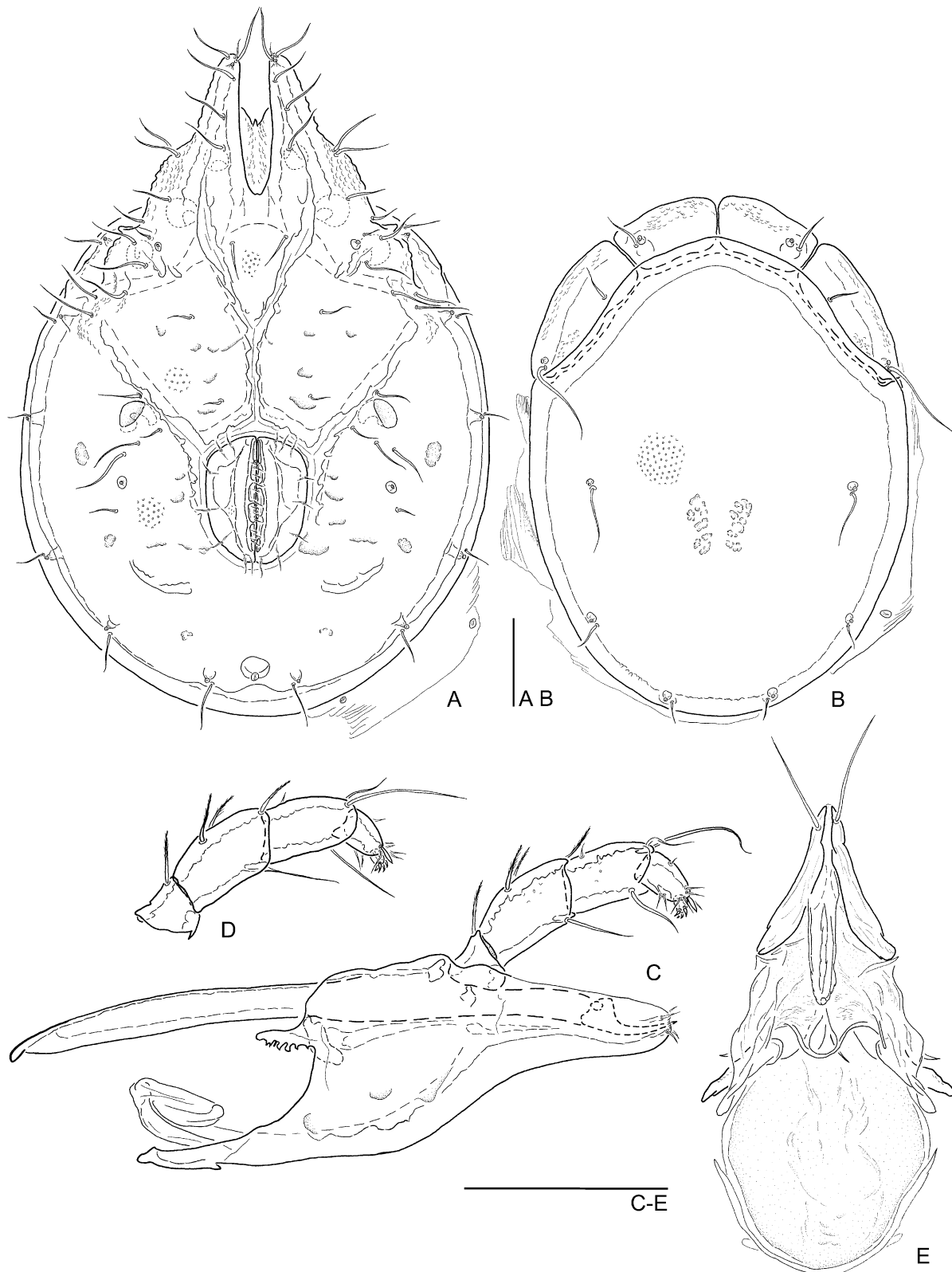


Figure 21. *Torrenticola menudopalpis*. A, B, E, male (CR 208); C, D, holotype male (CR 137). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

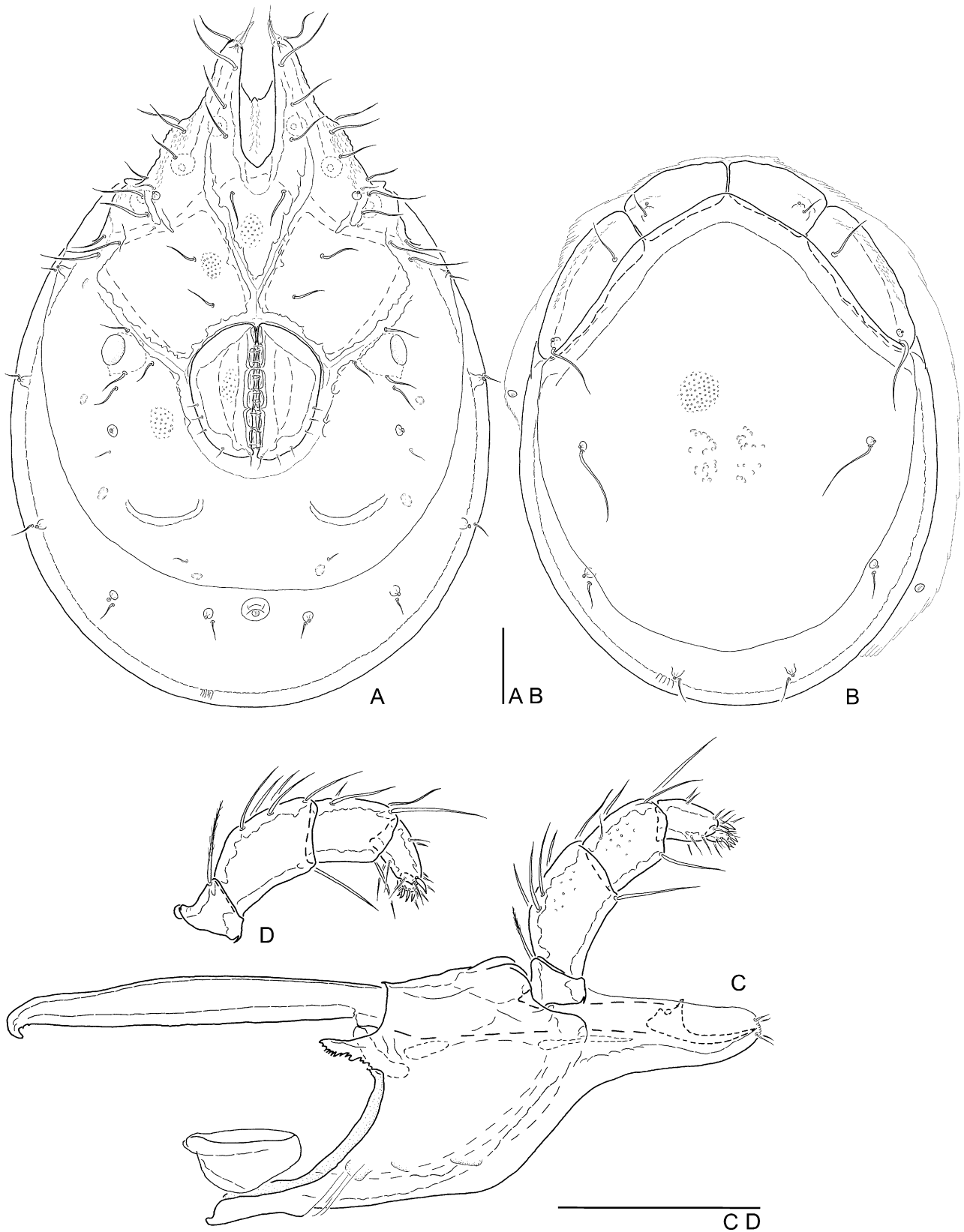


Figure 22. *Torrenticola menudopalpis*. A–D, female (CR 238). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 8. Measurements (μm) of *Torrenticola menudopalpis*; $N = 3$ (male), 2 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	765	741	643	765	64.9	826	780	873	65.9
Idiosoma W	544	530	461	544	44.5	579	540	618	55.5
Idiosoma L/W	1.41	1.40	1.39	1.41	0.01	1.43	1.41	1.45	0.02
Cx-I tL	324	319	265	324	32.7	336	334	338	3.5
Cx-III W	348	348	294	348	31.2	365	353	378	17.3
Cx-I tL/Cx-III W	0.93	0.92	0.90	0.93	0.01	0.92	0.88	0.96	0.1
Ds L	594	589	491	594	58.1	667	628	706	55.5
Dp L	546	542	456	546	51.0	623	579	667	62.4
Ds W	461	432	378	461	42.3	513	481	544	45.1
Ds L/W	1.29	1.30	1.29	1.36	0.04	1.30	1.30	1.31	0.01
Dp L/W	1.19	1.21	1.19	1.26	0.04	1.21	1.20	1.23	0.01
A-m platelet L	135	123	108	135	13.5	141	137	145	5.2
A-m platelet W	69	61	59	69	5.1	67	64	71	5.2
A-l platelet L	181	178	152	181	16.0	213	206	221	10.4
A-l platelet W	64	64	59	66	3.7	65	61	69	5.2
A-m pl L/a-l pl L	0.74	0.71	0.69	0.74	0.03	0.66	0.66	0.67	0.01
Capitular bay L	164	157	135	164	15.3	170	169	170	0.9
Capitular bay W	36	32	32	36	2.1	37	36	39	2.6
Cb L/W	4.62	4.62	4.23	4.92	0.3	4.55	4.34	4.76	0.3
Dist cb – gf	272	272	208	272	36.8	218	208	228	13.9
Cx-I mL	159	154	135	159	13.0	170	169	172	1.7
Cx-II + III mL	100	100	64	104	22.4	41	31	51	14.7
Cx-I tL/Cx-II/III mL	3.22	3.22	3.06	4.16	0.6	8.73	6.58	10.89	3.0
Cx-I/Cx-II + III mL	1.59	1.59	1.48	2.12	0.3	4.44	3.29	5.60	1.6
Genital field L	159	149	142	159	8.6	174	172	176	3.5
Gf L/Cx-II + III mL	1.59	1.59	1.44	2.23	0.4	4.55	3.33	5.76	1.7
Genital field W	127	119	118	127	5.3	167	157	176	13.9
Genital field L/W	1.25	1.25	1.21	1.26	0.03	1.05	1.00	1.09	0.1
Gf L/Id L	0.21	0.21	0.20	0.22	0.01	0.21	0.20	0.22	0.01
Gf L/dist cb – gf	0.59	0.59	0.55	0.68	0.1	0.80	0.75	0.85	0.1
Dist gf – expo	118	118	103	130	13.5	196	186	206	13.9
Dist gf – cauda	168	167	162	168	3.2	272	218	326	76.2
Gs L	243	234	225	243	8.6				
Gs aL	134	126	124	134	5.1				
Gs W	142	126	118	142	12.4				
Gs aL/tL	0.55	0.55	0.54	0.55	0.01				
Gs tL/W	1.71	1.85	1.71	1.92	0.1				
Capitulum vL	272	262	228	272	23.2	289	289	289	0.00
Capitulum dL	181	174	159	181	11.2	190	189	191	1.7
Rostrum L	81	76	71	81	4.9	86	86	86	0.00
Capitulum H	91	91	78	92	7.5	108	100	116	11.3
R L/c dL	0.45	0.45	0.44	0.45	0.01	0.45	0.45	0.45	0.00
R L/c vL	0.30	0.30	0.29	0.31	0.01	0.30	0.30	0.30	0.00
Gn bend depth	14	13	12	14	1.0	17	15	20	3.5
Chelicera L	323	306	250	323	38.5	347	331	363	22.5
Chelicera H	18	16	16	18	1.4	22	22	22	0.00
Chelicera L/H	17.60	17.60	15.69	19.23	1.8	15.72	15.00	16.44	1.0
Chelicera bs L	279	262	203	279	39.8	296	282	311	20.8
Chelicera claw L	44	44	44	47	1.4	50	49	51	1.7
Chel bs/claw L	6.33	5.94	4.37	6.33	1.0	5.90	5.75	6.05	0.2
P1 dorsal L	27	26	23	27	1.9	27	27	27	0.00
P2 dL	56	56	51	56	2.8	61	59	64	3.5
P3 dL	44	44	39	44	2.8	43	42	44	1.7
P4 dL	27	26	25	27	1.2	29	27	32	3.5
P5 dL	10	9	7	10	1.2	10	10	10	0.00

Table 8. Continued

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Palp total L	164	159	147	164	8.8	170	167	174	5.2
P4 vL	22	22	20	23	1.9	24	23	25	0.9
P4 vL to seta	15	15	12	20	3.7	18	17	18	0.9
P4 vL/L to seta	1.50	1.50	1.19	1.60	0.2	1.35	1.27	1.43	0.1
P1 rel L	0.16	0.16	0.16	0.16	0.00	0.16	0.15	0.16	0.00
P2 rel L	0.34	0.35	0.34	0.35	0.01	0.36	0.35	0.37	0.01
P3 rel L	0.27	0.27	0.27	0.28	0.01	0.25	0.24	0.26	0.02
P4 rel L	0.16	0.16	0.16	0.17	0.00	0.17	0.16	0.18	0.02
P5 rel L	0.06	0.06	0.05	0.06	0.01	0.06	0.06	0.06	0.00
P1 H	29	29	25	29	2.8	28	27	29	1.7
P2 H	32	32	27	32	2.8	34	32	37	3.5
P3 H	28	28	25	28	2.1	31	28	33	3.5
P4 H	17	15	15	17	1.4	18	17	20	1.7
P5 H	7	7	7	7	0.00	9	7	10	1.7
P1 L/H	0.92	0.92	0.88	0.95	0.04	0.96	0.92	1.00	0.1
P2 L/H	1.77	1.77	1.77	1.91	0.1	1.79	1.73	1.85	0.1
P3 L/H	1.57	1.57	1.57	1.60	0.02	1.41	1.26	1.57	0.2
P4 L/H	1.57	1.67	1.57	1.75	0.1	1.60	1.57	1.63	0.04
P5 L/H	1.33	1.17	1.00	1.33	0.2	1.17	1.00	1.33	0.2
P2/P4 L	2.09	2.10	2.09	2.19	0.1	2.09	2.00	2.18	0.1
P3/P4 L	1.64	1.64	1.60	1.71	0.1	1.47	1.31	1.64	0.2

TORRENTICOLA RATONCITOI SP. NOV.

(FIGS 23A–E, 24A–C; TABLE 9)

Type series: Holotype male, CR 58, Alajuela, San Ramon field station, right affluent Río San Lorencito, small stream, 940 m asl, 10.vii.1995, mounted.

Additional specimens examined: CR 30, Heredia, Río La Paz, stream, 1270 m asl, 29.vi.1995, 0/1/0 unmounted; CR 63, Puntarenas, Ecolodge San Luis, Quebrada Bruja, small stream, 1300 m asl, 15.vii.1995, 0/1/0 mounted; CR 139, Guanacaste, ACG, Cacao, rheocrene, 1150 m asl, 27.ii.1996, 0/1/0 unmounted; CR 141, Guanacaste, ACG, trail from Cacao to Maritza, rheocrene, 700 m asl, 28.ii.1996, 0/1/0 mounted; CR 154, Guanacaste, ACG, Maritza, Quebrada Las Yeguitas, small stream, 560 m asl, 02.iii.1996, 0/1/0 unmounted; CR 164, San José, near restaurant La Fonda, Carretera Braulio Carillo, spring brook, 1480 m asl, 09.iii.1996, 2/1/0 mounted, 3/13/0 unmounted; CR 206, San José, above San Antonio de Escazu, Quebrada Londres, small stream, 1620 m asl, 25.iii.1996, 1/0/0 mounted; CR 208, Alajuela, San Ramon field station, left affluent Río San Lorencito, small stream, 900 m asl, 26.iii.1996, 2/0/0 mounted; CR 222, Puntarenas, Monteverde, Río Guacimal, small stream, riffle, 1380 m asl, 31.iii.1996, 0/2/0 mounted; CR 223, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1100 m asl,

31.iii.1996, 0/1/0 mounted; CR 233-II, Guanacaste, ACG, Maritza, rheopsammocrene, 530 m asl, 21.ii.1997, 0/0/1 mounted; CR 281, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Río Negro, small stream, 760 m asl, 31.i.1997, 1/0/0 mounted; CR 288, Guanacaste, Dos Ríos, Quebrada La Gato, small stream, riffle, 520 m asl, 03.ii.1997, 0/1/0 unmounted.

Habitat: Slow and fast flowing spring brooks, small streams and one stream, one rheopsammocrene and two rheocrenes at 520–1620 m asl; mainly mesolihal, akal and leaf packages, also psammal, macropelal, micropelal; temperature 16.1–24.9 °C; conductivity 26–259 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (mainly Cordillera de Tilarán and Cordillera de Guanacaste, also Cordillera Central and northern Cordillera de Talamanca).

Derivatio nominis: *ratoncito* (Spanish = little mouse); referring to the elongated shape of the body, especially the anterior coxae and capitulum.

Diagnosis: Characters of the *boettgeri*-group; idiosoma mid-sized, oval; antero-medial and antero-lateral dorsal platelets of nearly equal size, short and broad, posterior margin of antero-medial platelets oblique, dorsal plate reddish; genital field small, slender; capitulum slightly elongated, ventral margin sigmoid, rostrum slightly bent towards ventral, palp small, P2–4 of

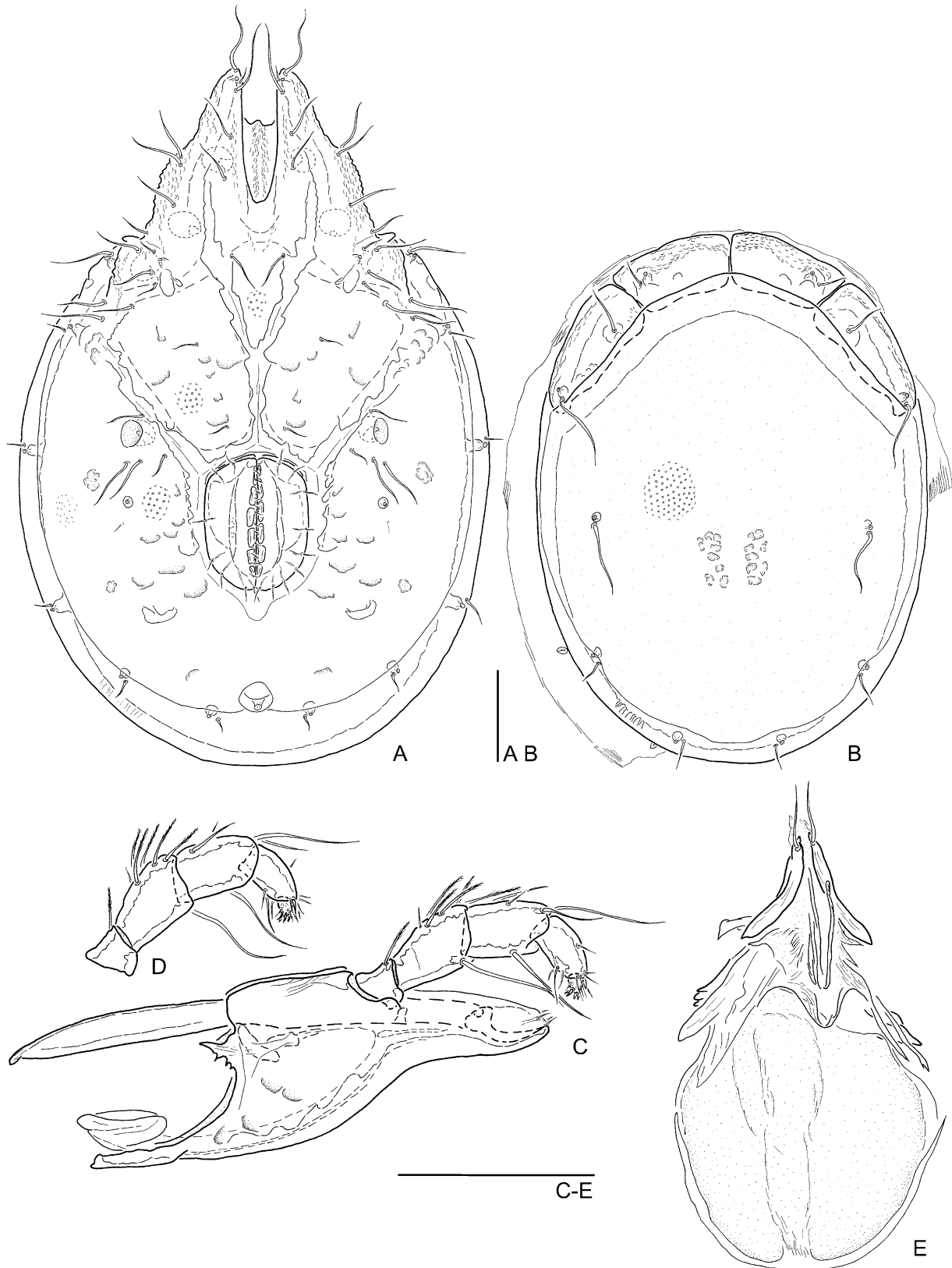


Figure 23. *Torrenticola ratoncitoi*. A–E, holotype male (CR 58). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

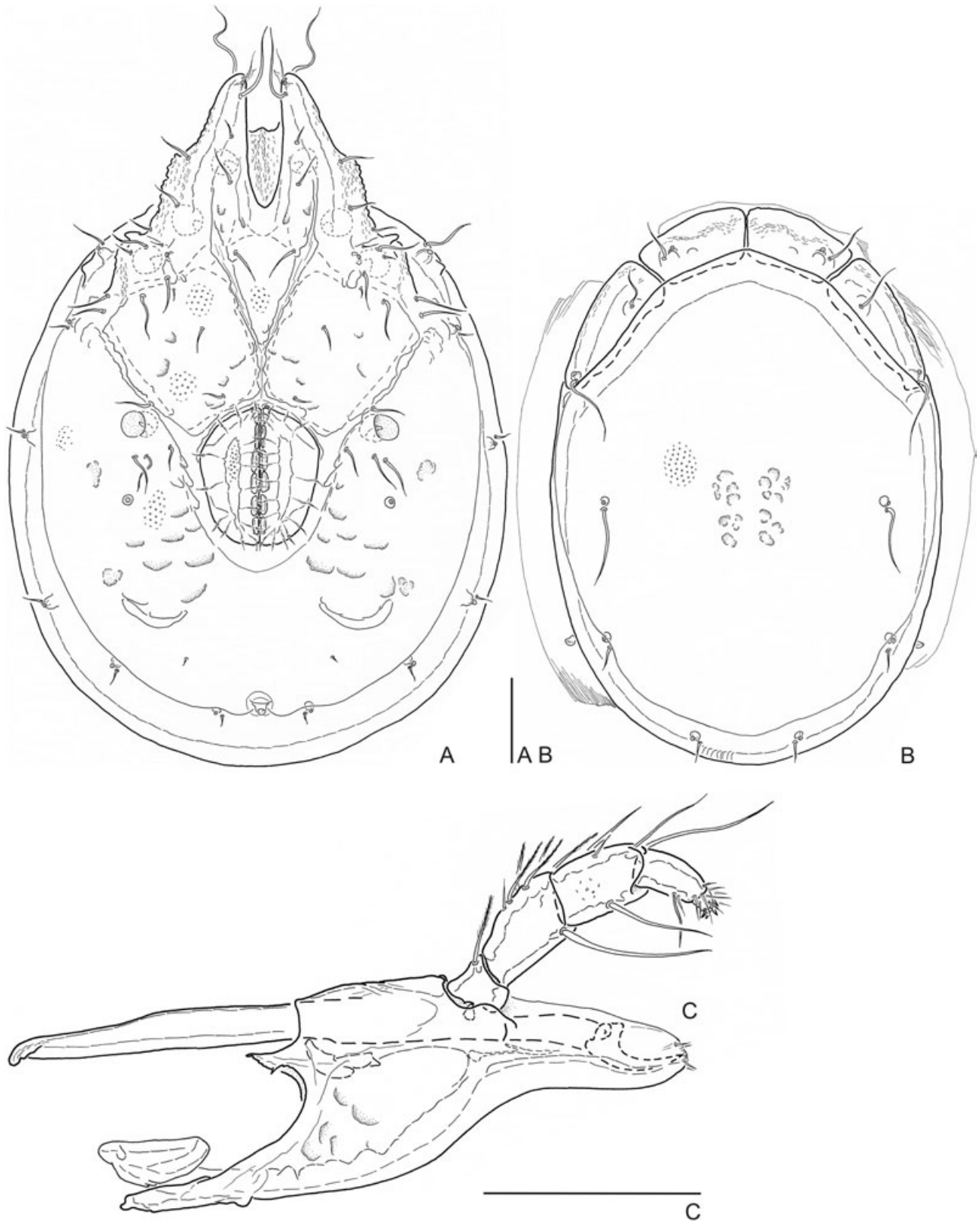


Figure 24. *Torrenticola ratoncitoi*. A–C, female (CR 63). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view. Scale bars = 100 μm.

similar size (P4 larger than in other species of the group); genital skeleton with large cella proximalis and shorter apical part.

Description – Male ($N = 7$): Idiosoma oval [L 741 μm (682–814 μm), L/W 1.47 (1.34–1.57)]; dorsal plate reddish (in some specimens very pale), antero-dorsal platelets short and broad [a-m L/a-l L 0.90 (0.76–0.88)], antero-medial platelets medially slightly convex, laterally oblique, lateral ones slightly longer, nearly triangular (regularly tapering towards posterior end), Dgl-5 directly posterior Dgl-4, at lateral margin of dorsal plate (Fig. 23B); lateral margins of coxal field (mainly Cx I/II) smooth, anterior tips of Cx-I rounded, Cxgl-4 slightly postero-medial of Cx-I tips, orientated towards medial; posterior margins of Cx-IV poorly visible, postero-lateral of caudal end of genital field; capitular bay deep and narrow, basely tapering; genital field subrectangular, anterior margins truncated, laterally nearly straight, tapering to posterior; excretory pore anterior to Vgl-2 on primary sclerotization (Fig. 23A); genital skeleton apically short and broad, cella proximalis mid-sized, inflated, processus proximalia small, pointed, more laterally [aL/tL 0.47 (0.46–0.51)], brachia distalia and proximalia well developed, orientated laterally, carina

anterior short, not extended (Fig. 23E); capitulum elongated, postero-ventral projection extended far to posterior; ventral margin smoothly curved, rostrum slightly bent towards ventral side; palp small, without ventral projections, P2 slightly extending distally (maximal height near distal end), short; P3 relative long, straight, dorsal and ventral margins parallel, distally rounded, P4 of moderate size (small, but still larger than in other species of the group), dorsal margin convex, ventral margin straight to convex; ventro-distal setae at P2 and P3, as well as dorso-distal seta at P3 very long; terminal setae at P5 slender (Fig. 23C, D).

Female ($N = 6$): Idiosoma similar to male, but generally larger (L 790–844 μm); medial margin of Cx-II/III shorter (Table 9); genital field larger, rhombic, anterior rounded, lateral margins straight, posterior truncate (Fig. 24A); gnathosoma similar to male (Fig. 24C).

Discussion: *Torrenticola ratoncitoi* is especially characterized by the very compact genital skeleton and the rectangular male genital field. Differential diagnostic measurements of *T. ratoncitoi* and the very similar species *T. elhachensis*, *T. kurtvietsi* and *T. nudopalpis* are compiled in Table 10.

Table 9. Measurements (μm) of *Torrenticola ratoncitoi*; $N = 6$ (male), 6 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	741	768	682	814	49.6	817	790	844	21.2
Idiosoma W	505	527	505	584	33.8	574	549	603	20.2
Idiosoma L/W	1.47	1.40	1.34	1.57	0.1	1.40	1.36	1.48	0.05
Cx-I tL	304	319	299	324	10.9	326	314	334	8.0
Cx-III W	314	331	314	353	16.0	351	334	363	10.4
Cx-I tL/Cx-III W	0.97	0.94	0.92	0.99	0.03	0.93	0.90	0.96	0.02
Ds L	574	598	540	657	41.4	643	608	657	20.0
Dp L	528	549	491	603	39.7	594	559	608	20.6
Ds W	427	432	402	471	23.3	461	451	486	12.6
Ds L/W	1.34	1.38	1.34	1.41	0.03	1.37	1.31	1.43	0.05
Dp L/W	1.24	1.27	1.22	1.30	0.03	1.27	1.21	1.32	0.05
A-m platelet L	135	137	123	147	9.0	136	127	142	4.9
A-m platelet W	64	69	64	71	3.0	66	61	69	3.5
A-l platelet L	149	163	147	176	12.3	169	162	175	4.9
A-l platelet W	64	65	64	69	2.4	64	59	71	4.5
A-m pl L/a-l pl L	0.90	0.86	0.76	0.90	0.1	0.80	0.78	0.86	0.03
Capitular bay L	141	145	134	152	7.5	155	147	159	4.6
Capitular bay W	34	34	32	42	3.3	38	32	39	2.8
Cb L/W	4.11	4.23	3.35	4.43	0.4	4.00	3.94	5.00	0.4
Dist cb – gf	273	274	252	312	20.9	235	225	245	6.7
Cx-I mL	169	173	169	181	4.8	173	167	179	4.4
Cx-II + III mL	93	93	76	108	10.7	53	47	61	5.7
Cx-I tL/Cx-II/III mL	3.27	3.36	3.00	3.94	0.3	6.15	5.45	7.17	0.6

Table 9. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Cx-I/Cx-II + III mL	1.82	1.83	1.61	2.23	0.2	3.23	2.88	3.84	0.4
Genital field L	148	156	142	164	8.5	163	154	169	5.6
Gf L/Cx-II + III mL	1.59	1.64	1.52	1.87	0.1	3.03	2.75	3.53	0.3
Genital field W	113	120	113	127	6.1	145	142	147	2.3
Genital field L/W	1.31	1.28	1.23	1.33	0.03	1.11	1.09	1.15	0.03
Gf L/Id L	0.20	0.20	0.20	0.21	0.00	0.20	0.19	0.20	0.00
Gf L/dist cb – gf	0.54	0.55	0.51	0.58	0.02	0.69	0.68	0.70	0.01
Dist gf – expo	125	135	108	164	21.6	197	174	214	14.7
Dist gf – cauda	183	192	159	216	21.4	266	262	294	12.3
Gs L	234	228	213	240	11.1				
Gs aL	110	109	100	113	5.7				
Gs W	137	146	137	174	13.3				
Gs aL/tL	0.47	0.47	0.46	0.51	0.02				
Gs tL/W	1.71	1.50	1.38	1.71	0.1				
Capitulum vL	245	256	234	272	14.9	273	265	279	5.7
Capitulum dL	167	170	154	176	8.2	181	174	186	4.6
Rostrum L	74	74	70	80	3.9	81	78	86	3.4
Capitulum H	86	88	83	93	4.0	93	92	98	2.2
R L/c dL	0.44	0.44	0.41	0.46	0.02	0.45	0.43	0.47	0.02
R L/c vL	0.30	0.29	0.27	0.30	0.01	0.30	0.29	0.31	0.01
Gn bend depth	15	13	11	15	1.8	15	13	17	1.2
Chelicera L	277	288	262	306	17.9	312	300	321	6.9
Chelicera H	17	18	16	20	1.6	20	17	22	1.6
Chelicera L/H	16.14	15.88	15.13	16.46	0.5	15.84	14.56	18.21	1.3
Chelicera bs L	233	245	218	262	16.8	266	256	272	5.3
Chelicera claw L	44	44	42	49	2.4	47	44	49	2.0
Chel bs/claw L	5.28	5.49	4.94	5.94	0.4	5.67	5.43	5.89	0.2
P1 dorsal L	22	23	20	25	1.9	25	23	27	1.3
P2 dL	49	51	45	51	2.5	51	49	55	2.0
P3 dL	44	44	42	47	1.6	47	44	47	1.3
P4 dL	37	37	34	39	1.8	37	34	39	1.6
P5 dL	10	10	10	11	0.5	10	10	11	0.7
Palp total L	162	166	151	173	7.5	170	165	173	3.4
P4 vL	29	28	27	32	2.0	29	27	29	1.3
P4 vL to seta	23	20	17	23	2.3	20	17	23	2.5
P4 vL/L to seta	1.26	1.42	1.26	1.57	0.1	1.44	1.22	1.71	0.2
P1 rel L	0.14	0.14	0.13	0.15	0.01	0.14	0.14	0.16	0.01
P2 rel L	0.30	0.30	0.30	0.31	0.01	0.31	0.29	0.32	0.01
P3 rel L	0.27	0.27	0.26	0.28	0.00	0.27	0.27	0.28	0.00
P4 rel L	0.23	0.23	0.22	0.24	0.01	0.22	0.21	0.23	0.01
P5 rel L	0.06	0.06	0.06	0.07	0.00	0.06	0.06	0.07	0.00
P1 H	27	27	27	28	0.6	29	28	29	0.6
P2 H	32	32	29	33	1.2	32	29	36	2.1
P3 H	29	29	27	29	1.0	29	29	32	1.0
P4 H	20	20	17	20	1.0	18	17	20	0.8
P5 H	7	7	7	9	0.5	7	7	7	0.00
P1 L/H	0.82	0.82	0.73	0.91	0.1	0.83	0.79	0.92	0.04
P2 L/H	1.54	1.59	1.54	1.62	0.04	1.62	1.45	1.67	0.1
P3 L/H	1.50	1.52	1.50	1.58	0.03	1.54	1.46	1.58	0.1
P4 L/H	1.88	1.94	1.88	2.00	0.1	2.03	1.87	2.14	0.1
P5 L/H	1.33	1.33	1.14	1.50	0.1	1.42	1.33	1.50	0.1
P2/P4 L	1.33	1.33	1.31	1.40	0.04	1.39	1.31	1.50	0.1
P3/P4 L	1.20	1.20	1.13	1.23	0.04	1.25	1.19	1.29	0.04

Table 10. Differential diagnostic measurements (μm) of *Torrenticola kurtvietsi*, *ratoncitoi*, *menudopalpis* and *elhachensis* (males and females)

	<i>kurtvietsi</i>	<i>ratoncitoi</i>	<i>menudopalpis</i>	<i>elhachensis</i>
Id L	630–659	682–844	643–873	692
Gf L/Id L	0.28–0.29	0.19–0.21	0.20–0.22	0.23
Gs aL/tL	0.69	0.46–0.51	0.54–0.55	0.62
Palp tL	189–191	151–173	147–174	159
P2 rel L	0.37–0.38	0.29–0.31	0.34–0.37	0.37
P2 L/H	~1.9	1.45–1.67	1.73–1.91	1.85
P4 rel L	0.16–0.20	0.21–0.24	0.16–0.18	0.20
P4 L/H	~1.6	1.87–2.14	1.57–1.75	1.63
P2/P4	1.85–2.38	1.31–1.50	2.00–2.19	1.85
P3/P4	1.24–1.52	1.13–1.29	1.31–1.71	1.23

'MEGAPALPIS'-LIKE SPECIES

New species from Costa Rica: T. flexirostris.

Differential diagnosis of the group: Idiosoma oval; Cx-I/II broad, apically triangular with pointed tips; genital field large; capitulum basal relatively high, bend towards elongated, up-curved rostrum; palps without (with very small) ventral projections at P2 and P3; cheliceral claws straightened, elongated.

Discussion: The 'Megapalpis'-like species group is named after the subgenus *Megapalpis* Halbert, 1944 until now only known from Europe and Asia (Di Sabatino *et al.*, 2003b). At the present state of knowledge, with only one species of this group known from Central America, it cannot be decided if this species group could be regarded as a phylogenetic entity. Besides some striking similarities between the new species from Costa Rica and the species of the subgenus *Megapalpis* from the Old World, there are also some differences (see below). Therefore, at the present state of knowledge, the new species should not be placed within that subgenus.

TORRENTICOLA FLEXIROSTRIS SP. NOV.

(FIG. 25A–D; TABLE 11)

Type series: Holotype female, CR 288, Guanacaste, 1 km south-west Dos Ríos, Quebrada La Gato, right affluent Río Cucaracho, small stream, 520 m asl, 03.ii.1997, mounted; paratypes: same locality and date as holotype, 0/2/0 unmounted.

Habitat: Fast flowing small mountain stream at 520 m asl; mesolithal, leaf packages; temperature 22.0 °C; conductivity 92 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (only known from type locality, Cordillera de Guanacaste).

Derivatio nominis: *flexus* (Latin = curve), *rostrum* (Latin = snout, rostrum); referring to the clearly up-

curved rostrum, typical for the species (and species group).

Diagnosis (only one female): Characters of the 'Megapalpis'-like species; idiosoma oval-drop shaped, small; dorsal plate reddish, anterior pointed; lateral margin of Cx-I/II straight, anterior part of Cx-I/II triangular; genital field large, broad-rhombic; ventral margin of capitulum basely rounded, rostrum ventrally +/- straight, curved upwards; cheliceral claws straightened, long (bs/claw L 3.3); P2/P3 only with very small ventral projections.

Description – Male: Unknown.

Female (N = 1): Idiosoma small (L 510 μm , L/W 1.46); dorsal plate pale reddish, anterior elongated, antero-lateral margins nearly straight, apically pointed; antero-medial platelets medially convex, widened, laterally straight to convex, oblique; antero-lateral platelets longer, anterior margins straight to convex, posterior tapering, rounded; Dgl-4 lateral to Dgl-5 (Fig. 25B); coxal field (especially anterior part) broad, Cx-I/II antero-laterally straight, apically pointed, Cxgl-4 postero-lateral of Cx-I tips, lateral margin of Cx-II/III hardly graded; capitular bay wide, U- to slightly V-shaped; medial margin of Cx-II/III very short (Table 11, Fig. 25A); posterior margin of Cx-IV far postero-lateral of caudal end of genital field; genital field large compared with coxal shield (gf L/dist cb-gf 1.18), broad-rhombic, anterior truncated, antero-lateral and lateral margins straight, posterior rounded; excretory pore posterior Vgl-2, glands and pore posterior to caudal margin of primary sclerotization (Fig. 25A); capitulum basely curved, with clear bend towards rostrum, rostrum basely very high, ventral margin only slightly concave, nearly straight, distally curved upwards, pointed; chelicera basely short, claw slightly straightened, long; ventral projections on P2 and especially P3 very small, P2 and P4 of similar length (P2/P4 1.07), P4 relatively thin, ventral setae on flat hump, slightly distally (Fig. 25C, D).

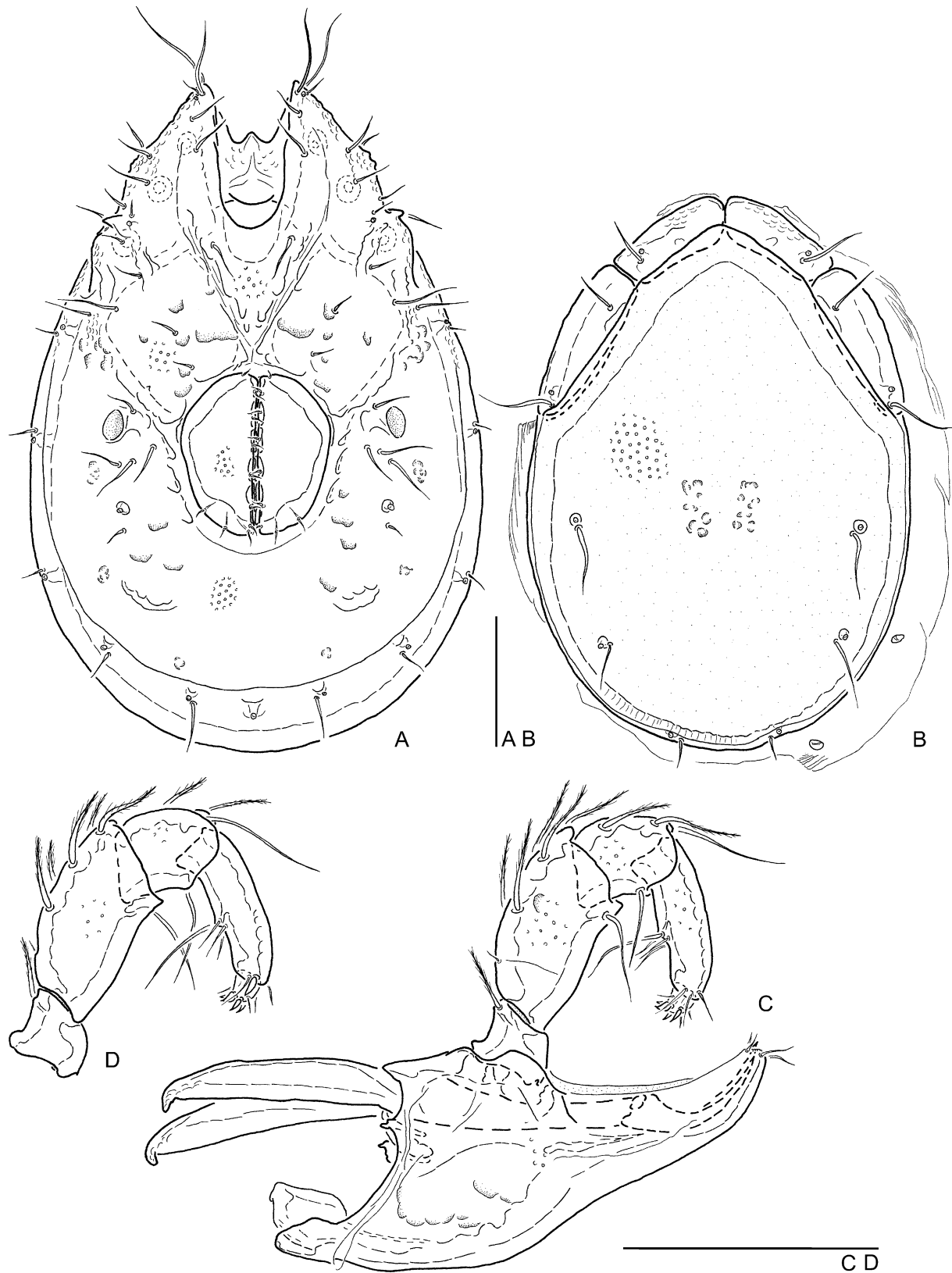


Figure 25. *Torrenticola flexirostris*. A–D, holotype female (CR 288). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 11. Measurements (μm) of *Torrenticola flexirostris*; $N = 1$ (female, holotype)

Idiosoma L	510	Cb L/W	1.80	R L/c dL	0.57	P1 rel L	0.13
Idiosoma W	348	Dist cb – gf	110	R L/c vL	0.41	P2 rel L	0.33
Idiosoma L/W	1.46	Cx-I mL	91	Gn bend depth	3	P3 rel L	0.18
Cx-I tL	201	Cx-II + III mL	17	Chelicera L	243	P4 rel L	0.31
Cx-III W	245	Cx-I tL/Cx-II/III mL	11.73	Chelicera H	18	P5 rel L	0.06
Cx-I tL/Cx-III W	0.82	Cx-I/Cx-II + III mL	5.29	Chelicera L/H	13.20	P1 H	32
Ds L	425	Genital field L	130	Chelicera bs L	186	P2 H	38
Dp L	402	Gf L/Cx-II + III mL	7.57	Chelicera claw L	56	P3 H	31
Ds W	294	Genital field W	120	Chel bs/claw L	3.30	P4 H	21
Ds L/W	1.44	Genital field L/W	1.08	P1 dorsal L	27	P5 H	10
Dp L/W	1.37	Gf L/Id L	0.25	P2 dL	71	P1 L/H	0.85
A-m platelet L	96	Gf L/dist cb – gf	1.18	P3 dL	39	P2 L/H	1.87
A-m platelet W	37	Dist gf – expo	135	P4 dL	66	P3 L/H	1.28
A-l platelet L	130	Dist gf – cauda	163	P5 dL	12	P4 L/H	3.18
A-l platelet W	42	Capitulum vL	211	Palp total L	216	P5 L/H	1.25
A-m pl L/a-l pl L	0.74	Capitulum dL	151	P4 vL	51	P2/P4 L	1.07
Capitular bay L	110	Rostrum L	86	P4 vL to seta	29	P3/P4 L	0.59
Capitular bay W	61	Capitulum H	87	P4 vL/L to seta	1.75		

Discussion: *Torrenticola flexirostris* from Costa Rica differs from the European and Asian species of the subgenus *Megapalpis* in the clearly shorter palps and rostrum, and therefore it should not be assigned to this subgenus. However, the characteristic shape of the rostrum, cheliceral claw and Cx-I/II, as well as – to a certain extent – of the palps, strongly suggests the classification of *T. flexirostris* in a separate group. The new species differs from all other species known from Central and South America in this combination of characters.

LAMELLIPALPIS-GROUP

Previously known species: *T. lamellipalpis* K.O. Viets, 1977 (Guatemala), *T. obliquipalpis* K.O. Viets, 1977 (Mexico, Guatemala).

New species from Costa Rica: *T. dispersa*, *T. guanacastensis*.

Differential diagnosis of the group: Idiosoma rounded-oval; ventral projections of P2 and P3 not cone-shaped, P2 bearing smooth lamellae of variable extension, ventral seta at P2 inserted centrally; capitulum elongated, ventral margin not graded (in some

Key to the species

- 1a Capitular bay wide and deep, lateral margins convex, basely broad (Figs 26A, 30A); ventral margin of capitulum smoothly curved; lamella at ventral margin of P2 large, broad; P4 more robust (Figs 26C, 27C, 30C, 31E).....2
- b Capitular bay medium to small, basely V-shaped (Figs 28A, 32A); ventral margin of capitulum slightly bent; lamella at ventral margin of P2 very flat; P4 smaller, tapering distally (Figs 28C, 33A).....3
- 2a Idiosoma slightly elongated (Id L/W 1.60–1.63); genital skeleton with elongated cella proximalis (gs aL/tL 0.28); palp very long, slender (tL 312–328 μm), P4 long and slender, dorsal and ventral margins nearly parallel (L/H 4.00–5.06) (Figs 30, 31)..... *T. lamellipalpis*
- b Idiosoma rounded-oval (Id L/W 1.42–1.53); genital skeleton with relatively shorter cella proximalis (gs aL/tL 0.37); palp short, stout (tL 232–247 μm), P4 short, in distal half inflated (L/H 2.50–2.75) (Figs 26, 27) *T. dispersa*
- 3a Idiosoma more slender, oval (Id L/W 1.48–1.51); coxal field more slender; capitulum very flat, slender, rostrum long, straight (r L/c vL 0.36–0.40); palp slender, P1 very slender, ventral bristle at P2 short, P4 relatively long (rel L 0.27–0.29, L/H 3.07–3.60 P2/P4 1.15–1.31, P3/P4 0.63–0.70); antero-medial dorsal plates laterally oblique; processus proximalia of cella proximalis long (Figs 32, 33)..... *T. obliquipalpis*
- b Idiosoma rounded (Id L/W 1.30–1.42); coxal field broader, more compact; capitulum higher, basely with small, sharp bend, rostrum shorter, basely high (r L/c vL 0.26–0.30), palp short, P1 more compact, ventral bristle at P2 long, P4 very short (rel L 0.21–0.24, L/H 2.33–2.90, P2/P4 1.48–1.71, P3/P4 0.79–0.92); processus proximalia of cella proximalis short (Figs 28, 29)..... *T. guanacastensis*

species +/- flat, rostrum long and slender); coxal field slightly elongate, broad, capitular bay V-shaped or wide with convex lateral margins; genital skeleton apically small, cella proximalis elongated, large (gs aL/tL 0.28–0.40).

Discussion: Due to the unique shape of the P2-projection – forming a variably shaped smooth lamella – the species of the *lamellipalpis*-group are clearly separated from all other species of the genus. Species of this group until now are only known from Central America. On account of the unique palps and the uniform shape of the genital skeleton, the group is regarded as a phylogenetic entity.

TORRENTICOLA DISPERSA SP. NOV.

(FIGS 26A–E, 27A–D; TABLE 12)

Type series: Holotype male, CR 14, Cartago, Río Macho, small stream, 1500 m asl, 21.vi.1995, mounted.

Additional specimens examined: CR 70, Puntarenas, Monteverde, Quebrada Quecha, small stream, 1560 m asl, 17.vii.1995, 0/1/0 mounted; CR 104, Puntarenas, Las Alturas, left affluent Río Bellavista, small stream, 1580 m asl, 01.viii.1995, 1/0/0 mounted, 0/1/0 unmounted.

Habitat: Fast to very fast flowing small mountain streams at 1500–1580 m asl; mesolitoral; temperature 16.5–18.1 °C; conductivity 19–41 µS cm⁻¹.

Distribution: Costa Rica (Cordillera de Talamanca, Cordillera de Tilarán).

Derivatio nominis: *dispersa* (Spanish = spread, scattered); referring to the scattered distribution of single sample sites and specimens of this species all over Costa Rica.

Diagnosis: Characters of the *lamellipalpis*-group; idiosoma oval; dorsal plate yellow; coxal field slightly elongated, Cx-I apically pointed, Cxgl-4 far posterior apical tips at lateral margin; capitular bay very large and wide, lateral margins convex; genital skeleton apically short, cella proximalis long with short processus proximalia; capitulum relatively high, ventral margin smoothly curved towards very high, relatively compact rostrum; palp short and stout, P1 and P2 short, compact; P2-lamella smooth, broad, medio-distally extended over two-thirds of ventral margin of P3, ventral seta long, inserted centrally; P3 relatively long; P4 short, dorsal margin convex, without ventral projections, ventral setae inserted far proximally.

Description – Male (*N* = 2): Idiosoma mid-sized [L 628 µm (652 µm), L/W 1.42 (1.53)]; dorsal plate broad; antero-medial dorsal platelets medially straight to

convex, laterally oblique, antero-lateral platelets longer, anterior and laterally convex, posterior tapering; Dgl-4 lateral to Dgl-5 (Fig. 26B); coxal field elongated and broad, laterally smoothly graded, Cx-I apically pointed, lateral margins of Cx-I/II smooth; Cxgl-4 far posterior of Cx-I tips at antero-lateral margins of Cx-I; capitular bay wide, lateral margins convex, basally nearly straight; posterior margins of Cx-IV lateral of genital field, directed postero-medial to antero-lateral; genital field far posterior (distance gf-cauda short), relatively long, anterior margins truncated, nearly across, lateral margins slightly convex, diverging to posterior, posterior half rounded; excretory pore posterior to Vgl-2, posterior of caudal margin of primary sclerotization (Fig. 26A); genital skeleton apically short (aL/tL 0.37), cella proximalis large, processus proximalia small, brachia distalia and proximalia small (Fig. 26E); capitulum relatively high, posterior part short, ventral margin very smoothly curved, no distinct edge between posterior part and rostrum (ventral margin +/- gradually tapering from proximal end to tip of rostrum); rostrum compact, very high; chelicera (within the species group) large, compact; P1 and P2 short, compact [L/H P1 0.94 (0.94), P2 1.20 (1.28)], P2 latero-distal margin straight, medio-distal margin sweeping ventrally to a tongue-shaped lamella; P3 relatively long, medio-distal margin slightly extended (the medio-distal lamellae at P2 and P3 are finer than shown in Fig. 26C, D); P4 short, compact [L/H 2.75 (2.74)], dorsal margin convex, distally inflated, ventral margin straight, without projections, two ventral setae inserted far proximally, two more centrally; P5 very small, short (Fig. 26C, D).

Female (*N* = 1): Idiosoma similar to male, larger (L 765 µm), more drop-shaped (Fig. 27A); medial margin Cx-II/III shorter; genital field slightly rhombic-oval, lateral margins only slightly tapering to posterior; posterior margins of Cx-IV postero-lateral behind genital field; excretory pore between Vgl-2, clearly behind posterior margin of primary sclerotization; distance genital field to cauda much longer than in male (Fig. 27A); gnathosoma similar to male (Fig. 27C, D).

Discussion: *Torrenticola dispersa* is most similar to *T. lamellipalpis* from Guatemala, especially with regard to the large capitular bay and smooth ventral margin of the capitulum. Due to these characters, both are clearly separated from all other species. However, *T. dispersa* is clearly distinguished by its more compact idiosoma, coxal field, dorsal plate, palp and rostrum. Especially the palp (in particular P4) is much shorter in *T. dispersa*. The two species show a similar slight sexual dimorphism of the idiosoma (position of posterior margin of Cx-IV, distance genital field to cauda).

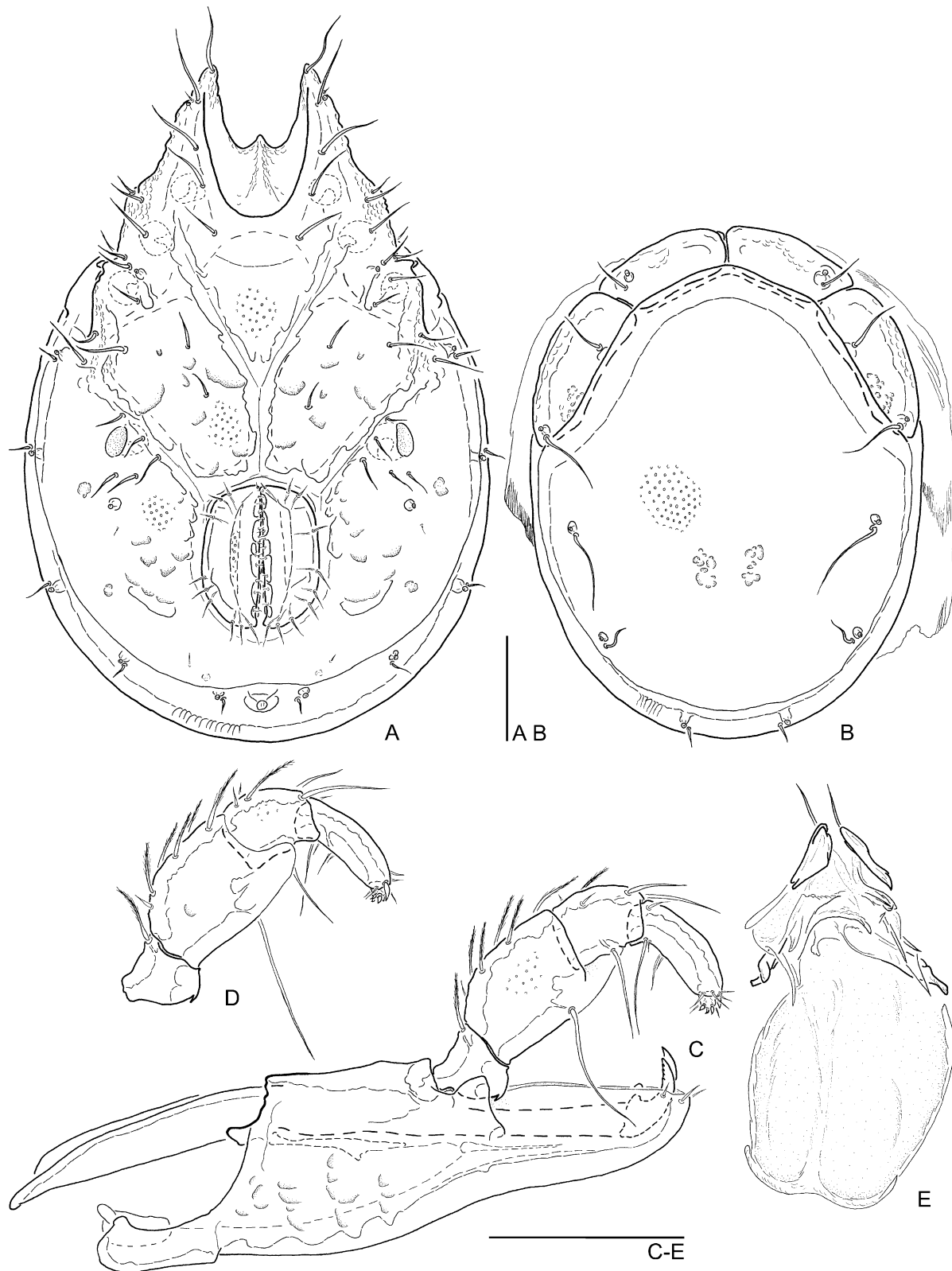


Figure 26. *Torrenticola dispersa*. A, B, holotype male (CR 14); C–E, male (CR 104). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view (apically damaged). Scale bars = 100 μ m.

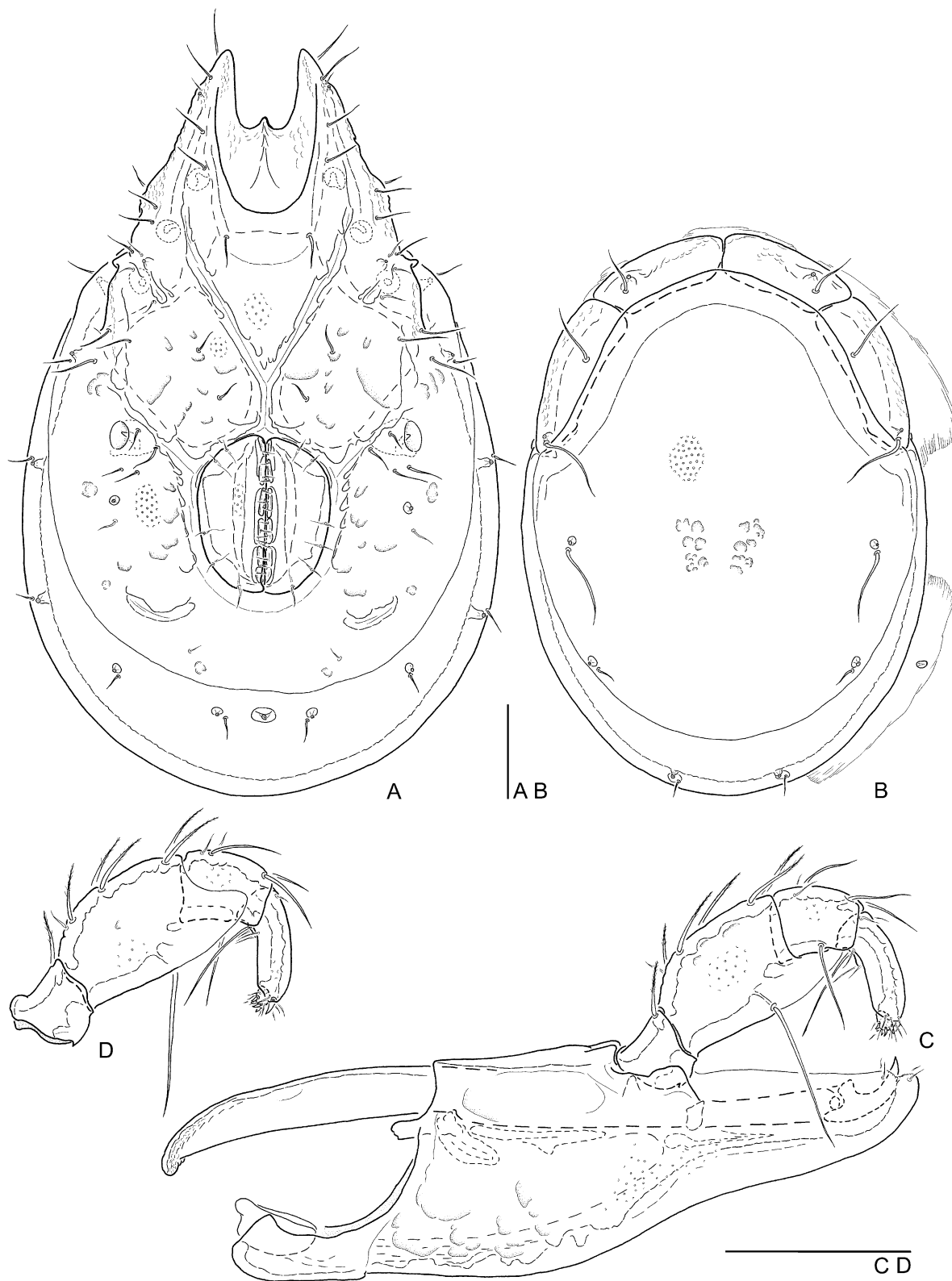


Figure 27. *Torrenticola dispersa*. A–D, female (CR 70). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 12. Measurements (μm) of *Torrenticola dispersa*; $N = 2$ (male), 1 (female)

	male			female			male			female		
	ht	SD		ht	SD		ht	SD		ht	SD	
Idiosoma L	628	652	17.3	765		Capitulum dL	225	223	1.7	262		
Idiosoma W	441	427	10.4	500		Rostrum L	98	96	1.7	111		
Idiosoma L/W	1.42	1.53	0.1	1.53		Capitulum H	131	94	26.0	123		
Cx-I tL	304	304	0.00	343		R L/c dL	0.43	0.43	0.00	0.43		
Cx-III W	314	304	6.9	324		R L/c vL	0.30	0.30	0.00	0.30		
Cx-I tL/Cx-III W	0.97	1.00	0.02	1.06		Gn bend depth	6	6	0.00	7		
Ds L	476	500	17.3	579		Chelicera L	343	356	9.5	412		
Dp L	441	466	17.3	549		Chelicera H	27	25	1.7	29		
Ds W	368	373	3.5	427		Chelicera L/H	12.73	14.55	1.3	14.00		
Ds L/W	1.29	1.34	0.03	1.36		Chelicera bs L	299	311	8.7	363		
Dp L/W	1.20	1.25	0.04	1.29		Chelicera claw L	44	45	0.9	49		
A-m platelet L	130	136	4.3	148		Chel bs/claw L	6.78	6.86	0.1	7.40		
A-m platelet W	49	44	3.5	49		P1 dorsal L	37	38	0.9	37		
A-l platelet L	157	167	6.9	174		P2 dL	74	72	0.9	88		
A-l platelet W	59	55	2.6	54		P3 dL	51	48	2.3	51		
A-m pl L/a-l pl L	0.83	0.82	0.01	0.85		P4 dL	67	64	2.6	61		
Capitular bay L	140	145	3.5	167		P5 dL	10	10	0.0	10		
Capitular bay W	105	91	10.4	100		Palp total L	238	232	4.9	247		
Cb L/W	1.33	1.59	0.2	1.66		P4 vL	49	47	1.7	44		
Dist cb – gf	247	262	10.4	233		P4 vL to seta	12	10	1.7	9		
Cx-I mL	162	164	1.7	179		P4 vL/L to seta	4.00	4.75	0.5	5.14		
Cx-II + III mL	81	89	6.1	54		P1 rel L	0.15	0.16	0.01	0.15		
Cx-I tL/Cx-II/III mL	3.76	3.40	0.3	6.37		P2 rel L	0.31	0.31	0.00	0.36		
Cx-I/Cx-II + III mL	2.00	1.84	0.1	3.32		P3 rel L	0.21	0.21	0.01	0.21		
Genital field L	140	141	0.9	164		P4 rel L	0.28	0.28	0.01	0.25		
Gf L/Cx-II + III mL	1.73	1.58	0.1	3.05		P5 rel L	0.04	0.04	0.00	0.04		
Genital field W	111	110	0.9	142		P1 H	39	40	0.9	37		
Genital field L/W	1.25	1.28	0.02	1.16		P2 H	61	56	3.5	61		
Gf L/Id L	0.22	0.22	0.00	0.21		P3 H	37	36	0.9	39		
Gf L/dist cb – gf	0.56	0.54	0.02	0.71		P4 H	25	23	0.9	25		
Dist gf – expo	74	74	0.00	127		P5 H	10	9	0.9	7		
Dist gf – cauda	103	109	4.3	203		P1 L/H	0.94	0.94	0.00	1.00		
Gs L		194				P2 L/H	1.20	1.28	0.1	1.44		
Gs aL		71				P3 L/H	1.39	1.34	0.03	1.31		
Gs W		100				P4 L/H	2.75	2.74	0.01	2.50		
Gs aL/tL		0.37				P5 L/H	1.00	1.14	0.1	1.33		
Gs tL/W	1.93					P2/P4 L	1.09	1.13	0.03	1.44		
Capitulum vL	322	315	5.2	377		P3/P4 L	0.76	0.75	0.00	0.84		

***TORRENTICOLA GUANACASTENSIS* SP. NOV.**

(FIGS 28A–E, 29A–D; TABLE 13)

Type series: Holotype male, CR 33, Heredia, La Virgen, Río Sarapiquí, river, 180 m asl, 30.vi.1995, mounted.

Additional specimens examined: CR 18, Limon, Río Cristine, stream, 180 m asl, 23.vi.1995, 1/0/0 mounted; CR 35, Alajuela, Río Hule, stream, 400 m asl, 30.vi.1995, 1/0/0 mounted; CR 123, Guanacaste, ACG, Río La Yengua, small stream, 560 m asl,

22.ii.1996, 2/0/0 mounted; CR 133, Guanacaste, Río Mena, stream, riffle, 240 m asl, 26.ii.1996, 1/0/0 mounted; CR 143, Guanacaste, Quebrada Kathia, small stream, 600 m asl, 28.ii.1996, 0/1/0 unmounted; CR 153, Guanacaste, ACG, Biological Station Maritza, Río Tempisquito, stream, 560 m asl, 02.iii.1996, 1/1/0 mounted; CR 155, Guanacaste, ACG, Quebrada Las Yeguitas, small stream, riffle, 280 m asl, 03.iii.1996, 1/0/0 mounted, 1/0/0 unmounted; CR 239, Guanacaste, ACG, Pitilla, Río Orosi, small stream, riffle, 600 m asl, 07.iv.1996, 0/1/0 mounted; CR 279, Guanacaste, ACG,

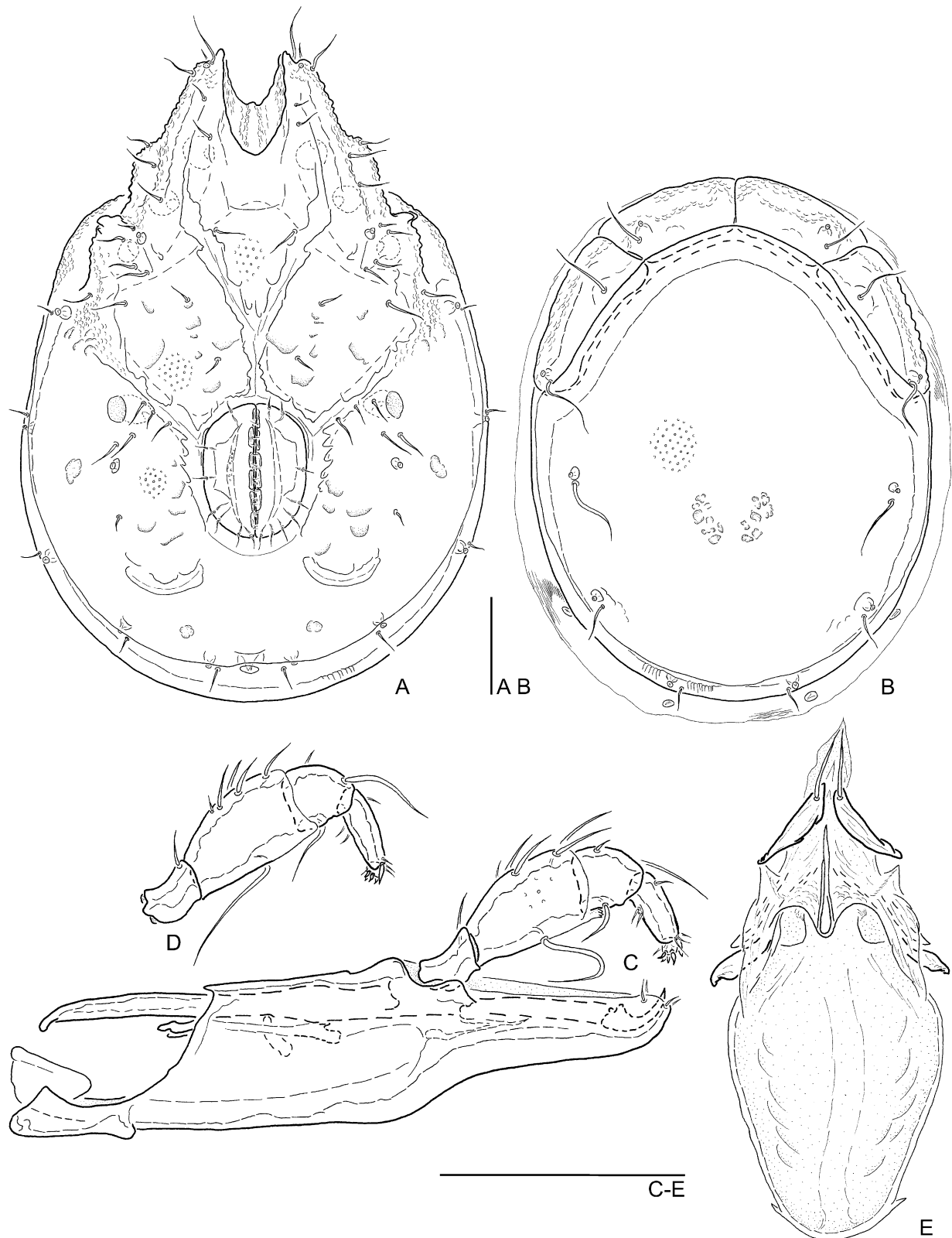


Figure 28. *Torrenticola guanacastensis*. A–D, holotype male (CR 33); E, male (CR 18). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

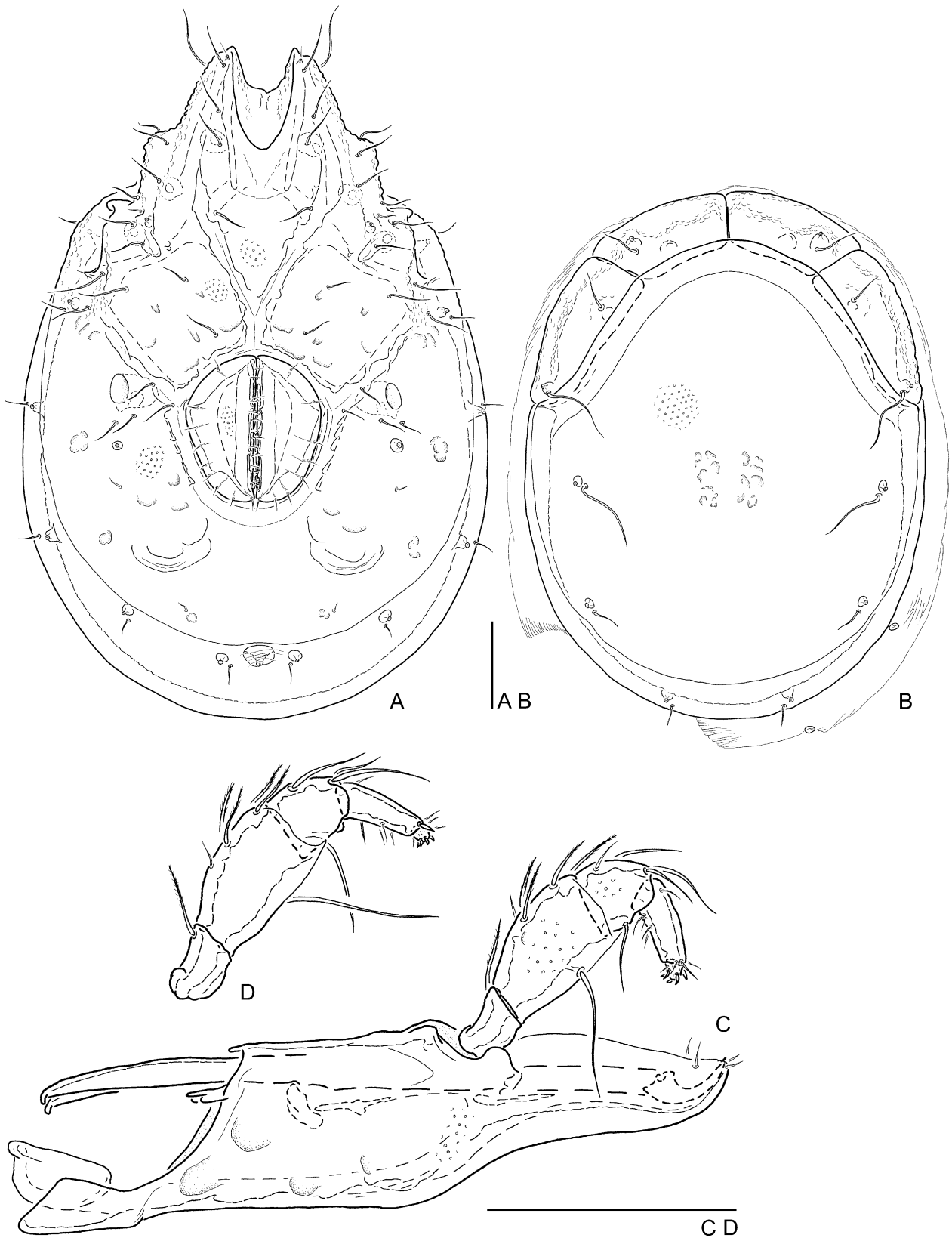


Figure 29. *Torrenticola guanacastensis*. A–D, female (CR 281). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 13. Measurements (μm) of *Torrenticola guanacastensis*; $N = 8$ (male), 3 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	657	662	618	697	24.3	677	652	746	48.3
Idiosoma W	481	478	441	520	27.6	495	486	525	20.4
Idiosoma L/W	1.37	1.39	1.30	1.42	0.04	1.39	1.32	1.42	0.1
Cx-I tL	284	284	260	299	12.6	280	275	294	10.2
Cx-III W	343	334	307	353	15.7	343	319	358	19.8
Cx-I tL/Cx-III W	0.83	0.85	0.81	0.88	0.02	0.82	0.81	0.86	0.03
Ds L	530	535	510	569	22.9	540	540	598	34.0
Dp L	486	488	461	510	20.2	491	486	544	32.7
Ds W	412	417	383	451	22.1	422	422	451	17.0
Ds L/W	1.29	1.29	1.26	1.33	0.02	1.28	1.28	1.33	0.03
Dp L/W	1.18	1.17	1.13	1.21	0.02	1.16	1.15	1.21	0.03
A-m platelet L	151	153	142	162	8.0	159	147	164	8.8
A-m platelet W	64	64	58	69	3.6	65	64	69	2.6
A-l platelet L	172	179	167	189	7.9	173	172	181	5.3
A-l platelet W	69	69	64	76	3.9	72	70	76	3.1
A-m pl L/a-l pl L	0.88	0.87	0.80	0.90	0.03	0.91	0.85	0.93	0.04
Capitular bay L	100	100	93	105	4.0	100	96	113	8.8
Capitular bay W	61	61	59	69	3.6	69	66	69	1.4
Cb L/W	1.64	1.61	1.50	1.65	0.1	1.52	1.39	1.64	0.1
Dist cb – gf	257	250	230	260	10.4	233	217	250	16.5
Cx-I mL	186	181	167	198	11.0	184	174	189	7.5
Cx-II + III mL	64	60	55	78	7.2	43	37	53	8.0
Cx-I tL/Cx-II/III mL	4.47	4.57	3.32	5.43	0.6	6.86	5.31	7.47	1.1
Cx-I/Cx-II + III mL	2.92	2.94	2.16	3.60	0.4	4.29	3.58	4.73	0.6
Genital field L	140	136	130	145	4.6	167	132	170	20.9
Gf L/Cx-II + III mL	2.19	2.21	1.69	2.62	0.3	3.97	2.51	4.53	1.0
Genital field W	110	110	108	120	4.5	141	116	159	21.5
Genital field L/W	1.27	1.22	1.18	1.27	0.03	1.14	1.07	1.18	0.1
Gf L/Id L	0.21	0.21	0.20	0.21	0.01	0.23	0.20	0.25	0.02
Gf L/dist cb – gf	0.54	0.55	0.54	0.57	0.01	0.73	0.53	0.77	0.1
Dist gf – expo	131	141	120	172	15.9	142	140	179	22.0
Dist gf – cauda	164	179	159	191	12.5	197	176	238	31.1
Gs L	206	206	189	216	9.6				
Gs aL	74	72	64	81	5.9				
Gs W	127	115	98	127	10.9				
Gs aL/tL	0.36	0.36	0.30	0.38	0.03				
Gs tL/W	1.62	1.83	1.62	2.05	0.1				
Capitulum vL	274	268	247	279	11.0	274	257	292	17.1
Capitulum dL	191	188	174	196	7.7	186	186	201	8.5
Rostrum L	76	76	70	81	3.6	76	71	81	4.9
Capitulum H	67	66	64	69	2.0	69	64	76	6.2
R L/c dL	0.40	0.40	0.40	0.42	0.01	0.40	0.38	0.41	0.01
R L/c vL	0.28	0.28	0.28	0.29	0.01	0.28	0.26	0.30	0.02
Gn bend depth	9	9	9	10	0.6	9	9	10	0.7
Chelicera L	262	260	245	273	9.3	256	250	277	14.1
Chelicera H	11	12	11	15	1.4	13	13	17	2.1
Chelicera L/H	23.78	20.70	17.83	23.78	2.1	18.55	16.14	19.00	1.5
Chelicera bs L	230	228	214	241	9.0	225	221	243	11.6
Chelicera claw L	32	32	29	32	1.1	31	29	34	2.6
Chel bs/claw L	7.23	7.27	6.85	7.92	0.3	7.36	7.07	7.50	0.2
P1 dorsal L	26	24	22	26	1.4	25	22	27	2.5
P2 dL	54	53	50	54	1.5	53	51	56	2.6

Table 13. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	29	29	27	29	1.2	27	27	32	2.8
P4 dL	36	34	29	36	2.0	34	33	38	2.6
P5 dL	7	7	6	9	0.7	7	7	9	0.7
Palp total L	152	147	138	152	4.7	147	142	159	8.8
P4 vL	27	25	22	27	1.7	25	25	29	2.8
P4 vL to seta	12	10	7	12	1.5	7	6	9	1.2
P4 vL/L to seta	2.20	2.75	2.20	3.67	0.5	3.43	3.33	4.00	0.4
P1 rel L	0.17	0.16	0.15	0.18	0.01	0.16	0.15	0.18	0.02
P2 rel L	0.35	0.36	0.35	0.37	0.01	0.35	0.35	0.37	0.01
P3 rel L	0.19	0.19	0.18	0.20	0.00	0.19	0.18	0.20	0.01
P4 rel L	0.23	0.23	0.21	0.24	0.01	0.23	0.23	0.24	0.00
P5 rel L	0.05	0.05	0.04	0.06	0.00	0.05	0.05	0.05	0.00
P1 H	18	18	17	20	0.9	18	17	20	1.2
P2 H	33	34	32	37	1.6	33	32	37	2.6
P3 H	26	26	22	28	1.8	26	25	27	1.2
P4 H	12	14	12	15	1.2	13	12	15	1.2
P5 H	6	6	5	7	0.9	6	6	6	0.00
P1 L/H	1.40	1.31	1.19	1.43	0.1	1.29	1.25	1.47	0.1
P2 L/H	1.63	1.54	1.45	1.63	0.1	1.59	1.53	1.62	0.04
P3 L/H	1.14	1.09	1.00	1.22	0.1	1.10	1.05	1.18	0.1
P4 L/H	2.90	2.41	2.33	2.90	0.2	2.58	2.45	2.80	0.2
P5 L/H	1.20	1.20	1.00	1.75	0.3	1.20	1.20	1.40	0.1
P2/P4 L	1.52	1.55	1.50	1.71	0.1	1.50	1.48	1.59	0.1
P3/P4 L	0.83	0.83	0.79	0.92	0.04	0.81	0.79	0.84	0.03

Rincon de la Vieja, Santa Maria, Quebrada Aguas Termales, small stream, stones with sulphur coating, 680 m asl, 31.i.1997, 1/0/0 mounted; CR 281, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Río Negro, small stream, 760 m asl, 31.i.1997, 1/1/0 mounted, 1/1/0 mounted for SEM, 2/3/0 unmounted; CR 283, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Quebrada Zopilote, stream, 790 m asl, 31.i.1997, 1/0/0 mounted, 0/4/0 unmounted; CR 350, Guanacaste, ACG, Pitilla, Río Coloncito, stream, 640 m asl, 09.iii.1997, 1/0/0 mounted, 1/1/0 unmounted.

Habitat: Mainly fast, some slow flowing small streams, streams and one river at 180–790 m asl; mesolithal, akal, macrolithal (also lithophytal, macropelal, leaf packages, psammal); temperature 18.9–24.9 °C; conductivity 29–118 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (mainly Cordillera de Guanacaste, some sites in the foothills of the Caribbean slope of the Cordillera Central).

Derivatio nominis: *guanacastensis*; referring to the fact that most specimens (and sample sites) of this new species were found in the Area de Conservación Guanacaste, north-western Costa Rica.

Diagnosis: Characters of the *lamellipalpis*-group; idiosoma rounded-oval, with broad, heavy 'shoulders', maximal width in posterior half; antero-dorsal platelets large, dorsal plate with pale reddish pattern (Fig. 6B-2, B-3); coxal field laterally graded, Cx-I apically short and very broad, Cx-I tips notched; capitular bay relatively small, basely V-shaped; capitulum elongated, +/- flat, posterior part long, ventral margin straight, with small, sharp bend towards relatively short rostrum; P2-lamella small, flat; P4 very small, without ventral projections; genital skeleton apically short, cella proximalis long.

Description – Male ($N = 12$): Idiosoma mid-sized [L 657 μm (618–697 μm), L/W 1.37 (1.30–1.42)]; dorsal plate posterior and antero-medial pale reddish (Fig. 6B-2), antero-medial platelets broad, medially straight, laterally oblique, antero-lateral platelets slightly longer, medially slightly concave, postero-laterally rounded; Dgl-4 lateral to Dgl-5 (Dgl-3, -4, -5 laying on a straight line) (Fig. 28B); coxal field broad, compact, slightly graded, Cx-I short and broad, apically truncated, tips notched (Fig. 28A), Cxgl-4 posterior to this notch; posterior margins of Cx-IV postero-lateral to genital field, across; genital field elongated, anterior margins convex, lateral margins gradually

tapering towards rounded posterior margins; excretory pore between Vgl-2, slightly behind (partly under) caudal margin of primary sclerotization (Fig. 28A); genital skeleton apically short, brachia distalia small, carina anterior short, small, cella proximalis large, elongated, processus proximalia very short (Fig. 28E); capitulum elongated, posterior long, ventral margin straight, with sharp bend towards relatively short, basely high rostrum [rel L/c vL 0.28 (0.28–0.29)]; chelicera thin and slender; palp very small, P2 with very small, flat ventral lamella (medio-distally only slightly extended), long ventral seta, P3 small, dorsal and ventral margin rounded, distally tapering, P4 very small, short [rel L 0.23 (0.21–0.24), L/H 2.90 (2.33–2.80), P2/P4 1.52 (1.50–1.71), P3/P4 0.83 (0.79–0.92)], relatively straight, without ventral projections, ventral setae in proximal half (Fig. 28C, D).

Female ($N = 3$): Idiosoma similar to male, slightly larger (L 652–746 μm); dorsal plate pale reddish; medial margin Cx-II/III shorter (Table 13); genital field broad-rhombic, anterior margin rounded, lateral margins slightly convex, strongly tapering to posterior; excretory pore and Vgl-2 clearly behind caudal margin of primary sclerotization (Fig. 29A); gnathosoma similar to male (Fig. 29C, D).

Discussion: *Torrenticola guanacastensis* is most similar to *T. obliquipalpis* known from Mexico and Guatemala. The small, V-shaped capitular bay and flat P2-lamella separate these two species from all others. However, the new species from Costa Rica is clearly separated from the latter in a shorter and more compact capitulum and palp (especially P4 is very small) as well as a broader idiosoma and coxal field.

TORRENTICOLA LAMELLIPALPIS K.O. VIETS, 1977
(FIGS 30A–D, 31A–E; TABLE 14)

Type series: Holotype male, Guatemala, km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 16.viii.1974, leg. Böttger, prep. no. 5716 SMF; allotype female, same locality and date, leg. Böttger, prep. no. 5718 SMF; paratypes, same locality and date, 1/2/0 mounted, leg. Böttger, prep. no. 5714, 5720 SMF.

Further material: Guatemala, leg. Böttger: San Juan Chamelco, south-east Cobán, Río Chilax, 1300 m asl, 13.viii.1974, 1/2/0; same locality, 12.viii.1974, 12/9/3 mounted, prep. no. 5946, 5947 SMF.

Habitat: Small mountain streams at 1300–1520 m asl.

Geographical distribution: Guatemala.

Published records: K.O. Viets (1977/78 Teil I).

Diagnosis: Characters of the *lamellipalpis*-group; idiosoma slightly elongated (L/W 1.60–1.63); dorsal plate

pale reddish; capitular bay very large and deep, lateral margins convex; coxal field laterally smooth; genital skeleton apically very short (aL/tL 0.28); palp very long, slender (tL 312–328 μm), P2-lamella smooth, large, P4 long and slender, dorsal and ventral margins nearly parallel (L/H 4.00–5.06), ventral setae in two groups far proximally.

Description: See K.O. Viets (1977/78 Teil I).

Discussion: *Torrenticola lamellipalpis* is most similar to *T. dispersa* (see above). The species is clearly separated from the latter especially in its more slender, elongated palp and the very slender rostrum.

TORRENTICOLA OBLIQUIPALPIS K.O. VIETS, 1977
(FIGS 32A–E, 33A–C; TABLES 15, 16)

Type series: Holotype Male, Guatemala, km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 16.viii.1974, leg. Böttger, prep. no. 5715 SMF; allotype female, same locality and date, leg. Böttger, prep. no. 5719 SMF; paratypes, same locality and date, 2/1/0 mounted, leg. Böttger, prep. no. 5717, 5800 SMF.

Further material: Mexico, San Francisco Oxtotilpan, Arroyo de Peña Blanca, stream, 1800 m asl (Cramer, 1988).

Material examined: CR 10, Heredia, El Tirol, Río Segundo, stream, 1780 m asl, 19.vi.1995, 0/1/0 mounted; CR 29, Heredia, spring brook, 1970 m asl, 29.vi.1995, 1/0/0 mounted; CR 57, Alajuela, San Ramon Field Station, hygropetric area below waterfall at Río San Lorencito, 1040 m asl, 09.vii.1995, 0/1/0 mounted; CR 60, Alajuela, San Ramon Field Station, right affluent Río San Lorencito, spring brook, 1080 m asl, 10.vii.1995, 0/2/0 unmounted; CR 71, Puntarenas, Monteverde, Río Guacimal, small stream, 1400 m asl, 18.vii.1995, 2/0/0 mounted; CR 72, Puntarenas, Monteverde, Quebrada Máquina, small stream, 1440 m asl, 18.vii.1995, 1/0/0 unmounted; CR 95, San José, Talamaca, small stream, 2340 m asl, 27.vii.1995, 1/0/0 mounted, 0/1/0 SEM mounted, 0/1/0 unmounted; CR 96, San José, Talamaca, Río Savegre, stream, 2160 m asl, 28.vii.1995, 1/0/0 mounted; CR 106, Puntarenas, Las Alturas Field Station, Río Bellavista, 1490 m asl, 01.viii.1995, 1/0/0 mounted, 0/1/0 unmounted; CR 107, Puntarenas, Las Alturas Field Station, Río Colón, stream, 1340 m asl, 01.viii.1995, 1/0/0 mounted, 1/1/0 unmounted; CR 139, Guanacaste, ACG, Cacao, rheocrene, 1150 m asl, 27.ii.1996, 0/1/0 unmounted.

Habitat: Mountain streams at mid to higher elevations; *Guatemala:* small stream at 1520 m asl; *Mexico:* stream at 1800 m asl; *Costa Rica:* mainly fast flowing streams, small streams and slow flowing spring brooks, one very fast flowing stream, one rheocrene

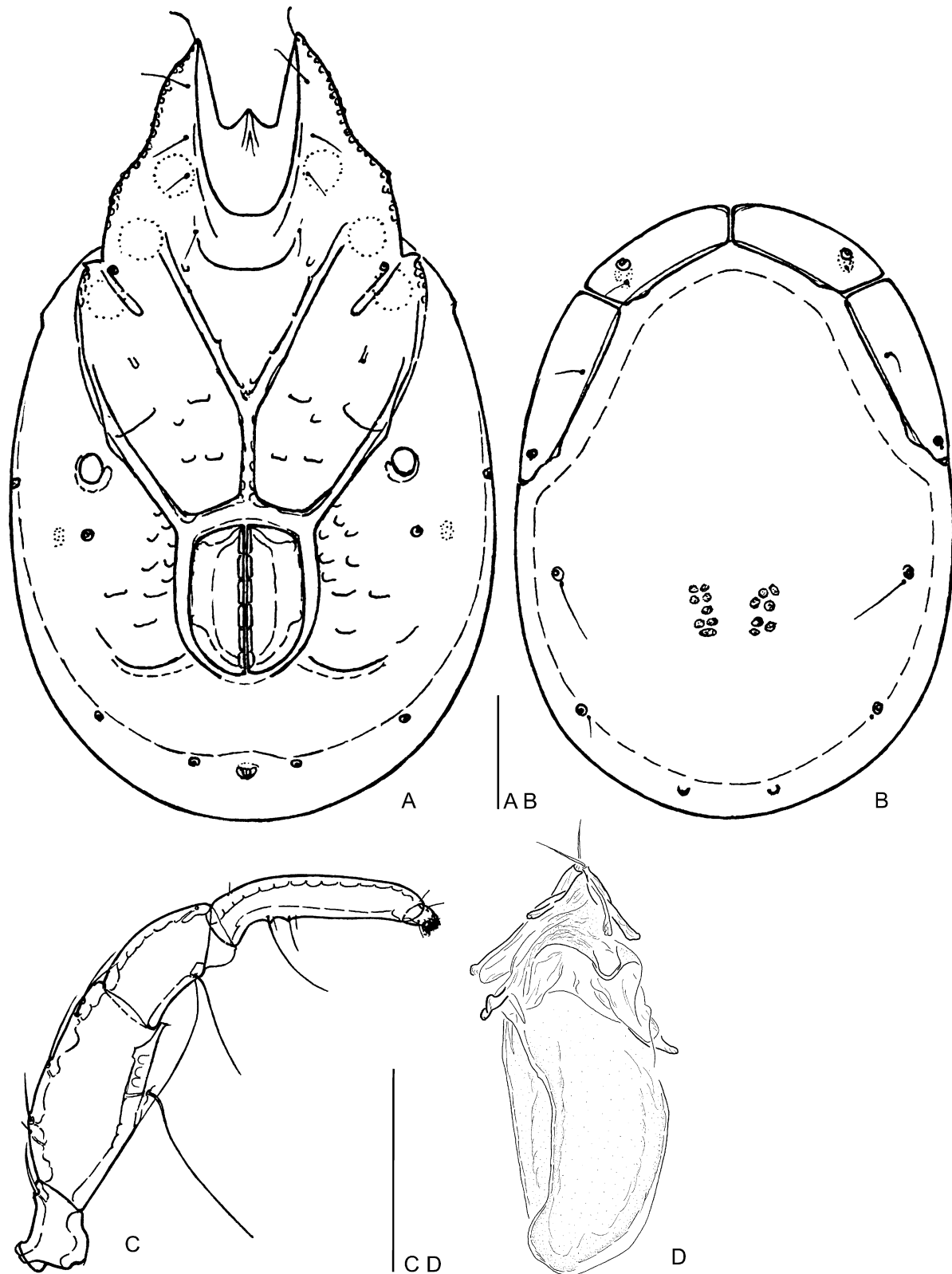


Figure 30. *Torrenticola lamellipalpis*. A–C, holotype male, prep. no. 5716 SMF Viets collection; after K.O. Viets (1977/78, Teil I); D, holotype male, prep. no. 5716 SMF Viets collection. A, idiosoma, ventral view; B, idiosoma, dorsal view; C, right palp, lateral view; D, genital skeleton, antero-lateral view. Scale bars = 100 μ m.

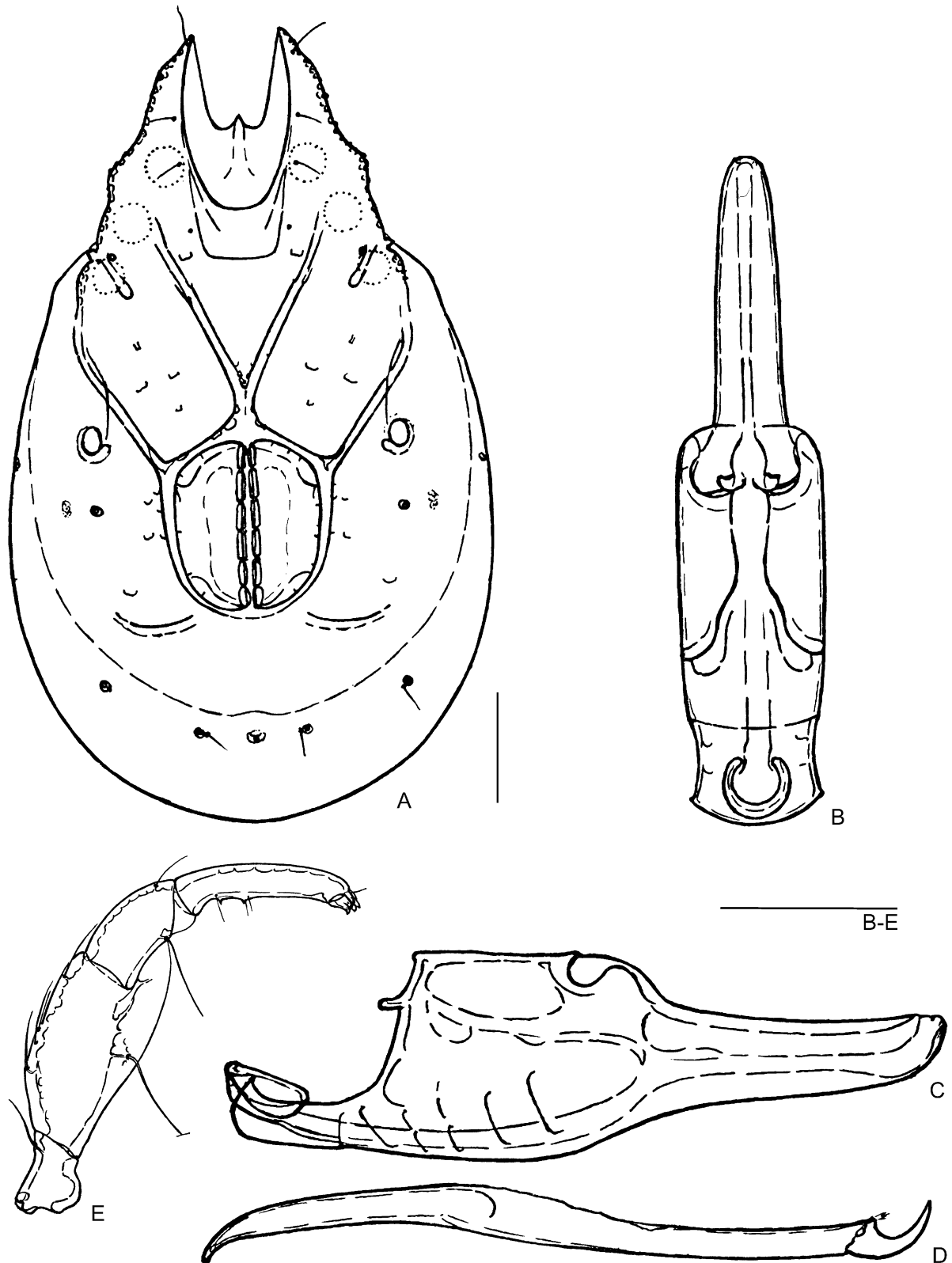


Figure 31. *Torrenticola lamellipalis*. A, B, D, E, allotype female, prep. no. 5718 SMF Viets collection; C, paratype female, prep. no. 5847 SMF Viets collection; after K.O. Viets (1977/78, Teil I). A, idiosoma, ventral view; B, capitulum, dorsal view; C, capitulum, lateral view; D, chelicera, lateral view; E, right palp, lateral view. Scale bars = 100 μ m.

Table 14. Measurements (μm) of *Torrenticola lamellipalpis*; $N = 3$ (male), 1 (female, paratype – designated as allotype)

	male					female
	ht	mean	min.	max.	SD	pt
Idiosoma L	697	697	662	706	23.2	736
Idiosoma W	427	427	407	441	17.2	456
Idiosoma L/W	1.63	1.63	1.60	1.63	0.02	1.61
Cx-I tL	324	324	309	324	8.5	334
Cx-III W	307	304	292	307	7.8	304
Cx-I tL/Cx-III W	1.05	1.06	1.05	1.06	0.01	1.10
Ds L	542	542	510	544	19.3	559
Dp L	510	510	479	510	18.1	525
Ds W	383	383	369	392	11.8	397
Ds L/W	1.42	1.39	1.38	1.42	0.02	1.41
Dp L/W	1.33	1.30	1.30	1.33	0.02	1.32
A-m platelet L	142	140	136	142	3.1	140
A-m platelet W	51	51	49	51	1.4	45
A-l platelet L	176	176	167	176	5.7	172
A-l platelet W	54	56	54	62	4.4	61
A-m pl L/a-l pl L	0.81	0.81	0.79	0.82	0.01	0.81
Capitular bay L	157	157	145	159	7.9	162
Capitular bay W	80	88	80	88	5.0	94
Cb L/W	1.97	1.81	1.64	1.97	0.2	1.71
Dist cb – gf	267	262	258	267	4.3	211
Cx-I mL	172	172	167	172	2.8	176
Cx-II + III mL	91	88	86	91	2.4	32
Cx-I tL/Cx-II/III mL	3.57	3.57	3.50	3.78	0.1	10.47
Cx-I/Cx-II + III mL	1.89	1.89	1.89	2.00	0.1	5.54
Genital field L	142	142	132	149	8.6	165
Gf L/Cx-II + III mL	1.57	1.57	1.50	1.74	0.1	5.19
Genital field W	108	108	102	113	5.5	145
Genital field L/W	1.32	1.32	1.30	1.33	0.01	1.14
Gf L/Id L	0.20	0.20	0.20	0.21	0.01	0.22
Gf L/dist cb – gf	0.53	0.53	0.51	0.57	0.03	0.78
Dist gf – expo	96	93	93	96	1.4	125
Dist gf – cauda	135	135	135	141	3.5	201
Gs L	203	203	203	203	0.00	
Gs aL	56	56	56	56	0.00	
Gs aL/tL	0.28	0.28	0.28	0.28	0.00	
Capitulum vL	363	363	343	370	13.9	385
Capitulum dL	282	273	272	282	5.3	323
Rostrum L	147	142	137	147	4.9	152
Capitulum H		103	103	103	0.00	
R L/c dL	0.52	0.52	0.50	0.52	0.01	0.47
R L/c vL	0.41	0.40	0.38	0.41	0.01	0.39
Gn bend depth	2	2	2	10	4.2	2
Chelicera L	382	382	360	390	15.3	408
Chelicera H	25	25	22	25	1.4	26
Chelicera L/H	15.60	15.60	14.70	17.67	1.5	15.86
Chelicera bs L	333	333	314	341	13.9	354
Chelicera claw L	49	49	47	49	1.4	54
Chel bs/claw L	6.80	6.80	6.74	6.95	0.1	6.57
P1 dorsal L	42	42	40	44	1.9	44
P2 dL	105	105	100	105	2.8	108
P3 dL	66	66	66	66	0.0	66
P4 dL	98	98	93	99	3.2	96

Table 14. Continued

	male					female
	ht	mean	min.	max.	SD	pt
P5 dL	12	12	12	13	0.7	11
Palp total L	323	323	312	328	8.2	325
P4 vL	75	75	74	76	1.2	74
P4 vL to seta	18	17	16	18	1.0	16
P4 vL/L to seta	4.18	4.43	4.18	4.62	0.2	4.62
P1 rel L	0.13	0.13	0.13	0.13	0.00	0.14
P2 rel L	0.33	0.32	0.32	0.33	0.00	0.33
P3 rel L	0.20	0.20	0.20	0.21	0.01	0.20
P4 rel L	0.30	0.30	0.30	0.30	0.00	0.29
P5 rel L	0.04	0.04	0.04	0.04	0.00	0.03
P1 H	36	36	34	38	1.9	37
P2 H	54	54	51	54	1.4	54
P3 H	37	37	34	37	1.4	37
P4 H	25	22	20	25	2.4	23
P5 H	10	10	10	10	0.00	10
P1 L/H	1.17	1.17	1.16	1.18	0.01	1.20
P2 L/H	1.95	1.95	1.95	1.95	0.00	2.00
P3 L/H	1.80	1.80	1.80	1.93	0.1	1.80
P4 L/H	4.00	4.22	4.00	5.06	0.6	4.11
P5 L/H	1.25	1.25	1.25	1.38	0.1	1.13
P2/P4 L	1.08	1.08	1.06	1.08	0.01	1.13
P3/P4 L	0.68	0.68	0.67	0.71	0.02	0.69

and the hygroscopic zone below a waterfall at 1040–2340 m asl; mainly mesolithal, furthermore akal, macropelal, macrolithal, lithophyal, psammal; temperature 11.2–20.1 °C; conductivity 17–83 $\mu\text{S cm}^{-1}$.

Geographical distribution: Mexico, Guatemala, Costa Rica (Cordillera de Tilarán, Cordillera Central and central Cordillera de Talamanca).

Published records: K.O. Viets (1977/78 Teil I); Cramer (1988).

Diagnosis: Characters of the *lamellipalpis*-group; idiosoma relatively large, oval (L 652–804 μm , L/W 1.31–1.54), with pronounced ‘shoulders’; dorsal plate pale reddish to red; coxal field laterally graded; capitular bay deep V-shaped; capitulum flat and straight, ventral margin only with slight bend, rostrum long, slender (r L/c vL 0.32–0.40); P2-lamella smooth, very thin, P4 relatively short (rel L 0.27–0.29, L/H 3.06–4.13 P2/P4 1.14–1.31, P3/P4 0.63–0.73).

Description: See K.O. Viets (1977/78 Teil I).

Discussion. In the species description (K.O. Viets, 1977/78 Teil I), the structure of the P2-lamella remains unclear. Therefore, by means of a specimen from Costa Rica, the structure of the palp is given in detail (Fig. 33A, B). The combination of a relatively

small, V-shaped capitular bay, relatively slender palps and a long and slender rostrum clearly characterizes this species. *Torrenticola obliquipalpis* is one of the only two species known so far the Costa Rican torrenticolid fauna has in common with other regions in Central America (both species referred to – *T. obliquipalpis* and *T. brevicoxalis* – have been described from Guatemala).

SERRATIPALPIS-GROUP

Previously known species: *T. cirratipalpis* K.O. Viets, 1977 (Guatemala), *T. gennada* Cook, 1980 (Costa Rica), *T. keesdavidsi* Cramer, 1992 (Mexico).

New species from Costa Rica: *T. alargada*, *T. alexandra*, *T. australis*, *T. monticola*.

Differential diagnosis of the group: Idiosoma rounded-oval, with clear ‘shoulders’; capitulum mostly elongated, ventral margin flat to slightly sigmoid, mostly without sharp bend; rostrum mostly long and slender; P2 and P3 without cone-shaped ventral projections, ventro-medial margins distally with short to long frayed lamellae; coxal field slightly elongate, broad, capitular bay relatively deep, mostly slightly V-shaped; genital skeleton apically large, cella proximalis small.

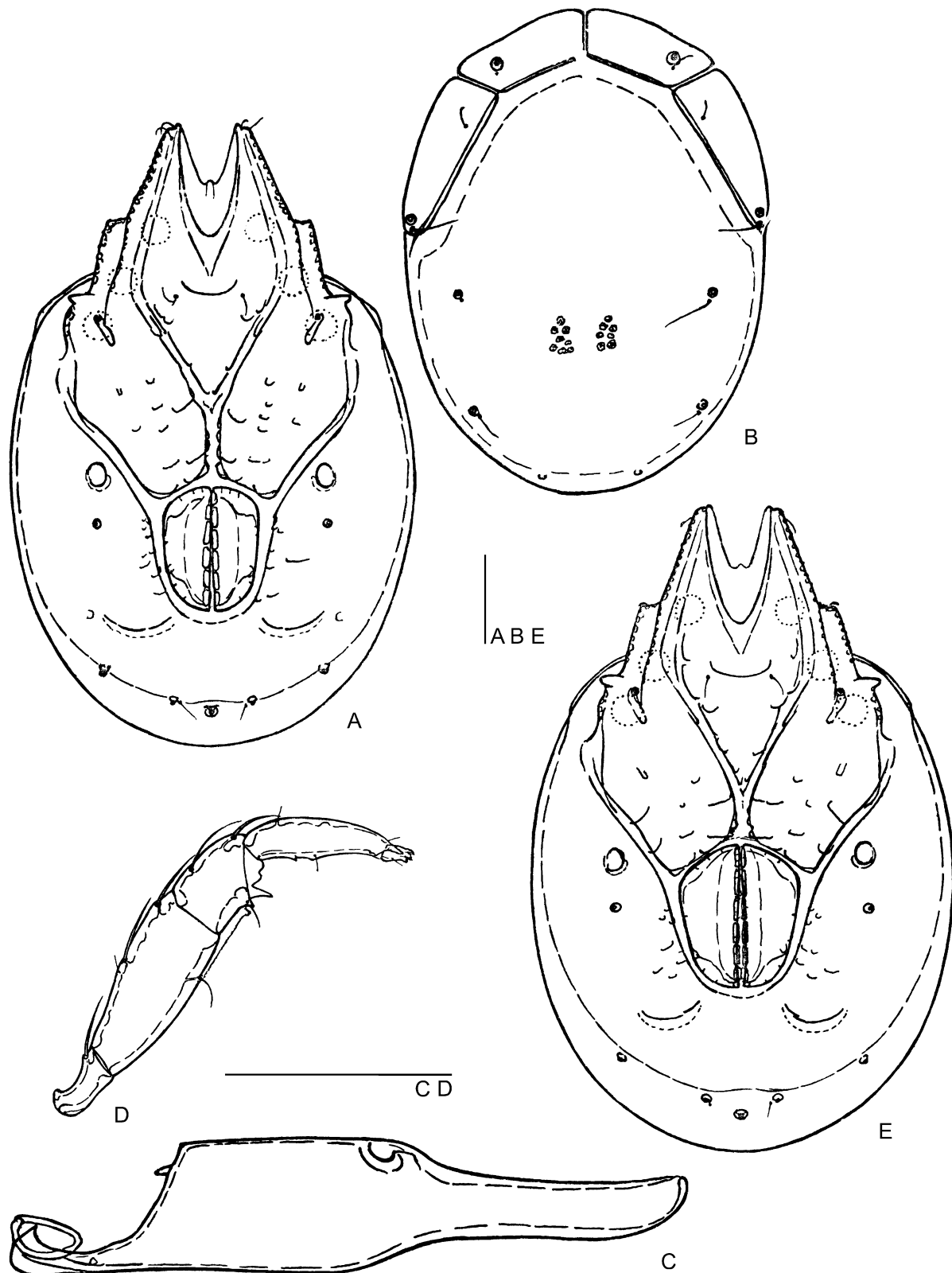


Figure 32. *Torrenticola obliquipalpis*. A–D, holotype male, prep. no. 5715 SMF Viets collection; E, allotype female, prep. no. 5719 SMF Viets collection; after K.O. Viets (1977/78, Teil I). A, E, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, right palp, lateral view. Scale bars = 100 μ m.

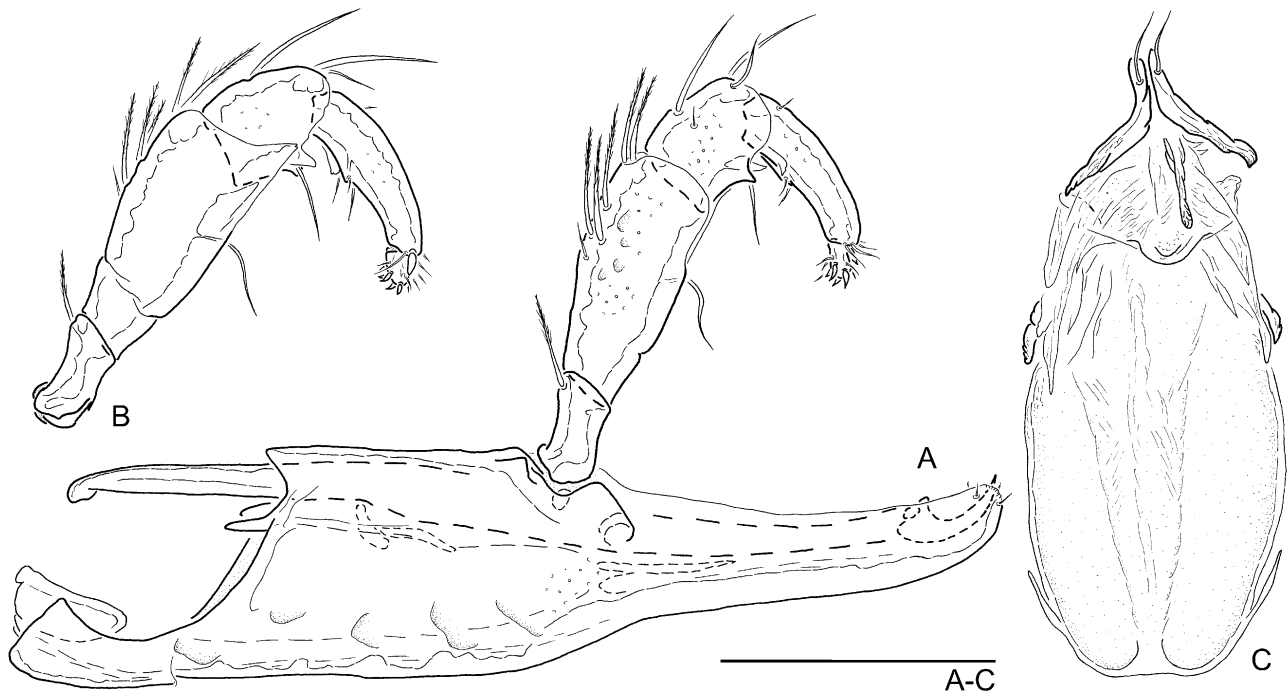


Figure 33. *Torrenticola obliquipalpis*. A, B, male (CR 29); C, paratype male, prep. no. 5800 SMF Viets collection. A, capitulum and right palp, lateral view; B, left palp, medial view; C, genital skeleton, anterior view. Scale bars = 100 µm.

Table 15. Measurements (µm) of *Torrenticola obliquipalpis* from Guatemala; *N* = 3 (male), 1 (female, paratype – designated as allotype). The measurements not given in the original description (K.O. Viets, 1977)/78 Teil I) were completed by new measurements of the preparations of the type specimens (SMF, Viets collection)

	male					female
	ht	mean	min.	max.	SD	pt
Idiosoma L	721	721	652	741	46.4	755
Idiosoma W	481	481	441	491	26.0	500
Idiosoma L/W	1.50	1.50	1.48	1.51	0.02	1.51
Cx-I tL	334	329	299	334	18.6	338
Cx-III W	337	337	299	338	22.4	334
Cx-I tL/Cx-III W	0.99	0.99	0.97	1.00	0.01	1.01
Ds L	569	569	518	592	37.7	598
Dp L	510	510	471	530	30.0	540
Ds W	432	432	392	438	24.5	441
Ds L/W	1.32	1.32	1.32	1.35	0.02	1.36
Dp L/W	1.18	1.20	1.18	1.21	0.01	1.22
A-m platelet L	167	162	136	167	16.5	164
A-m platelet W	66	66	55	69	7.0	66
A-l platelet L	198	198	187	208	10.4	203
A-l platelet W	74	74	64	74	5.7	74
A-m pl L/a-l pl L	0.84	0.78	0.73	0.84	0.1	0.81
Capitular bay L	127	123	115	127	6.2	130
Capitular bay W	74	69	66	74	3.7	69
Cb L/W	1.73	1.73	1.68	1.85	0.1	1.89
Dist cb – gf	285	285	252	292	21.1	262
Cx-I mL	206	206	184	211	14.4	211
Cx-II + III mL	76	76	65	76	6.4	47
Cx-I tL/Cx-II/III mL	4.39	4.39	4.33	4.61	0.1	7.27
Cx-I/Cx-II + III mL	2.71	2.77	2.71	2.83	0.1	4.53
Genital field L	154	154	143	156	6.7	172

Table 15. *Continued*

	male					female
	ht	mean	min.	max.	SD	pt
Gf L/Cx-II + III mL	2.03	2.05	2.03	2.21	0.1	3.68
Genital field W	123	120	113	123	5.1	147
Genital field L/W	1.26	1.27	1.26	1.30	0.02	1.17
Gf L/Id L	0.21	0.21	0.21	0.22	0.00	0.23
Gf L/dist cb – gf	0.54	0.54	0.53	0.57	0.02	0.65
Dist gf – expo	123	123	115	127	6.2	154
Dist gf – cauda	159	159	145	174	14.7	197
Gs L	225	225	176	230	29.8	
Gs aL	88	76	71	88	8.8	
Gs W		91	85	98	9.5	
Gs aL/tL	0.39	0.39	0.33	0.40	0.04	
Gs tL/W		2.22	2.09	2.35	0.2	
Capitulum vL	350	341	304	350	24.5	353
Capitulum dL	274	252	228	274	23.3	270
Rostrum L	127	127	121	136	7.4	140
Capitulum H		67	62	71	6.1	74
R L/c dL	0.46	0.53	0.46	0.54	0.04	0.52
R L/c vL	0.36	0.40	0.36	0.40	0.02	0.40
Gn bend depth		9	7	11	2.6	10
Chelicera L		304	281	328	33.8	
Chelicera H		20	17	22	3.5	
Chelicera L/H		15.62	14.89	16.36	1.0	
Chelicera bs L		268	245	292	32.9	
Chelicera claw L		36	36	37	0.9	
Chel bs/claw L		7.41	6.90	7.93	0.7	
P1 dorsal L	34	34	31	34	2.1	34
P2 dL	76	76	69	78	5.1	78
P3 dL	42	42	39	42	1.4	44
P4 dL	66	60	56	66	5.0	65
P5 dL	11	10	10	11	0.7	10
Palp total L	229	224	205	229	13.0	232
P4 vL	49	47	44	49	2.5	51
P4 vL to seta	17	15	15	17	1.4	22
P4 vL/L to seta	2.86	3.00	2.86	3.17	0.2	2.33
P1 rel L	0.15	0.15	0.15	0.15	0.00	0.15
P2 rel L	0.33	0.34	0.33	0.35	0.01	0.34
P3 rel L	0.18	0.19	0.18	0.19	0.00	0.19
P4 rel L	0.29	0.28	0.27	0.29	0.01	0.28
P5 rel L	0.05	0.05	0.04	0.05	0.00	0.04
P1 H	17	17	17	17	0.00	17
P2 H	37	37	36	37	0.7	36
P3 H	32	29	28	32	1.9	29
P4 H	18	18	18	18	0.00	20
P5 H	7	7	6	7	0.7	7
P1 L/H	2.00	2.00	1.79	2.00	0.1	2.00
P2 L/H	2.07	2.07	1.93	2.13	0.1	2.21
P3 L/H	1.31	1.39	1.31	1.42	0.1	1.50
P4 L/H	3.60	3.27	3.07	3.60	0.3	3.31
P5 L/H	1.50	1.50	1.33	1.60	0.1	1.33
P2/P4 L	1.15	1.22	1.15	1.31	0.1	1.21
P3/P4 L	0.63	0.69	0.63	0.70	0.04	0.68

Table 16. Measurements (μm) of *Torrenticola obliquipalpis* from Costa Rica; $N = 6$ (male), 2 (female)

	male				female			
	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	765	721	804	28.6	753	716	790	52.0
Idiosoma W	540	491	594	43.9	530	500	559	41.6
Idiosoma L/W	1.45	1.31	1.54	0.1	1.42	1.41	1.43	0.01
Cx-I tL	334	324	358	11.9	324	304	343	27.7
Cx-III W	356	343	383	17.5	353	343	363	13.9
Cx-I tL/Cx-III W	0.95	0.87	0.97	0.04	0.92	0.89	0.95	0.04
Ds L	606	559	623	23.5	603	574	633	41.6
Dp L	547	505	579	23.9	542	515	569	38.2
Ds W	454	422	491	29.8	444	437	451	10.4
Ds L/W	1.30	1.27	1.40	0.1	1.36	1.31	1.40	0.1
Dp L/W	1.19	1.13	1.26	0.1	1.22	1.18	1.26	0.1
A-m platelet L	162	157	164	3.4	160	158	162	2.6
A-m platelet W	70	66	76	3.6	71	69	74	3.5
A-l platelet L	213	201	230	11.3	214	208	221	8.7
A-l platelet W	72	69	76	2.6	74	74	74	0.00
A-m pl L/a-l pl L	0.75	0.71	0.80	0.03	0.75	0.73	0.76	0.02
Capitular bay L	124	116	140	8.0	119	100	137	26.0
Capitular bay W	81	71	96	10.4	74	69	78	6.9
Cb L/W	1.57	1.31	1.72	0.2	1.61	1.46	1.75	0.2
Dist cb – gf	321	309	331	10.1	270	267	272	3.5
Cx-I mL	212	206	216	4.0	213	211	216	3.5
Cx-II + III mL	105	91	113	8.6	52	51	53	0.9
Cx-I tL/Cx-II/III mL	3.30	2.96	3.63	0.3	6.21	5.91	6.52	0.4
Cx-I/Cx-II + III mL	2.06	1.89	2.30	0.2	4.09	4.09	4.10	0.00
Genital field L	161	151	170	6.8	175	162	189	19.1
Gf L/Cx-II + III mL	1.59	1.46	1.72	0.1	3.36	3.14	3.58	0.3
Genital field W	125	123	130	2.5	153	147	159	8.7
Genital field L/W	1.30	1.19	1.32	0.1	1.14	1.10	1.18	0.1
Gf L/Id L	0.21	0.21	0.21	0.00	0.23	0.23	0.24	0.01
Gf L/dist cb – gf	0.50	0.49	0.52	0.01	0.65	0.61	0.69	0.06
Dist gf – expo	119	98	141	14.3	143	140	147	5.2
Dist gf – cauda	168	143	173	11.3	193	191	195	2.6
Gs L	229	216	238	9.2				
Gs aL	81	74	88	6.3				
Gs W	148	123	162	16.7				
Gs aL/tL	0.35	0.34	0.38	0.02				
Gs tL/W	1.50	1.42	1.94	0.2				
Capitulum vL	353	338	392	23.6	349	325	374	34.6
Capitulum dL	261	247	287	16.4	255	238	272	24.3
Rostrum L	126	118	145	12.6	117	104	130	18.2
Capitulum H	81	74	103	12.8	78	71	86	10.4
R L/c dL	0.49	0.46	0.52	0.02	0.46	0.44	0.48	0.03
R L/c vL	0.36	0.34	0.38	0.01	0.33	0.32	0.35	0.02
Gn bend depth	11	7	12	2.0	12	12	12	0.00
Chelicera L	335	327	375	22.6	336	309	364	39.0
Chelicera H	18	17	20	1.3	16	15	17	1.7
Chelicera L/H	19.10	17.31	19.29	0.7	21.11	21.00	21.21	0.2
Chelicera bs L	296	290	333	19.7	299	273	325	36.4
Chelicera claw L	39	37	44	3.1	37	36	39	2.6
Chel bs/claw L	7.92	7.39	8.00	0.3	7.99	7.69	8.28	0.4
P1 dorsal L	32	31	39	3.1	32	27	37	6.9
P2 dL	83	76	93	7.8	78	72	83	7.8

Table 16. *Continued*

	male				female			
	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	45	42	51	4.1	42	38	47	6.1
P4 dL	65	60	81	9.2	61	56	66	6.9
P5 dL	12	10	12	1.0	11	10	12	1.7
Palp total L	238	219	276	23.5	224	203	245	29.5
P4 vL	49	47	59	6.0	48	44	53	6.1
P4 vL to seta	17	15	20	2.3	13	12	15	1.7
P4 vL/L to seta	3.00	2.80	3.17	0.1	3.59	3.58	3.60	0.01
P1 rel L	0.14	0.12	0.14	0.01	0.14	0.13	0.15	0.01
P2 rel L	0.35	0.33	0.35	0.01	0.35	0.34	0.36	0.01
P3 rel L	0.19	0.19	0.20	0.00	0.19	0.19	0.19	0.00
P4 rel L	0.28	0.27	0.29	0.01	0.27	0.27	0.28	0.01
P5 rel L	0.05	0.04	0.05	0.00	0.05	0.05	0.05	0.00
P1 H	22	20	25	2.0	21	20	22	1.7
P2 H	42	37	49	4.3	42	38	45	5.2
P3 H	36	32	39	2.7	32	31	34	2.6
P4 H	20	20	22	1.0	18	17	20	1.7
P5 H	7	6	9	0.9	7	6	7	0.9
P1 L/H	1.51	1.30	1.60	0.1	1.52	1.38	1.67	0.2
P2 L/H	1.96	1.82	2.07	0.1	1.87	1.84	1.90	0.05
P3 L/H	1.30	1.27	1.35	0.03	1.30	1.24	1.36	0.1
P4 L/H	3.31	3.06	4.13	0.4	3.33	3.29	3.38	0.1
P5 L/H	1.67	1.43	2.00	0.2	1.63	1.60	1.67	0.05
P2/P4 L	1.25	1.14	1.30	0.1	1.27	1.26	1.28	0.02
P3/P4 L	0.68	0.64	0.73	0.04	0.69	0.67	0.70	0.02

Discussion: The Central American species of this group correspond to the species of the *serratipalpis*-group reported from Africa, Asia and southern Europe, characterized by similar P2/3 lamellae and elongated, +/- flat capitulum (Gerecke & Di Sabatino, 1996). At least 15 different species of this group (mostly undescribed until now) are present in the North American fauna (Goldschmidt, unpubl. data). Apart from *T. gennada* and *T. monticola*, characterized by short lamellae at P2, the species are poorly differentiated. Due to the

characteristic shape of the serrate to frayed hyaline lamellae at the P2 and P3, the species of this group are regarded as a phylogenetic entity. In some species (*T. gennada*, *T. monticola*) these lamellae are relatively short. This character state should not be confused with the cone-shaped P2 projections in some *curtipalpis*-like species, which are distally blunt and bear small denticles. These are not 'lamellae'; however, attention needs to be given as the differences between these two groups in some species seem to be less distinct.

Key to the species

- 1a P2/3-lamellae short, finely serrated; capitulum relatively high, rostrum mid-sized (Figs 42C, 43C, 46C)2
- b P2/3-lamellae longer, clearly frayed; capitulum mostly flat, rostrum mostly long (Figs 34C, 44C, etc.).....3
- 2a P4 very short; rostrum shorter (Fig. 46C); dorsally very pale reddish..... *T. monticola*
- b P4 longer; rostrum longer (Fig. 42C); pale dorsal colour pattern (Fig. 6C-1)..... *T. gennada*
- 3a P2 > P4, P4 relatively short (rel L 0.31–0.33, P2/P4 1.07–1.16, P3/P4 0.53–0.60); two setae-bearing projections on ventral margin of P4 clearly distant from each other; P3 lamella clearly separated from ventro-distal margin of P3 (Figs 34C, 35C); genital skeleton apically long, slender, cella proximalis small (aL/tL 0.64–0.69); posterior half of dorsal plate red (Fig. 6C-2, 6C-3)..... *T. alargada*
- b P2 = P4, P4 longer (rel L 0.34–0.35, P2/P4 0.91–1.00, P3/P4 0.46–0.53); setae-bearing projections on ventral margin of P4 close together; P3 lamella less clearly separated from distal margin (Figs 36C, 38C, 44C, etc.); genital skeleton apically shorter [aL/tL 0.52–0.56 (*cirratipalpis*), 0.49–0.58 (*T. alexandra*), 0.64–0.65 (*T. australis*)]; posterior or complete dorsal plate red to reddish (Fig. 6A–C)4

4a	Capitulum basely high, short, with clear ventral and lateral bend (Figs 38C, 39C, 44C); coxal field slightly shorter (Figs 38A, 39A, 44A).....	5
b	Capitulum basely elongated, +/- flat, ventral margin smooth sigmoid, without lateral bend (Figs 36C, 37C, 40E); coxal field more elongated (Fig. 36A, 37A, 40A, D)	6
5a	Rostrum long and slender (Fig. 44C); dorsal plate with colour pattern (reddish with pale 'shoulder-corners', Fig. 6B-1, 6B-2); Cx-I tips pointed, Cx-I/II laterally smooth; P4 very slender (Fig. 44C, D).....	<i>T. keesdavidsi</i>
b	Rostrum mid-sized, basely very high (Figs 38C, 39C); dorsal plate yellowish to pale reddish (without pattern); Cx-I short, tips broad, blunt, Cx-I/II laterally graded; genital field long (gf L/Id L 0.25–0.28); P4 slender (Figs 38D, 39D)	<i>T. australis</i>
6a	Posterior half of dorsal plate red (with or without central 'tip', Fig. 6C-2, 6C-3); coxal field more stout (Cx-I tL/Cx-III W 0.81–0.87) (Figs 36A, 37A); capitular bay slightly narrower (L/W 1.77–2.09); P3 more stout (L/H 1.07–1.19); setae-bearing projections on ventral margin of P4 close, but clearly separated from each other (Fig. 36C, 36D, 37C, D)	<i>T. alexandra</i>
b	Dorsal plate red; coxal field more elongated (Cx-I tot. L/Cx-III W 0.89–0.93) (Fig. 40A, D); capitular bay wider (L/W 1.68–1.78); P3 more elongated (L/H 1.20–1.26); setae-bearing projections on ventral margin of P4 not separated (Fig. 40C)	<i>T. cirratipalpis</i>

TORRENTICOLA ALARGADA SP. NOV.

(FIGS 34A–E, 35A–C; TABLE 17)

Type series: Holotype male, CR 60, Alajuela, San Ramon Field Station, right affluent Río San Lorencito, spring brook, 1080 m asl, 10.vii.1995, mounted; paratypes, same locality and date, 2/0/0 mounted, 2/2/0 unmounted; paratypes: CR 57, Alajuela, San Ramon Field Station, rocks below water fall of Río San Lorencito, hygropetric area, 1040 m asl, 09.vii.1995, 2/0/0 mounted; CR 58, Alajuela, San Ramon Field Station, right affluent Río San Lorencito, small stream, 940 m asl, 10.vii.1995, 1/0/0 mounted; CR 59, Alajuela, San Ramon Field Station, left affluent Río San Lorencito, small stream, 1000 m asl, 10.vii.1995, 1/0/0 mounted.

Additional specimens examined: CR 105, Puntarenas, Las Alturas, Biological Station, left affluent Río Bellavista, small stream, 1580 m asl, 01.viii.1995, 1/1/0 unmounted; CR 118, Guanacaste, ACG, Pitilla, small stream, 600 m asl, 21.ii.1996, 0/1/0 unmounted; CR 141, Guanacaste, ACG, trail from Cacao to Maritza, rheocrene, 700 m asl, 28.ii.1996, 0/2/0 unmounted; CR 162, Limon, right affluent of Río Corinto, spring brook, 500 m asl, 07.iii.1996, 0/4/0 unmounted; CR 164, San José, spring brook, 1480 m asl, 09.iii.1996, 2/1/0 mounted, 1/5/0 unmounted; CR 208, Alajuela, San Ramon Field Station, left affluent of Río San Lorencito, small stream, 950 m asl, 26.iii.1996, 3/1/0 mounted, 2/2/0 unmounted; CR 211, Alajuela, San Ramon, small stream, 700 m asl, 27.iii.1996, 1/1/0 mounted, 1/6/0 unmounted; CR 281, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Río Negro, small stream, 760 m asl, 31.i.1997, 0/1/0 unmounted; CR 283, Guanacaste, ACG, Rincon de La Vieja, Santa Maria, Quebrada Zopilote, stream, 790 m asl, 31.i.1997, 0/1/0 mounted;

CR 288, Guanacaste, Dos Ríos, Quebrada La Gato, small stream, riffle, 520 m asl, 03.ii.1997, 1/0/0 mounted, 1/1/0 unmounted; CR 289, Guanacaste, ACG, Nueva Zelandia, Río Cucaracho, small stream, riffle, 620 m asl, 03.ii.1997, 1/0/0 mounted; CR 299, Heredia, affluent Río Toro, small stream 35 m asl, 09.ii.1997, 1/0/0 mounted, 1/1/0 SEM-mounted, 1/6/0 unmounted; CR 324, Guanacaste, ACG, affluent Quebrada San Josecito, small stream, 1000 m asl, 20.ii.1997, 1/0/0 mounted.

Habitat: Slow and fast flowing (one site very fast flowing) spring brooks, small streams, one stream, one hygropetric area and one rheocrene at 500–1580 m (one site at 35 m) asl; mainly mesolitoral, furthermore akal, lithophytal, macrolithal, psammal, leaf packages, macropelal, micropelal; temperature 16.9–23.6 °C; conductivity 25–119 µS cm⁻¹.

Distribution: Mainly Central and Northern Costa Rica (Cordillera de Tilarán, Cordillera de Guanacaste), one sample site each in the Cordillera Central, the Caribbean slope of the Cordillera Central, the southern Talamanca and the northern lowland.

Derivatio nominis: *alargar* (Spanish = lengthen); referring to the elongate coxal field and the slender capitulum.

Diagnosis: Characters of the *serratipalpis*-group; idiosoma oval, with heavy 'shoulders'; posterior two-thirds of dorsal plate red to pale reddish (Fig. 6C-2); coxal field elongated, capitular bay deep V-shaped, basely rounded; capitulum elongated, relatively flat, ventral margin smoothly curved, rostrum long and slender; P2 ventro-distally with relatively long, finely frayed lamella, P3 ventro-distally with a short, high, finely frayed lamella, P4 relatively short, two setae-bearing projections on ventral margin of P4 clearly distant

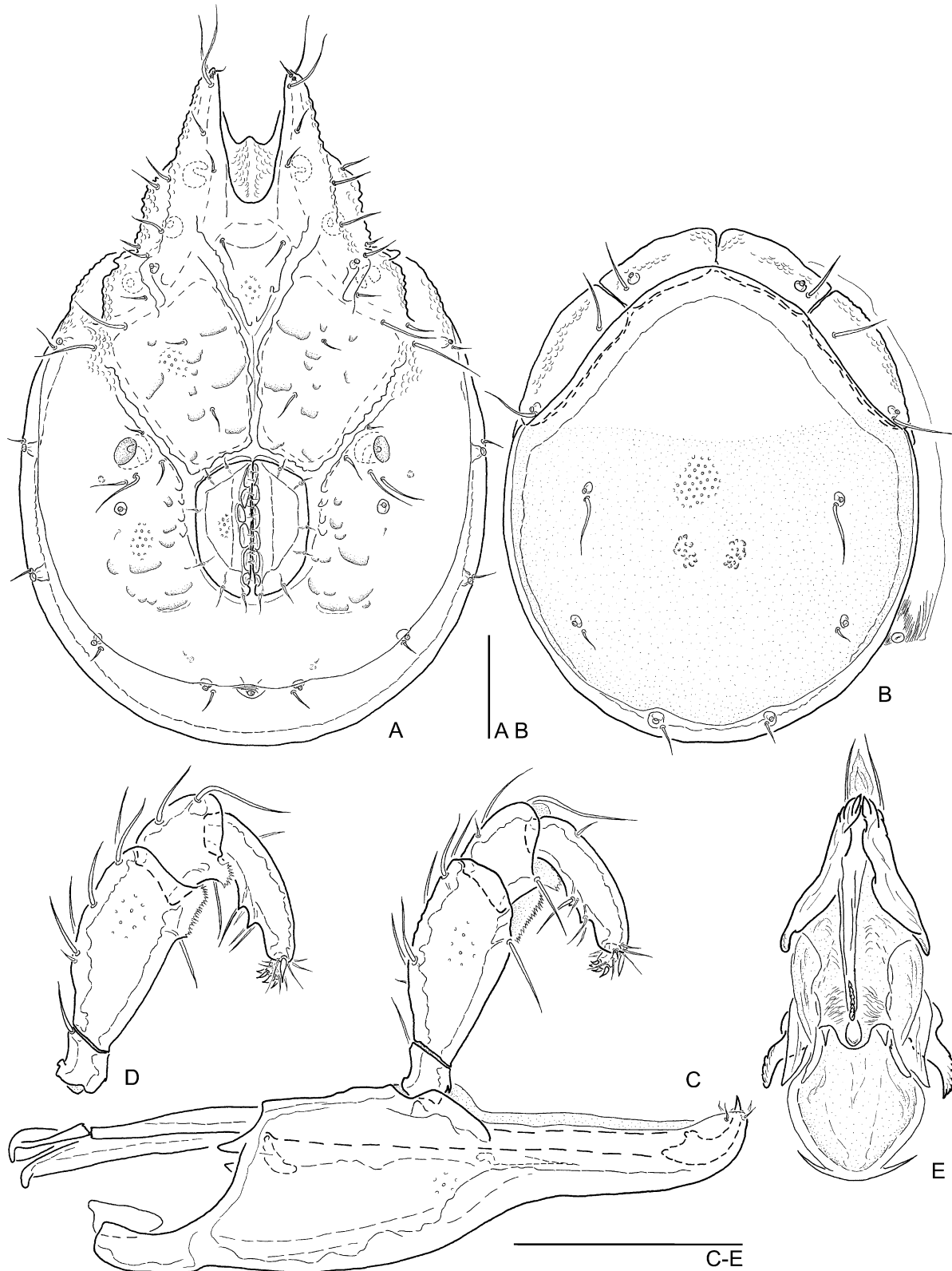


Figure 34. *Torrenticola alargada*. A–D, holotype male (CR 60); E, paratype male (CR 57). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

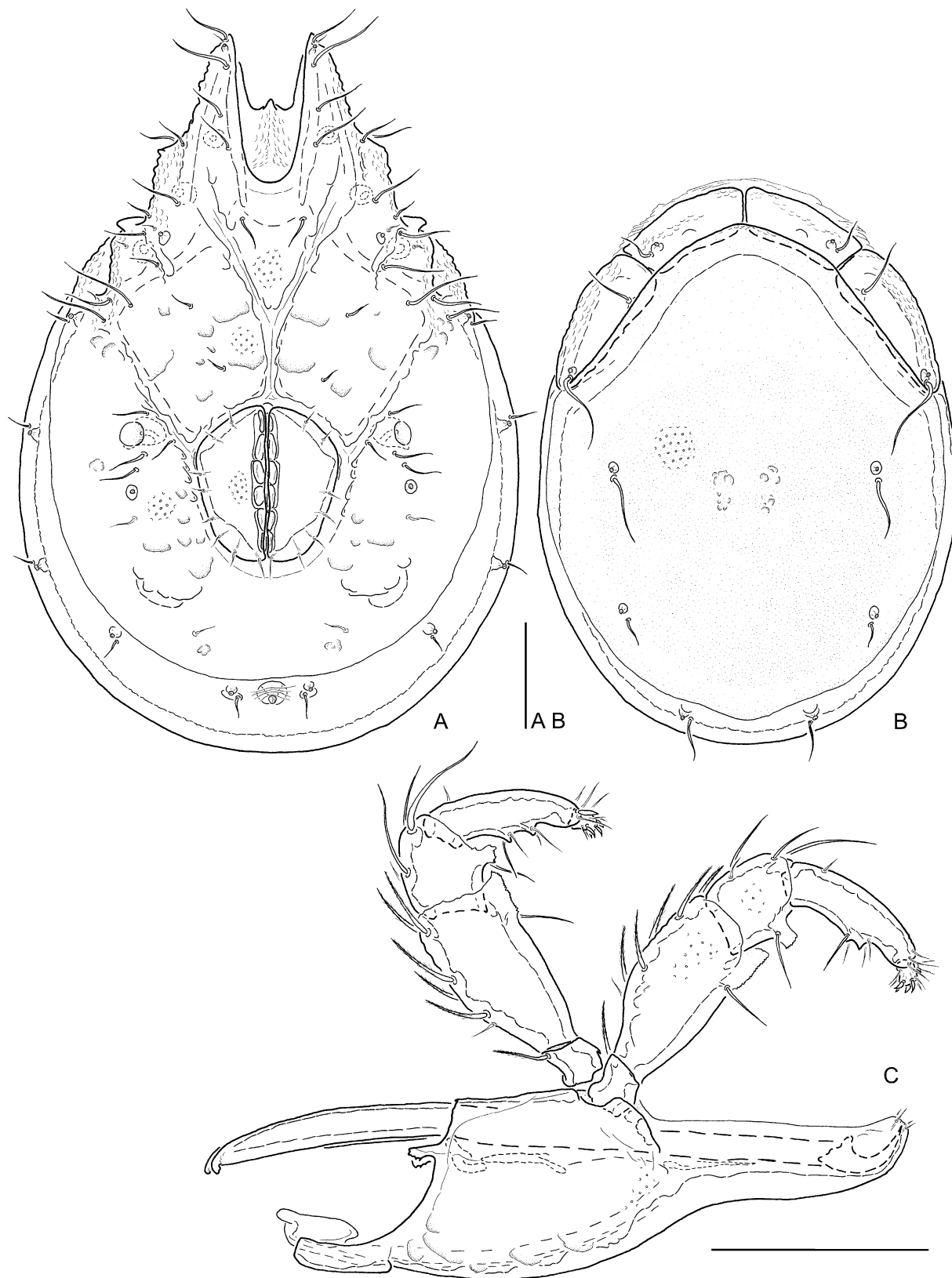


Figure 35. *Torrenticola alargada*. A–C, female (CR 211). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view and left palp, medial view. Scale bars = 100 µm.

Table 17. Measurements (μm) of *Torrenticola alargada*; $N = 10$ (male), 4 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	638	613	569	667	27.6	655	647	697	22.4
Idiosoma W	446	446	422	481	19.6	471	456	520	28.1
Idiosoma L/W	1.43	1.36	1.31	1.44	0.1	1.39	1.34	1.42	0.03
Cx-I tL	265	255	235	280	12.9	267	255	284	12.3
Cx-III W	294	297	283	314	10.6	307	304	334	14.1
Cx-I tL/Cx-III W	0.90	0.86	0.81	0.90	0.03	0.86	0.83	0.89	0.03
Ds L	489	479	451	510	20.1	515	500	544	18.9
Dp L	453	444	422	481	19.0	478	471	510	18.5
Ds W	395	378	348	422	19.3	395	387	432	20.0
Ds L/W	1.24	1.25	1.21	1.32	0.03	1.28	1.26	1.34	0.04
Dp L/W	1.15	1.16	1.14	1.22	0.03	1.19	1.18	1.25	0.03
A-m platelet L	121	118	113	137	7.4	126	120	132	5.1
A-m platelet W	49	47	44	49	2.1	50	47	51	2.3
A-l platelet L	154	148	137	157	7.5	152	142	164	9.9
A-l platelet W	56	53	51	56	2.2	56	54	61	3.1
A-m pl L/a-l pl L	0.79	0.80	0.76	0.88	0.04	0.83	0.78	0.88	0.04
Capitular bay L	127	127	115	136	6.5	135	130	142	5.1
Capitular bay W	61	66	61	72	4.4	69	67	77	4.4
Cb L/W	2.08	1.91	1.61	2.08	0.2	1.91	1.84	2.00	0.1
Dist cb – gf	245	237	221	251	10.0	206	206	227	10.4
Cx-I mL	137	132	120	143	6.6	131	125	145	8.3
Cx-II + III mL	100	96	81	100	6.2	72	66	78	5.8
Cx-I tL/Cx-II/III mL	2.64	2.75	2.63	3.09	0.1	3.74	3.36	4.08	0.3
Cx-I/Cx-II + III mL	1.37	1.42	1.33	1.64	0.1	1.87	1.65	2.00	0.1
Genital field L	132	127	118	140	7.1	145	142	152	4.2
Gf L/Cx-II + III mL	1.32	1.36	1.26	1.48	0.1	2.03	1.90	2.15	0.1
Genital field W	110	110	108	120	4.0	137	135	147	5.8
Genital field L/W	1.20	1.13	1.09	1.20	0.04	1.04	1.03	1.08	0.02
Gf L/Id L	0.21	0.21	0.20	0.21	0.00	0.22	0.22	0.22	0.00
Gf L/dist cb – gf	0.54	0.54	0.50	0.56	0.02	0.70	0.67	0.71	0.02
Dist gf – expo	88	91	80	100	6.4	125	120	130	4.5
Dist gf – cauda	135	130	118	145	9.7	173	165	176	4.7
Gs L	169	170	149	179	8.1				
Gs aL	113	113	96	120	6.6				
Gs W	118	86	77	118	14.0				
Gs aL/tL	0.67	0.67	0.64	0.69	0.01				
Gs tL/W	1.44	1.94	1.44	2.32	0.3				
Capitulum vL	290	286	270	301	9.5	301	289	323	14.3
Capitulum dL	216	209	194	225	9.7	222	211	235	10.1
Rostrum L	116	110	105	118	4.6	118	110	127	7.3
Capitulum H	81	83	76	91	4.4	89	83	98	7.0
R L/c dL	0.54	0.54	0.52	0.56	0.01	0.53	0.52	0.54	0.01
R L/c vL	0.40	0.39	0.37	0.40	0.01	0.39	0.38	0.40	0.01
Gn bend depth	10	10	9	12	1.0	11	10	12	1.0
Chelicera L	314	314	293	341	15.3	342	319	355	18.0
Chelicera H	15	15	12	18	1.7	17	16	20	1.5
Chelicera L/H	21.33	20.57	16.53	27.20	3.0	18.93	18.06	22.31	1.9
Chelicera bs L	279	279	255	299	14.4	300	279	314	16.8
Chelicera claw L	34	39	34	42	2.3	42	39	43	1.5
Chel bs/claw L	8.14	7.21	6.71	8.14	0.5	7.19	6.94	7.53	0.2
P1 dorsal L	27	22	20	27	2.6	22	22	25	1.2
P2 dL	83	81	78	88	3.2	87	85	91	2.7

Table 17. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	42	42	39	44	1.8	44	44	48	1.8
P4 dL	74	74	69	80	3.2	76	74	81	3.1
P5 dL	12	12	10	12	1.2	12	11	12	0.6
Palp total L	238	228	218	246	9.8	242	236	254	7.2
P4 vL	56	56	53	64	3.1	56	54	61	3.1
P4 vL to seta	31	29	25	31	2.4	30	28	32	1.6
P4 vL/L to seta	1.84	2.02	1.80	2.20	0.1	1.96	1.69	2.00	0.1
P1 rel L	0.11	0.10	0.09	0.11	0.01	0.09	0.09	0.10	0.01
P2 rel L	0.35	0.35	0.35	0.36	0.00	0.36	0.35	0.37	0.01
P3 rel L	0.18	0.18	0.17	0.18	0.00	0.18	0.18	0.19	0.00
P4 rel L	0.31	0.32	0.31	0.33	0.01	0.31	0.31	0.32	0.00
P5 rel L	0.05	0.05	0.04	0.05	0.00	0.05	0.05	0.05	0.00
P1 H	23	22	20	23	1.4	23	20	25	2.1
P2 H	42	42	39	44	2.0	44	44	44	0.00
P3 H	36	36	32	39	2.7	37	34	39	2.1
P4 H	20	19	17	20	1.1	20	20	22	1.2
P5 H	7	9	7	10	1.0	10	9	10	0.6
P1 L/H	1.16	1.00	0.89	1.38	0.1	1.03	0.90	1.13	0.1
P2 L/H	2.00	1.98	1.81	2.09	0.1	1.97	1.92	2.06	0.1
P3 L/H	1.17	1.17	1.07	1.31	0.1	1.21	1.16	1.29	0.1
P4 L/H	3.75	4.00	3.63	4.33	0.3	3.88	3.33	4.13	0.3
P5 L/H	1.67	1.25	1.14	1.67	0.2	1.25	1.25	1.29	0.02
P2/P4 L	1.13	1.10	1.07	1.14	0.02	1.14	1.12	1.16	0.02
P3/P4 L	0.57	0.57	0.53	0.59	0.02	0.59	0.58	0.60	0.01

from each other; genital skeleton apically long, slender, carina anterior long, cella proximalis small.

Description – Male ($N = 17$): Idiosoma mid-sized, rounded-oval [L 638 μm (569–667 mm), L/W 1.43 (1.31–1.44)]; posterior two-thirds of dorsal plate reddish to red (Figs 6C-2, 34B), antero-medial dorsal platelets medially convex, laterally straight, only slightly oblique, antero-lateral platelets longer, medially straight, postero-laterally tapering, Dgl-4 slightly medial to Dgl-5 (Fig. 34B); Cx-I long, slender, anterior tips rounded, Cxgl-4 at tips, Cx-I/II laterally moderately graded, posterior margins of Cx-IV merely visible, laterally besides caudal end of genital field; capitular bay relatively deep and narrow, slightly V-shaped, basely rounded; genital field small, anterior margins truncate, only slightly convex with sharp bend to straight lateral margins, posterior margin rounded; excretory pore between Vgl-2, posterior to caudal margin of primary sclerotization (Fig. 34A); genital skeleton apically very long and slender, cella proximalis small with mid-sized, sharp pointed processus proximalia, brachia distalia and proximalia well developed, their posterior tips (especially of the brachia proximalia) curved parallel to the longitudinal

axis of the genital skeleton, carina anterior long (Fig. 34E); capitulum slender, ventral margin smoothly curved, rostrum long and slender; chelicera slender; P1 small; P2 long, dorsal margin convex, ventral margin straight, medio-distal margin sweeping ventrally to the tip of ventro-distal lamella, lamella hyaline with straight very finely frayed margin, distally slightly extended, ventro-distal seta proximal to lamella; P3 short, dorsal margin convex, ventrally concave, distal and ventral margins at medio-distal corner sweeping strongly to a short, finely frayed convex lamella; dorsal margin of P4 flat bowed, ventral margin at the insertion of setae extended to two sharp tips well distant from each other, proximal seta inserted centrally between proximal and distal end (Fig. 34C, D).

Female ($N = 4$): Idiosoma similar to male; dorsal red pattern mainly centrally, towards margins pale (Fig. 35B); medial margin Cx-II/III shorter (Table 17), posterior margin of Cx-IV postero-lateral to genital field; genital field broad rhombic, anterior margins oblique to medio-rostral, lateral margins straight, tapering to posterior, caudally truncated (Fig. 35A); gnathosoma similar to male (Fig. 35C).

Discussion: The shape of the palps – P2/P3 lamellae relatively long, P4 short, compact, with two separated ventral tips – clearly distinguishes this species from all others of the group. Furthermore, the contrast of relatively compact palps and an elongated, slender rostrum is characteristic for *T. alargada*.

***TORRENTICOLA ALEXANDRA* SP. NOV.**

(FIGS 36A–E, 37A–D; TABLE 18)

Type series: Holotype male, CR 25, Puntarenas, Ecolodge San Luis, rheocrene next to Quebrada Alondra, 1020 m asl, 26.vi.1995, mounted.

Additional specimens examined: CR 47, Limón, left affluent to Río Corinto, small stream, 500 m asl, 04.vii.1995, 0/1/0 unmounted; CR 137, Guanacaste, ACG, Cerro Cacao, rheocrene, 1260 m asl, 27.ii.1996, 1/0/0 mounted, 1/0/0 unmounted; CR 227, Guanacaste, Tenorio, spring brook, 1000 m asl, 02.iv.1996, 1/0/0 mounted; CR 229, Guanacaste, Tenorio, spring brook, 980 m asl, 02.iv.1996, 1/0/0 mounted, 0/1/0 unmounted; CR 231, Guanacaste, ACG, Pitilla, Quebrada de Cuesta de Nacho, residual pool of stream, 550 m asl, 03.iv.1996, 1/1/0 mounted, 1/2/0 unmounted; CR 290 Guanacaste, ACG, bank of Río Cucaracho, rheocrene, 640 m asl, 03.ii.1997, 0/1/0 mounted, 0/4/0 unmounted; CR 299, Heredia, affluent Río Toro, small stream, 35 m asl, 09.ii.1997, 1/0/0 mounted, 0/2/0 unmounted; CR 303, Heredia, Zona Norte, small stream, 35 m asl, 10.ii.1997, 1/3/0 unmounted; CR 318, Limón, Fila Carbon, spring brook, 130 m asl, 14.ii.1997, 0/2/0 mounted, 0/1/0 unmounted; 03AA-MM-96, Guanacaste, ACG, Maritza, small stream, 05.v.1996, 0/1/0 mounted, 0/1/0 unmounted.

Habitat: Mainly slow flowing rheocrenes and spring brooks, some fast flowing small streams, one standing residual pool of a drying stream at 35–1260 m asl (mainly 500–1000 m asl); mesolital, akal, psammal, macrolital, lithophytal, macropelal, micropelal; temperature 17.3–24.1 °C; conductivity 26–72 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica [mainly Cordillera de Guanacaste, one sample site each in the Cordillera de Tilarán, northern lowland and the Caribbean slope of the Cordillera de Talamanca (Fila Carbon)].

Derivatio nominis: *alexandra*; named after Alexandra Aschendorf.

Diagnosis: Characters of the *serratipalpis*-group; idiosoma relatively small, rounded-oval, with pronounced 'shoulders'; posterior half of dorsal plate reddish to red (Fig. 6C-2, 6C-3); coxal field relatively broad, anterior tips of Cx-I +/- pointed; capitular bay deep, slightly V-shaped; capitulum elongated, ventral margin

smoothly curved, rostrum long and slender, nearly straight; palp relatively slender, ventro-distal margin of P2 and P3 with finely frayed lamella, P4 slender, setae-bearing projection double pointed, in the centre of ventral margin; genital skeleton compact, apical part slightly longer than cella proximalis.

Description – Male ($N = 6$): Idiosoma rounded-oval [L 608 μm (594–608 μm), L/W 1.35 (1.38–1.44)]; broad 'shoulders' (Fig. 36A); dorsal plate with reddish to red pattern on posterior half (Fig. 6C-1, 6C-2), antero-dorsal platelets broad, antero-medial platelets medially straight, anterior margin convex, laterally broader, lateral margin concave, slightly oblique, antero-lateral platelets longer, medially straight, postero-laterally tapering; Dgl-4 slightly lateral to Dgl-5 (Fig. 36B); coxal field relatively stout [Cx-I tL/Cx-III W 0.83 (0.85–0.87)], Cx-I basely relatively broad, anterior tips medially pointed, Cxgl-4 posterior Cx-I tips, Cx-I medially short [Cx-I/Cx-II/III mL 1.22 (1.00–1.31)]; capitular bay relatively narrow, slightly V-shaped, basely rounded; posterior margins of Cx-IV merely visible, laterally besides caudal margin of genital field; anterior margins of genital field truncated, nearly across, with sharp bend to straight lateral margins, these gradually tapering towards rounded posterior margins, acetabula small; excretory pore between Vgl-2, in shallow indentation of caudal margin of primary sclerotization (Fig. 36A); genital skeleton apically slightly longer than cella proximalis, brachia distalia small, brachia proximalia well developed, orientated laterally, their lateral tips bend towards posterior, carina anterior well developed, processus proximalia of cella proximalis mid-sized, sharp pointed (Fig. 36E); ventral margin of capitulum smoothly curved, however, with clear bend towards long and slender rostrum; chelicera slender; P1 small, P2 slightly shorter P4 [P2/P4 0.97 (0.93–0.97)] dorsal margin convex, ventral margin straight, very smoothly sweeping towards ventro-distal lamella, distal margin straight, ventro-distally sweeping to the tip of ventro-distal hyaline, finely frayed lamella; P3 relatively short, compact [L/H 1.07 (1.13–1.19)], dorsal margin nearly straight, ventrally concave, distal and ventral margins medio-distally forming finely frayed, hyaline lamella; P4 relatively long, slender, dorsal margin straight to convex, setae-bearing projection on ventral margin two-tipped, proximal seta inserted centrally between proximal and distal end (Fig. 36C, D).

Female ($N = 5$): Idiosoma similar to male, larger (L 623–706 μm), medial margin Cx-II/III shorter (Table 18), genital field broad, rounded-rhombic; posterior margin Cx-IV postero-laterally behind genital field (Fig. 37A); dorsal colour pattern slightly different (Fig. 37B); gnathosoma similar to male, palp slightly more slender (Fig. 37C, D).

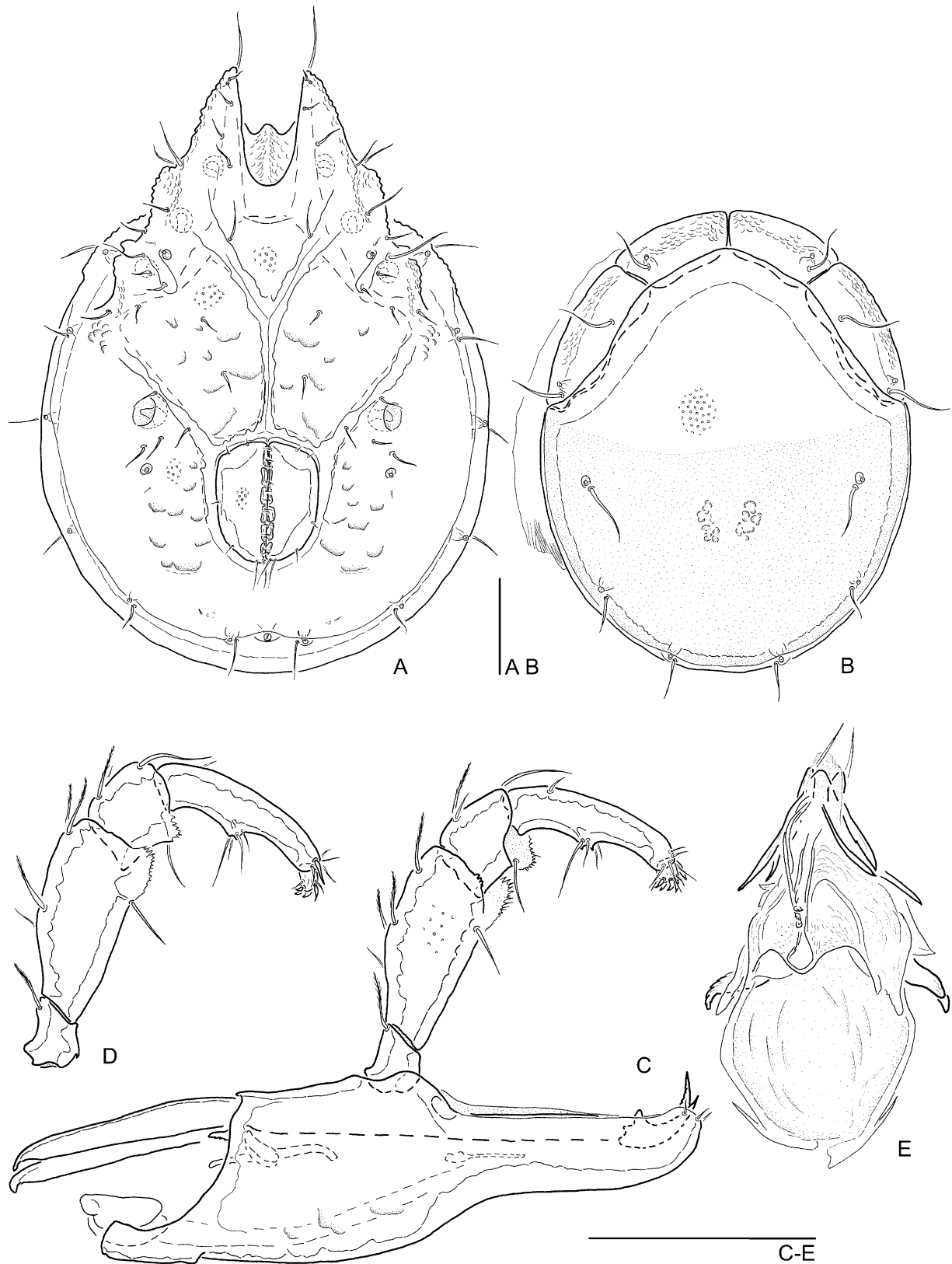


Figure 36. *Torrenticola alexandra*. A–E, holotype male (CR 25). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum and right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

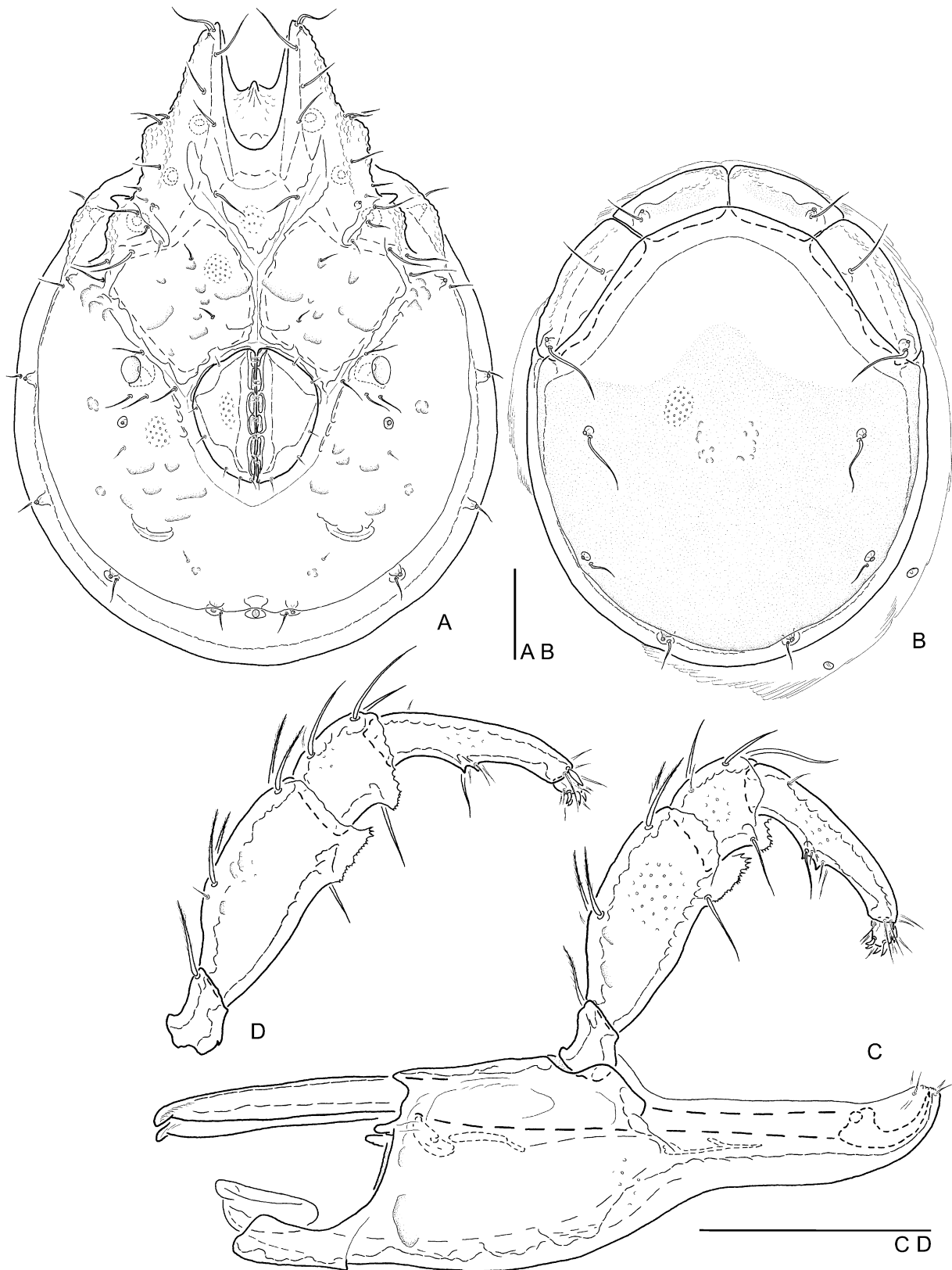


Figure 37. *Torrenticola alexandra*. A–D, female (CR 290). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 18. Measurements (μm) of *Torrenticola alexandra*; $N = 5$ (male), 5 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	608	603	594	608	7.4	647	623	706	36.3
Idiosoma W	451	432	422	451	12.3	471	456	525	30.9
Idiosoma L/W	1.35	1.38	1.35	1.44	0.04	1.38	1.33	1.41	0.03
Cx-I tL	255	255	250	255	2.5	265	245	275	12.7
Cx-III W	309	294	294	309	7.4	309	289	329	16.8
Cx-I tL/Cx-III W	0.83	0.86	0.83	0.87	0.02	0.84	0.81	0.87	0.02
Ds L	471	461	441	471	12.8	505	495	559	28.9
Dp L	432	427	407	437	11.3	466	461	520	26.1
Ds W	383	363	353	383	10.7	407	397	441	21.8
Ds L/W	1.23	1.25	1.23	1.30	0.03	1.24	1.23	1.27	0.01
Dp L/W	1.13	1.15	1.13	1.20	0.03	1.16	1.13	1.18	0.02
A-m platelet L	125	123	110	125	5.7	135	127	140	4.8
A-m platelet W	54	49	44	54	3.6	54	49	58	3.2
A-l platelet L	162	152	145	162	7.3	159	147	181	14.1
A-l platelet W	61	56	54	61	2.8	61	55	61	2.7
A-m pl L/a-l pl L	0.77	0.77	0.74	0.81	0.03	0.82	0.77	0.92	0.1
Capitular bay L	118	118	115	123	3.1	131	123	137	5.6
Capitular bay W	56	64	56	69	5.1	72	66	76	4.7
Cb L/W	2.09	1.84	1.79	2.09	0.1	1.84	1.77	1.98	0.1
Dist cb – gf	255	254	245	260	6.1	211	191	218	11.4
Cx-I mL	137	136	135	137	1.4	135	123	140	6.5
Cx-II + III mL	113	110	103	113	4.2	69	64	77	5.2
Cx-I tL/Cx-II/III mL	2.26	2.31	2.26	4.00	0.8	3.86	3.50	3.93	0.2
Cx-I/Cx-II + III mL	1.22	1.22	1.00	1.31	0.1	1.96	1.75	1.97	0.1
Genital field L	124	125	110	132	8.6	149	140	152	4.9
Gf L/Cx-II + III mL	1.10	1.16	1.10	1.29	0.1	2.18	1.94	2.19	0.1
Genital field W	108	108	105	110	2.0	137	130	142	5.1
Genital field L/W	1.15	1.16	1.05	1.23	0.1	1.07	1.02	1.15	0.05
Gf L/Id L	0.20	0.21	0.20	0.22	0.01	0.22	0.21	0.23	0.01
Gf L/dist cb – gf	0.49	0.50	0.49	0.54	0.02	0.71	0.69	0.73	0.02
Dist gf – expo	75	71	64	75	4.4	123	115	152	15.5
Dist gf – cauda	107	103	96	107	4.4	179	157	203	19.6
Gs L	179	179	149	187	15.1				
Gs aL	98	98	74	107	13.0				
Gs W	108	103	76	118	16.5				
Gs aL/tL	0.55	0.55	0.49	0.58	0.03				
Gs tL/W	1.66	1.66	1.45	2.47	0.4				
Capitulum vL	268	265	260	272	4.9	292	282	312	12.7
Capitulum dL	206	203	196	206	4.1	221	208	238	12.6
Rostrum L	110	108	100	110	4.0	115	110	125	5.6
Capitulum H	81	82	78	87	3.2	94	83	105	7.8
R L/c dL	0.54	0.53	0.50	0.54	0.01	0.53	0.50	0.55	0.02
R L/c vL	0.41	0.40	0.39	0.41	0.01	0.39	0.38	0.41	0.01
Gn bend depth	10	10	9	11	0.9	12	11	12	0.5
Chelicera L	301	296	284	303	9.0	330	314	343	11.9
Chelicera H	15	15	15	20	2.4	20	17	22	2.0
Chelicera L/H	20.50	19.33	15.44	20.50	2.5	17.50	14.78	19.86	1.9
Chelicera bs L	267	257	247	267	9.0	288	272	296	10.2
Chelicera claw L	34	37	34	39	2.0	42	42	47	2.2
Chel bs/claw L	7.79	6.73	6.56	7.79	0.5	6.72	6.37	6.91	0.2
P1 dorsal L	27	27	23	27	1.6	29	25	29	2.2
P2 dL	81	81	75	81	2.7	88	81	92	4.4

Table 18. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	39	42	39	42	1.3	44	39	47	2.7
P4 dL	83	83	80	87	2.8	88	86	93	3.3
P5 dL	15	15	12	15	1.1	12	12	15	1.1
Palp total L	245	246	232	251	7.5	265	243	273	12.1
P4 vL	64	64	61	66	1.8	66	66	72	3.1
P4 vL to seta	29	29	29	32	1.3	32	31	37	3.0
P4 vL/L to seta	2.17	2.08	2.00	2.21	0.1	2.08	1.80	2.27	0.2
P1 rel L	0.11	0.11	0.10	0.11	0.00	0.11	0.10	0.11	0.00
P2 rel L	0.33	0.33	0.32	0.33	0.00	0.33	0.33	0.34	0.00
P3 rel L	0.16	0.17	0.16	0.17	0.00	0.17	0.16	0.17	0.00
P4 rel L	0.34	0.34	0.34	0.35	0.00	0.34	0.33	0.35	0.01
P5 rel L	0.06	0.06	0.05	0.06	0.01	0.05	0.04	0.06	0.00
P1 H	22	23	22	25	1.2	26	23	29	2.3
P2 H	40	42	37	44	2.7	44	42	49	2.7
P3 H	37	37	33	37	1.6	39	34	42	2.8
P4 H	20	20	17	22	1.7	22	20	22	1.3
P5 H	10	9	7	10	1.0	10	7	10	1.1
P1 L/H	1.22	1.10	1.00	1.22	0.1	1.10	1.00	1.14	0.1
P2 L/H	2.00	1.94	1.83	2.03	0.1	1.94	1.88	2.00	0.1
P3 L/H	1.07	1.13	1.07	1.19	0.04	1.13	1.09	1.16	0.03
P4 L/H	4.25	4.25	3.94	4.64	0.3	4.22	4.00	4.75	0.3
P5 L/H	1.50	1.50	1.43	2.00	0.2	1.25	1.25	1.67	0.2
P2/P4 L	0.97	0.94	0.93	0.97	0.02	0.97	0.94	1.00	0.02
P3/P4 L	0.47	0.49	0.47	0.50	0.01	0.50	0.46	0.50	0.02

Discussion: *Torrenticola alexandra* is most similar to *T. cirratipalpis*. Both species are characterized by the combination of an elongated, slender capitulum, with a flat sigmoid ventral margin, slender palps and well-developed ventro-distal lamellae at P2 and P3. *Torrenticola alexandra* is separated from the latter species in a more compact coxal field and genital field and slightly more stout palps (especially P2 and P3). Furthermore, in *T. alexandra* the ventral hump at P4 is bifurcated and the dorsal plate bears a posterior red pattern (Fig. 6C-2, 6C-3); the female genital field is compact, rounded, heavily converging to posterior.

***TORRENTICOLA AUSTRALIS* SP. NOV.**

(FIGS 38A–E, 39A–D; TABLE 19)

Type series: Holotype male, CR 105, Puntarenas, Las Alturas, Biological Station, left affluent Río Bellavista, small stream, 1580 m asl, 01.viii.1995, mounted; paratypes: same locality and date, 1/1/0 mounted, 4/0/0 unmounted.

Habitat: Fast flowing small stream at 1580 m asl; mesolithal, akal, macropelal; temperature 17.5 °C; conductivity 17 µS cm⁻¹.

Distribution: Costa Rica (only known from type locality, the southern Talamanca).

Derivatio nominis: *australis* (Latin = southern); referring to distribution of the species, restricted to the southern Talamanca.

Diagnosis: Characters of the *serratipalpis*-group; idiosoma oval; dorsal plate reddish to red; coxal field relatively short, Cx-I/II short, laterally graded; genital field long (especially in male); capitulum basely short, high; rostrum mid-sized, high (in male with fine but clear edge separated from basal part of capitulum); genital skeleton with high carina anterior.

Description – Male (*N* = 2): Idiosoma mid-sized, oval-rounded [L 647 µm (687 µm), L/W 1.29 (1.32)]; rounded ‘shoulders’ (Fig. 38A); dorsal plate reddish (Fig. 6A), antero-dorsal platelets broad, antero-medial platelets medially straight to convex, anterior margin convex, lateral margin concave, oblique, antero-lateral platelets longer, medially straight, postero-laterally tapering, pointed; Dgl-4 slightly medial to Dgl-5 (Fig. 38B); coxal field stout [Cx-I tL/Cx-III W 0.74 (0.75)], laterally sharply graded, Cx-I anterior short, broad, Cxgl-4 postero-lateral from Cx-I tips; capitular bay wide

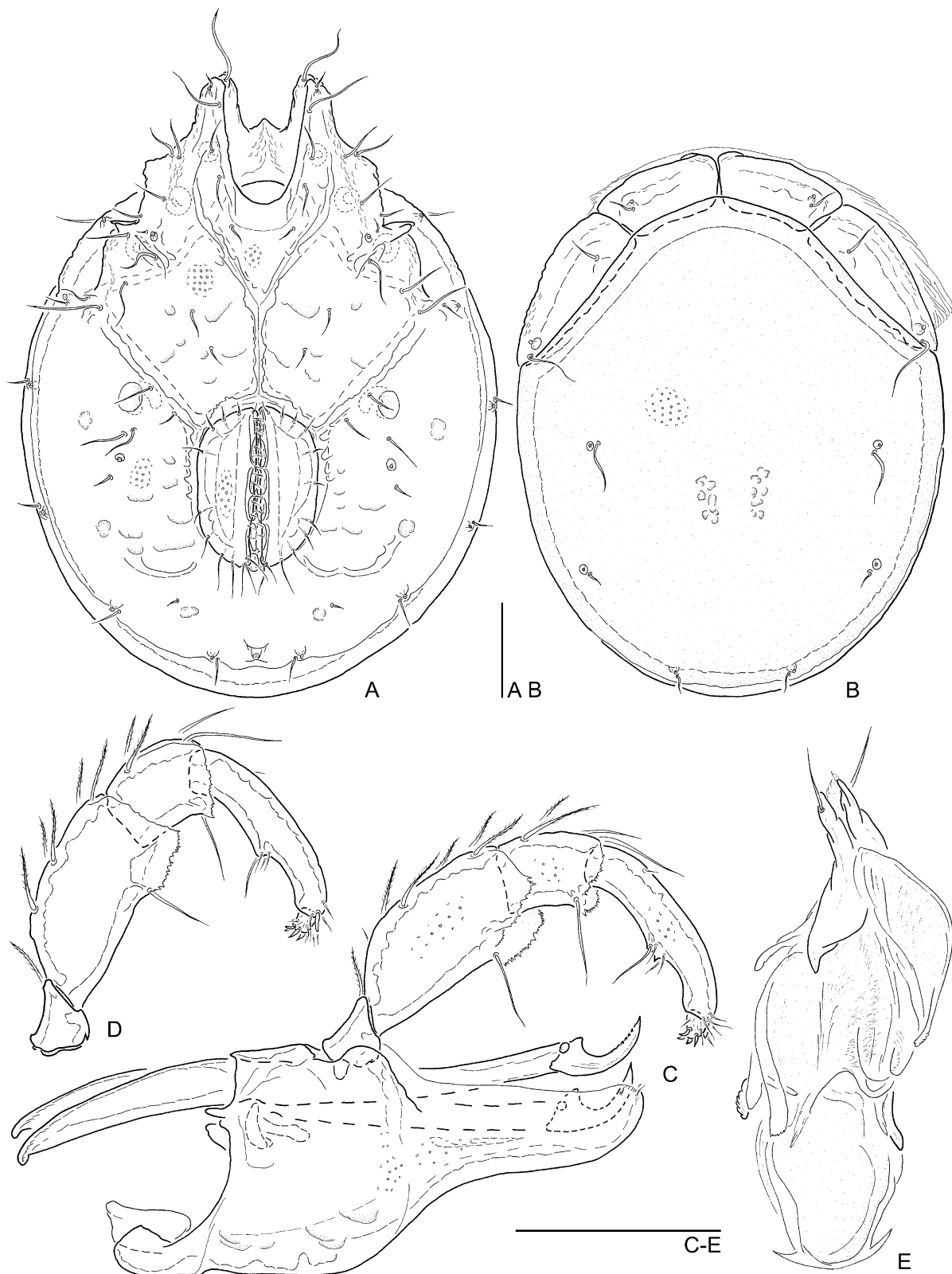


Figure 38. *Torrenticola australis*. A–E, holotype male (CR 105). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

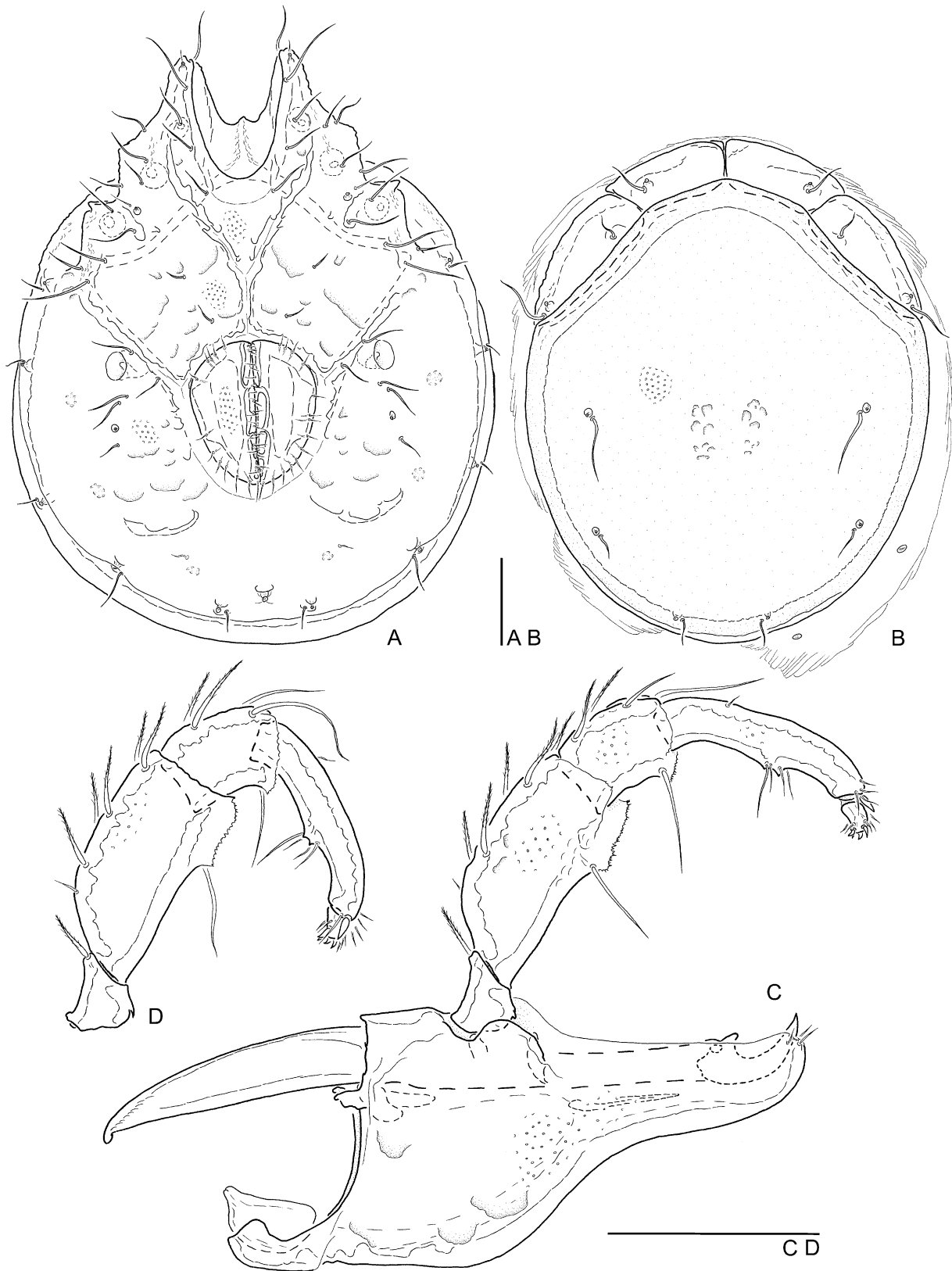


Figure 39. *Torrenticola australis*. A–D, paratype female (CR 105). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 19. Measurements (μm) of *Torrenticola australis*; $N = 2$ (males), 1 (female) and *T. cirratipalpis*; $N = 3$ (males), 1 (female). The measurements for *T. cirratipalpis* not given in the original description (K.O. Viets, 1977/78 Teil I) were completed by new measurements of the preparations of the type specimens (SMF, Viets collection)

	<i>australis</i>				<i>cirratipalpis</i>					
	male			female	male					female
	ht	pt	SD		ht	mean	min.	max.	SD	
Idiosoma L	647	687	27.7	667	623	618	613	623	4.9	662
Idiosoma W	500	520	13.9	540	432	432	432	432	0.00	461
Idiosoma L/W	1.29	1.32	0.02	1.24	1.44	1.43	1.42	1.44	0.01	1.44
Cx-I tL	245	265	13.9	255	275	275	265	275	5.7	270
Cx-III W	334	353	13.9	368	304	299	294	304	4.9	304
Cx-I tL/Cx-III W	0.74	0.75	0.01	0.69	0.90	0.90	0.89	0.93	0.02	0.89
Ds L	530	569	27.7	559	476	476	466	481	7.5	500
Dp L	491	525	24.3	520	428	428	425	437	6.1	456
Ds W	432	451	13.9	461	383	383	383	387	2.8	407
Ds L/W	1.23	1.26	0.02	1.21	1.24	1.24	1.22	1.24	0.01	1.23
Dp L/W	1.14	1.16	0.02	1.13	1.12	1.12	1.11	1.13	0.01	1.12
A-m platelet L	127	137	6.9	142	125	125	120	126	3.2	135
A-m platelet W	56	62	4.3	56	54	55	54	58	1.9	56
A-l platelet L	184	186	1.7	176	157	162	157	168	5.5	154
A-l platelet W	64	69	3.5	66	64	64	61	64	1.4	64
A-m pl L/a-l pl L	0.69	0.74	0.03	0.81	0.80	0.75	0.74	0.80	0.03	0.87
Capitular bay L	135	140	3.5	140	115	116	115	118	1.2	121
Capitular bay W	86	91	3.5	94	69	67	66	69	1.2	69
Cb L/W	1.57	1.54	0.02	1.48	1.68	1.73	1.68	1.78	0.05	1.77
Dist cb – gf	206	228	15.6	184	274	274	265	276	6	225
Cx-I mL	105	118	8.7	113	157	157	152	159	3.7	149
Cx-II + III mL	96	100	3.5	66	110	110	98	118	9.9	74
Cx-I tL/Cx-II/III mL	2.57	2.64	0.05	3.86	2.49	2.49	2.25	2.80	0.3	3.67
Cx-I/Cx-II + III mL	1.10	1.17	0.05	1.70	1.42	1.42	1.29	1.63	0.2	2.03
Genital field L	179	184	3.5	167	132	132	132	136	2.1	149
Gf L/Cx-II + III mL	1.87	1.83	0.03	2.52	1.20	1.20	1.16	1.35	0.1	2.03
Genital field W	131	135	2.6	142	108	108	108	111	2.1	140
Genital field L/W	1.36	1.36	0.00	1.17	1.23	1.23	1.22	1.23	0.00	1.07
Gf L/Id L	0.28	0.27	0.01	0.25	0.21	0.22	0.21	0.22	0.00	0.23
Gf L/dist cb – gf	0.81	0.87	0.04	0.91	0.48	0.49	0.48	0.50	0.01	0.66
Dist gf – expo	93	105	8.7	132	74	70	69	74	2.6	115
Dist gf – cauda	132	142	6.9	176	100	100	97	100	2.1	169
Gs L	240	240	0.00			186	179	192	9.5	
Gs aL	157	154	1.7			100	93	108	10.4	
Gs W				87	86	88	1.7			
Gs aL/tL	0.65	0.64	0.01			0.54	0.52	0.56	0.03	
Gs tL/W				2.14	2.03	2.24	0.2			
Capitulum vL	270	289	13.9	289	288	285	280	288	3.9	290
Capitulum dL	203	216	8.7	213	224	223	218	224	3.2	233
Rostrum L	116	113	2.6	115	113	118	113	120	3.7	118
Capitulum H	115	123	5.2	127	82	81	80	82	1.2	86
R L/c dL	0.57	0.52	0.04	0.54	0.50	0.54	0.50	0.54	0.02	0.51
R L/c vL	0.43	0.39	0.03	0.40	0.39	0.42	0.39	0.42	0.02	0.41
Gn bend depth	15	15	0.00	16	6	6	5	7	1.2	7
Chelicera L	311	328	12.1	333	320	319	306	320	7.5	
Chelicera H	22	25	1.7	27	17	17	15	17	1.4	
Chelicera L/H	14.11	13.40	0.5	12.36	18.64	18.64	18.57	20.83	1.3	
Chelicera bs L	262	277	10.4	282	281	277	265	281	8.3	

Table 19. *Continued*

	<i>australis</i>				<i>cirratipalpis</i>					
	male			female	male					female
	ht	pt	SD		ht	mean	min.	max.	SD	
Chelicera claw L	49	51	1.7	51	39	42	39	42	1.4	
Chel bs/claw L	5.35	5.38	0.02	5.48	7.16	6.65	6.35	7.16	0.4	
P1 dorsal L	34	34	0.00	37	32	32	32	33	0.7	32
P2 dL	97	103	4.3	103	86	86	83	86	1.4	89
P3 dL	51	58	4.3	58	44	44	42	44	1.4	43
P4 dL	103	113	6.9	109	93	91	88	93	2.5	93
P5 dL	12	15	1.7	15	12	12	12	13	0.7	11
Palp total L	298	322	17.3	321	267	267	257	267	5.7	268
P4 vL	81	91	6.9	86	72	70	69	72	1.9	75
P4 vL to seta	45	53	5.2	49	37	34	32	37	2.5	39
P4 vL/L to seta	1.78	1.72	0.04	1.75	1.97	2.04	1.97	2.15	0.1	1.91
P1 rel L	0.12	0.11	0.01	0.11	0.12	0.12	0.12	0.12	0.00	0.12
P2 rel L	0.33	0.32	0.00	0.32	0.32	0.32	0.32	0.32	0.00	0.33
P3 rel L	0.17	0.18	0.00	0.18	0.17	0.17	0.16	0.17	0.00	0.16
P4 rel L	0.35	0.35	0.00	0.34	0.35	0.34	0.34	0.35	0.00	0.35
P5 rel L	0.04	0.05	0.00	0.05	0.05	0.05	0.05	0.05	0.00	0.04
P1 H	27	29	1.7	29	25	25	23	25	0.7	25
P2 H	50	51	0.9	49	42	42	38	42	2.1	42
P3 H	37	39	1.7	39	36	36	33	37	1.9	34
P4 H	22	23	0.9	22	22	21	20	22	1.2	22
P5 H	10	10	0.00	10	10	10	9	10	0.7	10
P1 L/H	1.27	1.17	0.1	1.25	1.30	1.35	1.30	1.37	0.04	1.30
P2 L/H	1.93	2.00	0.1	2.10	2.06	2.06	2.06	2.19	0.1	2.15
P3 L/H	1.40	1.47	0.05	1.47	1.24	1.24	1.20	1.26	0.03	1.25
P4 L/H	4.67	4.84	0.1	4.94	4.22	4.24	4.22	4.63	0.2	4.22
P5 L/H	1.25	1.50	0.2	1.50	1.25	1.38	1.25	1.43	0.1	1.13
P2/P4 L	0.94	0.91	0.02	0.94	0.92	0.94	0.92	0.95	0.01	0.96
P3/P4 L	0.50	0.51	0.01	0.53	0.47	0.47	0.47	0.49	0.01	0.46

V-shaped, basely broad, strongly narrowing to dorsally; posterior margins of Cx-IV laterally besides caudal end of genital field, across; genital field elongated, large [gf L/Id L 0.28 (0.27)], anterior margins of genital field truncated, slightly pointed, lateral margins nearly straight, posterior margins rounded; excretory pore between Vgl-2, at caudal margin of primary sclerotization (Fig. 38A); genital skeleton apically long, cella proximalis small, processus proximalia mid-sized, brachia distalia and brachia proximalia strong, carina anterior high arched (Fig. 38E); capitulum basely high, short, laterally with fine edge, ventral margin with clear bend towards mid-sized, basely high rostrum; chelicera slender; P2 shorter than P4 [P2/P4 0.94 (0.91)], dorsal margin proximally with strong bend, distally convex to straight, ventral margin straight, distally of seta with mid-sized, hyaline, finely frayed lamella, laterally also ending in frayed, ventro-distal lamella; P3 relatively slender [L/H 1.40 (1.47)],

latero-distal and medio-distal margin forming finely frayed, hyaline lamellae; P4 relatively slender, dorsal margin curved, setae-bearing projection on ventral margin in distal half (Fig. 38C, D).

Female ($N = 1$): Idiosoma similar to male, broader, nearly rounded (L/W 1.24) (Fig. 39A); dorsal plate very pale reddish; medial margin Cx-II/III shorter (Table 19), capitular bay more V-shaped, lateral margins convex; genital field rhombic, anterior rounded, truncated, lateral margin convex, strongly tapering to posterior, caudally pointed; posterior margin Cx-IV postero-laterally behind genital field (Fig. 39A); gnathosoma similar to male, capitulum without lateral edge, palp slightly more slender (Fig. 39C, D).

Discussion: *Torrenticola australis* is characterized by a compact, basely high capitulum, a compact laterally sharply graded coxal field and, in the male, a large genital field. The shape of the capitulum and coxal

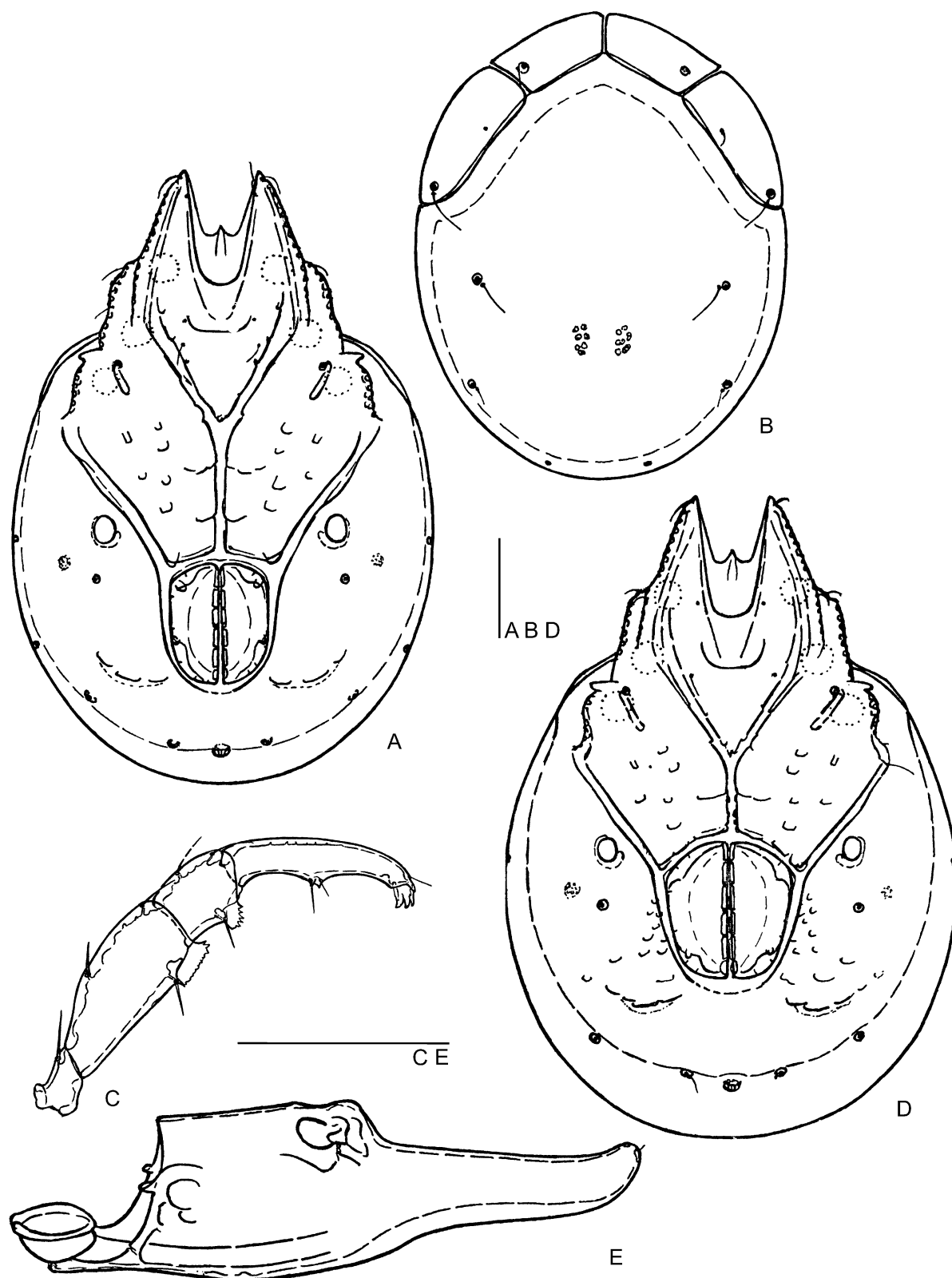


Figure 40. *Torrenticola cirratipalpis*. A–C, holotype male, prep. no. 5806 SMF Viets collection; D, E, allotype female, prep. no. 5802 SMF Viets collection; after K.O. Viets (1977/78, Teil I). A, D, idiosoma, ventral view; B, idiosoma, dorsal view; C, left palp; E, capitulum, lateral view. Scale bars = 100 μ m.

field of *T. australis* is unusual within the *serratipalpis*-group; nevertheless due to the typical frayed lamellae at the P2 and P3 there is no doubt about the allocation of the species to this group. The female illustrated in Figure 39A shows an irregular organization of the acetabula (as an atavism towards the 'original' organization of three pairs of acetabula), with five on one side and four on the other. *Torrenticola australis* is one of the two species in their distribution restricted to the southern Talamanca.

TORRENTICOLA CIRRATIPALPIS K.O. VIETS, 1977
(FIGS 40A–E, 41; TABLE 19)

Type series: Holotype male, Guatemala, km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 11.viii.1974, leg. Böttger, prep. no. 5806 SMF; allotype female, same locality and date, leg. Böttger, prep. no. 5802 SMF; paratypes same locality and date, 1/1/0 mounted, leg. Böttger, prep. no. 5807, 5801 SMF; same locality, 16.viii.1974, 1/0/0 mounted, prep. no. 5757 SMF.

Geographical distribution: Guatemala.

Habitat: Small mountain stream at 1520 m asl.

Published records: K.O. Viets (1977/78 Teil I).

Diagnosis: Characters of the *serratipalpis*-group; idiosoma oval-rounded (L/W 1.42–1.44), clear 'shoulders'; dorsal plate red; capitular bay V-shaped, basely broad; capitulum elongated, ventral margin flat sigmoid,



Figure 41. *Torrenticola cirratipalpis*. Paratype male, prep. no. 5757 SMF Viets collection. Genital skeleton, anterior view. Scale bar = 100 µm.

rostrum long with relatively high basis (r L/c vL 0.39–0.42); P2/3-lamellae mid-sized, frayed, hyaline, P4 long (rel L 0.34–0.35, L/H 4.22–4.63 P2/P4 0.92–0.96, P3/P4 0.46–0.49), ventral setae centrally on small pointed hump; genital skeleton apically moderately long, cella proximalis mid-sized.

Description: See K.O. Viets (1977/78 Teil I).

Discussion: *Torrenticola cirratipalpis* is most similar to *T. alexandra* (see above). However, *T. cirratipalpis* bears a more elongated coxal field and genital field as well as slightly more slender palps and a red dorsal plate without posterior pattern, the female genital field is more rectangular-rhombic, merely converging to posterior.

TORRENTICOLA GENNADA COOK, 1980
(FIGS 42A–E, 43A–E; TABLE 20)

Type series: Holotype female, Costa Rica, Alajuela, 26 km east Esparta, mountain stream, 15.xii.1973, leg. Cook, prep. no. DC 9–73 FMC.

Material examined: CR 45, Limón, Río Corinto, stream, 500 m asl, 04.vii.1995, 4/7/0 unmounted; CR 59, Alajuela, San Ramon Field Station, left affluent Río San Lorencito, small stream, 1000 m asl, 10.vii.1995, 2/0/0 mounted, 13/11/0 unmounted; CR 73, Alajuela, Higuito, Río Centendo, small stream, 300 m asl, 20.vii.1995, 1/0/0 mounted, 2/1/0 unmounted; CR 103, Puntarenas, 10 km south-east Buenos Aires, Río Plataneros, stream, 180 m asl, 31.vii.1995, 0/2/0 unmounted; CR 118, Guanacaste, ACG, Pitilla, small stream, 600 m asl, 21.ii.1996, 1/0/0 mounted; CR 119, Guanacaste, ACG, Pitilla, small stream, 600 m asl, 21.ii.1996, 1/0/0 mounted; CR 133, Guanacaste, Río Mena, stream, 240 m asl, 26.ii.1996, 1/0/0 mounted; CR 155, Guanacaste, ACG, Quebrada Las Yeguitas, small stream, 280 m asl, 03.iii.1996, 1/0/0 mounted; CR 161, Limón, Río Corinto, stream, 500 m asl, 07.iii.1996, 2/0/0 mounted, 1/1/0 SEM-mounted, 7/10/0 unmounted; CR 190, Puntarenas, Peninsula de Osa, Río Pavón, stream, 110 m asl, 19.iii.1996, 1/0/0 mounted, 3/4/0 unmounted; CR 193, Puntarenas, Peninsula de Osa, La Quebradonda, small stream, 230 m asl, 20.iii.1996, 6/0/0 mounted, 27/9/0 unmounted; CR 194, Puntarenas, Peninsula de Osa, La Quebrada cinta plateada, small stream, 70 m asl, 21.iii.1996, 1/1/0 mounted, 1/4/0 unmounted; CR 195 Puntarenas, Peninsula de Osa, Río Drake, stream, 70 m asl, 21.iii.1996, 0/1/0 mounted; CR 196, Puntarenas, Peninsula de Osa, La Junta Quebrada, small stream, 140 m asl, 21.iii.1996, 3/0/0 mounted, 1/0/0 unmounted; CR 212, Alajuela, Río Balsa, stream, 960 m asl, 27.iii.1996, 0/1/0 mounted, 0/3/0 unmounted; CR 220, Alajuela, Río Piedras Negras, stream, 600 m asl, 30.iii.1996, 1/1/0 mounted, 0/1/0

Table 20. Measurements (μm) of *Torrenticola gennada*; $N = 10$ (male), 6 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	569	569	525	598	24.0	594	564	677	41.4
Idiosoma W	383	410	348	424	23.7	414	378	481	39.1
Idiosoma L/W	1.49	1.41	1.35	1.51	0.04	1.47	1.32	1.49	0.1
Cx-I tL	226	243	226	260	11.1	235	226	265	16.1
Cx-III W	255	282	250	309	17.6	284	255	378	45.0
Cx-I tL/Cx-III W	0.88	0.87	0.76	0.90	0.04	0.83	0.70	0.91	0.1
Ds L	451	468	427	491	22.3	481	451	564	41.4
Dp L	432	441	402	456	20.8	461	432	530	35.9
Ds W	334	353	304	363	18.8	361	329	412	30.9
Ds L/W	1.35	1.32	1.31	1.40	0.03	1.36	1.27	1.39	0.04
Dp L/W	1.29	1.25	1.22	1.32	0.03	1.29	1.22	1.32	0.04
A-m platelet L	108	113	96	115	6.7	112	108	125	6.6
A-m platelet W	32	40	32	42	3.2	39	32	47	5.5
A-l platelet L	130	138	125	153	9.8	136	130	159	11.3
A-l platelet W	44	49	39	54	4.9	49	39	61	7.5
A-m pl L/a-l pl L	0.83	0.80	0.74	0.85	0.04	0.83	0.76	0.87	0.04
Capitular bay L	123	121	115	135	6.8	127	121	145	8.7
Capitular bay W	66	65	59	75	5.5	75	64	91	10.6
Cb L/W	1.85	1.91	1.61	2.00	0.1	1.72	1.58	1.96	0.2
Dist cb – gf	157	197	176	211	10.1	157	151	181	11.6
Cx-I mL	115	123	110	129	5.6	114	103	125	8.0
Cx-II + III mL	37	67	56	76	6.4	42	36	50	6.3
Cx-I tL/Cx-II/III mL	6.14	3.54	3.04	4.61	0.4	5.77	4.69	6.63	0.8
Cx-I/Cx-II + III mL	3.13	1.78	1.52	2.22	0.2	2.84	2.24	3.14	0.4
Genital field L	132	129	115	137	6.3	134	129	149	7.2
Gf L/Cx-II + III mL	3.60	1.84	1.61	2.43	0.2	3.24	2.66	3.90	0.5
Genital field W	121	110	94	113	6.1	126	118	140	8.0
Genital field L/W	1.09	1.19	1.11	1.22	0.03	1.08	1.04	1.09	0.02
Gf L/Id L	0.23	0.22	0.22	0.23	0.01	0.23	0.22	0.24	0.01
Gf L/dist cb – gf	0.84	0.65	0.62	0.71	0.03	0.84	0.80	0.90	0.04
Dist gf – expo	113	95	86	108	8.1	121	109	154	16.4
Dist gf – cauda	159	127	113	140	8.7	174	159	203	15.6
Gs L		173	149	186	10.9				
Gs aL		117	98	127	9.2				
Gs W		81	66	91	10.3				
Gs aL/tL		0.68	0.65	0.70	0.02				
Gs tL/W		2.07	1.89	2.26	0.2				
Capitulum vL	252	263	239	270	10.6	270	252	299	17.3
Capitulum dL	181	185	169	189	5.9	187	181	216	13.4
Rostrum L	100	105	94	110	4.7	112	100	118	7.1
Capitulum H	98	96	88	107	5.9	104	98	121	8.8
R L/c dL	0.55	0.57	0.55	0.58	0.01	0.56	0.55	0.61	0.03
R L/c vL	0.40	0.40	0.39	0.42	0.01	0.40	0.39	0.42	0.01
Gn bend depth	15	12	11	12	0.5	14	12	17	1.9
Chelicera L		290	272	316	15.1	316	296	348	19.8
Chelicera H		20	18	25	2.2	25	21	27	2.5
Chelicera L/H		14.41	12.80	16.27	1.1	12.91	12.29	15.76	1.4
Chelicera bs L		250	230	267	12.4	265	250	292	16.5
Chelicera claw L		42	39	49	3.3	49	47	56	3.9
Chel bs/claw L		5.77	5.40	6.38	0.3	5.37	5.14	5.70	0.2
P1 dorsal L		25	22	29	2.2	26	22	27	2.0
P2 dL		78	72	88	5.0	86	78	100	8.2

Table 20. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL		42	39	48	2.9	47	42	54	4.6
P4 dL		74	66	80	3.7	76	71	88	6.7
P5 dL		12	11	16	1.3	12	12	15	1.1
Palp total L		230	211	255	13.7	245	225	284	22.1
P4 vL		56	49	61	3.6	56	54	66	4.9
P4 vL to seta		32	27	38	3.5	34	29	38	3.2
P4 vL/L to seta		1.71	1.60	1.92	0.1	1.77	1.64	1.83	0.1
P1 rel L		0.10	0.10	0.12	0.00	0.10	0.09	0.11	0.01
P2 rel L		0.34	0.34	0.35	0.00	0.35	0.35	0.35	0.00
P3 rel L		0.18	0.18	0.19	0.00	0.18	0.18	0.19	0.00
P4 rel L		0.32	0.31	0.33	0.01	0.31	0.31	0.32	0.00
P5 rel L		0.05	0.05	0.07	0.00	0.05	0.05	0.05	0.00
P1 H		26	25	31	2.2	29	27	34	3.1
P2 H		44	42	49	2.1	47	44	54	3.8
P3 H		39	36	42	2.1	40	37	48	4.1
P4 H		20	20	26	2.0	25	21	27	2.4
P5 H		10	10	10	0.00	10	10	10	0.00
P1 L/H		0.93	0.82	1.00	0.06	0.83	0.79	0.95	0.1
P2 L/H		1.78	1.71	1.89	0.1	1.79	1.76	1.86	0.05
P3 L/H		1.11	1.03	1.15	0.04	1.13	1.12	1.15	0.01
P4 L/H		3.59	3.10	3.75	0.2	3.25	3.10	3.53	0.2
P5 L/H		1.25	1.13	1.63	0.1	1.25	1.25	1.50	0.1
P2/P4 L		1.07	1.03	1.13	0.03	1.13	1.10	1.14	0.02
P3/P4 L		0.57	0.55	0.61	0.02	0.60	0.58	0.61	0.01

unmounted; CR 223, Puntarenas, Ecologde San Luis, Quebrada Alondra, small stream, 1100 m asl, 31.iii.1996, 0/1/0 mounted; CR 239, Guanacaste, ACG, Pitilla, Río Orosi, small stream, riffle, 600 m asl, 07.iv.1996, 1/1/0 mounted, 0/2/0 unmounted; CR 271, Guanacaste, ACG, Pocosol, Río Tempisquito, stream, 290 m asl, 25.i.1997, 1/0/0 mounted, 0/1/0 unmounted; CR 286, Guanacaste, ACG, El Hacha, Quebrada Jorco, small stream, 280 m asl, 02.ii.1997, 4/3/0 unmounted; CR 287, Guanacaste, ACG, El Hacha, Quebrada Bolanos, small stream, 300 m asl, 02.ii.1997, 2/0/0 mounted, 6/3/0 unmounted; CR 309, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 1/0/0 mounted, 2/3/0 unmounted; CR 310, Limón, Hitoy Cerere, small stream, 200 m asl, 12.ii.1997, 1/0/0 mounted, 3/10/0 unmounted; CR 311, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 0/9/0 unmounted; CR 317, Limón, Fila Carbon, Quebrada Canajira, small stream, 50 m asl, 14.ii.1997, 0/1/0 unmounted; CR 333, Heredia, OTS-Station La Selva, Río Sábalo-Esquina, stream, riffle, 40 m asl, 01.iii.1997, 1/0/0 mounted, 0/1/0 unmounted.

Habitat: Mainly slow flowing, also fast and very fast flowing small streams, streams and some spring

brooks at 10–1100 m asl; mainly mesolithal, also macropelal, akal, psammal, macrolithal, leaf packages and lithophyal; temperature 18.7–28.1 °C; conductivity 21–181 µS cm⁻¹.

Geographical distribution: Costa Rica (Peninsula de Osa, Cordillera de Guanacaste, Cordillera de Tilarán, Caribbean foothills of the Cordillera Central and Cordillera de Talamanca, central Pacific foothills).

Published records: Cook (1980).

Diagnosis: Characters of the *serratipalpis*-group; idiosoma small, oval; posterior 1/2–2/3 of dorsal plate red (Fig. 6C-1, 6C-2); capitular bay relatively large, lateral margins slightly convex; capitulum relative high, ventral margin sigmoid, rostrum mid-sized, slender; P2/3 with finely serrated unobtrusive lamellae.

Description – Male ($N = 28$): Idiosoma rounded-oval (L 525–598, L/W 1.35–1.51); dorsal plate with pale reddish pattern (Fig. 6C-1–5, 6C-2), anterior slightly pointed, antero-medial dorsal platelets medially convex, laterally concave, antero-lateral platelets only slightly longer (a-m/a-l 0.74–0.84), medially straight to convex, postero-laterally moderately tapering, Dgl-4 medial to Dgl-5 (relatively far central)

(Fig. 42B); coxal field moderately elongated, anterior tips of Cx-I slender, rounded, Cxgl-4 near tips, Cx-I/II laterally graded; posterior margins of Cx-IV lateral to caudal end of genital field; capitular bay nearly U-shaped, lateral margins slightly convex; genital field broad, anterior margins truncate, with sharp bend to slightly convex lateral margins, tapering caudally, posterior margin rounded; excretory pore slightly caudal to Vgl-2, posterior caudal margin of primary sclerotization (Fig. 42A); genital skeleton apically very long and slender, cella proximalis small with mid-sized processus proximalia, brachia distalia and proximalia well developed, oblique to the longitudinal axis of the genital skeleton, carina anterior long (Fig. 42E); capitulum basely relatively high, ventral margin sigmoid, rostrum elongated ($r/L/c \ vL \ 0.39-0.42$); chelicera slender; P2 slightly longer than P4 (P2/P4 1.03–1.13), ventro-distal lamella at P2 relatively short, moderately high, finely serrated, ventro-distal lamella at P3 short, high, finely serrated; setae on ventral margin of P4 on two sharp tips close together, slightly distally (Fig. 42C, D, Table 20).

Female: See Cook (1980).

Discussion: The description of this species has been based upon a single female (Cook, 1980). As the shape of the ventral projections at P2 and P3 is very characteristic, the assignation of specimens of both sexes to this species nevertheless is clear. The male is described for the first time here. A single female of *T. gennada* has been reported from Mexico (Otero-Colina, 1988); however, according to the description (figures and measurements) given in that publication, this identification must be incorrect: the specimen treated in that publication bears shorter anterior dorsal platelets, shorter, more compact (basely higher) rostrum and smaller ventral projections at P2 and P3. *Torrenticola gennada* and *T. monticola* are characterized by an untypical compact idiosoma, basely high capitulum and very short ventro-distal lamellae at P2 and P3. *Torrenticola gennada* is separated from the latter by a more elongated P4 and capitulum, as well as a more compact genital field.

TORRENTICOLA KEESDAVIDSI CRAMER, 1992
(FIGS 44A–D, 45A–D; TABLE 21)

Type series: Holotype female, México, Estado de México, Municipio de Temascaltepec, San Francisco Oxtotilpan, arroyo Peña Blanca 1800 m asl, 07.iv.1984, leg. Cramer, coll. Cristina Cramer, Instituto de Biología, UNAM; paratype, same locality, 19.xii.1984, 0/1/0, leg. Cramer, coll. Cristina Cramer, Instituto de Biología, UNAM.

Material examined: Mexico, Avándaro, Arroyo Hondo C, 17.iii.1990, 1/0/0 mounted, leg. Q. Benito, coll. Cristina Cramer, prep. Q. Benito; Mexico, Avándaro, Arroyo Hondo D, 18.iii.1990, 0/1/0 mounted, coll. Cristina Cramer, prep. Q. Benito.

Geographical distribution: Mexico.

Habitats: Small stream at 1800 m asl.

Published records: Cramer (1992).

Diagnosis: Characters of the *serratipalpis*-group; idiosoma oval-rounded; dorsal plate with reddish pattern (Fig. 6B-1, 6B-2); capitular bay relatively wide \pm U-shaped; coxal field slender, Cx-I/II laterally smooth, Cx-I apically sharply pointed; capitulum basely high, short, with sharp lateral edge, ventrally bent, rostrum long, slender; P2/3-lamellae mid-sized, frayed, hyaline, P4 long, slender, ventral setae centrally on small double-tipped hump.

Description – *Male* ($N = 1$): Idiosoma mid-sized, rounded-oval (L 657 μ m, L/W 1.34); dorsal plate with reddish pattern (Fig. 6B-2), antero-medial dorsal platelets medially straight, laterally straight, oblique, antero-lateral platelets longer, medially straight, postero-laterally tapering, Dgl-4 slightly lateral to Dgl-5 (Fig. 44B); coxal field elongated, Cx-I/II laterally very smooth, Cx-I tips sharply pointed, Cxgl-4 far posterior of tips; capitular bay relatively deep U-shaped, apically slightly diverging, basely rounded; posterior margins of Cx-IV \pm across, laterally besides caudal end of genital field; genital field compact, anterior margins truncate, sharp bent to slightly convex lateral margins, posterior margin rounded; excretory pore between Vgl-2, posterior caudal margin of primary sclerotization (Fig. 44A); capitulum with postero-ventral apodemes elongated, laterally with very sharp ridge, ventral margin curved; chelicera slender; P2 long, box-shaped, dorsal and ventral margin straight, nearly parallel, medio-distal margin sweeping ventrally to the relatively high ventro-distal lamella, lamella hyaline with straight very finely frayed margin, ventro-distal seta proximal to lamella; P3 short, dorsal margin convex, ventral concave, distal and ventral margins at medio-distal corner sweeping strongly to a short, high, finely frayed convex lamella; P4 elongated, distally curved (rel L 0.36, P2/P4 0.93, P3/P4 0.47), ventral setae on relatively high, central projection with two sharp tips (Fig. 44C, D).

Female: See Cramer (1992).

Discussion: As only two females were described in the original description of this species (Cramer, 1992), figures and description are given here of the male, based upon one slide at hand from the collection of Cristina

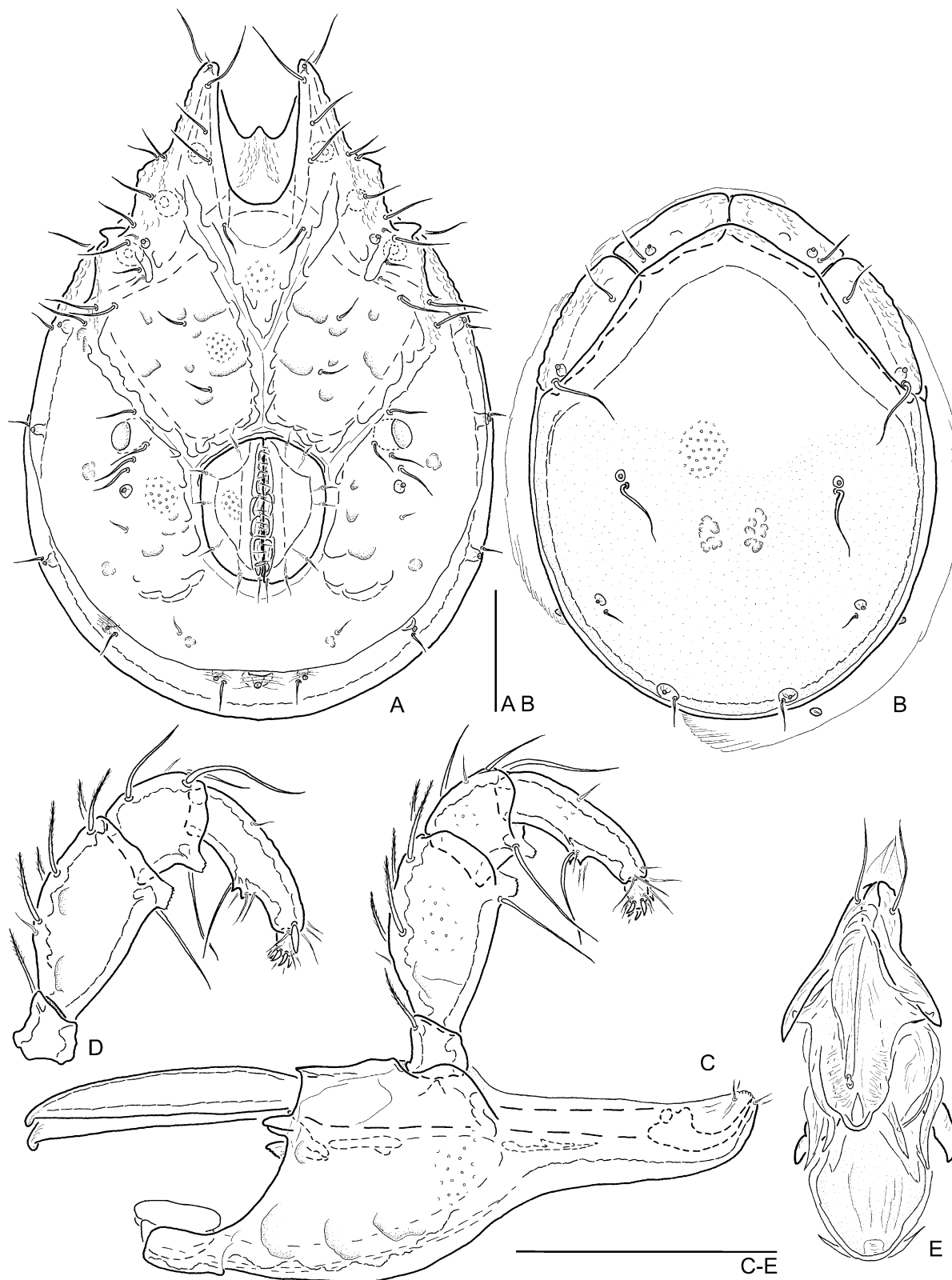


Figure 42. *Torrenticola gennada*. A, B, male (CR 287); C, D, male (CR 73); E, male (CR 190). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 μm.

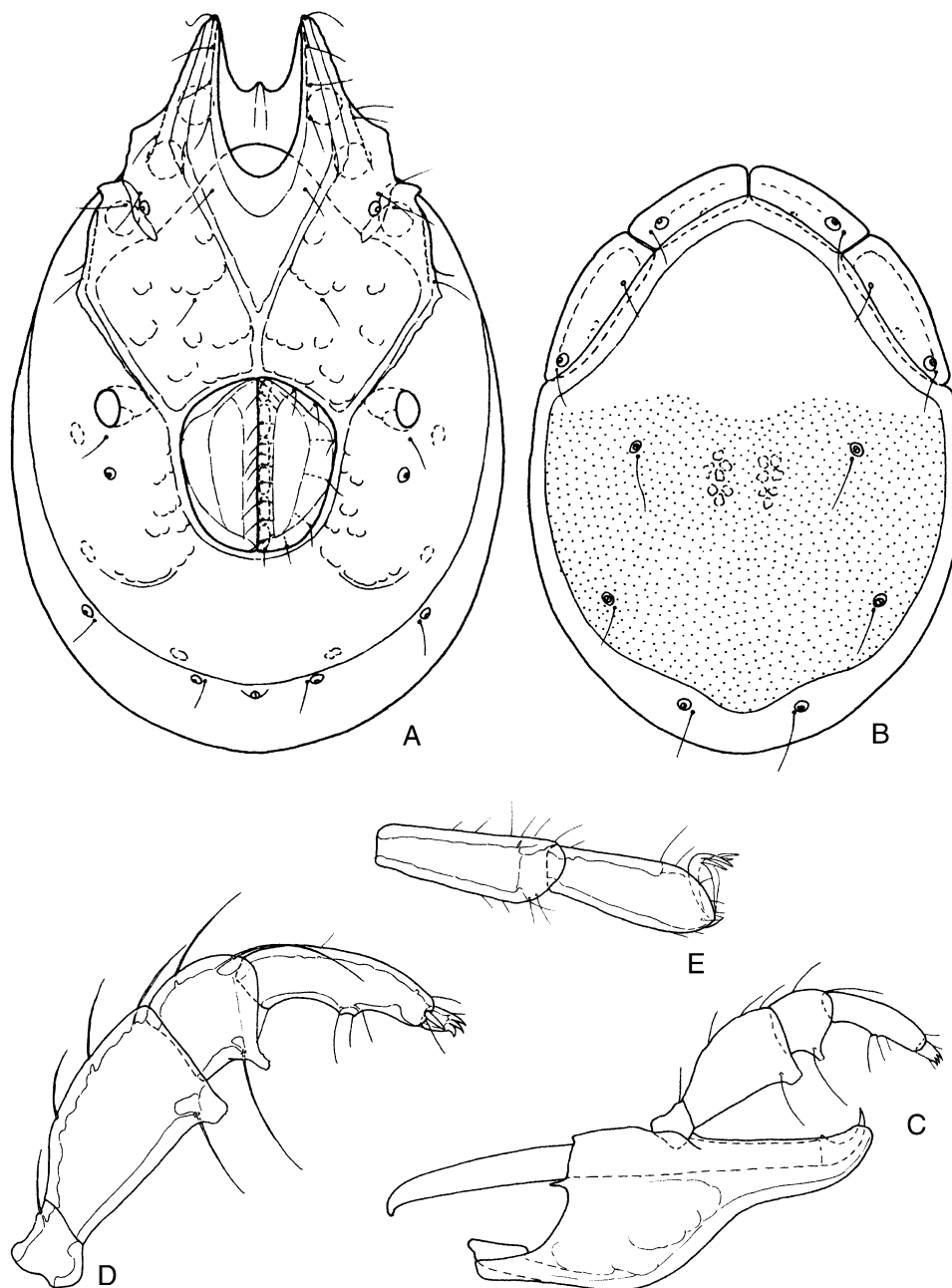


Figure 43. *Torrenticola gennada*. A–E, female, after Cook (1980). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, first leg, distal segments. No measurement scale bars available.

Cramer at the UNAM. Unfortunately, the genital skeleton is not properly mounted on this slide, it remained squeezed inside the specimen; as far as visible it is probably similar to the genital skeleton of *T. cirratipalpis* or *T. alexandra*, with a relatively large cella proximalis. *Torrenticola keesdavidsi* is characterized by a sharp lateral bend at the capitulum, untyp-

ical for most species of the *serratipalpis*-group, but – to a far lesser extent – also present in *T. australis*. Furthermore, the species is differentiated by its long and slender rostrum (clearly separated from the basal part of the capitulum), thin and slender P4, very sharply pointed Cx-I tips, smooth lateral margins of the coxal field and a broad genital field in the male.

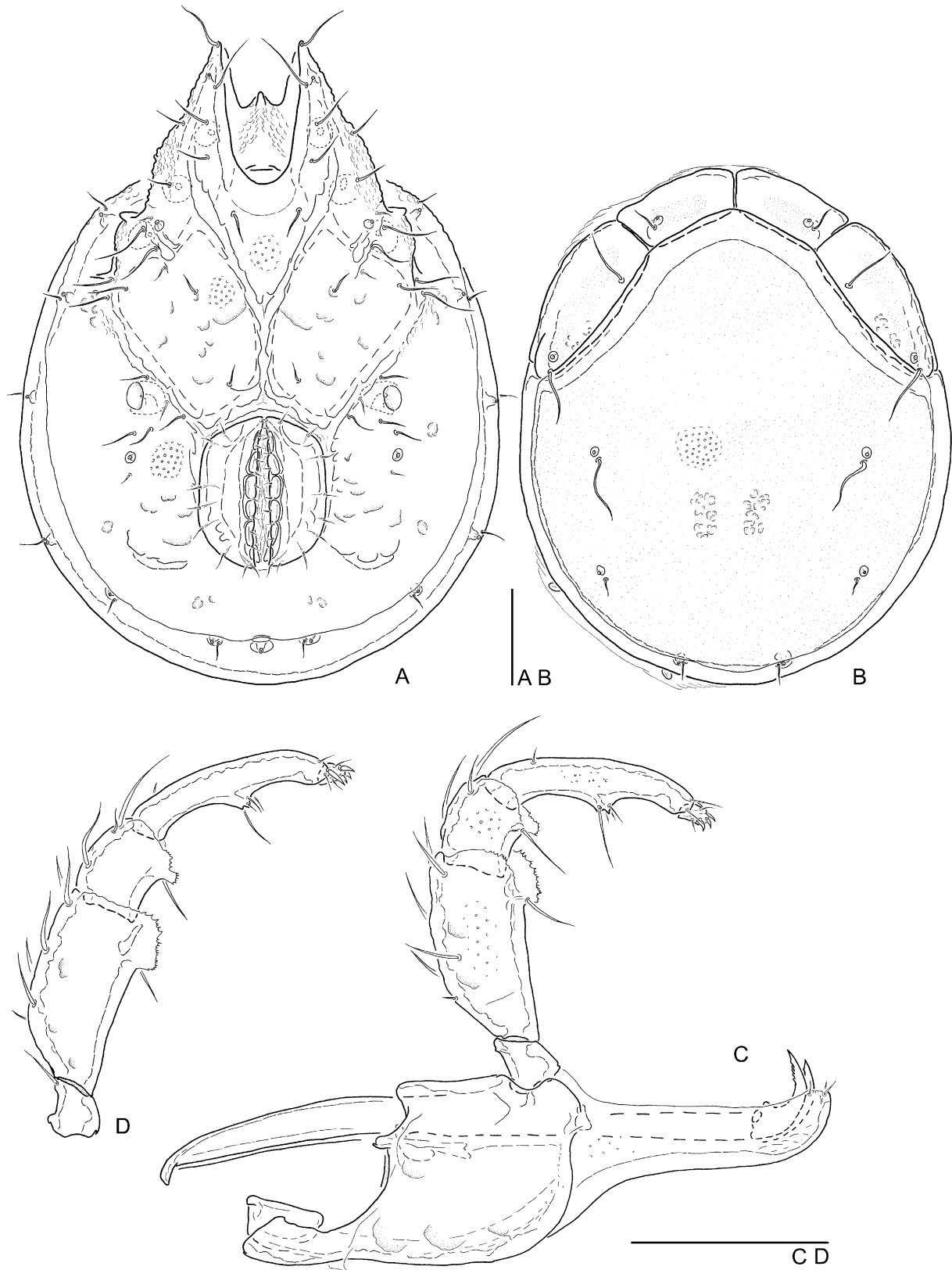


Figure 44. *Torrenticola keesdavidsi*. A–D, male, prep. Cramer. A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

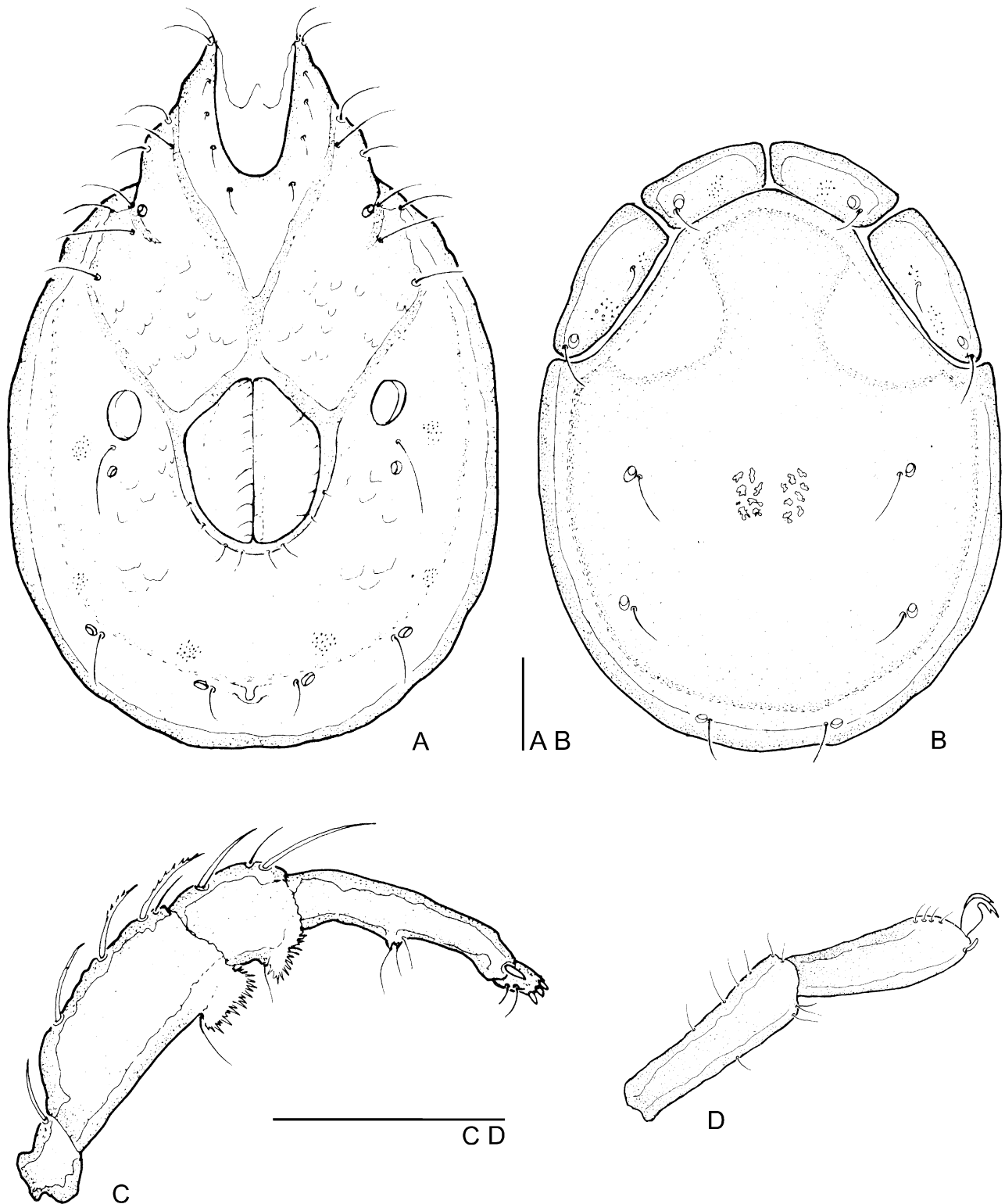


Figure 45. *Torrenticola keesdavidsi*. A–D, female, prep. Cramer; after Cramer (1992). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, left palp, medial view; D, first leg, distal segments. Scale bars = 100 µm.

Table 21. Measurements (μm) of *Torrenticola keesdavidsi*; $N = 1$ (male), 1 (female) and *T. monticola*; $N = 2$ (male). The measurements of *T. keesdavidsi* not given in the original description (Cramer, 1992) were completed by new measurements of preparations from the Cramer collection (UNAM)

	<i>keesdavidsi</i>		<i>monticola</i>		
	male	female	male		
			ht	pt	SD
Idiosoma L	657	536	667	657	6.9
Idiosoma W	491	518	500	476	17.3
Idiosoma L/W	1.34	1.03	1.33	1.38	0.03
Cx-I tL	284		280	284	3.5
Cx-III W	314		343	319	17.3
Cx-I tL/Cx-III W	0.91		0.81	0.89	0.1
Ds L	530	499	549	540	6.9
Dp L	491		515	510	3.5
Ds W	451	442	409	402	4.9
Ds L/W	1.17	1.13	1.34	1.34	0.00
Dp L/W	1.09		1.26	1.27	0.01
A-m platelet L	130	132	120	125	3.5
A-m platelet W	56		49	47	1.7
A-l platelet L	183	169	164	170	4.3
A-l platelet W	76	47	60	59	0.5
A-m pl L/a-l pl L	0.71	0.78	0.73	0.73	0.00
Capitular bay L	149	150	148	149	0.9
Capitular bay W	74	81	83	78	3.5
Cb L/W	2.03	1.85	1.78	1.91	0.1
Dist cb – gf	245		221	213	5.2
Cx-I mL	145		137	135	1.7
Cx-II + III mL	86		74	71	1.7
Cx-I tL/Cx-II/III mL	3.32		3.80	4.00	0.1
Cx-I/Cx-II + III mL	1.69		1.87	1.90	0.02
Genital field L	159	167	153	154	0.9
Gf L/Cx-II + III mL	1.86		2.08	2.17	0.1
Genital field W	135	148	123	120	1.7
Genital field L/W	1.18	1.13	1.25	1.29	0.03
Gf L/Id L	0.24		0.23	0.23	0.00
Gf L/dist cb – gf	0.65		0.72	0.69	0.02
Dist gf – expo	83		110	110	0.00
Dist gf – cauda	118		147	142	3.5
Gs L			203	196	5.2
Gs aL			164	130	24.3
Gs W			126	126	
Gs aL/tL			0.81	0.66	0.1
Gs tL/W			1.55	1.55	
Capitulum vL	309	310	285	282	2.6
Capitulum dL	223		208	201	5.2
Rostrum L	123		105	103	1.7
Capitulum H	103	103	120	120	0.00
R L/c dL	0.55		0.51	0.51	0.00
R L/c vL	0.40		0.37	0.37	0.00
Gn bend depth	17		17	17	0.00
Chelicera L	331	358	332	328	2.6
Chelicera H	22		25	25	0.00
Chelicera L/H	15.00		13.55	13.40	0.1
Chelicera bs L	282		281	277	2.6

Table 21. *Continued*

	<i>keesdavidsi</i>		<i>monticola</i>		
	male	female	male		
			ht	pt	SD
Chelicera claw L	49		51	51	0.00
Chel bs/claw L	5.75		5.45	5.38	0.1
P1 dorsal L	32	29	27	28	0.9
P2 dL	98	98	85	78	4.3
P3 dL	49	52	49	50	0.9
P4 dL	105	105	71	69	1.7
P5 dL	12	14	15	17	1.7
Palp total L	296	298	246	243	2.6
P4 vL	86		51	49	1.7
P4 vL to seta	47		32	29	1.7
P4 vL/L to seta	1.84		1.62	1.67	0.04
P1 rel L	0.11	0.10	0.11	0.12	0.00
P2 rel L	0.33	0.33	0.34	0.32	0.01
P3 rel L	0.17	0.17	0.20	0.21	0.01
P4 rel L	0.36	0.35	0.29	0.28	0.00
P5 rel L	0.04	0.05	0.06	0.07	0.01
P1 H	27		32	34	1.7
P2 H	48		51	50	0.9
P3 H	34		44	45	0.9
P4 H	20		27	32	3.5
P5 H	10		12	10	1.7
P1 L/H	1.18		0.85	0.82	0.02
P2 L/H	2.05		1.64	1.56	0.1
P3 L/H	1.43		1.11	1.11	0.00
P4 L/H	5.38		2.64	2.15	0.3
P5 L/H	1.25		1.20	1.75	0.4
P2/P4 L	0.93	0.93	1.19	1.14	0.03
P3/P4 L	0.47	0.5	0.69	0.73	0.03

***TORRENTICOLA MONTICOLA* SP. NOV.**

(FIG. 46A–E; TABLE 21)

Type series: Holotype male, CR 98, Cartago, Finca Los Lagos, Río Macho, small stream, 2340 m asl, 28.vii.1995, mounted; paratype, same locality and date, 1/0/0 mounted.

Habitat: Fast flowing small stream at 2340 m asl; lithophyal; temperature 12.8 °C; conductivity 21 µS cm⁻¹.

Distribution: Costa Rica (only known from type locality, Central Cordillera de Talamanca).

Derivatio nominis: *monticola* (Latin = mountain-dweller); referring to the elevation of the sample site of the species, higher than in all other species of the group.

Diagnosis (only males): Characters of the *serratipalpis*-group; idiosoma oval to broad drop-shaped; dorsal

plate very pale reddish, anterior bluntly pointed; coxal field slightly elongated, Cx-I/II laterally graded; capitular bay deep U-shaped; genital field subrectangular; capitulum basely short, high, ventral margin very smoothly curved; rostrum mid-sized, slender; palp relatively compact, P2-lamella short, P4 very short, slightly conical.

Description – Male (*N* = 2): Idiosoma mid-sized [L 667 µm (657 µm), L/W 1.33 (1.38)]; antero-dorsal platelets relatively short, antero-medial platelets medially straight to convex, anterior margin nearly straight, lateral margin concave, antero-lateral platelets longer, medially straight, postero-laterally slightly tapering; Dgl-4 slightly lateral to Dgl-5 (Fig. 46B); coxal field laterally sharply graded, slightly elongated (Cx-III antero-laterally surpassing ‘shoulder-corners’), Cx-I tips slender, Cxgl-4 slightly posterior to Cx-I tips; capitular bay basely rounded, lateral margins straight; posterior margins of Cx-IV

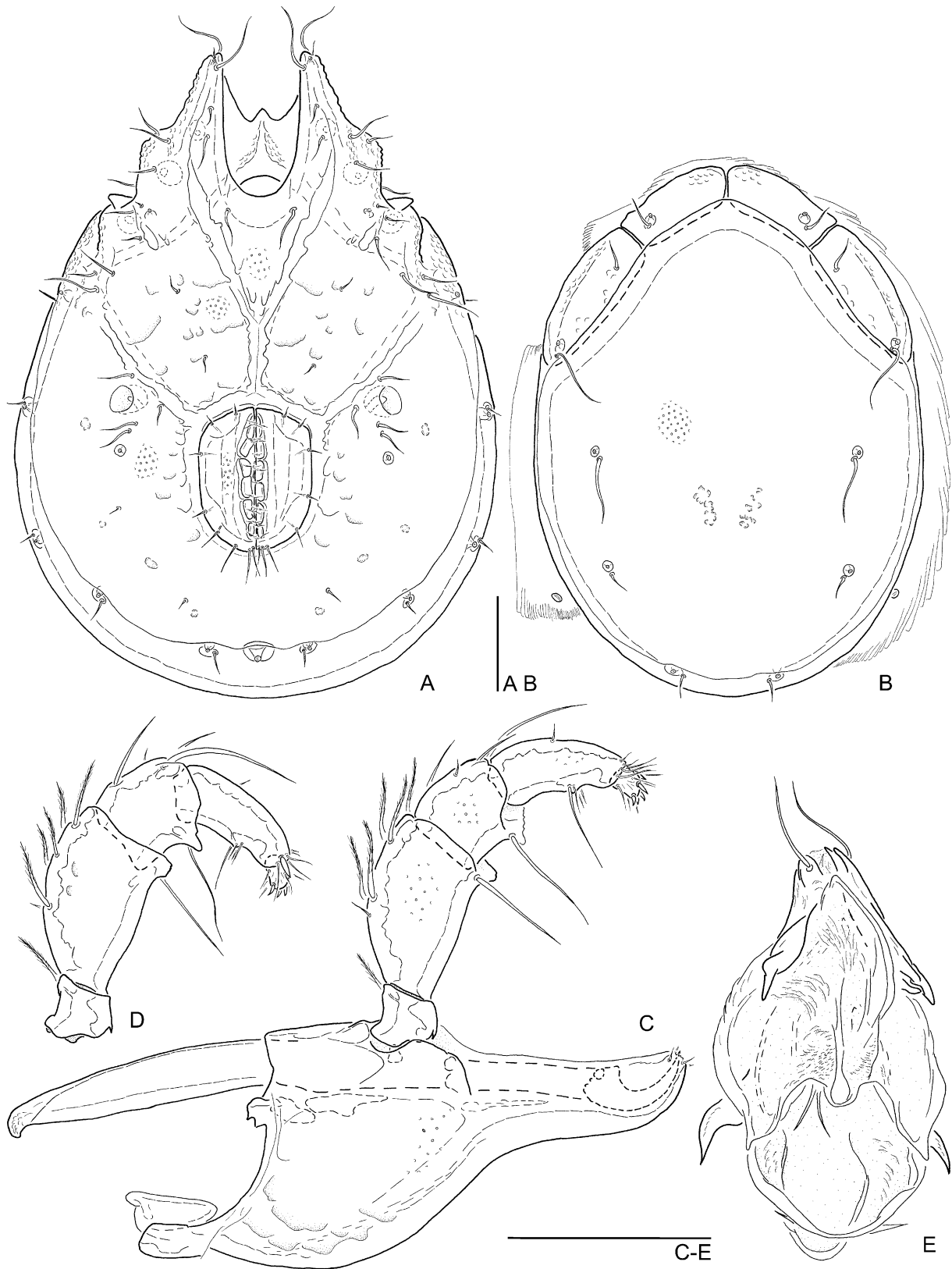


Figure 46. *Torrenticola monticola*. A–E, holotype male (CR 98). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 μ m.

not visible; genital field nearly rectangular, anterior margins truncated, nearly across, sharply bent to nearly straight lateral margins, posterior margins rounded; excretory pore between Vgl-2, posterior caudal margin of primary sclerotization (Fig. 46A); genital skeleton broad, compact, apically relatively long, cella proximalis small, processus proximalia small, brachia distalia and brachia proximalia strong, brachia proximalia sharply pointed, curved to posterior (Fig. 46E); ventral margin of capitulum basely rounded, bellied, smoothly curved towards relatively slender rostrum; chelicera slender; palp short, compact, P2 longer than P4 [P2/P4 1.19 (1.14)], dorsal margin rounded, ventral margin convex, distally of seta with short, small, finely serrate lamella; P3 compact (L/H 1.11 (1.11)), ventro-distally with short, high, finely serrate lamellae; P4 very short, slightly cone-shaped, ventral setae on very flat hump in distal half of ventral margin (Fig. 46C, D).

Female: Unknown.

Discussion: *Torrenticola monticola* – together with *T. gennada* (see above) – is characterized by its compact idiosoma, basely high capitulum and very short ventro-distal lamellae at P2 and P3. The species is separated from *T. gennada* in a very short, compact P4, basely higher, bellied capitulum and a more elongated genital field. In the general shape of the idiosoma and gnathosoma *T. monticola* is similar to the *columbiana*-like species. However, due to the presence of a small, finely serrate lamella at the ventro-distal margin of P2 (similar to *T. gennada*), *T. monticola* should be placed – with caution – in this species group.

BREVICOXALIS-GROUP

Previously known species: *T. brevicoxalis* K.O. Viets, 1977 (Guatemala).

Differential diagnosis of the group: Dorsal plate reddish (Fig. 6A); idiosoma oval; coxal field apically very short, laterally sharply graded, anterior coxae only slightly surpassing idiosoma, Cx-I tips broad triangular pointed; posterior margin of Cx-IV far behind genital field; excretory pore well anterior Vgl-2; genital field slightly elongated (clearly trapezoid in female); capitular bay V-shaped; capitulum basely high, with very sharp bend at ventral margin and lateral edge, rostrum short to mid-sized; palp medium sized, P2 and P3 without projections, ventral setae at P4 far distally; chelicera with long, straight claw.

Discussion: Even though the *brevicoxalis*-group at the present state of knowledge is only represented by a single species, based on its characteristic features, it should be regarded as a phylogenetic entity.

TORRENTICOLA BREVICOXALIS K.O. VIETS, 1977 (FIG. 47A–H; TABLES 22, 23)

Type series: Holotype male, Guatemala, north-west Cobán, Río Cuxjá, 800 m asl, 24.vii.1974, leg. Böttger, prep. no. 5981 SMF; allotype female same locality and date, prep. no. 5979 SMF, paratypes same locality and date, 1/9/0 mounted, prep. no. 5980, 5964, 5750 SMF.

Material examined: CR 137, Guanacaste, ACG, Cerro Cacao, rheocene, 1260 m asl, 27.ii.1996, 0/1/0 mounted, 0/1/0 unmounted; CR 138, Guanacaste, ACG, Cacao, spring brook, 1170 m asl, 27.ii.1996, 0/1/0 unmounted.

Table 22. Measurements (µm) of *Torrenticola brevicoxalis* from Costa Rica; *N* = 1 (female)

Idiosoma L	613	Cb L/W	1.90	R L/c dL	0.46	P1 rel L	0.14
Idiosoma W	481	Dist cb – gf	159	R L/c vL	0.33	P2 rel L	0.28
Idiosoma L/W	1.28	Cx-I mL	130	Gn bend depth	15	P3 rel L	0.20
Cx-I tL	226	Cx-II + III mL	25	Chelicera L	243	P4 rel L	0.32
Cx-III W	338	Cx-I tL/Cx-II/III mL	9.21	Chelicera H	13	P5 rel L	0.06
Cx-I tL/Cx-III W	0.67	Cx-I/Cx-II + III mL	5.30	Chelicera L/H	18.00	P1 H	25
Ds L	542	Genital field L	164	Chelicera bs L	189	P2 H	33
Dp L	500	Gf L/Cx-II + III mL	6.70	Chelicera claw L	54	P3 H	29
Ds W	407	Genital field W	140	Chel bs/claw L	3.50	P4 H	21
Ds L/W	1.33	Genital field L/W	1.18	P1 dorsal L	25	P5 H	10
Dp L/W	1.23	Gf L/Id L	0.27	P2 dL	50	P1 L/H	1.00
A-m platelet L	132	Dist gf – expo	149	P3 dL	37	P2 L/H	1.52
A-m platelet W	66	Dist gf – cauda	201	P4 dL	59	P3 L/H	1.25
A-l platelet L	189	Capitulum vL	176	P5 dL	11	P4 L/H	2.82
A-l platelet W	74	Capitulum dL	127	Palp total L	181	P5 L/H	1.13
A-m pl L/a-l pl L	0.70	Rostrum L	59	P4 vL	44	P2/P4 L	0.85
Capitular bay L	93	Capitulum H	81	P4 vL to seta	34	P3/P4 L	0.63
Capitular bay W	49			P4 vL/L to seta	1.29		

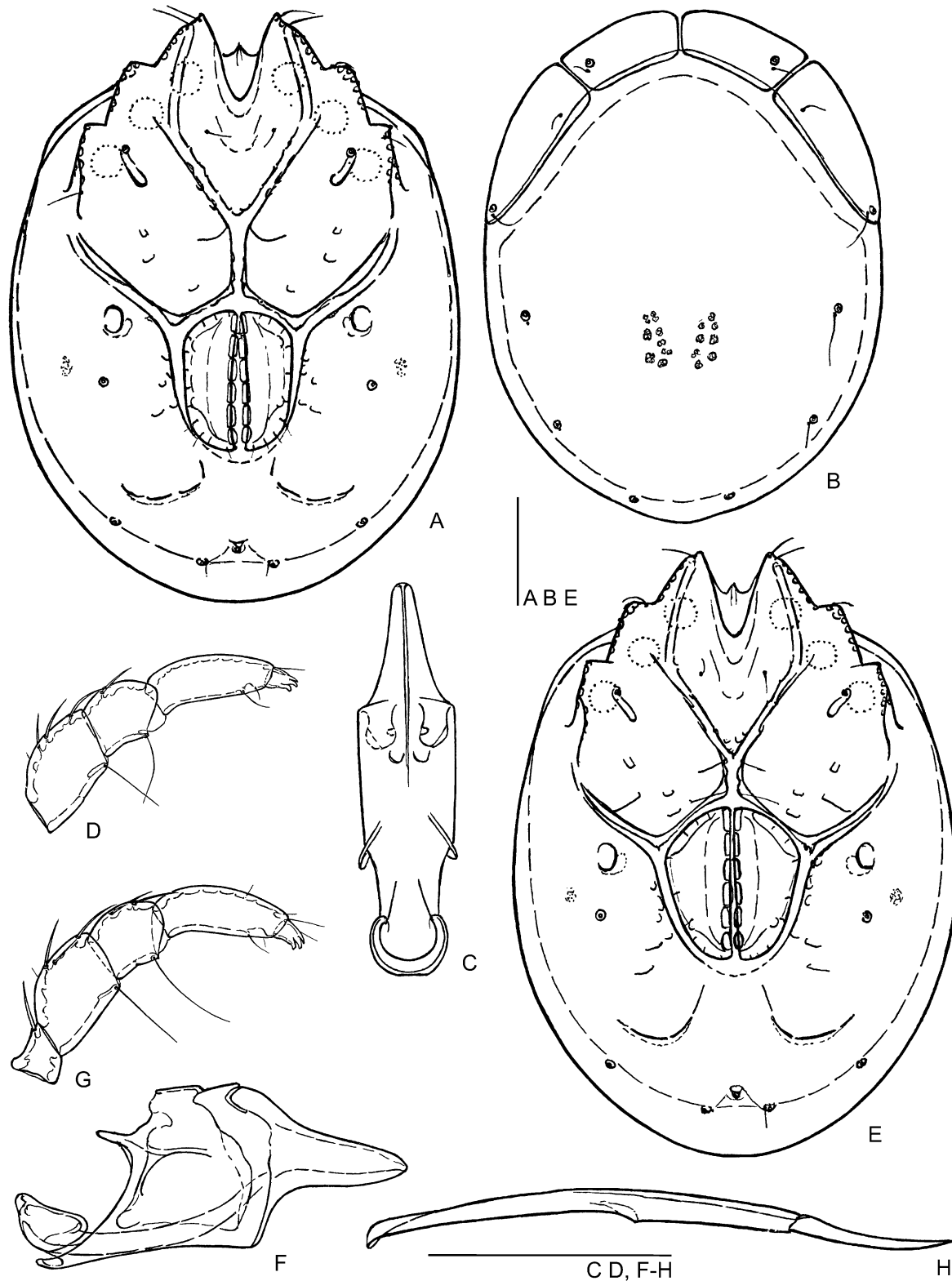


Figure 47. *Torrenticola brevicoxalis*. A–D, holotype male, prep. no. 5981 SMF Viets collection; E–G, allotype female, prep. no. 5979 SMF Viets collection; H, paratype, female, prep. no. 5964 SMF Viets collection; after K.O. Viets (1977/78, Teil II). A, E, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, dorsal view; D, left palp (P1 missing); F, capitulum, lateral view; G, right palp; H, chelicera. Scale bars = 100 μ m.

Table 23. Measurements (μm) of *Torrenticola brevicoxalis* from Guatemala, from the original description by K.O. Viets (1977/78 Teil II); $N = 2$ (male), 6 (female)

	male		female	
	ht	pt	min.	max.
Idiosoma L	561	585	577	625
Idiosoma W	429	429	425	478
Ds L	507	537	528	573
Dp L	452	472	462	502
Ds W	385	379	377	425
A-m platelet L	125	127	119	140
A-l platelet L	166	164	159	183
Capitular bay L	79	79	79	82
Cx-I mL	116	122	112	126
Cx-II + III mL	82	90	40	48
Genital field L	137	137	148	166
Genital field W	102	98	128	139
Capitulum vL	162	158	162	168
Chelicera L			217	236
P1 dorsal L	22	22	22	23
P2 dL	43	44	43	48
P3 dL	31	32	32	36
P4 dL	55	55	54	59
P5 dL	14	14	13	15
Palp total L	165	167	164	181

Habitat: Guatemala: Stream at 800 m asl; Costa Rica: Slow flowing rheocene and spring brook at 1260 and 1170 m asl; psammal, macropelal, macrolithal, mesolithal; temperature 17.3–18.1 °C; conductivity 30–35 $\mu\text{S cm}^{-1}$.

Geographical distribution: Guatemala, Costa Rica (Cordillera de Guanacaste).

Published records: K.O. Viets (1977/78 Teil II).

Diagnosis: As for the species group.

Description: See K.O. Viets (1977/78 Teil II).

Discussion: The species is clearly separated from all other species of the genus, as the chelicerae are very

long and the cheliceral claw is straight. Furthermore, the very sharp ventral bend at the capitulum and the very short, sharply graded coxal field are very characteristic. K.O. Viets (1977/78 Teil II) discusses the similarity of the palp with that of *Monatractides*, due to the lack of appendages at P2 and P3. Morphologically the females from northern Costa Rica differ from the females described from Guatemala only in a slightly deeper capitular bay and shorter medial length of Cx-II + III (Tables 22, 23). Also the habitat is different: *T. brevicoxalis* has been described from a stream in Guatemala, whereas the Costa Rican specimens were found in a spring and a spring brook.

CONIROSTRIS-LIKE SPECIES

Previously known species: *T. conirostris* (Lundblad, 1941) (Colombia, Guatemala), *T. rala* Cook, 1980 (Mexico, Costa Rica).

New species from Costa Rica: *T. conipalpis*.

Differential diagnosis of the group: Rostrum short (to very short), basely very high, blunt cone-shaped; palps short, compact, P2/P3 mostly without or with very small cone-shaped ventro-distal projections (similar to *Monatractides*).

Discussion: Despite the great variability in the characteristics of the specimens, the elevation and habitat types of the localities, most specimens of the *conirostris*-like species collected in Costa Rica are addressed to the *conirostris/rala*-species complex, and not differentiated further. This species complex is not distinguishable at present, as all characteristic features (genital field length; rostrum length, basal height; P4 shape, relative length, etc.) vary continuously within the specimens and therefore do not allow clear differentiation of separate species. Furthermore, the specimens collected in Costa Rica more or less completely close the gap between the two species described previously (*T. conirostris*, *T. rala*). Owing to the lack of a clear systematic position, this species group should not be regarded as a phylogenetic entity.

Key to the species

- 1a Idiosoma compact [L/W 1.27–1.35 (males), 1.35–1.40 (females); Cx-I tL/Cx-III W 0.74–0.75 (males), 0.74–0.78 (females)]; antero-lateral dorsal platelets relatively long (a-m/a-l pl L 0.71–0.77); capitular bay wide (L/W 1.61–2.08); coxal field laterally graded, relatively short, compact; genital field relatively short, compact [L/W 1.17–1.21 (males), 1.11–1.13 (females)]; P2 long (rel L 0.32–0.34, L/H 1.62–1.75); P4 very short, tapering distally (rel L 0.23–0.24, L/H 1.83–2.00, P2/P4 1.32–1.42); rostrum distally curved upwards (Figs 48, 49) *T. conipalpis*
- b Idiosoma mostly elongated-oval [L/W 1.28–1.60, Cx-I tL/Cx-III W 0.74–0.98 (mostly > 0.80)]; antero-lateral dorsal platelets shorter (a-m/a-l pl L 0.75–0.92); capitular bay narrow (L/W 2.05–2.84); coxal field laterally smooth to slightly graded; male genital field more elongated (L/W 1.23–1.44); P2 short (rel L 0.26–0.30, L/H 1.21–1.40); P4 relatively longer (rel L 0.25–0.30, L/H 2.13–2.75, P2/P4 0.90–1.16); rostrum cone-shaped, not up-curved (Figs 50–56) *T. conirostris/rala*-complex

***TORRENTICOLA CONIPALPIS* SP. NOV.**

(FIGS 48A–E, 49A–C; TABLE 24)

Type series: Holotype male, CR 208, Alajuela, San Ramon, left affluent of Río San Lorencito, 900 m asl, small stream, 26.iii.1996, mounted.

Additional specimens examined: CR 139, Guanacaste, ACG, Cacao, rheocrene, 1150 m asl, 27.ii.1996, 1/1/0 mounted; CR 226, Puntarenas, Ecolodge San Luis, above Río San Luis, rheopsammocrene, 1220 m, 01.iv.1996, 1/1/0 mounted.

Habitat: Fast flowing springs and one small stream at 900–1220 m asl; akal, mesolithal, macropelal; temperature 17.0–19.3 °C; conductivity 33–70 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Cordillera de Tilaran, Cordillera de Guanacaste).

Derivatio nominis: *conus* (Latin = cone), *palpus* (Latin = palp); referring to the cone-shaped P4.

Diagnosis: Characters of the *conirostris*-group; idiosoma mid-sized, compact, heavy 'shoulders'; dorsal plate reddish to red; antero-dorsal platelets compact, antero-lateral platelets relatively long; Cx-I apically short; capitular bay relatively wide; genital field compact; genital skeleton relatively slender; ventral margin of capitulum convex, rostrum basely high, distally tapering, up-curved; P4 very short, tapering distally, ventral setae distally.

Description – Male ($N=3$): Idiosoma rounded [L 638 μm (650–677 μm), L/W 1.27 (1.31–1.35)], primary sclerotization extended antero-dorsally of coxal field forming heavy 'shoulders' (Fig. 48A); dorsal plate reddish (reddish patched) to red, dorsal shield anterior wide; antero-medial dorsal platelets relatively small, medial margins straight to rounded, posterior straight, slightly oblique, antero-lateral platelets anterior straight, strongly tapering to posterior [a-m/a-l pl L 0.71 (0.72–0.76)]; Dgl-4 lateral to Dgl-5 (Fig. 48B); coxal field laterally graded (strongly, however, with rounded edges), broad, short [Cx-I tL/Cx-III W 0.74 (0.75)]; Cx-I short, apically with broad, rounded tips; Cxgl-4 close to tips; capitular bay relatively wide U-shaped, basely rounded, apically diverging [L/W 1.61 (1.96–2.08)]; medial margin of Cx-II/III mid-sized; posterior margin of Cx-IV far postero-lateral of genital field, not very distinct, relatively close to latero-caudal margin of primary sclerotization; genital field anterior bluntly rounded, lateral margins slightly convex, slightly tapering to caudal, postero-laterally rounded, caudally truncated [L/W 1.17 (1.20–1.21)]; excretory pore between Vgl-2, pore and glandularia directly posterior (partly under) primary sclerotization (Fig. 48A); genital skeleton elongated, apically short, small carina anterior, brachia distalia slender, brachia proximalia well developed,

cella proximalis large, elongated, with small processus proximalia (tL/W 1.88 (2.00), aL/tL 0.38–0.40) (Fig. 48E); capitulum postero-ventrally extended, ventral margin basely slightly convex, bent towards rostrum, distally only slightly concave, rostrum at base very high, greatly tapering towards slightly up-curved tip (Fig. 48C); palps short, with P2 by far longest segment; P2 with short ventro-distal cone-shaped projection, P3 without ventral projection; P4 very short, tapering (blunt cone-shaped) [rel L 0.23 (0.24), L/H 1.83 (2.00), P2/P4 1.42 (1.32–1.33)], ventral margin straight, without projection, setae far distally [vL/L to seta 1.28 (1.26–1.30)] (Fig. 48C, D).

Female ($N=2$): Idiosoma similar to male (Fig. 49A), larger (L 726–746 μm); dorsal plate red (Fig. 49B); genital field broad, rounded-rhombic (L/W 1.11–1.13) (Fig. 49A); gnathosoma similar to male, rostrum distally slightly broader (Fig. 49C).

Discussion: *Torrenticola conipalpis* at the present state of knowledge is the only species clearly characterized within the *conirostris*-like species group. The shape of the coxal field (short, compact, laterally sharply graded), the up-curved rostrum and the short, cone-shaped P4 (in combination with a relatively long P2) characterizes the species.

***TORRENTICOLA CONIROSTRIS* (LUNDBLAD, 1941)**
(FIG. 50A–H; TABLE 25)

Type series: Holotype female, Colombia, Manrique, north El Tambo, stream, 2000 m asl, 01.iii.1940, leg. K. von Sneidern, prep. no. 2744 SMNH; allotype male, same locality and date, prep. no. 2745 SMNH.

Further material: Colombia, leg. K. von Sneidern: Manrique, north El Tambo, stream, 2000 m asl, 01.iii.1940, 2/3/0, mounted, prep. no. 3863 SMNH; Manrique, north El Tambo, stream below waterfall, 2200 m asl, march 1940, 8/7/0; El Tambo, small stream, 1700 m asl, 04.xii.1936, 1/2/0. Guatemala, leg. K. Böttger: Río Lima, km 150–151 road Guatemala Ciudad to Coban, stream, 1520 m asl, 16.viii.1974, 10/4/0; same locality, 11.viii.1974, 0/2/0.

Geographical distribution: Colombia, Guatemala.

Habitat: Colombia: Fast flowing mountain streams at 1700–2200 m asl; Guatemala: Mountain stream at 1520 m asl; moss covered stones, terrestrial vegetation.

Published records: Lundblad (1953), K.O. Viets (1977/78 Teil I).

Diagnosis: Characters of the *conirostris*-group; idiosoma elongated (L/W 1.59–1.60); dorsal plate reddish; antero-medial dorsal platelets relatively long (a-m/a-l

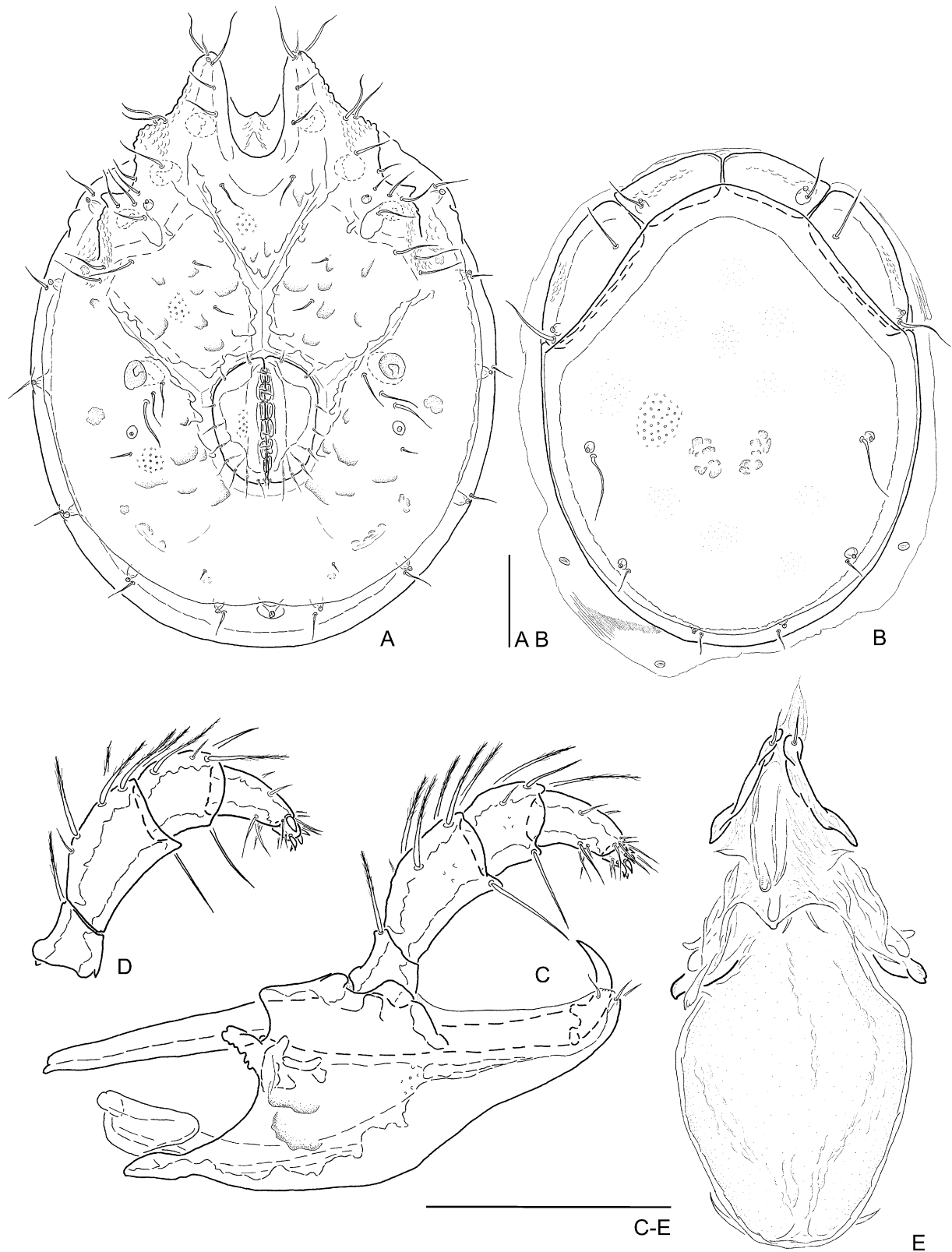


Figure 48. *Torrenticola conipalpis*. A–D, holotype male (CR 208); E, male (CR 226). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

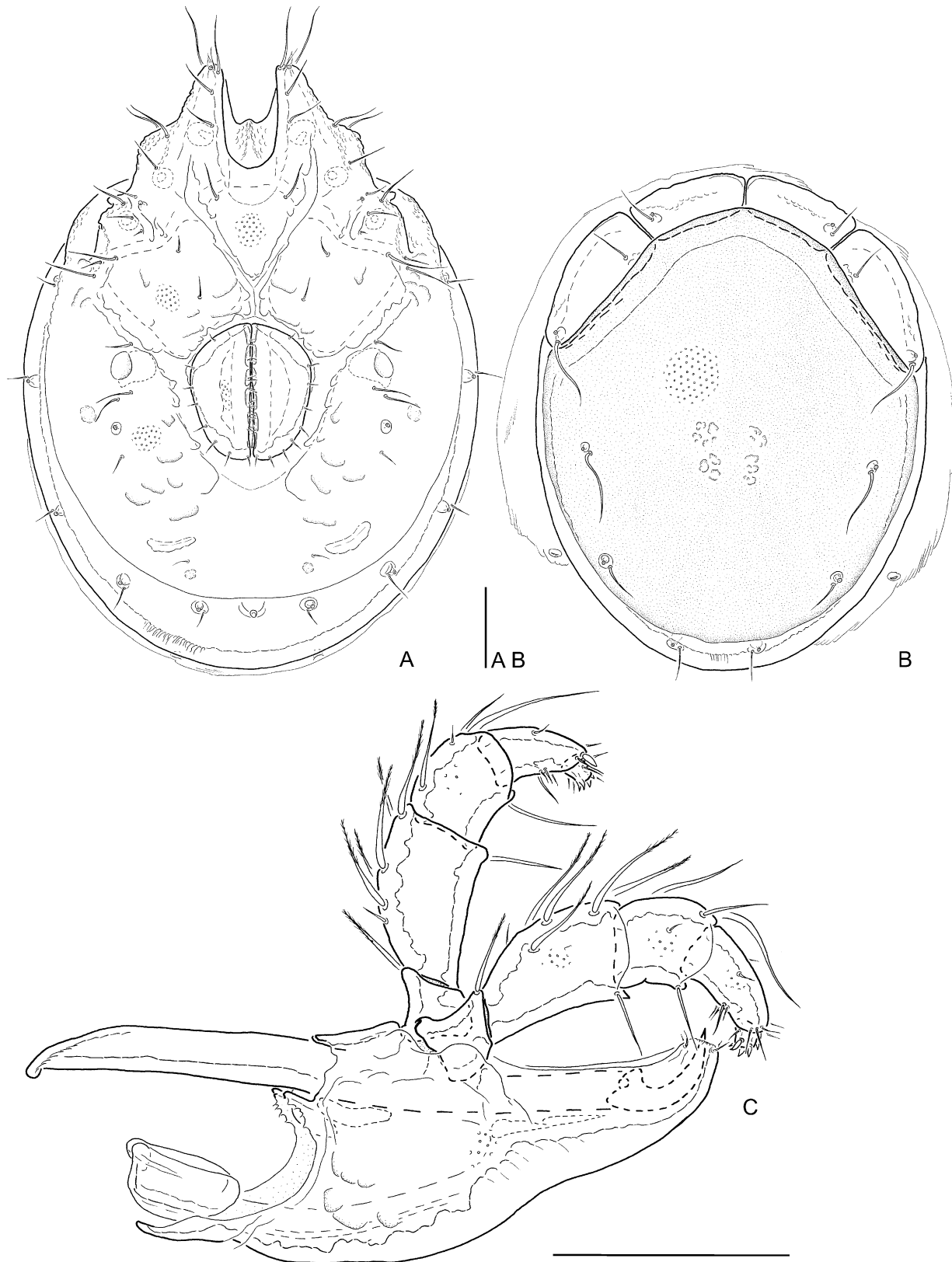


Figure 49. *Torrenticola conipalpis*. A–C, female (CR 226). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view and left palp, medial view. Scale bars = 100 μ m.

Table 24. Measurements (μm) of *Torrenticola conipalpis*; $N = 3$ (male), 2 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	638	650	638	677	20.0	736	726	746	13.9
Idiosoma W	500	500	481	515	17.2	537	520	554	24.3
Idiosoma L/W	1.27	1.31	1.27	1.35	0.04	1.37	1.35	1.40	0.04
Cx-I tL	255	260	255	265	4.9	275	275	275	0.00
Cx-III W	343	348	343	353	4.9	363	353	373	13.9
Cx-I tL/Cx-III W	0.74	0.75	0.74	0.75	0.00	0.76	0.74	0.78	0.03
Ds L	530	540	530	559	15.0	589	579	598	13.9
Dp L	500	500	500	515	8.5	549	540	559	13.9
Ds W	407	417	407	441	17.7	468	456	481	17.3
Ds L/W	1.30	1.29	1.27	1.30	0.02	1.26	1.24	1.27	0.02
Dp L/W	1.23	1.20	1.17	1.23	0.03	1.17	1.16	1.18	0.01
A-m platelet L	123	134	123	140	8.7	140	136	145	6.1
A-m platelet W	51	55	51	61	5.0	56	56	56	0.00
A-l platelet L	173	176	173	194	11.1	189	189	189	0.00
A-l platelet W	69	69	69	81	7.1	73	69	77	6.1
A-m pl L/a-l pl L	0.71	0.72	0.71	0.76	0.02	0.74	0.72	0.77	0.03
Capitular bay L	110	120	110	123	6.5	129	127	130	1.7
Capitular bay W	69	61	59	69	5.1	65	64	66	1.7
Cb L/W	1.61	1.96	1.61	2.08	0.2	1.98	1.96	2.00	0.03
Dist cb – gf	218	218	218	233	8.5	193	190	196	4.3
Cx-I mL	147	145	142	147	2.4	151	151	152	0.9
Cx-II + III mL	64	69	64	78	7.5	36	32	39	5.2
Cx-I tL/Cx-II/III mL	4.00	3.79	3.38	4.00	0.3	7.82	7.01	8.62	1.1
Cx-I/Cx-II + III mL	2.31	2.07	1.84	2.31	0.2	4.31	3.84	4.77	0.7
Genital field L	137	140	137	145	3.7	168	167	169	1.7
Gf L/Cx-II + III mL	2.15	2.04	1.84	2.15	0.2	4.78	4.25	5.31	0.7
Genital field W	118	118	115	120	2.4	149	147	152	3.5
Genital field L/W	1.17	1.20	1.17	1.21	0.02	1.12	1.11	1.13	0.01
Gf L/Id L	0.22	0.21	0.21	0.22	0.00	0.23	0.23	0.23	0.00
Gf L/dist cb – gf	0.63	0.63	0.62	0.63	0.01	0.87	0.85	0.89	0.03
Dist gf – expo	140	147	140	149	5.1	189	186	191	3.5
Dist gf – cauda	174	179	174	181	3.7	247	234	260	18.2
Gs L	198	198	196	216	10.7				
Gs aL		81	78	83	3.5				
Gs W	105	107	105	108	1.7				
Gs aL/tL		0.40	0.40	0.40					
Gs tL/W	1.88	1.94	1.88	2.00	0.1				
Capitulum vL	218	229	218	232	7.2	255	252	258	4.3
Capitulum dL	149	156	149	159	5.0	175	174	176	1.7
Rostrum L	74	78	74	81	3.7	91	89	93	2.6
Capitulum H	88	93	88	96	3.7	105	105	105	0.00
R L/c dL	0.49	0.49	0.49	0.52	0.02	0.52	0.51	0.54	0.02
R L/c vL	0.34	0.34	0.34	0.35	0.01	0.36	0.35	0.36	0.00
Gn bend depth	5	5	5	5	0.00	4	4	5	0.9
Chelicera L	255	265	255	267	6.5	298	296	299	1.7
Chelicera H	18	18	18	18	0.00	22	22	22	0.00
Chelicera L/H	13.87	14.40	13.87	14.53	0.4	13.50	13.44	13.56	0.1
Chelicera bs L	216	218	216	223	3.7	250	247	252	3.5
Chelicera claw L	39	44	39	47	3.7	48	47	49	1.7
Chel bs/claw L	5.50	5.06	4.68	5.50	0.4	5.24	5.05	5.42	0.3

Table 24. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P1 dorsal L	29	32	29	32	1.4	34	33	34	0.9
P2 dL	58	59	58	61	1.9	70	69	71	1.7
P3 dL	38	39	38	39	0.7	44	43	45	1.7
P4 dL	40	44	40	47	3.1	50	49	50	0.9
P5 dL	10	11	10	15	2.6	11	10	12	1.7
Palp total L	175	185	175	194	9.2	208	203	213	6.9
P4 vL	28	29	28	32	1.9	34	34	34	0.00
P4 vL to seta	22	23	22	25	1.2	25	22	27	3.5
P4 vL/L to seta	1.28	1.28	1.26	1.30	0.02	1.41	1.27	1.56	0.2
P1 rel L	0.17	0.17	0.16	0.17	0.00	0.16	0.16	0.16	0.00
P2 rel L	0.33	0.32	0.32	0.33	0.01	0.34	0.33	0.34	0.00
P3 rel L	0.22	0.21	0.20	0.22	0.01	0.21	0.21	0.21	0.00
P4 rel L	0.23	0.24	0.23	0.24	0.01	0.24	0.24	0.24	0.00
P5 rel L	0.06	0.06	0.06	0.08	0.01	0.05	0.05	0.06	0.01
P1 H	27	29	27	29	1.4	32	29	34	3.5
P2 H	36	36	34	37	1.2	41	39	43	2.6
P3 H	32	33	32	34	1.2	37	37	38	0.9
P4 H	22	22	22	23	0.7	26	25	27	1.7
P5 H	10	10	10	10	0.00	10	10	10	0.00
P1 L/H	1.09	1.08	1.08	1.09	0.00	1.06	1.00	1.13	0.1
P2 L/H	1.62	1.67	1.62	1.71	0.05	1.70	1.66	1.75	0.1
P3 L/H	1.19	1.19	1.14	1.19	0.03	1.18	1.17	1.19	0.02
P4 L/H	1.83	2.00	1.83	2.00	0.1	1.93	1.86	2.00	0.1
P5 L/H	1.00	1.13	1.00	1.50	0.3	1.13	1.00	1.25	0.2
P2/P4 L	1.42	1.33	1.32	1.42	0.1	1.41	1.40	1.41	0.01
P3/P4 L	0.94	0.89	0.84	0.94	0.05	0.89	0.88	0.90	0.02

pl L 0.85–0.91); genital field elongated [L/W 1.44 (male), 1.24 (female)]; excretory pore well between Vgl-2, posterior to caudal margin of primary sclerotization; rostrum short (r L/c vL 0.26–0.27), P3 long (rel L 0.22–0.24, L/H 1.23–1.31).

Description: See Lundblad (1953).

Discussion: The specimens from Guatemala differ slightly from the description, in bearing small disto-ventral projections at P2 and P3, as well as the excretory pore lying anterior to the Vgl-2 (K.O. Viets, 1977/78 Teil I).

TORRENTICOLA RALA COOK, 1980
(FIG. 51A–G; TABLE 25)

Type series: Holotype male, Mexico, Chiapas State, 13 km north-west Tonalá, near km 54, stream, 23.ii.1972, leg. D. Cook, prep. no. DC 12–72 FMC; allotype female, Mexico, Guerrero State, near village Quarenta y Dos, near km 97, small stream, 05.iv.1972, leg. D. Cook, prep. no. DC 43–72 FMC;

paratypes, same locality and date, 1/0/0, leg. D. Cook, prep. no. DC 12–72 CNC; Mexico, Oaxaca State, Río Tapanatepec, 23.ii.1972, 1/0/0, leg. D. Cook; Costa Rica, Guanacaste, 4 km south Cañas, stream, 13.xii.1973, 1/0/0, leg. D. Cook, prep. no. DC 3–73 CNC.

Geographical distribution: Mexico, Costa Rica (Guanacaste).

Habitat: Small streams and streams.

Published records: Cook (1980).

Diagnosis: Characters of the *conirostris*-group; idiosoma rounded-oval (L/W 1.40–1.51); dorsal plate yellow with 'slight indications of a posterior patch' (Cook, 1980); medial margin of Cx-II/III short (Cx-I tL/Cx-II/III mL 4.16–4.53, male); genital field oval (L/W 1.26–1.30, male); excretory pore well anterior to Vgl-2, on primary sclerotization; rostrum short, high (longer than in *T. conirostris*) (r L/c vL 0.31); P3 short (rel L 0.21, L/H 1.08); P4 more slender (L/H 2.50), ventral setae far distal (vL/L to setae 1.00).

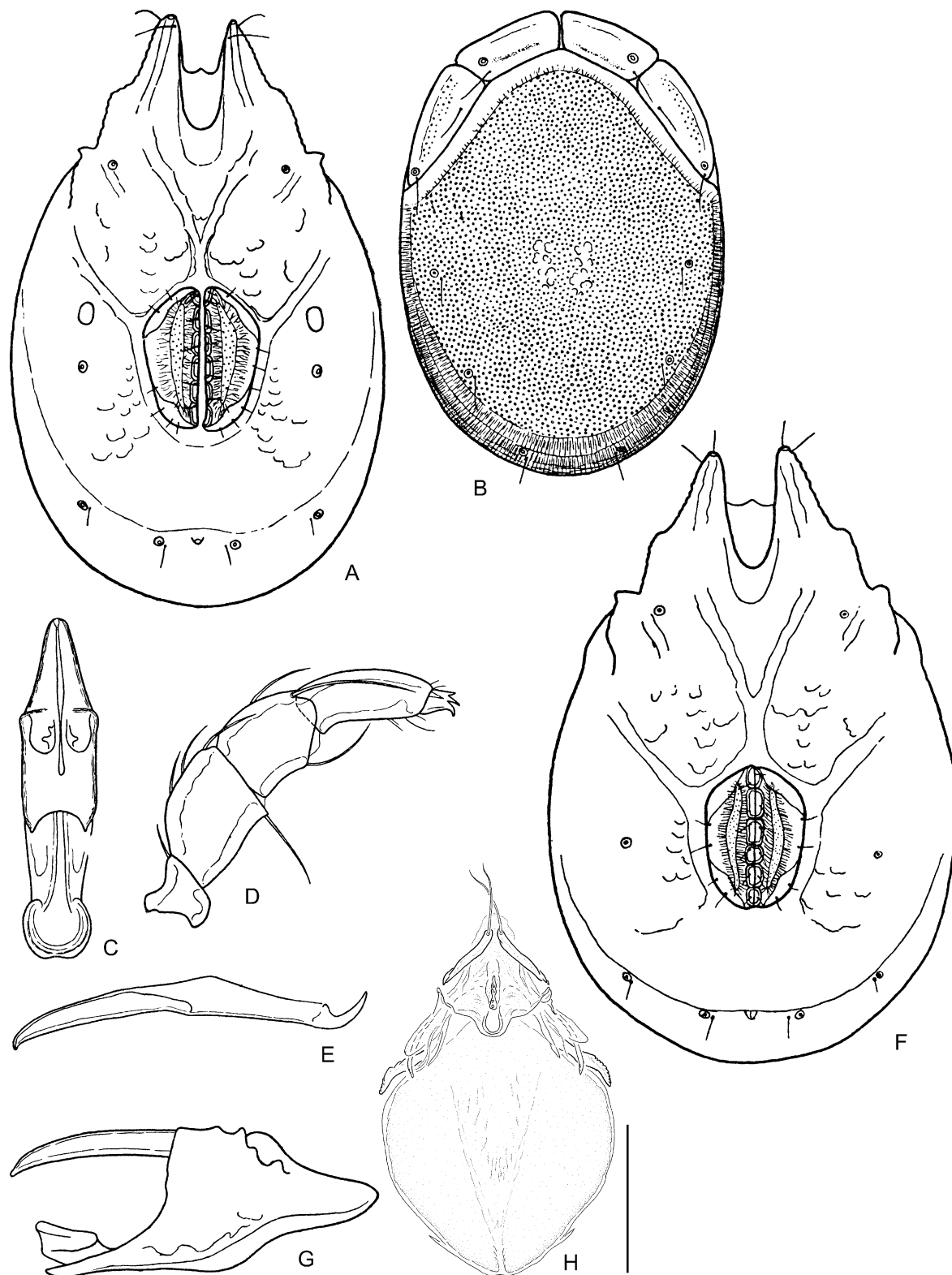


Figure 50. *Torrenticola conirostris*. A–E, holotype female, prep. no. 2744 SMNH Lundblad collection; F, G, allotype male, prep. no. 2745 SMNH Lundblad collection; after Lundblad (1953); H, male, prep. no. 5742 SMF Viets collection. A, F, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, dorsal view; D, palp; E, chelicera; G, capitulum with chelicera, lateral view; H, genital skeleton, anterior view. Scale bar = 100 μ m (no measurement scale bars available for A–G).

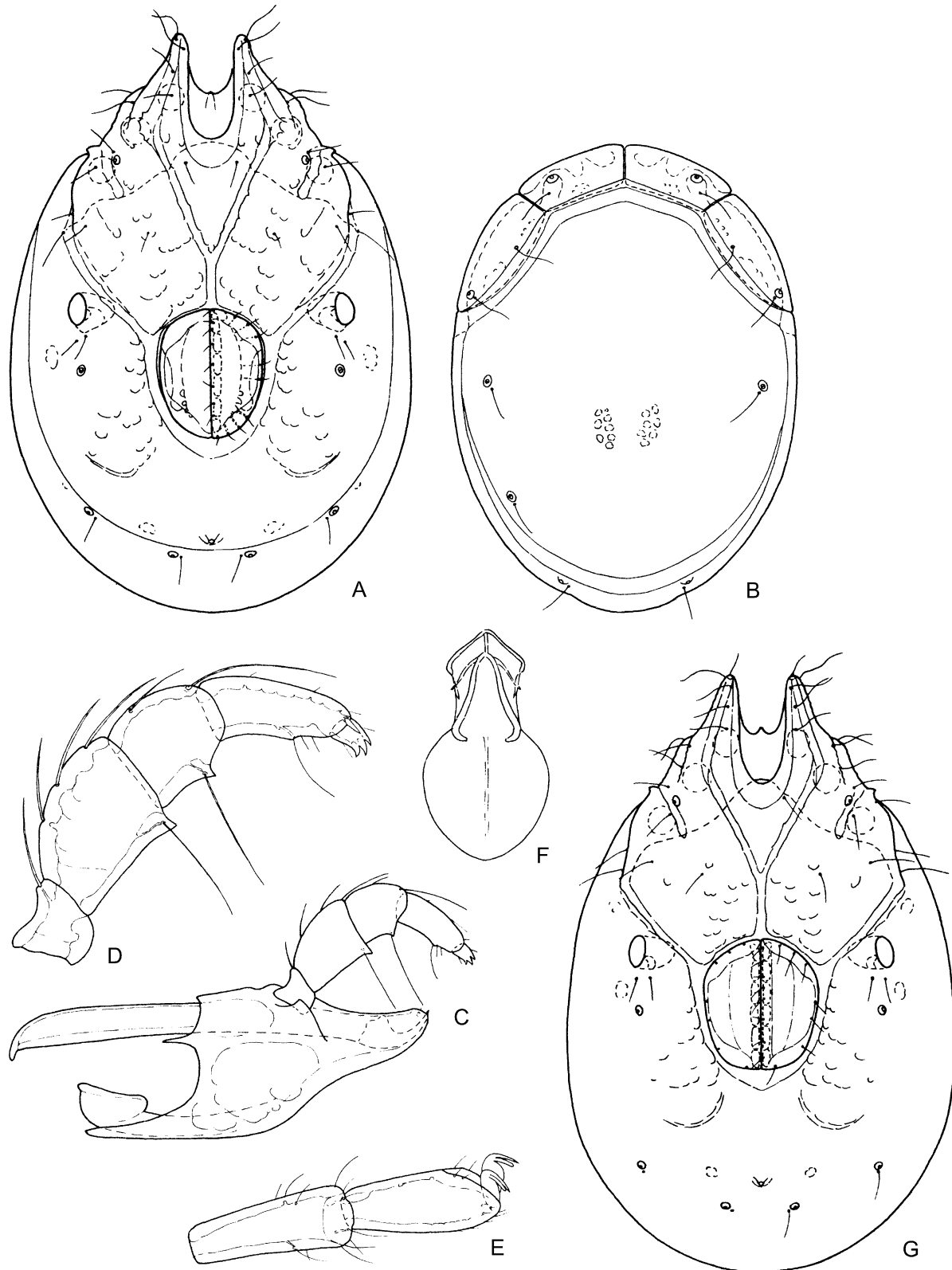


Figure 51. *Torrenticola rala*. A–F, male; G, female, after Cook (1980). A, G idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, first leg, terminal segments; F, genital skeleton, anterior view (most probably squeezed in preparation). No measurement scale bars available.

Table 25. Measurements (μm) of *Torrenticola conirostris*; $N = 1$ (male), 1 (female) and *T. rala*; $N = 3$ (male), 1 (female). The measurements not given in the original descriptions (Lundblad, 1953; Cook, 1980) as far as possible were completed by new measurements of the preparations of the type specimens (SMNH, Lundblad collection; FMC, Cook collection)

	<i>conirostris</i>		<i>rala</i>					
	male	female						female
	ht	pt	ht	mean	min.	max.	SD	pt
Idiosoma L	716	746	652	638	598	652	27.9	687
Idiosoma W	451	466	451	427	422	451	15.8	461
Idiosoma L/W	1.59	1.60	1.45	1.45	1.40	1.51	0.1	1.49
Cx-I tL	284	284	255	260	255	265	4.9	265
Cx-III W	324	324	304	304	284	304	11.3	304
Cx-I tL/Cx-III W	0.88	0.88	0.84	0.87	0.84	0.91	0.04	0.87
Ds L	579	589	540	520	520	540	11.3	559
Dp L	530	540	500	481	471	500	15.0	520
Ds W	402	412	402	392	373	402	15.0	402
Ds L/W	1.44	1.43	1.34	1.34	1.33	1.39	0.04	1.39
Dp L/W	1.32	1.31	1.24	1.24	1.23	1.26	0.02	1.29
A-m platelet L	147	142	125	125	120	130	4.9	130
A-m platelet W	64	61	51	56	51	56	2.8	51
A-l platelet L	162	167	152	152	149	162	6.5	149
A-l platelet W	69	69	64	64	56	64	4.2	61
A-m pl L/a-l pl L	0.91	0.85	0.82	0.80	0.80	0.82	0.01	0.87
Capitular bay L	140	142	130	130	123	145	11.2	132
Capitular bay W	54	59	54	53	51	54	1.2	56
Cb L/W	2.59	2.42	2.41	2.41	2.38	2.74	0.2	2.35
Dist cb – gf	235	201	196	196	194	196	1.4	179
Cx-I mL	152	147	130	130	123	130	4.2	137
Cx-II + III mL	71	42	56	59	56	64	3.7	39
Cx-I tL/Cx-II/III mL	4.00	6.83	4.53	4.42	4.16	4.53	0.2	6.76
Cx-I/Cx-II + III mL	2.14	3.53	2.30	2.21	1.92	2.30	0.2	3.50
Genital field L	159	179	140	145	140	149	4.9	159
Gf L/Cx-II + III mL	2.24	4.29	2.48	2.48	2.27	2.54	0.1	4.06
Genital field W	110	145	110	115	110	115	2.8	137
Genital field L/W	1.44	1.24	1.27	1.27	1.26	1.30	0.02	1.16
Gf L/Id L	0.22	0.24	0.21	0.23	0.21	0.24	0.01	0.23
Gf L/dist cb – gf	0.68	0.89	0.71	0.74	0.71	0.77	0.03	0.89
Dist gf – expo	145	149	125	119	113	125	8.7	123
Dist gf – cauda	192	225	194	172	110	194	43.2	218
Gs L			201	201	201	201		
Capitulum vL	218	221	208	208	208	208		
Capitulum dL	137	145	135	135	135	135		
Rostrum L	56	59	64	64	64	64		
Capitulum H	93		93	93	93	93		
R L/c dL	0.41	0.41	0.47	0.47	0.47	0.47		
R L/c vL	0.26	0.27	0.31	0.31	0.31	0.31		
Gn bend depth	7		7	7	7	7		
Chelicera L	233	243	240	240	240	240		
Chelicera H	17	20						
Chelicera L/H	13.57	12.38						
Chelicera bs L	191	196						
Chelicera claw L	42	47						
Chel bs/claw L	4.59	4.21						
P1 dorsal L	25	23	25	25	25	25		
P2 dL	47	49	47	47	47	47		

Table 25. *Continued*

	<i>conirostris</i>		<i>rala</i>					
	male		female					
	ht	pt	ht	mean	min.	max.	SD	pt
P3 dL	42	39	34	34	34	34		
P4 dL	51	54	49	49	49	49		
P5 dL	12	12	12	12	12	12		
Palp total L	176	178	167	167	167	167		
P4 vL	42	39						
P4 vL to seta	32	34						
P4 vL/L to seta	1.31	1.14	1.00					
P1 rel L	0.14	0.13	0.15	0.15	0.15	0.15		
P2 rel L	0.26	0.28	0.28	0.28	0.28	0.28		
P3 rel L	0.24	0.22	0.21	0.21	0.21	0.21		
P4 rel L	0.29	0.30	0.29	0.29	0.29	0.29		
P5 rel L	0.07	0.07	0.07	0.07	0.07	0.07		
P1 H	25	27	25	25	25	25		
P2 H	37	37	37	37	37	37		
P3 H	32	32	32	32	32	32		
P4 H	20	20	20	20	20	20		
P5 H	9	10	10	10	10	10		
P1 L/H	1.00	0.86	1.00	1.00	1.00	1.00		
P2 L/H	1.27	1.33	1.27	1.27	1.27	1.27		
P3 L/H	1.31	1.23	1.08	1.08	1.08	1.08		
P4 L/H	2.63	2.75	2.50	2.50	2.50	2.50		
P5 L/H	1.43	1.25	1.25	1.25	1.25	1.25		
P2/P4 L	0.90	0.91	0.95	0.95	0.95	0.95		
P3/P4 L	0.81	0.73	0.70	0.70	0.70	0.70		

Description: See Cook (1980).

Discussion: With the material available at the time the species has been described, the separation from *T. conirostris* has been clear – now, the new material from Costa Rica seems to close the gap between these two species. However, before a complete revision of this species group, the two species cannot be synonymized.

COSTA RICAN SPECIMENS OF THE
CONIROSTRIS/RALA-COMPLEX
(FIGS 52A–E, 53A–D, 54A–D, 55A, B, 56A–D;
TABLE 26)

Material examined: CR 4, Alajuela, 7 km west Atenas, Río Tizate, small stream, 540 m asl, 15.vi.1995, 0/3/0 mounted; CR 5, Alajuela, 2 km north-west Sarchí, Río Sarchí, stream, 900 m asl, 17.vi.1995, 1/0/0 mounted; CR 11, Alajuela, 3 km north-east San Mateo, Río Machuca, small stream, 240 m asl, 20.vi.1995, 1/0/0 mounted; CR 12, Puntarenas, at Panamericana, 1 km south Barbudal, Río Seco, stream, 80 m asl,

20.vi.1995, 1/0/0 mounted; CR 13, Puntarenas, at Panamericana, 3 km west San Gerardo, Río Lagarto, river, 80 m asl, 20.vi.1995, 0/1/0 mounted; CR 16, Limón, Corinto, Río Corinto, stream, 220 m asl, 22.vi.1995, 1/0/0 mounted; CR 18, Limón, 2 km north Jiménez, Río Cristine, stream, 180 m asl, 23.vi.1995, 4/0/0 mounted, 6/4/0 unmounted; CR 19, Limón, 2 km north Jiménez, Río Cristine, stream, 180 m asl, 23.vi.1995, 3/0/0 mounted, 10/12/0 unmounted; CR 21, Limón, 1 km east Flores, Río Costa Rica, river, 260 m asl, 24.vi.1995, 1/0/0 mounted; CR 24, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1010 m asl, 26.vi.1995, 0/1/0 unmounted; CR 29, Heredia, spring brook, 1970 m asl, 29.vi.1995, 0/1/0 unmounted; CR 33, Heredia, La Virgen, Río Sarapiquí, river, 180 m asl, 30.vi.1995, 0/1/0 unmounted; CR 34, Alajuela, 2 km north-west San Miguel, Río Sardinal, stream, 420 m asl, 30.vi.1995, 1/0/0 mounted, 1/1/0 unmounted; CR 35, Alajuela, 3 km north-west San Miguel, Río Hule, stream, 400 m asl, 30.vi.1995, 3/0/0 mounted, 1/5/0 unmounted; CR 37, Alajuela, 4 km east Aguas Zarcas, Río Negritos, stream, 330 m asl, 30.vi.1995, 3/0/0 mounted, 3/5/0

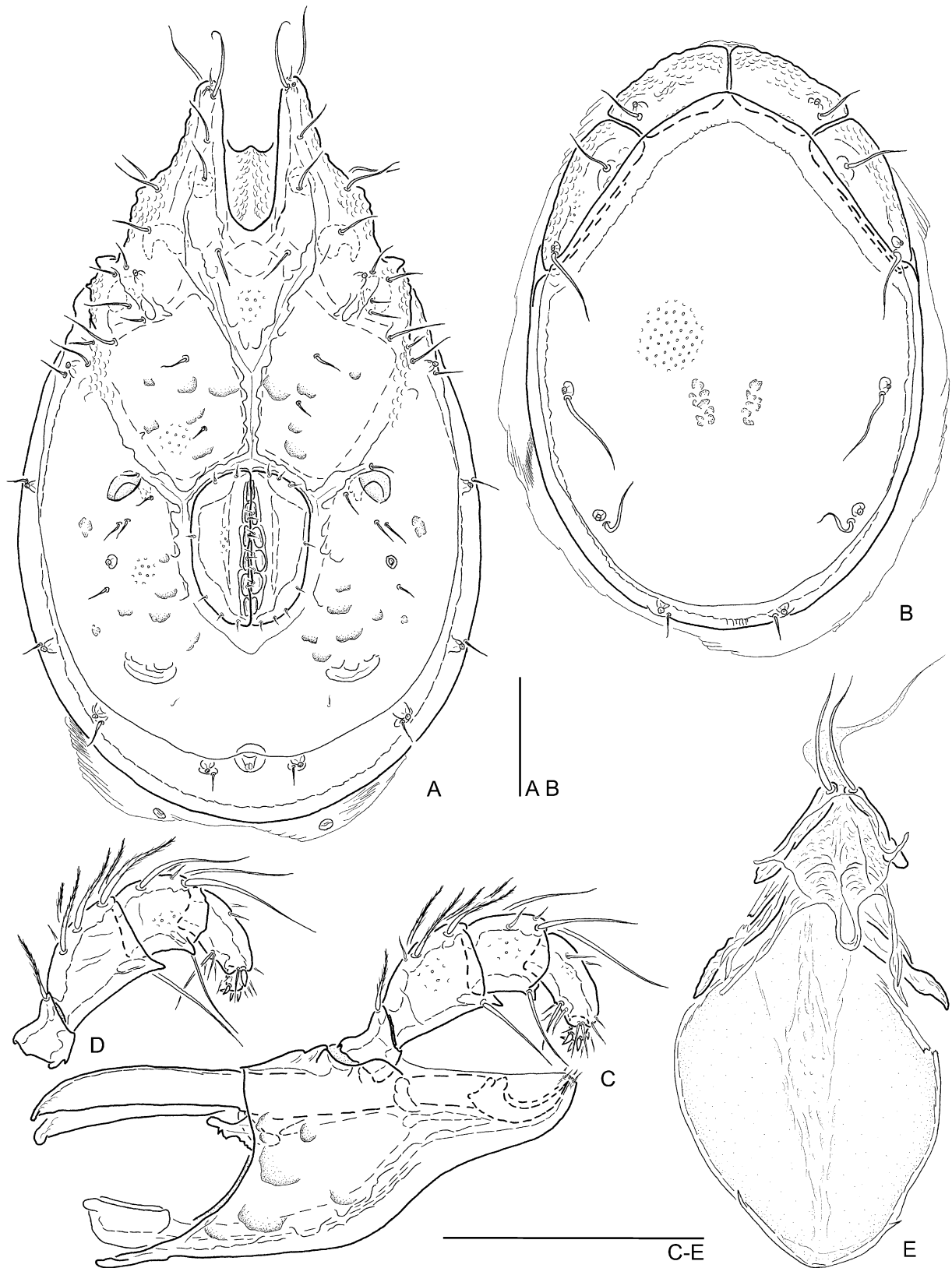


Figure 52. *Torrenticola conirostris/rala-complex*. A–E, male (CR 201). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

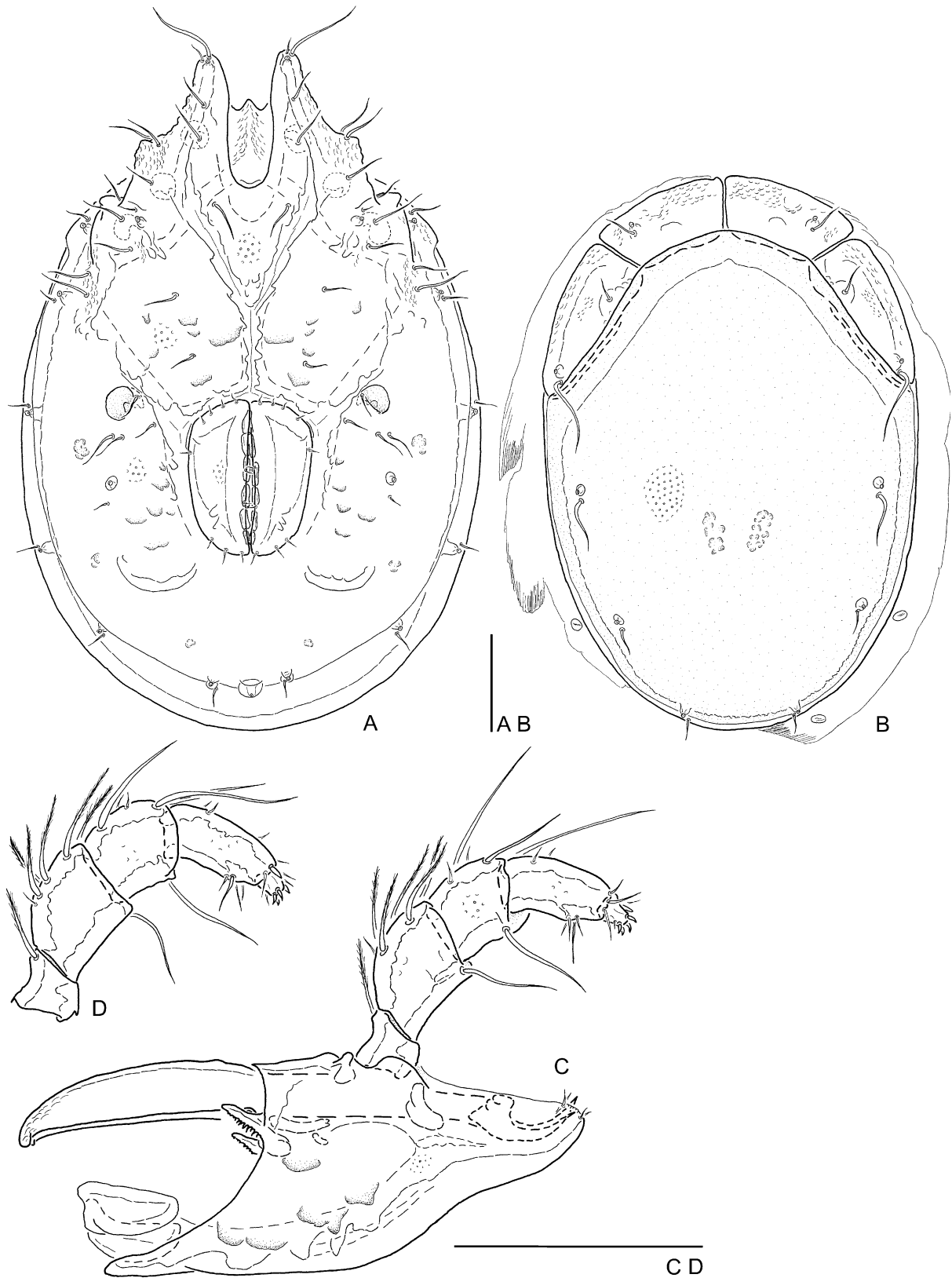


Figure 53. *Torrenticola conirostris*/rala-complex. A–D, male (CR 206). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

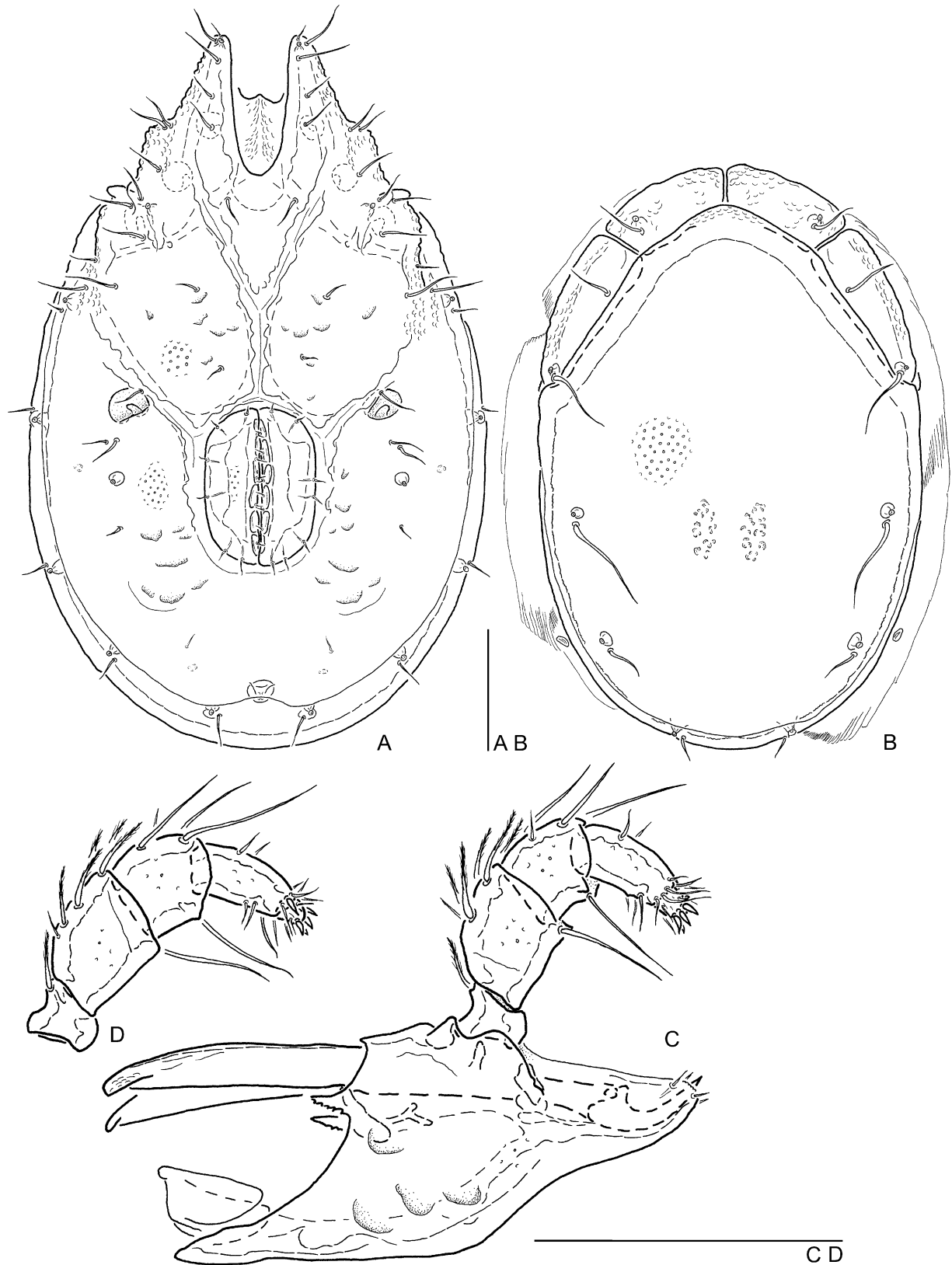


Figure 54. *Torrenticola conirostris/rala-complex*. A–D, male (CR 190). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 μ m.

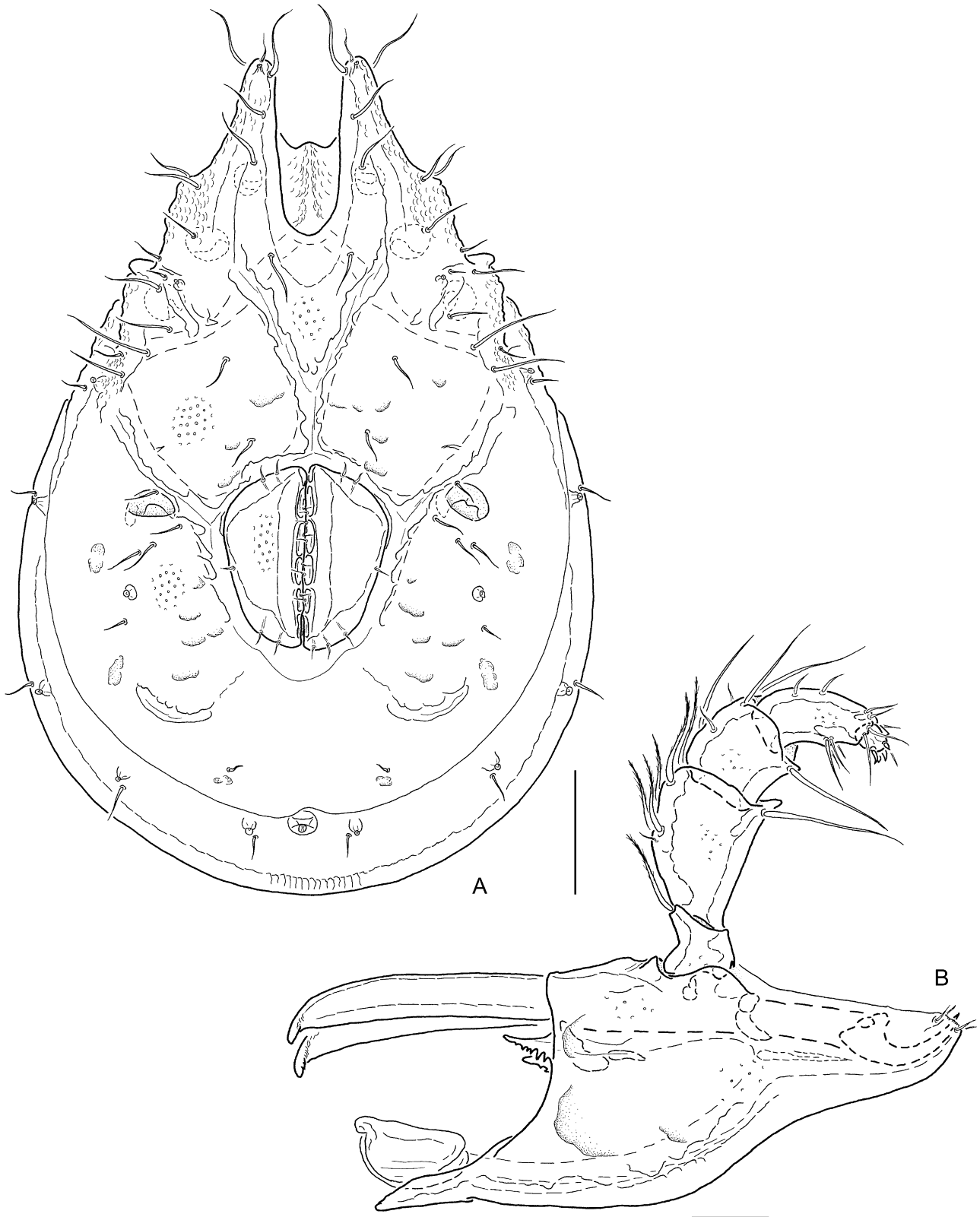


Figure 55. *Torrenticola conirostris/rala-complex*. A, B, female (CR 201). A, idiosoma, ventral view; B, capitulum with right palp, lateral view. Scale bars = 100 µm.

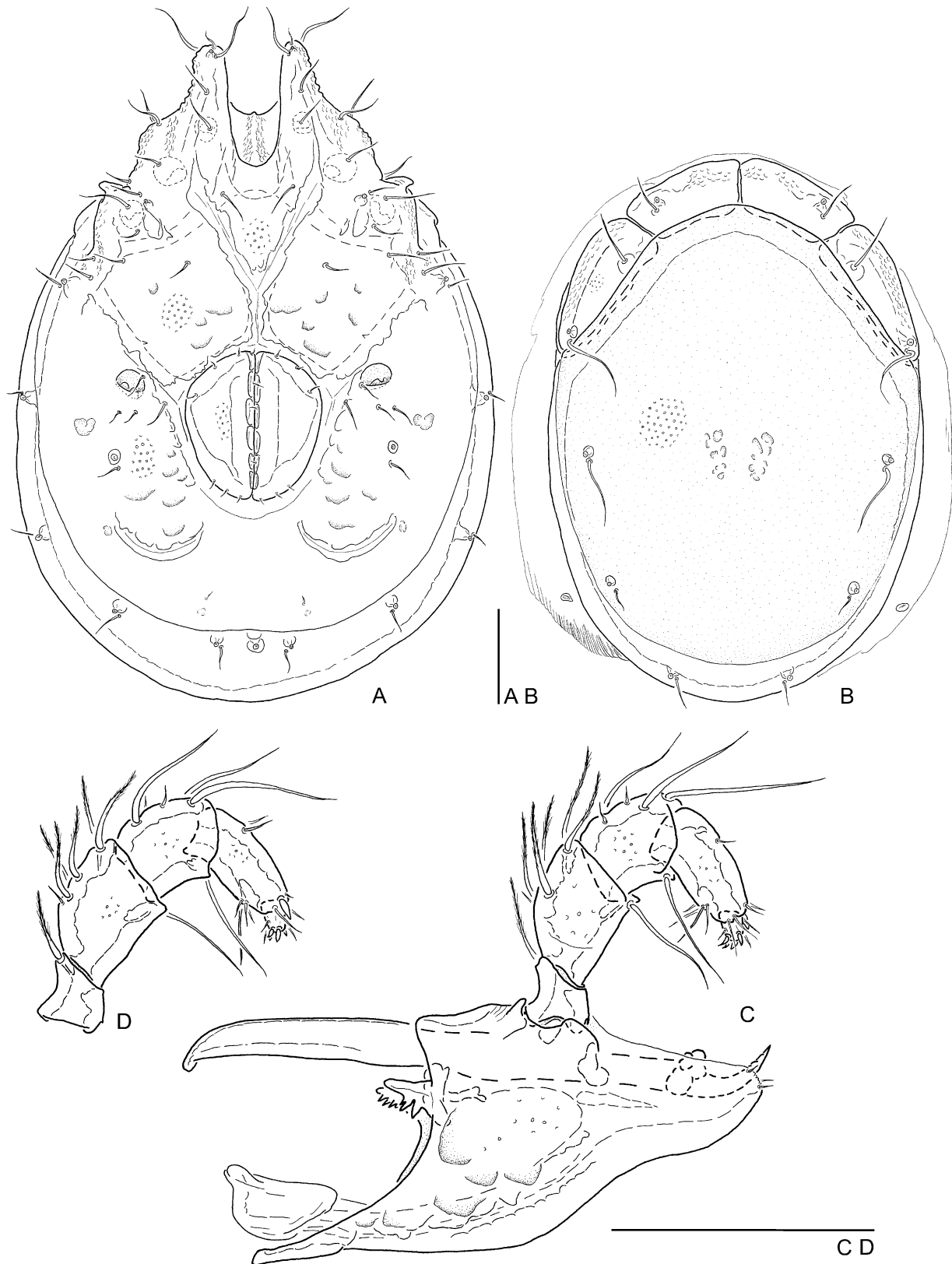


Figure 56. *Torrenticola conirostris/rala-complex*. A–D, female (CR 225). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 26. Measurements (μm) of the *conirostris*/*rala*-complex from Costa Rica; $N = 22$ (male), 6 (female)

	male				female			
	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	616	549	721	51.5	660	623	687	27.6
Idiosoma W	446	363	520	47.5	446	432	500	28.8
Idiosoma L/W	1.42	1.28	1.59	0.1	1.44	1.32	1.59	0.1
Cx-I tL	245	216	275	18.8	253	226	265	15.0
Cx-III W	304	255	334	25.5	299	280	340	20.5
Cx-I tL/Cx-III W	0.82	0.74	0.98	0.05	0.81	0.76	0.90	0.05
Ds L	503	451	603	49.7	525	510	569	21.0
Dp L	461	417	559	47.2	486	471	525	19.2
Ds W	373	314	432	37.8	375	368	397	10.5
Ds L/W	1.39	1.27	1.49	0.1	1.42	1.35	1.45	0.04
Dp L/W	1.28	1.18	1.40	0.1	1.31	1.25	1.34	0.04
A-m platelet L	123	108	140	11.0	118	115	135	7.7
A-m platelet W	54	44	64	5.7	54	51	59	2.4
A-l platelet L	148	127	174	12.9	148	140	162	8.2
A-l platelet W	57	44	74	7.5	55	51	62	4.4
A-m pl L/a-l pl L	0.81	0.75	0.92	0.03	0.83	0.76	0.86	0.04
Capitular bay L	123	104	142	11.0	126	115	140	10.7
Capitular bay W	51	47	56	3.6	53	47	61	5.3
Cb L/W	2.49	2.05	2.84	0.2	2.44	2.10	2.59	0.2
Dist cb – gf	196	176	221	12.1	179	164	196	12.3
Cx-I mL	125	108	137	8.5	126	113	132	6.9
Cx-II + III mL	65	54	86	9.8	48	34	58	7.8
Cx-I tL/Cx-II/III mL	3.86	2.89	4.87	0.6	5.16	4.52	7.15	0.9
Cx-I/Cx-II + III mL	1.94	1.41	2.43	0.3	2.59	2.30	3.71	0.5
Genital field L	140	123	169	14.7	149	145	159	5.7
Gf L/Cx-II + III mL	2.19	1.56	2.96	0.4	3.16	2.77	4.21	0.5
Genital field W	110	93	127	11.6	131	127	147	7.4
Genital field L/W	1.30	1.23	1.38	0.04	1.13	1.07	1.21	0.1
Gf L/Id L	0.23	0.22	0.24	0.01	0.23	0.22	0.23	0.01
Gf L/dist cb – gf	0.72	0.61	0.83	0.1	0.84	0.80	0.89	0.04
Dist gf – expo	111	96	152	14.7	138	120	149	10.2
Dist gf – cauda	160	135	213	24.7	202	191	221	11.2
Gs L	229	174	274	28.8				
Gs aL	72	51	96	12.0				
Gs W	132	105	201	24.6				
Gs aL/tL	0.32	0.25	0.37	0.03				
Gs tL/W	1.62	1.18	2.15	0.3				
Capitulum vL	197	172	235	18.8	203	191	230	16.2
Capitulum dL	132	113	149	11.2	140	120	159	15.8
Rostrum L	61	50	76	7.2	62	56	81	10.1
Capitulum H	85	76	108	10.3	90	81	98	6.4
R L/c dL	0.47	0.43	0.51	0.02	0.47	0.43	0.51	0.03
R L/c vL	0.31	0.27	0.33	0.01	0.31	0.29	0.35	0.02
Gn bend depth	6	5	7	0.9	7	5	10	1.6
Chelicera L	218	189	270	24.4	231	206	250	18.6
Chelicera H	17	16	22	1.9	18	17	20	1.2
Chelicera L/H	12.14	10.63	13.75	0.7	12.32	11.50	14.57	1.1
Chelicera bs L	178	127	225	24.2	189	169	208	15.9
Chelicera claw L	42	37	47	2.9	42	37	44	3.1
Chel bs/claw L	4.47	3.47	5.11	0.4	4.58	4.41	5.00	0.2
P1 dorsal L	25	20	29	2.7	26	22	27	2.0
P2 dL	47	39	59	5.7	45	42	54	5.3

Table 26. *Continued*

	male				female			
	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	36	32	44	3.9	36	32	39	3.0
P4 dL	47	39	56	5.2	47	42	49	2.5
P5 dL	12	10	15	1.5	13	10	15	2.2
Palp total L	164	145	200	17.6	167	149	181	12.6
P4 vL	35	27	44	5.0	34	27	37	3.5
P4 vL to seta	23	16	27	2.9	22	20	28	2.9
P4 vL/L to seta	1.56	1.28	1.85	0.1	1.56	1.22	1.63	0.2
P1 rel L	0.14	0.13	0.16	0.01	0.15	0.14	0.16	0.01
P2 rel L	0.28	0.27	0.30	0.01	0.28	0.27	0.30	0.01
P3 rel L	0.22	0.20	0.23	0.01	0.21	0.21	0.23	0.01
P4 rel L	0.28	0.25	0.30	0.01	0.28	0.26	0.29	0.01
P5 rel L	0.08	0.06	0.09	0.01	0.08	0.06	0.08	0.01
P1 H	25	21	27	2.0	25	22	27	2.0
P2 H	34	32	42	3.5	36	32	39	3.0
P3 H	31	28	34	2.1	31	28	33	1.9
P4 H	20	17	22	1.6	20	18	22	1.2
P5 H	10	7	10	0.7	10	9	10	0.5
P1 L/H	1.00	0.89	1.11	0.1	1.02	1.00	1.11	0.1
P2 L/H	1.32	1.21	1.41	0.1	1.30	1.27	1.38	0.05
P3 L/H	1.17	1.08	1.29	0.1	1.17	1.13	1.23	0.03
P4 L/H	2.50	2.13	2.75	0.2	2.32	2.22	2.38	0.1
P5 L/H	1.43	1.13	1.71	0.2	1.40	1.00	1.50	0.2
P2/P4 L	1.00	0.94	1.13	0.1	1.00	0.95	1.16	0.1
P3/P4 L	0.77	0.68	0.88	0.04	0.78	0.74	0.84	0.04

unmounted; CR 45, Limón, Río Corinto, stream, 500 m asl, 04.vii.1995, 0/1/0 unmounted; CR 51, Cartago, 5 km north Capellades, small stream, 1660 m asl, 05.vii.1995, 0/1/0 mounted; CR 57, Alajuela, San Ramon Field Station, hygropetric area at Río San Lorencito, 1040 m asl, 09.vii.1995, 0/1/0 mounted; CR 63, Puntarenas, Ecolodge San Luis, Quebrada Bruja, small stream, 1300 m asl, 15.vii.1995, 1/0/0 mounted, 1/1/0 SEM-mounted, 1/1/0 unmounted; CR 65, Puntarenas, Ecolodge San Luis, Río San Luis, small stream, 1240 m asl, 16.v.1995, 2/0/0 mounted, 1/0/0 unmounted; CR 67 Puntarenas, Ecolodge San Luis, left affluent of Río San Luis, spring brook, 1100 m asl, 16.vii.1995, 0/1/0 unmounted; CR 71, Puntarenas, Monteverde, Río Guacimal, small stream, 1400 m asl, 18.vii.1995, 1/0/0 unmounted; CR 72, Puntarenas, Monteverde, Quebrada Máquina, small stream, 1440 m asl, 18.vii.1995, 0/1/0 unmounted; CR 73, Alajuela, 4 km west San Mateo, Río Centendo, small stream, 300 m asl, 20.vii.1995, 7/1/0 mounted, 10/7/0 unmounted; CR 74, Puntarenas, Río Guacimal, river, 200 m asl, 20.vii.1995, 0/1/0 unmounted; CR 84, Guanacaste, Peninsula de Nicoya, 2 km north San Gabriel, affluent Río Bejuco, small stream, 100 m asl,

25.vii.1995, 1/0/0 mounted; CR 85, Guanacaste, Peninsula de Nicoya, Soledad, small stream, 60 m asl, 25.vii.1995, 1/0/0 mounted, 2/1/0 unmounted; CR 86, Guanacaste, Peninsula de Nicoya, 1 km north Río Ora, Río Ora, stream, 100 m asl, 25.vii.1995, 1/0/0 mounted, 3/4/0 unmounted; CR 87, Guanacaste, Peninsula de Nicoya, Río Nosara, small stream, 200 m asl, 25.vii.1995, 0/2/0 unmounted; CR 95, San José, Río Savegre valley, 10 km south-east Salispuedes, Quebrada Ojo de Agua, small stream, 2340 m asl, 27.vii.1995, 0/1/0 mounted; CR 103, Puntarenas, 10 km south-east Buenos Aires, Río Platanares, stream, 180 m asl, 31.vii.1995, 1/0/0 mounted; CR 104, Puntarenas, Las Alturas Biological Station, left affluent Río Bellavista, small stream, 1580 m asl, 01.viii.1995, 1/0/0 mounted; CR 112, Puntarenas, Peninsula de Osa, 15 km south Jiménez, small stream, 40 m asl, 03.viii.1995, 3/0/0 mounted, 2/1/0 unmounted; CR 118, Guanacaste, ACG, Pitilla, small stream, 600 m asl, 21.ii.1996, 0/1/0 unmounted; CR 119, Guanacaste, ACG, Pitilla, small stream, 600 m asl, 21.ii.1996, 0/1/0 unmounted; CR 120, Guanacaste, ACG, Centeno, Ojo de Agua de Centeno, spring brook, 160 m asl, 22.ii.1996, 1/0/0 mounted; CR

122, Guanacaste, ACG, Centeno, Río Centeno, lake outflow, 160 m asl, 22.ii.1996, 0/1/0 unmounted; CR 123, Guanacaste, ACG, Gongora, Río La Yengua, small stream, 560 m asl, 22.ii.1996, 3/0/0 mounted, 1/5/0 unmounted; CR 133, Guanacaste, 2 km west Santa Cecilia, Río Mena, stream, 240 m asl, 26.ii.1996, 1/0/0 mounted; CR 134, Guanacaste, Río Sabalo, small stream, 280 m asl, 26.ii.1996, 1/0/0 mounted; CR 140, Guanacaste, ACG, Cacao, Quebrada Florcita, small stream, 740 m asl, 28.ii.1996, 3/0/0 mounted, 5/11/0 unmounted; CR 142, Guanacaste, ACG, Maritza, Quebrada Mata Redonda, small stream, 700 m asl, 28.ii.1996, 2/0/0 mounted, 0/2/0 unmounted; CR 144, Guanacaste, ACG, Las Pailas, small stream, 720 m asl, 29.ii.1996, 5/0/0 mounted, 8/13/0 unmounted; CR 145, Guanacaste, ACG, Las Pailas, small stream, 740 m asl, 29.ii.1996, 6/0/0 mounted, 6/9/0 unmounted; CR 146, Guanacaste, ACG, Las Pailas, small stream, 730 m asl, 29.ii.1996, 5/0/0 mounted, 12/26/0 unmounted; CR 149, Guanacaste, ACG, Murcielago, outflow Ojo de Agua, spring brook, 260 m asl, 01.iii.1996, 1/0/0 mounted; CR 150, Guanacaste, ACG, Murcielago, Río Copel, small stream, 130 m asl, 01.iii.1996, 2/0/0 mounted, 0/7/0 unmounted; CR 152, Guanacaste, ACG, Maritza, Quebrada Marilin, small stream, 560 m asl, 02.iii.1996, 0/2/0 unmounted; CR 153, Guanacaste, ACG, Maritza, Río Tempisquito, stream, 560 m asl, 02.iii.1996, 2/0/0 mounted, 9/8/0 unmounted; CR 154, Guanacaste, ACG, Maritza, Quebrada Las Yeguitas, small stream, 560 m asl, 02.iii.1996, 2/0/0 mounted, 5/4/0 unmounted; CR 155, Guanacaste, ACG, Quebrada Las Yeguitas, small stream, riffle, 280 m asl, 03.iii.1996, 4/2/0 unmounted; CR 157, Cartago, NP Tapanti, Río Badilla, small stream, 1540 m asl, 06.iii.1996, 0/1/0 unmounted; CR 158, Cartago, NP Tapanti, small stream, 1420 m asl, 06.iii.1996, 2/0/0 mounted, 2/3/0 unmounted; CR 160, Cartago, NP Tapanti, Quebrada Palmitas, small stream, 1500 m asl, 06.iii.1996, 3/0/0 mounted, 4/5/0 unmounted; CR 186, Puntarenas, Peninsula de Osa, Los Patos, Río Rincón, stream, 100 m asl, 18.iii.1996, 2/0/0 mounted, 1/3/0 unmounted; CR 187, Puntarenas, Peninsula de Osa, Quebrada Cerros del Oro, spring brook, 150 m asl, 18.iii.1996, 0/1/0 unmounted; CR 190, Puntarenas, Peninsula de Osa, NP Corcovado, Dos brazos del Río Rincón, Río Pavón, stream, 110 m asl, 19.iii.1996, 1/0/0 mounted, 0/5/0 unmounted; CR 193, Puntarenas, Peninsula de Osa, Rancho Quemado, La Quebradonda, small stream, 230 m asl, 20.iii.1996, 2/0/0 mounted, 3/3/0 unmounted; CR 195, Puntarenas, Peninsula de Osa, Los Angeles de Drake, Río Drake, stream, 70 m asl, 21.iii.1996, 0/3/0 unmounted; CR 196, Puntarenas, Peninsula de Osa, Los Migueles, La Junta Quebrada, small stream, 140 m asl, 21.iii.1996, 2/0/0 mounted, 6/6/0 unmounted; CR 200, Puntarenas, Peninsula de

Osa, above Los Angeles de Drake, Río Drake, stream, 80 m asl, 22.iii.1996, 2/0/0 mounted, 3/4/0 unmounted; CR 201, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Los Migueles, rheopsammocrene, 150 m asl, 23.iii.1996, 3/2/0 mounted, 2/4/0 unmounted; CR 202, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, small stream, 150 m asl, 23.iii.1996, 4/0/0 mounted, 5/3/0 unmounted; CR 203, Puntarenas, Peninsula de Osa, Los Angeles de Drake, Río Drake, stream, 60 m asl, 23.iii.1996, 1/1/0 mounted, 1/4/0 unmounted; CR 204, Puntarenas, Peninsula de Osa, Los Angeles de Drake, La Junta Quebrada, small stream, 60 m asl, 23.iii.1996, 1/0/0 mounted, 1/2/0 unmounted; CR 206, San José, above San Antonio de Escazu, small stream, 1620 m asl, 25.iii.1996, 2/0/0 mounted; CR 208, Alajuela, San Ramon Field Station, left affluent to Río San Lorencito, small stream, 1000 m asl, 26.iii.1996, 1/1/0 unmounted; CR 216, Alajuela, Arenal, Río Agua Caliente, stream, 620 m asl, 29.iii.1996, 0/1/0 unmounted; CR 217, Alajuela, 2 km north Balneario Tabascon, small stream, 520 m asl, 30.iii.1996, 1/0/0 mounted, 0/2/0 unmounted; CR 222, Puntarenas, Monteverde, Río Guacimal, small stream, riffle, 1380 m asl, 31.iii.1996, 0/1/0 unmounted; CR 223, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1100 m asl, 31.iii.1996, 0/2/0 unmounted; CR 225, Puntarenas, Ecolodge San Luis, small stream, 1200 m asl, 01.iv.1996, 2/1/0, mounted, 1/2/0 unmounted; CR 227, Guanacaste, Tenorio, spring brook, 1000 m asl, 02.iv.1996, 0/1/0 unmounted; CR 235, Guanacaste, ACG, El Hacha, Río Animas, stream, 280 m asl, 05.iv.1996, 1/0/0 mounted; CR 238, Guanacaste, ACG, Playa Naranjo, affluent Río Posa Salada, spring brook, 160 m asl, 06.iv.1996, 0/1/0 mounted, 0/1/0 unmounted; CR 239, Guanacaste, ACG, Pitilla, Río Orosi, small stream, 600 m asl, 07.iv.1996, 0/1/0 mounted; CR 241, Guanacaste, ACG, Murcielago, Río Murcielago, small stream, 40 m asl, 08.iv.1996, 2/1/0 mounted, 3/6/0 unmounted; CR 248, Guanacaste, ACG, El Hacha, Río Sabalo, small stream, 380 m asl, 17.i.1997, 0/1/0 mounted, 0/1/0 unmounted; CR 249, Guanacaste, 8 km east Cuajiniquil, affluent Río Cuajiniquil, stream, 70 m asl, 18.i.1997, 2/1/0 mounted, 4/6/0 unmounted; CR 250, Guanacaste, 5 km east Cuajiniquil, Río Cuajiniquil, stream, 50 m asl, 18.i.1997, 0/1/0 mounted, 0/1/0 unmounted; CR 252, Guanacaste, ACG, 10 km west Maritza, Río Espavelar, small stream, 280 m asl, 19.i.1997, 3/1/0 mounted, 4/1/0 unmounted; CR 252-II, Guanacaste, ACG, 10 km west Maritza, Río Espavelar, dry stream bed, interstitial, 280 m asl, 05.iii.1997, 1/0/0 mounted; CR 259, Guanacaste, ACG, Santa Elena, spring brook, 300 m asl, 23.i.1997, 0/1/0 mounted; CR 261, Guanacaste, ACG, Murcielago, Río Murcielago, small stream, 40 m asl, 24.i.1997, 2/1/0 mounted; CR 268,

Guanacaste, ACG, Pocosol, Quebrada Centeno, small stream, 200 m asl, 25.i.1997, 1/1/0 mounted, 0/3/0 unmounted; CR 271, Guanacaste, ACG, Pocosol, Río Tempisquito, stream, 290 m asl, 25.i.1997, 6/3/0 mounted, 23/25/1 unmounted; CR 272, Guanacaste, ACG, Playa Naranjo, Río Poza Salada, small stream, 60 m asl, 28.i.1997, 1/0/0 mounted, 1/1/0 unmounted; CR 275, Guanacaste, ACG, road to Maritza, Quebrada Limonal, small stream, 310 m asl, 29.i.1997, 0/1/0 mounted, 1/0/0 unmounted; CR 279, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Quebrada Aguas Termales, small stream, stones with sulphur coating, 680 m asl, 31.i.1997, 40/36/0 unmounted; CR 281, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Río Negro, small stream, 760 m asl, 31.i.1997, 3/0/0 mounted, 12/24/0 unmounted; CR 283, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Quebrada Zopilote, stream, 790 m asl, 31.i.1997, 2/0/0 mounted, 2/6/0 unmounted; CR 287, Guanacaste, ACG, El Hacha, Quebrada Bolanos, small stream, 300 m asl, 02.ii.1997, 2/2/0 unmounted; CR 288, Guanacaste, 1 km south-west Dos Ríos, Quebrada La Gato, affluent of Río Cucaracho, small stream, 520 m asl, 03.ii.1997, 15/30/0 unmounted; CR 289, Guanacaste, ACG, 1 km west Nueva Zelandia, Río Cucaracho, small stream, 640 m asl, 03.ii.1997, 2/0/0 mounted, 10/13/0 unmounted; CR 292, Guanacaste, Arenal, small stream, 560 m asl, 06.ii.1997, 1/1/0 unmounted; CR 293, Alajuela, Cuevas de Venado, small stream, 340 m asl, 06.ii.1997, 0/1/0 unmounted; CR 295, Alajuela, Cuevas de Venado, small stream, 310 m asl, 07.ii.1997, 3/6/0 unmounted; CR 299, Heredia, Zona Norte, Golfito, affluent Río Torro, small stream, 35 m asl, 09.ii.1997, 2/0/0 mounted, 5/12/0 unmounted; CR 303, Heredia, Zona Norte, small stream, 35 m asl, 10.ii.1997, 1/1/0 unmounted; CR 311, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 1/0/0 unmounted; CR 328, Guanacaste, ACG, Las Pailas, warm rheocrene besides waterfall, 680 m asl, 26.ii.1996, 1/1/0 mounted, 0/3/0 unmounted; CR 333, Heredia, OTS-Station La Selva, Río Sabalo-Esquina, stream, 40 m asl, 01.iii.1997, 0/1/0 unmounted; CR 340, Heredia, OTS-Station La Selva, Quebrada Taconazo, small stream, 20 m asl, 02.iii.1996, 1/0/0 mounted, 1/2/0 unmounted; CR 350, Guanacaste, ACG, Pitilla, Río Coloncito, stream, 640 m asl, 09.iii.1997, 4/5/0 unmounted.

Habitat: Mainly slow to fast flowing (some very fast) small streams and streams, also spring brooks, rivers, rheocrenes and rheopsammocrenes, one hygropetric area and one interstitial sample from dry stream bed at 20–1660 m asl (one site at 2340 m asl, mainly below 1000 m asl); mainly mesolithal and lithophyal, furthermore akal, leaf packages in current, macropelal, micropelal, macrolithal, psammal and terrestrial

vegetation; temperature 11.2–31.5 °C, conductivity 14–1047 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (all over the country, many sites in the Cordillera de Guanacaste, also found in the Cordillera de Tilarán, Cordillera Central and Cordillera de Talamanca, pacific lowland, including Peninsula de Santa Elena, Nicoya and Osa, northern and Caribbean lowland).

Description – Male ($N = 129$): Idiosoma mid-sized, elongated-oval to oval (L 549–721 μm , L/W 1.28–1.59); dorsal plate mostly pale reddish or with reddish pattern (Fig. 6A, 6B-1, 6C-1, 6C-2); antero-medial dorsal platelets relatively large (broad), medial margins straight, posterior straight, oblique, antero-lateral platelets anterior straight to concave, posterior greatly tapering (elongated triangular), bluntly pointed; Dgl-4 lateral to Dgl-5, dorsal glandularia far lateral (Figs 52B, 53B, 54B); coxal field laterally graded; sometimes well-developed ‘shoulders’ (Fig. 53A); Cx-I tips relatively broad, apically rounded, Cxgl-4 slightly posterior to tips of Cx-I; capitular bay deep and narrow U-shaped (Fig. 52A), basely rounded or slightly V-shaped (Figs 52A, 53A, 54A), lateral margins straight (Fig. 52A) or apically diverging (Figs 53A, 54A); medial margin of Cx-II/III relatively long; genital field compact (Fig. 53A) or elongated (Figs 52A, 54A), anterior margin truncated, laterally straight, slightly tapering to posterior, posterior rounded, truncated or nearly rectangular, anterior and posterior rounded laterally straight (Figs 52A, 53A, 54A); posterior margins of Cx-IV postero-lateral of genital field, across; excretory pore between (Fig. 52A), slightly posterior (Fig. 53A) or anterior (Fig. 54A) Vgl-2, pore and glandularia on or slightly posterior caudal margin of primary sclerotization; genital skeleton apically very short (aL/tL 0.25–0.37), carina anterior not visible, brachia distalia well developed, oblique, brachia proximalia long and slender, oblique, cella proximalis large, rounded, processus proximalis small, sharp pointed (Fig. 52E); capitulum postero-ventrally elongated, apodemes slender, ventral margin of capitulum basely straight, with rounded bend towards slightly concave ventral margin of short, high rostrum, rostrum blunt cone-shaped (Figs 53C, 54C) or slightly more elongated, tapering (Fig. 52C); palp very short, compact, with short (Fig. 52C, D) or without (Fig. 53C, D, 54C, D) ventro-distal projections at P2/P3; P2 very short; P3 relatively long; P4 short (Figs 53C, D, 54C, D) to very short (Fig. 52C, D), distally slightly tapering, setae on ventral margin on a very small, flat hump, \pm far in distal half.

Female ($N = 25$): General characters similar to male; idiosoma slightly more oval drop-shaped (Fig. 55A);

medial margin Cx-II/III long; genital field broad-rhombic to rounded-rhombic, anterior margin rounded, laterally straight (Fig. 55A) to slightly convex (Fig. 56A), gradually tapering to posterior rounded margin; excretory pore and glandularia posterior primary sclerotization; gnathosoma similar to male (Figs 55B, 56C, D).

Discussion: According to the original descriptions of *T. conirostris* and *T. rala*, the species seem to be clearly separated. However, specimens of the *conirostris/rala*-complex – collected in many different habitats all over Costa Rica – show various combinations of the characteristics of *T. conirostris* and *T. rala*: for example, elongated idiosoma and genital field plus excretory pore lying anterior to Vgl-2 on primary sclerotization (Fig. 54A). Other specimens differ from the descriptions of *T. conirostris* as well as *T. rala* in a laterally clearly more graded coxal field (Fig. 56A); in bearing a very short rostrum (Fig. 56C); or very short P4 (Fig. 52C, D). However, as all features can be found in various gradations, at the present state of knowledge it is not possible to clearly separate different species (neither to allocate specimens to the already described species nor to define new ones). More research – including large populations from single sites as well as collections from different geographical regions – is needed in order to clarify the systematics of this species group. Features varying within this species-complex are: idiosoma, elongated – oval; coxal field, laterally graded – smooth; genital field, long – short; excretory pore, on primary sclerotization (anterior Vgl-2) – posterior caudal margin of primary sclerotization (between Vgl-2); capitular bay, U-shaped – V-shaped; rostrum, very short, compact – more slender; P4,

very short – longer; ventro-distal cones at P2/3 sharp pointed – missing.

COLUMBIANA-LIKE SPECIES

Previously known species: *T. columbiana* (Lundblad, 1941) (Colombia, Argentina), *T. flavescens* K.O. Viets, 1977 (Guatemala), *T. semicolor* K.O. Viets, 1977 (Guatemala, Costa Rica), *T. amala* Cook, 1980 (Costa Rica).

New species from Costa Rica: *T. altifontana*, *T. ambigua*, *T. chirripoensis*, *T. corta*, *T. cortobrazo*, *T. esferica*, *T. esquinada*, *T. fastigata*, *T. rapidensis*, *T. torpebrazo*.

Differential diagnosis of the group: Rostrum of median length, mostly basely high, tapering distally, bent towards basal part of ventral margin of capitulum +/- curved; ventral projections of P2/P3 cone-shaped [pointed or truncated (in some species even with small distal denticles), not developed as lamellae].

Discussion: The species group contains many very similar species, in some cases a clear separation is only possible by means of measurement ratios. The assignment of male and female to the same species in some cases also seems doubtful, as the extent of sexual dimorphism is not always clear. Some species are clearly determined by the shape of their genital skeleton, and in these cases only the male sex can be distinguished with certainty. In some cases, even classification of specimens to the group of *columbiana*-like or *bicolor*-like species seems unclear; therefore, in doubtful cases, both keys should be used. As the species group is not clearly separated from others, it should not be regarded as a phylogenetic entity.

Key to the species

- | | | |
|----|---|---------------------|
| 1a | Basal part of capitulum high, rostrum separated by a sharp bend in ventral margin and a clear lateral ridge (Fig. 74C); idiosoma small and rounded (L 549 µm, L/W 1.32); genital field relatively long, Cx-II/III medially short (gf L/Cx-II/III mL 2.61) (Fig. 74A) (female unknown) | <i>T. esquinada</i> |
| b | Ventral margin of capitulum curved, mostly with smooth bend towards rostrum (Figs 59C, 60D, 76D, G, etc.); idiosoma mostly larger (Id L 520–1089 µm); proportions gf/Cx-II/III mL various | 2 |
| 2a | Idiosoma rounded (L/W 1.12–1.32) and dorsal plate rounded [L/W 1.11–1.20 (single specimen up to 1.28)] and dorsal plate reddish to red (Figs 61A, B, 62A, B, 73A, B) | 3 |
| b | Idiosoma mostly oval (L/W 1.33–1.53), if rounded (L/W 1.25–1.32), then dorsal plate more elongated (L/W > 1.23) and yellow, or Cx-I short (Cx-I/Cx-II/III mL < 1.40); colour of dorsal plate variable (yellow, reddish, with colour pattern) | 4 |
| 3a | Cx-I very short, tips short, triangular (Fig. 73A); medial margin of Cx-II/III relatively short (Cx-I tL/Cx-II/III mL 5.57); P4 long and slender (rel L 0.32, L/H 3.67, P2/P4 0.91); rostrum compact, basely very high (Fig. 73C) (female unknown) | <i>T. esferica</i> |
| b | Cx-I tips relatively longer, +/- slender (Fig. 61A); medial margin of Cx-II/III longer (males Cx-I tL/Cx-II/III mL < 5.0); P4 shorter (rel L 0.29–0.30, L/H 2.82–3.10, P2/P4 1.03–1.12); rostrum more slender | <i>T. ambigua</i> |
| 4a | P4 very short (rel L 0.27–0.29, L/H 2.29–2.70, P3/P4 0.70–0.80) (Figs 72C, D, 85C, D, 86C, D); dorsal plate reddish to red | 5 |

b	P4 longer (rel L 0.30–0.36, L/H 2.80–4.42, P3/P4 0.50–0.67); dorsal plate yellow, reddish or with red pattern.....	6
5a	Coxal field elongated (Cx-I tL/Cx-III W 1.00); capitular bay deep and narrow (L/W 2.81); dorsal plate reddish; rostrum short, compact (Fig. 72)	<i>T. cortobrazo</i>
b	Coxal field more compact (Cx-I tL/Cx-III W 0.83–0.93); capitular bay wider (L/W 1.95–2.06); dorsal plate red; rostrum more slender (Figs 85, 86).....	<i>T. torpebrazo</i>
6a	Male genital field short relative to Cx-II/III medial length [gf L/Cx-II/III mL 1.33–1.67 (one specimen of <i>T. semicolor</i> 1.86), gf L/dist. cb-gf 0.54–0.65]; genital skeleton apically of medium length (gs aL/tL 0.42–0.50), scleritum proximale mediale weak, with fine tip, carina anterior +/- flat (Figs 77, 83E).....	7
b	Male genital field longer relative to Cx-II/III medial length (gf L/Cx-II/III mL 1.74–3.29, gf L/dist. cb-gf 0.66–0.96), genital skeleton apically long (gs aL/tL 0.57–0.71; one species 0.44, however, only known in one specimen with genital skeleton crushed), scleritum proximale well developed, medially with strong curved scleritum, carina anterior often higher (Fig. 59E, etc.)	8
7a	Dorsal shield elongated-oval (L/W 1.33–1.47); capitular bay mostly deeper, narrower (L/W 1.82–2.30); ventral setae on P4 distal (vL/L to seta 1.61–1.77); P3 short, compact (L/H 1.10–1.19, rel L 0.17–0.18); Cx-I more elongated, tips rounded, truncated; capitulum relatively slender (Figs 81–84)	<i>T. semicolor</i>
b	Dorsal shield rounded-oval (L/W 1.28–1.31); capitular bay wider (L/W 1.75–1.88); ventral setae on P4 more central (vL/L to seta 1.82–2.35); P3 longer (L/H 1.31–1.35, rel L 0.18–0.21); Cx-I tips short, pointed; capitulum basely higher (Fig. 76)	<i>T. flavescens</i>
8a	Idiosoma large (males L 844–1020 µm, females 961–1089 µm); palp more slender (e.g. P4 L/H 3.69–4.42) (Figs 57C, 66C, 67C) (highest elevations, above 3000 m asl)	9
b	Idiosoma mostly smaller (males L 549–863 µm, females 628–971 µm); palp more stout (e.g. P4 L/H 2.73–3.45) (Figs 58C, 59C, 60C, etc.)	10
9a	Idiosoma smaller, more rounded (male L 844 µm, L/W 1.34); P3 long and slender (rel L 0.22, L/H 1.57); rostrum stout (Fig. 57C) (female unknown).....	<i>T. altifontana</i>
b	Idiosoma larger, more elongated (males L 873–1020 µm, L/W 1.35–1.50); P3 shorter, more compact (rel L 0.17–0.19, L/H 1.22–1.43); rostrum more slender (Fig. 66C)	<i>T. chirripoensis</i>
10a	Rostrum short, separated by sharp bend from basal part of capitulum (Fig. 71C); genital field long, relative to medial length of Cx-II/III (gf L/Cx-II/III ml 3.13); coxal field very short (Fig. 71A) (female unknown)	<i>T. corta</i>
b	Rostrum longer, ventral margin of capitulum gradually curved (Fig. 59C etc.); genital field generally shorter, relative to medial length of Cx-II/III (gf L/Cx-II/III ml < 3.00 (3.29 in one exceptional specimen of <i>T. columbiana</i>); coxal field more elongated (Fig. 59A, etc.)	11
11a	Idiosoma small (males L 549–662 µm, females 628–697 µm)	<i>T. amala</i>
b	Idiosoma larger (males L 687–863 µm, females 741–971 µm)	12
12a	Coxal field laterally smooth, tips of Cx-I pointed; posterior margins of Cx-IV laterally besides genital field (Fig. 75A); dorsal plate pale reddish (female unknown)	<i>T. fastigata</i>
b	Coxal field laterally graded, tips of Cx-I rounded; posterior margins of Cx-IV mostly postero-laterally of genital field (Figs 69A, 78A, 79A); dorsal plate mostly with pale colour pattern	13
13a	Idiosoma mostly larger (males L 785–863 µm, females L 839–971 µm); dorsal plate more slender (L/W 1.31–1.47); chelicera more compact (L/H 10.00–12.25), cheliceral claw long relative to basal segment (bs L/claw L < 4.55); dorsal plate yellow to pale reddish (without pattern) (Figs 78–80).....	<i>T. rapidensis</i>
b	Idiosoma mostly smaller (males L 697–765 µm, females 741–873 µm); dorsal plate more compact (L/W 1.16–1.27); chelicera more elongated (L/H 12.38–14.67), cheliceral claw shorter relative to basal segment (bs L/claw L > 4.55); dorsal plate in posterior half red (Figs 68–70)	<i>T. columbiana</i>

TORRENTICOLA ALTIFONTANA SP. NOV.

(FIG. 57A–E; TABLE 27)

Type series: Holotype male, CR 171, Cartago, NP Chirripó, Valle de los Morenas, rheocrene, 3450 m asl, 13.iii.1996, mounted.

Habitat: Slow flowing high mountain spring at 3450 m asl; psammal, akal, terrestrial vegetation; temperature 8.1 °C; conductivity 148 µS cm⁻¹.

Distribution: Costa Rica (only known from type locality in the central Cordillera de Talamanca).

Derivatio nominis: *altus* (Latin = high), *fontanus* (Latin = of the springs); referring to the fact that the type locality of this species is the highest spring found in Costa Rica.

Diagnosis: (only 1 male) Characters of the *columbiana*-like mites; idiosoma large, rounded-oval;

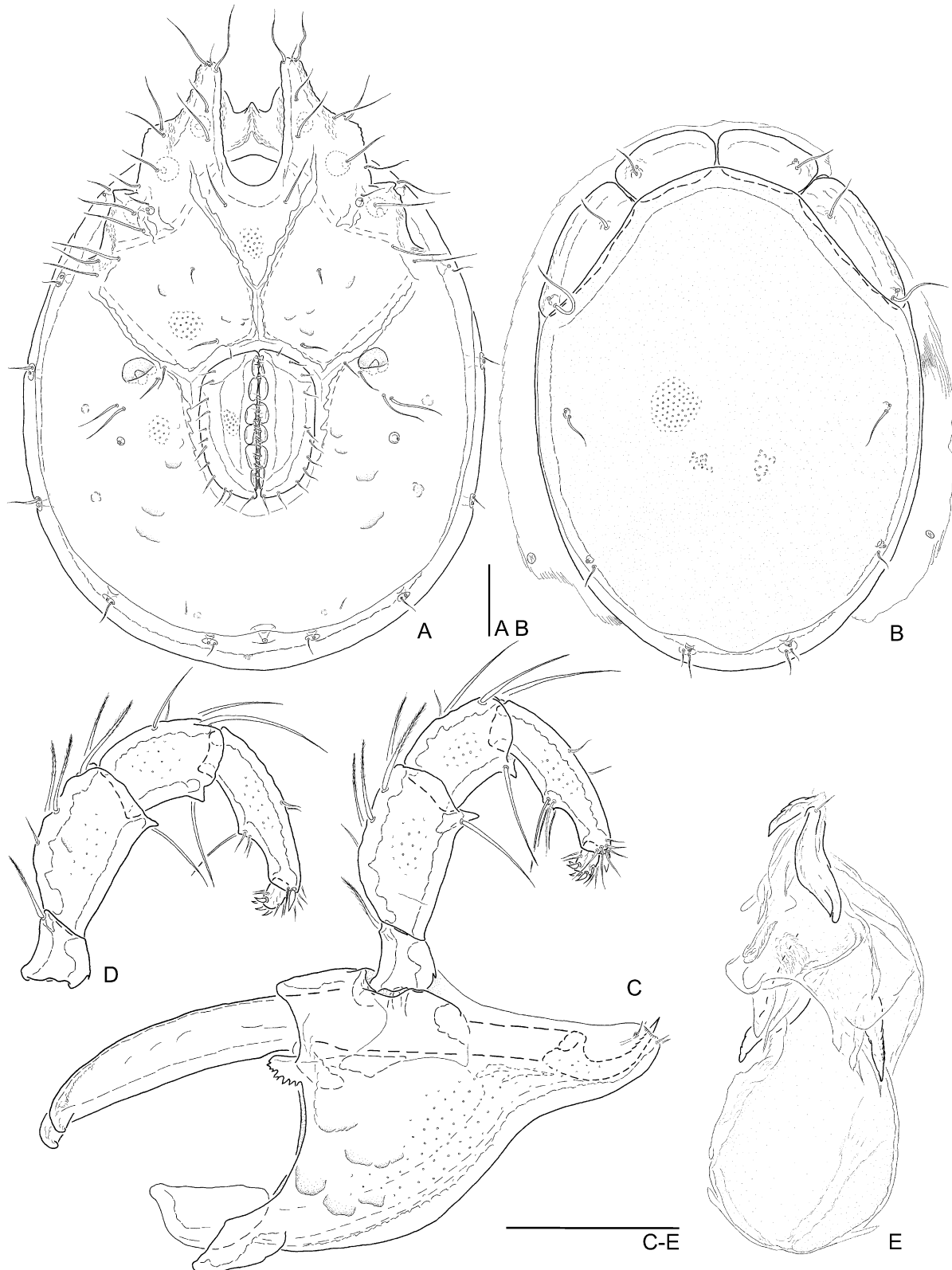


Figure 57. *Torrenticola altifontana*. A–E, holotype male (CR 171). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

Table 27. Measurements (μm) of *Torrenticola altifontana*; $N = 1$ (male, holotype)

Idiosoma L	844	Cb L/W	2.12	Rostrum L	105	P1 rel L	0.13
Idiosoma W	628	Dist cb – gf	225	Capitulum H	162	P2 rel L	0.28
Idiosoma L/W	1.34	Cx-I mL	140	R L/c dL	0.47	P3 rel L	0.22
Cx-I tL	314	Cx-II + III mL	76	R L/c vL	0.35	P4 rel L	0.33
Cx-III W	417	Cx-I tL/Cx-II/III mL	4.13	Gn bend depth	15	P5 rel L	0.05
Cx-I tL/Cx-III W	0.75	Cx-I/Cx-II + III mL	1.84	Chelicera L	352	P1 H	34
Ds L	736	Genital field L	206	Chelicera H	27	P2 H	51
Dp L	687	Gf L/Cx-II + III mL	2.71	Chelicera L/H	13.05	P3 H	45
Ds W	530	Genital field W	162	Chelicera bs L	285	P4 H	28
Ds L/W	1.39	Genital field L/W	1.27	Chelicera claw L	66	P5 H	12
Dp L/W	1.30	Gf L/Id L	0.24	Chel bs/claw L	4.31	P1 L/H	1.21
A-m platelet L	147	Gf L/dist cb – gf	0.91	P1 dorsal L	42	P2 L/H	1.79
A-m platelet W	69	Dist gf – expo	203	P2 dL	92	P3 L/H	1.57
A-m platelet L/W	2.14	Dist gf – cauda	240	P3 dL	71	P4 L/H	3.83
A-l platelet L	206	Gs L	277	P4 dL	108	P5 L/H	1.40
A-l platelet W	70	Gs aL	123	P5 dL	17	P2/P4 L	0.85
A-m pl L/a-l pl L	0.71	Gs aL/tL	0.44	Palp total L	330	P3/P4 L	0.66
Capitular bay L	174	Capitulum vL	299	P4 vL	81		
Capitular bay W	82	Capitulum dL	225	P4 vL to seta	47		
				P4 vL/L to seta	1.74		

dorsal plate reddish; antero-medial dorsal platelets short; coxal field compact, laterally graded, Cx-I apically rounded; genital field long; genital skeleton apically short, cella proximalis large; rostrum short, cone-shaped; palp long, P2/P3 with sharp pointed ventro-distal projections, P3 long, P4 relatively slender.

Description – Male ($N = 1$): Idiosoma rounded-oval (L 844 μm , L/W 1.34); dorsal plate reddish; antero-medial dorsal platelets short and broad, medial and lateral margins convex, posterior \pm straight; antero-lateral platelets anterior straight to convex, posterior greatly tapering, rounded (a-m/a-l pl L 0.71); Dgl-4 and Dgl-5 far lateral (Fig. 57B); coxal field laterally graded, relatively compact (Cx-I tL/Cx-III W 0.75), Cx-I short, apically rounded, blunt; Cxgl-4 at the tips of Cx-I; capitular bay deep U-shaped; medial margin Cx-II/III relatively short; genital field elongated (gf L/Cx-II/III mL 2.71), rectangular-oval, anterior truncated, laterally slightly convex, slightly tapering to posterior; postero-lateral edges rounded, posterior truncated; excretory pore between Vgl-2, pore and glandularia directly caudal to primary sclerotization (Fig. 57A); genital skeleton apically relatively short, cella proximalis large, with small, short processus proximalia (aL/tL 0.44), carina anterior very small, flat, carina posterior larger, brachia distalia well developed, compact, brachia proximalia slender (Fig. 57E); capitulum basely high, short, ventro-proximal apodeme oblique, ventral margin sigmoid curved, rostrum relatively short (Fig. 57C, Table 27), cone-shaped; palp long (tL 330 μm), especially P3 and

P4; ventral projections of P2/P3 strong, pointed cones, projection of P2 directed ventro-distally; P3 elongated (L/H 1.57), P4 long and slender (rel L 0.33, L/H 3.83), ventral setae on distinct projection in distal half (vL/L to seta 1.74) (Fig. 57C, D).

Female: Unknown.

Discussion: *Torrenticola altifontana* is one of only three Costa Rican species of the genus, in their distribution restricted to springs. The species is characterized by a large, rounded idiosoma, short rostrum and relatively long P3. The Dgl-6 of *T. altifontana* bear two setae [in all other species, these glands (as the others) are accompanied by a single seta]. However, further material is needed to determine whether this duplication is a characteristic feature of the species.

TORRENTICOLA AMALA COOK, 1980
(FIGS 58A–D, 59A–E, 60A–D; TABLE 28)

Type series: Holotype male, Costa Rica, Heredia, La Selva [Field Station of the Organization for Tropical Studies (OTS)], Río Puerto Viejo, 10.xii.1973, leg. Cook, prep. no. DC 1–73 FMC.

Material examined: CR 16, Limón, Río Corinto, stream, 220 m asl, 22.vi.1995, 4/4/0 mounted; CR 17, Limón, Río Corinto, stream, 220 m asl, 22.vi.1995, 3/1/0 mounted, 2/3/0 unmounted; CR 18, Limón, Río Cristine, stream, 180 m asl, 23.vi.1995, 4/0/0 mounted, 6/6/0 unmounted; CR 19, Limón, Río Cristine, stream, 180 m asl, 23.vi.1995, 3/0/0 mounted, 0/2/0 unmounted; CR 21, Limón, Río Costa

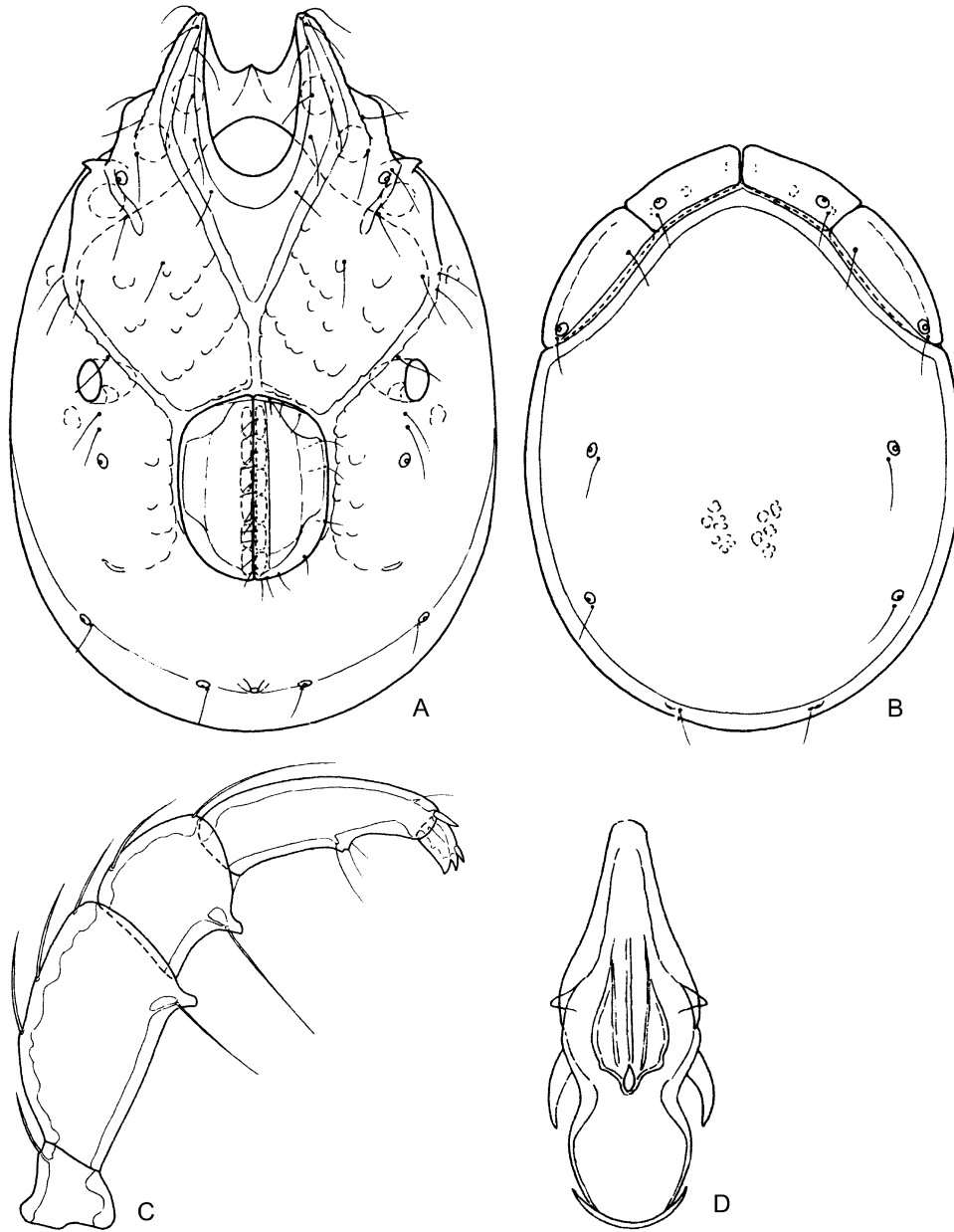


Figure 58. *Torrenticola amala*. A–D, holotype male, after Cook (1980). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, left palp, medial view; D, genital skeleton, anterior view. No measurement scale bars available.

Rica, river, 260 m asl, 24.vi.1995, 0/1/0 mounted, 0/1/0 unmounted; CR 22, Puntarenas, Quebrada Puntarenas, small stream, 1040 m asl, 25.vi.1995, 1/0/0 mounted; CR 33, Heredia, La Virgen, Río Sarapiquí, river, 180 m asl, 30.vi.1995, 2/0/0 mounted, 1/5/0 unmounted; CR 35, Alajuela, Río Hule, stream, 400 m asl, 30.vi.1995, 2/0/0 mounted, 1/1/0 SEM-mounted, 2/6/0 unmounted; CR 37, Alajuela, Río Negritos, stream, 330 m asl, 30.vi.1995, 3/0/0 mounted, 2/4/0 unmounted; CR 41, Limon, Río Torro Amarillo, river, 280 m asl, 03.vii.1995, 0/1/0 unmounted; CR 42,

Limon, Río Reventazon, river, 100 m asl, 03.vii.1995, 0/1/0 unmounted; CR 43, Limon, Río Pacuare, river, 80 m asl, 03.vii.1995, 9/13/2 unmounted; CR 45, Limón, Río Corinto, stream, 500 m asl, 04.vii.1995, 2/0/0 unmounted; CR 46, Limón, right affluent of Río Corinto, spring brook, 500 m asl, 04.vii.1995, 0/1/0 unmounted; CR 54, Cartago, Río Turrialba, stream, 830 m asl, 06.vii.1995, 1/1/0 unmounted; CR 55, Cartago, Río Reventazon, river, 640 m asl, 06.vii.1995, 1/1/0 unmounted; CR 56, Alajuela, San Ramon Field Station, Río San Lorencito, small stream, 940 m asl,

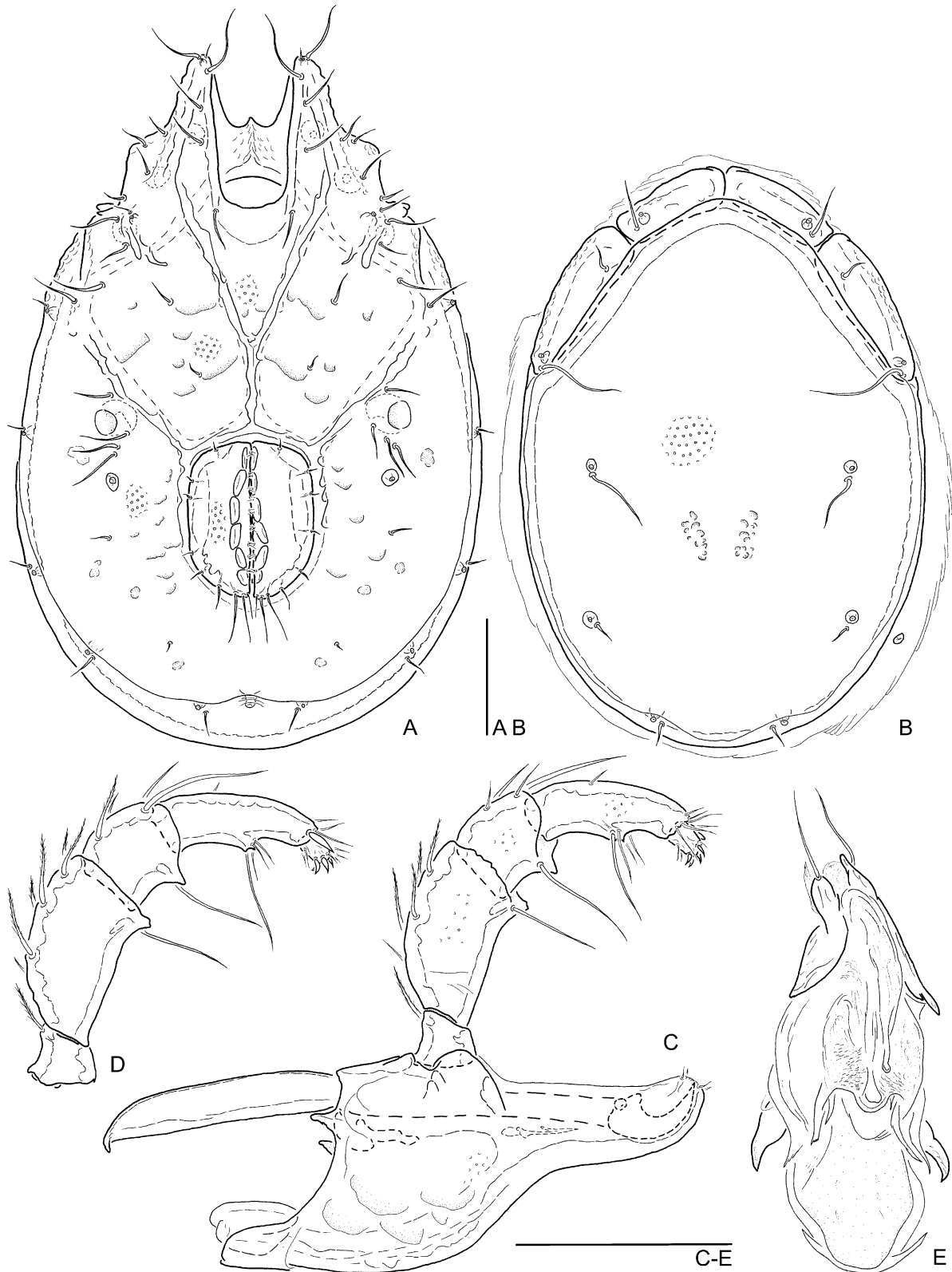


Figure 59. *Torrenticola amala*. A–D, male (CR 203); male (CR 205). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

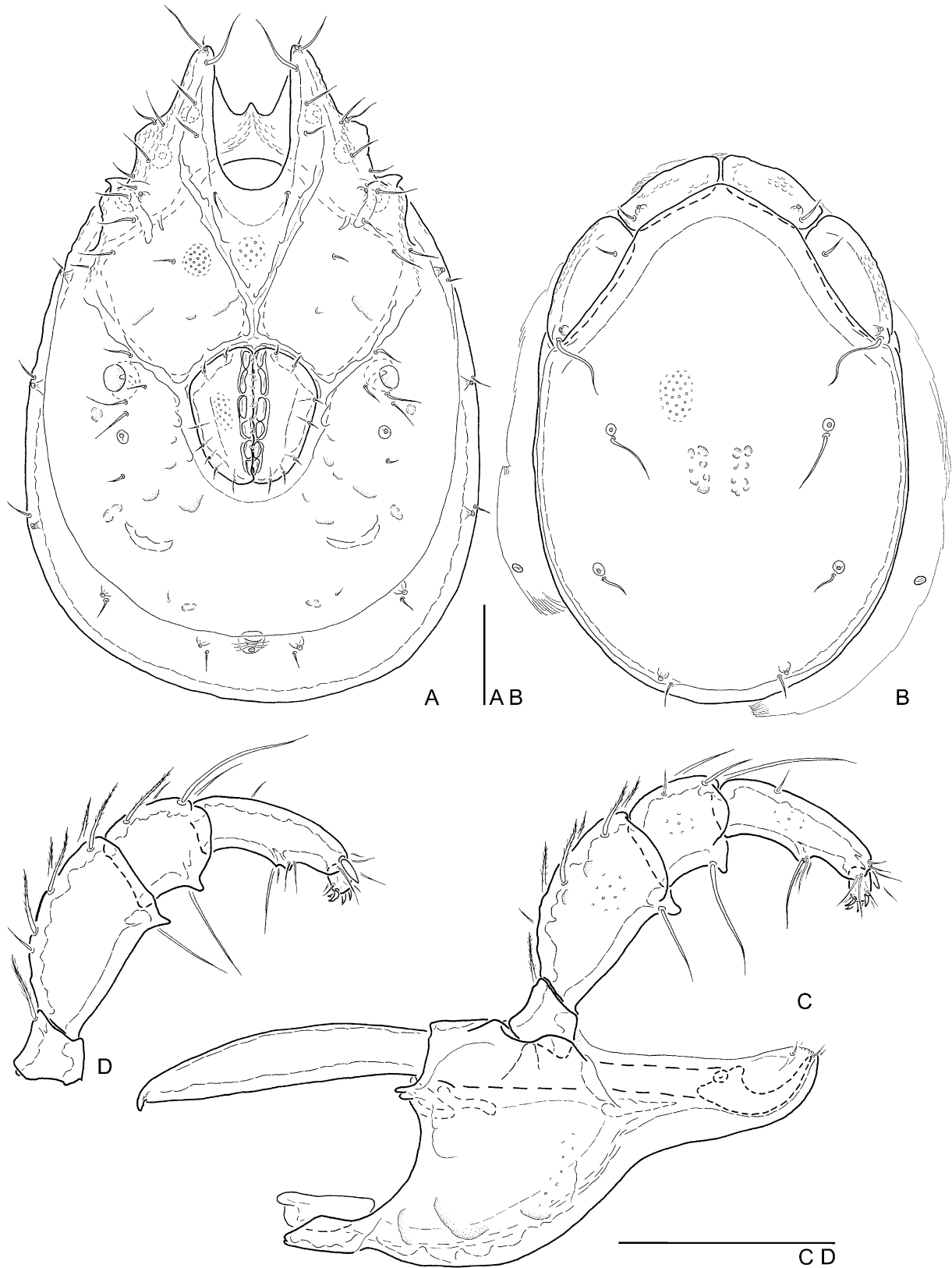


Figure 60. *Torrenticola amala*. A–D, female (CR 203). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 28. Measurements (μm) of *Torrenticola amala*; $N = 20$ (male), 6 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	613	589	549	662	28.1	652	628	697	27.0
Idiosoma W	432	422	373	471	25.3	466	432	481	17.5
Idiosoma L/W	1.42	1.40	1.33	1.53	0.04	1.43	1.38	1.45	0.03
Cx-I tL	265	245	226	275	14.0	265	250	275	9.1
Cx-III W	294	294	270	343	19.4	314	294	329	11.9
Cx-I tL/Cx-III W	0.90	0.84	0.77	0.90	0.04	0.84	0.80	0.89	0.03
Ds L	510	486	456	549	26.6	547	500	579	27.2
Dp L	481	463	437	520	24.6	520	486	544	22.7
Ds W	383	358	319	407	21.2	383	363	412	19.3
Ds L/W	1.33	1.35	1.29	1.45	0.04	1.41	1.38	1.45	0.03
Dp L/W	1.26	1.29	1.23	1.37	0.04	1.33	1.32	1.37	0.02
A-m platelet L	115	110	96	123	6.6	122	113	135	9.3
A-m platelet W	39	37	32	44	4.0	43	37	54	5.9
A-m platelet L/W	2.94	2.91	2.53	3.32	0.2	2.78	2.50	3.21	0.3
A-l platelet L	137	143	130	173	11.6	148	137	159	8.0
A-l platelet W	51	47	44	59	4.1	55	47	61	4.8
A-m pl L/a-l pl L	0.84	0.75	0.67	0.84	0.05	0.82	0.77	0.85	0.03
Capitular bay L	141	129	118	141	6.9	142	135	149	4.9
Capitular bay W	74	69	64	86	5.7	76	69	83	4.8
Cb L/W	1.92	1.88	1.44	2.00	0.1	1.84	1.78	2.11	0.1
Dist cb – gf	191	199	187	228	10.9	157	151	168	7.3
Cx-I mL	130	118	108	147	10.1	125	113	132	7.5
Cx-II + III mL	54	71	54	86	7.5	32	18	37	6.4
Cx-I tL/Cx-II/III mL	4.91	3.39	2.97	4.91	0.5	8.24	7.21	14.68	2.8
Cx-I/Cx-II + III mL	2.41	1.67	1.39	2.50	0.3	3.85	3.36	6.93	1.4
Genital field L	157	143	132	162	9.2	148	137	157	7.1
Gf L/Cx-II + III mL	2.91	1.97	1.74	2.91	0.3	4.69	4.00	8.00	1.5
Genital field W	125	113	105	125	6.9	140	130	148	7.7
Genital field L/W	1.25	1.25	1.20	1.32	0.03	1.06	1.04	1.11	0.03
Gf L/Id L	0.26	0.24	0.23	0.26	0.01	0.23	0.22	0.24	0.01
Gf L/dist cb – gf	0.82	0.71	0.66	0.82	0.04	0.94	0.88	1.00	0.05
Dist gf – expo		92	74	115	10.3	152	135	167	13.1
Dist gf – cauda		123	110	147	10.5	209	196	230	13.0
Gs L	213	205	186	216	8.6				
Gs aL	145	130	118	145	7.5				
Gs W	86	94	86	118	12.0				
Gs aL/tL	0.68	0.65	0.61	0.68	0.02				
Gs tL/W	2.49	2.13	1.73	2.49	0.2				
Capitulum vL	247	241	224	262	11.4	270	260	284	10.0
Capitulum dL	181	172	162	184	7.8	194	180	201	8.3
Rostrum L	98	93	83	100	5.5	107	96	113	6.4
Capitulum H	108	101	93	113	6.2	119	113	125	5.1
R L/c dL	0.54	0.54	0.52	0.55	0.01	0.55	0.53	0.57	0.01
R L/c vL	0.40	0.38	0.37	0.40	0.01	0.39	0.36	0.40	0.01
Gn bend depth	13	13	12	15	1.1	15	15	17	1.0
Chelicera L		288	257	301	13.8	322	311	341	12.5
Chelicera H		22	20	25	1.7	28	25	29	2.4
Chelicera L/H		13	11	14	0.8	11.56	11.25	12.80	0.7
Chelicera bs L		239	213	250	11.2	267	260	282	10.1
Chelicera claw L		49	44	54	2.9	55	51	59	2.6

Table 28. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Chel bs/claw L		4.89	4.59	5.06	0.1	4.84	4.79	5.05	0.1
P1 dorsal L	27	27	25	32	2.3	30	29	32	1.0
P2 dL	86	81	74	86	4.1	90	85	96	4.0
P3 dL	44	44	40	48	2.5	48	47	51	1.9
P4 dL	81	77	71	83	3.8	85	80	88	3.4
P5 dL	17	15	15	17	1.0	15	13	17	1.5
Palp total L	255	243	164	265	21.5	268	257	282	9.4
P4 vL		56	51	64	3.1	63	61	66	1.9
P4 vL to seta		34	29	47	3.9	37	34	40	2.0
P4 vL/L to seta	1.71	1.21	1.92	0.1	1.71	1.64	1.86	0.1	
P1 rel L	0.11	0.11	0.10	0.12	0.01	0.11	0.10	0.12	0.01
P2 rel L	0.34	0.33	0.32	0.34	0.01	0.34	0.33	0.34	0.00
P3 rel L	0.17	0.18	0.17	0.19	0.01	0.18	0.18	0.18	0.00
P4 rel L	0.32	0.32	0.31	0.32	0.00	0.31	0.31	0.32	0.00
P5 rel L	0.07	0.06	0.06	0.07	0.01	0.06	0.05	0.07	0.01
P1 H	34	32	29	34	1.8	34	32	37	1.7
P2 H	49	46	42	50	2.2	50	48	54	2.4
P3 H	42	39	37	42	1.5	42	40	45	1.8
P4 H	27	25	23	27	1.3	27	26	27	0.6
P5 H	12	11	10	12	1.0	11	10	11	0.5
P1 L/H	0.79	0.85	0.77	0.96	0.1	0.91	0.80	0.93	0.1
P2 L/H	1.75	1.75	1.68	1.83	0.04	1.77	1.73	1.87	0.05
P3 L/H	1.06	1.14	1.00	1.23	0.1	1.13	1.11	1.18	0.03
P4 L/H	3.00	3.09	2.73	3.30	0.2	3.20	3.00	3.27	0.1
P5 L/H	1.40	1.47	1.20	1.75	0.1	1.47	1.22	1.56	0.1
P2/P4 L	1.06	1.03	1.00	1.10	0.03	1.07	1.05	1.09	0.02
P3/P4 L	0.55	0.57	0.55	0.62	0.02	0.57	0.56	0.58	0.01

09.vii.1995, 2/0/0 mounted, 4/4/0 unmounted; CR 57, Alajuela, San Ramon Field Station, hygropetric area below waterfall at Río San Lorencito, 1040 m asl, 09.vii.1995, 2/0/0 unmounted; CR 61, Alajuela, San Ramon Field Station, Río San Lorenzo, stream, 800 m asl, 11.vii.1995, 1/0/0 mounted, 0/1/0 unmounted; CR 74, Puntarenas, Río Guacimal, river, 200 m asl, 20.vii.1995, 1/0/0 mounted; CR 102, San José, 4 km south-west San Isidro, Río Pedregoso, stream, 630 m asl, 31.vii.1995, 2/0/0 mounted, 4/5/0 unmounted; CR 107, Puntarenas, Las Alturas, Biological Station, Río Colon, stream, 1340 m asl, 01.viii.1995, 3/12/0 unmounted; CR 108, Puntarenas, near San Vito, Quebrada Quince, small stream, 1060 m asl, 02.viii.1995, 2/0/0 mounted, 3/2/0 unmounted; CR 112, Puntarenas, Peninsula de Osa, 15 km south Jiménez, small stream, 40 m asl, 03.viii.1995, 1/0/0 mounted; CR 129, Alajuela, Canalete, Río Canalete, small stream, 100 m asl, 24.ii.1996, 2/0/0 mounted, 0/4/0 unmounted; CR 130, Alajuela, Canalete, Río Zapote, river, 100 m asl, 24.ii.1996, 1/0/0 mounted, 0/1/0 unmounted; CR 133,

Guanacaste, 2 km west Sta. Cecilia, Río Mena, stream, 240 m asl, 26.ii.1996, 3/0/0 mounted, 5/6/0 unmounted; CR 155, Guanacaste, ACG, Quebrada Las Yeguitas, small stream, riffle, 280 m asl, 03.iii.1996, 1/2/0 unmounted; CR 158, Cartago, NP Tapanti, small stream, 1420 m asl, 06.iii.1996, 2/0/0 unmounted; CR 161, Limón, near Braulio Carillo highway, Río Corinto, stream, 500 m asl, 07.iii.1996, 2/0/0 mounted, 2/0/0 unmounted; CR 163, Cartago, 2 km north Jicotea, Río Jicotea, small stream, 800 m asl, 08.iii.1996, 3/2/0 mounted, 14/11/0 unmounted; CR 168, San José, San Gerardo, Río Blanco, small stream, 1220 m asl, 11.iii.1996, 1/0/0 mounted; CR 186, Puntarenas, Peninsula de Osa, La Palma, Río Rincón, stream, 100 m asl, 18.iii.1996, 7/1/0 mounted, 13/6/0 unmounted; CR 190, Puntarenas, Peninsula de Osa, Río Pavón, stream, 110 m asl, 19.iii.1996, 5/1/0 mounted, 34/20/0 unmounted; CR 193, Puntarenas, Peninsula de Osa, Rancho Quemado, La Quebradonda, small stream, 230 m asl, 20.iii.1996, 5/0/0 mounted, 6/4/0 unmounted; CR 194, Puntarenas,

Peninsula de Osa, Los Angeles de Drake, La Quebrada Cinta, small stream, 70 m asl, 21.iii.1996, 1/0/0 mounted, 1/0/0 unmounted; CR 195, Puntarenas, Peninsula de Osa, Los Angeles de Drake, Río Drake, stream, 70 m asl, 21.iii.1996, 4/0/0 mounted, 14/13/0 unmounted; CR 196, Puntarenas, Peninsula de Osa, Los Migueles, La Junta Quebrada, small stream, 140 m asl, 21.iii.1996, 0/1/0 mounted, 1/2/0 unmounted; CR 200, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Río Drake, stream, 80 m asl, 22.iii.1996, 4/0/0 mounted, 7/2/0 unmounted; CR 203, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Río Drake, stream, 60 m asl, 23.iii.1996, 2/1/0 mounted, 0/5/0 unmounted; CR 204, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, La Junta Quebrada, small stream, 60 m asl, 23.iii.1996, 1/0/0 mounted, 0/1/0 unmounted; CR 205, Puntarenas, Peninsula de Osa, 5 km south Chacarita, Río Esquinas, river, 40 m asl, 24.iii.1996, 3/0/0 mounted, 3/0/0 unmounted; CR 216, Alajuela, Arenal, Río Agua Caliente, stream, 620 m asl, 29.iii.1996, 0/1/0 unmounted; CR 248, Guanacaste, ACG, El Hacha, Río Sabalo, small stream, 380 m asl, 17.i.1997, 0/1/0 mounted; CR 252, Guanacaste, ACG, road to Maritza, Río Espavelar, small stream, 280 m asl, 19.i.1997, 3/1/0 mounted, 2/4/0 unmounted; CR 271, Guanacaste, ACG, Pocosol, Río Tempisquito, stream, 290 m asl, 25.i.1997, 1/2/0 mounted, 3/7/0 unmounted; CR 286, Guanacaste, ACG, El Hacha, Quebrada Jorco, small stream, 280 m asl, 02.ii.1997, 0/1/0 unmounted; CR 288, Guanacaste, 1 km south-west Dos Ríos, Quebrada La Gato, affluent of Río Cucaracho, small stream, 520 m asl, 03.ii.1997, 2/0/0 mounted, 3/7/0 unmounted; CR 289, Guanacaste, ACG, 1 km west Nueva Zelandia, Río Cucaracho, small stream, 640 m asl, 03.ii.1997, 1/0/0 mounted; CR 291, Guanacaste, Río Sabalo, small stream, 540 m asl, 06.ii.1997, 13/19/0 unmounted; CR 292, Guanacaste, Arenal, small stream, 560 m asl, 06.ii.1997, 1/1/0 unmounted; CR 293, Alajuela, Cuevas de Venado, small stream, 340 m asl, 06.ii.1997, 2/4/0 unmounted; CR 295, Alajuela, Cuevas de Venado, small stream, 310 m asl, 07.ii.1997, 2/0/0 mounted, 8/15/0 unmounted; CR 311, Limón, Hitoy Cerere, spring brook, 200 m asl, 12.ii.1997, 2/0/0 unmounted; CR 315, Limón, Hitoy Cerere, stream, 190 m asl, 13.ii.1997, 1/5/0 unmounted; CR 333, Heredia, OTS-Station La Selva, Río Sabalo-Esquina, stream, 40 m asl, 01.iii.1997, 1/0/0 mounted, 11/10/0 unmounted; CR 334, Heredia, OTS-Station La Selva, Río El Salto, stream, 10 m asl, 01.iii.1997, 0/2/0 unmounted.

Habitat: Slow to very fast flowing (mainly fast flowing) small streams, streams and rivers at 40–1220 m asl [mainly at lower elevations (100–500 m asl)]; mesolithal, lithophyal, akal, psammal, macropelal, leaf

packages, macrolithal; temperatures 18.0–30.6 °C; conductivity 21–278 $\mu\text{S cm}^{-1}$.

Geographical distribution: Costa Rica (all lowland and lower mountain regions: northern lowland, Pacific slope of Cordillera de Guanacaste, Cordillera de Tilarran, Caribbean slope of Cordillera Central, northern and southern Cordillera de Talamanca, Peninsula de Osa).

Published records: Cook (1980).

Diagnosis: Characters of the *columbiana*-like species; idiosoma small, oval-rounded; dorsal plate yellowish to pale reddish or with pale reddish pattern; medial margin Cx-II/III short; male genital field large; capitular bay large; capitulum average (without specific features), P2/P3 cones mostly truncated.

Description – Male (see also Cook, 1980; holotype, in brackets: new material, $N = 85$): Idiosoma relatively small [L 613 (549–662) μm , L/W 1.42 (1.30–1.53)]; dorsal plate yellowish [pale reddish, pale reddish pattern (Fig. 6C–I)]; apically slightly pointed; Dgl-5 straight posterior to Dgl-4 (Figs 58B, 59B); coxal field laterally graded, Cx-I short, apically rounded, blunt; Cxgl-4 at tips of Cx-I; capitular bay large, U-shaped to convex, medial margin Cx-II/III short; genital field large [gf L/Cx-II/III mL 2.91 (1.77–2.50)], rectangular-oval, anterior truncated, laterally +/- straight, postero-lateral and posterior rounded; excretory pore between Vgl-2, pore and glandularia at (Fig. 58A) or slightly posterior caudal margin of primary sclerotization (Fig. 59A); genital skeleton apically relatively long, cella proximalis small, with pointed processus proximalia, brachia proximalia curved (Fig. 59E); capitulum basely bellied, ventral margin sigmoid curved, rostrum mid-sized (Fig. 59C, Table 28); palp relatively short; ventral projections of P2/P3 blunt, truncated cones; ventral setae of P4 on distinct, two-tipped projection slightly distally (Fig. 58C, 59C, D).

Female ($N = 13$): Idiosoma similar to male; dorsal plate yellow or with pale posterior colour pattern (Fig. 6C–I); Dgl-4 far medially (Fig. 60B); excretory pore and Vgl-2 slightly posterior primary sclerotization; genital field broadly rounded, anterior and antero-laterally rounded, lateral margins slightly convex, clearly tapering to posterior, caudally truncate; posterior margins of Cx-IV postero-laterally of genital field (Fig. 60A); gnathosoma similar to male (Fig. 60C, D).

Discussion: *Torrenticola amala* is the only Costa Rican species regularly found in rivers (in total only three species were found in these habitats at all). The species has been described by Cook (1980) based on only one male from the northern lowland; however,

T. amala is a very variable species, widespread over different regions of Costa Rica. *Torrenticola amala* is relatively small, with a large capitular bay and mostly blunt projections at P2 and P3. Some specimens from the Peninsula de Osa show a box-shaped capitular bay, with straight lateral margins and a nearly straight basal part (Fig. 59A); the capitular bay of the type specimen from the northern lowland is more bellied U-shaped, with convex lateral margins and rounded basal part (Fig. 58A). The females of the species differ in the shape of the genital field; in some specimens it is broad-rounded, only merely tapering to caudal, whereas in others the genital field is more elongate-rhombic, clearly tapering caudally. The dorsal colour varies between yellowish, pale reddish and a pale colour pattern on the posterior half of the dorsal plate (Fig. 6C-1). However, as these differences are more gradually developed, with intermediate forms at hand, they do not justify the establishment of a separate species. The species is mainly characterized due to the small size of the idiosoma and the large genital field.

***TORRENTICOLA AMBIGUA* SP. NOV.**

(FIGS 61A–E, 62A–D, 63A–D, 64A–D, 65A–E;
TABLE 29)

Type series: Holotype Male, CR 218, Alajuela, 2 km north Balneario de Tabascon, small stream, 520 m asl, 30.iii.1996, mounted; paratype, same locality and date, 0/1/0 mounted, 1/1/0 unmounted.

Additional specimens examined: CR 15, Cartago, 3 km south Río Macho, rheohelocrene, 1500 m asl, 21.vi.1995, 0/1/0 mounted; CR 51, Cartago, 5 km north Capellades, small stream, 1660 m asl, 05.vii.1995, 0/1/0 unmounted; CR 60, Alajuela, San Ramon Field Station, right affluent Río San Lorencito, spring brook, 1080 m asl, 10.vii.1995, 1/0/0 mounted, 0/1/0 unmounted; CR 104, Puntarenas, Biological Station Las Alturas, left affluent Río Bellavista, small stream, 1580 m asl, 01.viii.1995, 1/0/0 mounted; CR 110, Puntarenas, Linda Vista botanical garden, Río Jaba, small stream, 1100 m asl, 02.viii.1995, 1/0/0 mounted; CR 207, San José, above San Antonio de Escazu, rheopsammocrene, 1620 m asl, 25.iii.1996, 0/1/0 mounted; CR 217, Alajuela, 2 km north Balneario Tabascon, small stream, 520 m asl, 30.iii.1996, 4/1/0 unmounted; CR 226, Puntarenas, Ecolodge San Luis, above Río San Luis, rheopsammocrene, 1220 m asl, 01.iv.1996, 1/1/0 mounted, 0/1/0 unmounted; CR 312, Limón, Hitoy Cerere, rheopsammocrene, 190 m asl, 13.ii.1997, 3/1/0 mounted, 3/6/0 unmounted.

Habitat: Slow and fast flowing small streams, spring brooks, rheohelocrenes and rheopsammocrenes at 190–1660 m asl; mesolithal, akal, psammal, micro-

pelal, macropelal; temperature 15.6–24.2 °C; conductivity 19–208 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Cordillera de Tilarán, northern, southern and Caribbean slope of the Cordillera de Talamanca).

Derivatio nominis: *ambiguus* (Latin = ambiguous, variable, uncertain); referring to the large variability within the species.

Diagnosis: Characters of the *columbiana*-like species; idiosoma mid-sized, rounded; dorsal plate rounded-oval, reddish to red or with reddish pattern (Fig. 6A, B-I, B-II, B-III); antero-medial dorsal platelets relatively long; coxal field laterally graded, relatively broad, Cx-I tips slender; genital skeleton apically very short, cella proximalis large, elongated; P3 slender, P4 short.

Description – Male ($N = 8$): Idiosoma rounded [apart from coxal field nearly circular (Figs 61A, 62A)] [L 657 μm (643–736 μm), L/W 1.18 (1.15–1.32)]; dorsal plate rounded [L/W 1.20 (1.11–1.20)], with red pattern (Fig. 6A, B-I, B-II), reddish to red or yellow; antero-medial dorsal platelets nearly as long as antero-lateral ones [a-m/a-l pl L 0.83 (0.81–0.90)], medial margins convex, posterior margins slightly concave, oblique, antero-lateral platelets anterior margins straight, posterior blunt pointed; Dgl-4 medial to Dgl-5 (Figs 61B, 62B); coxal field broad [Cx-I tL/Cx-III W 0.83 (0.71–0.83)], lateral margins sharply graded, Cx-I tips slender, apically rounded, Cxgl-4 nearly at tips of Cx-I; capitular bay deep U-shaped, lateral margins slightly convex; medial margin of Cx-II/III relatively short [Cx-I/Cx-II/III mL 2.30 (1.89–2.44)]; posterior margin of Cx-IV latero-caudal of genital field; genital field short (Fig. 61A) to slightly elongated (Fig. 62A) [gf L/Id L 0.23 (0.23–0.25), L/W 1.21 (1.13–1.36), gf L/Cx-II/III mL 2.33 (2.28–2.70)], subrectangular, anterior truncated, antero-lateral rounded, lateral margins straight, posterior rounded; excretory pore slightly anterior [in some specimens far anterior (Fig. 62A)] Vgl-2 (glands and pore close together), pore and glands slightly posterior [excretory pore partly below or on (Fig. 62A)] caudal margin of primary sclerotization (Fig. 61A); genital skeleton apically short, cella proximalis relatively long, with fine, long processus proximalia [aL/tL 0.36 (0.32–0.40)], brachia distalia short, curved to postero-lateral, brachia proximalia slender, directed postero-laterally (Fig. 61E); ventral margin of capitulum sigmoid, basally straight, with sharp bend towards mid-sized (Fig. 61C) or relative high, compact (Fig. 62C) rostrum; ventral projection of P2 cone-shaped, sharply pointed, directed ventro-distally, P2 > P4; P3 relative long and slender [L/H 1.39 (1.31–1.46)], ventral projection small cone-shaped, directed ventrally; P4 short [rel L 0.30

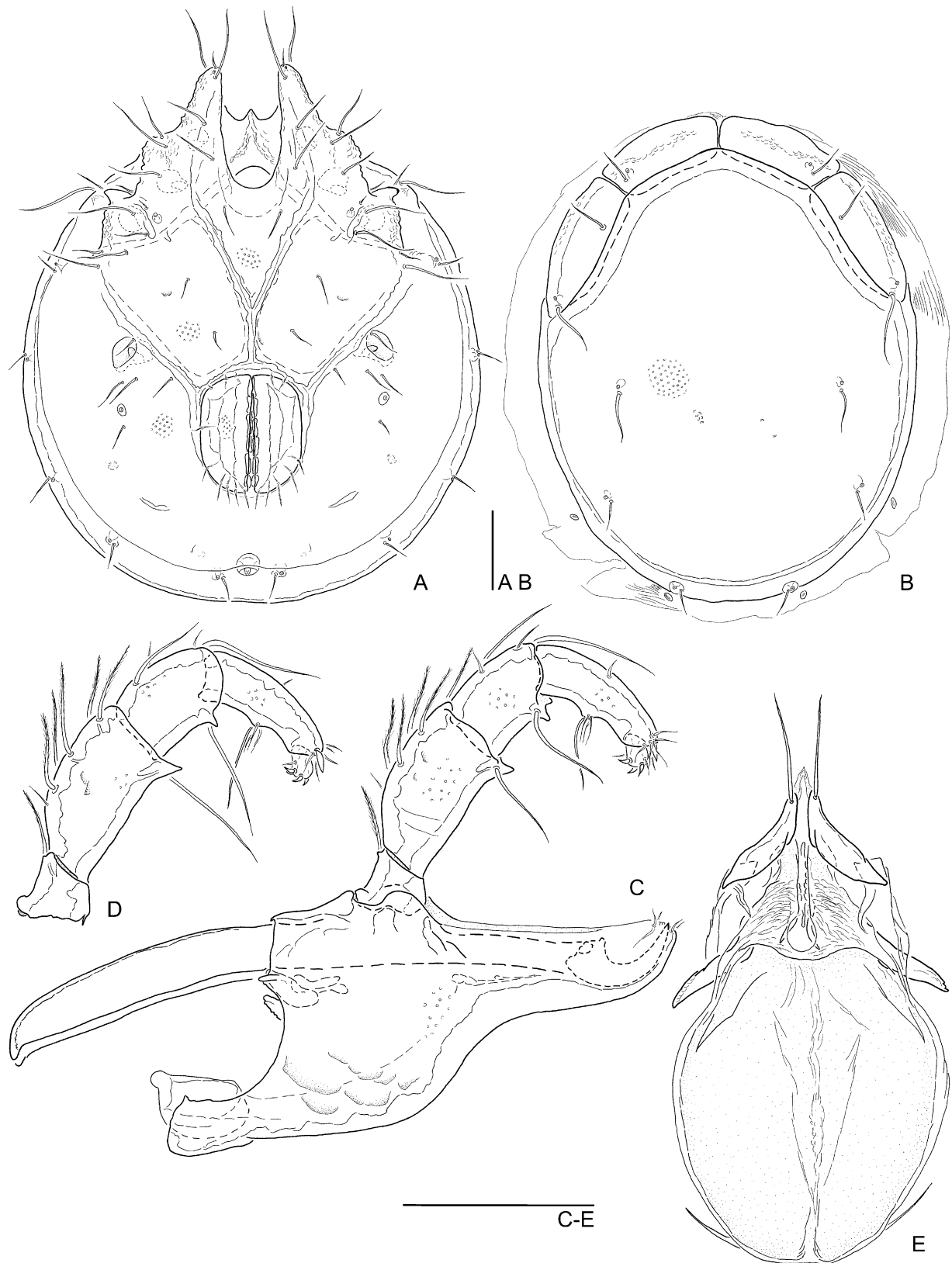


Figure 61. *Torrenticola ambigua*. A–E, holotype male (CR 218). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

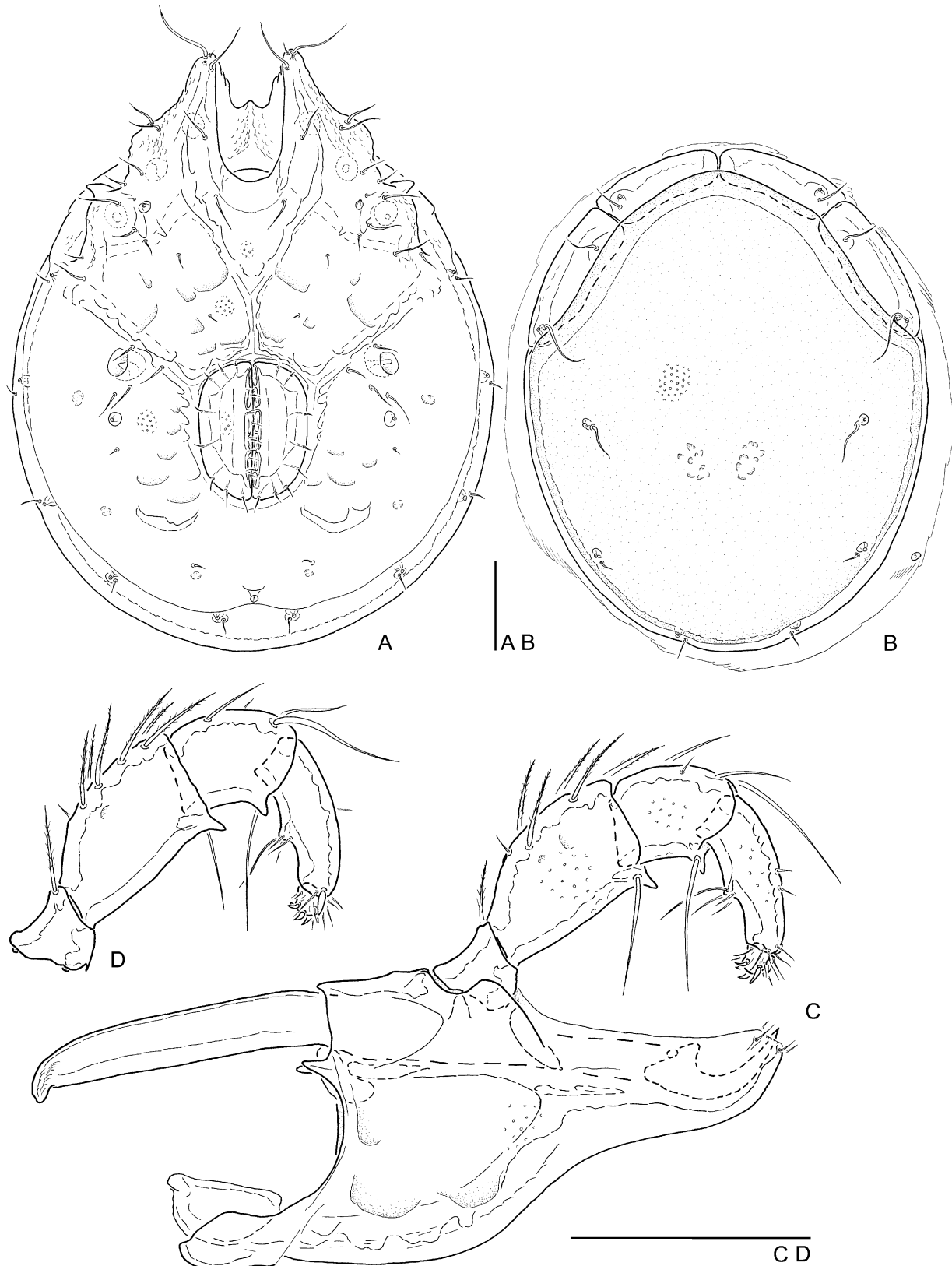


Figure 62. *Torrenticola ambigua*. A–D, male (CR 312). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

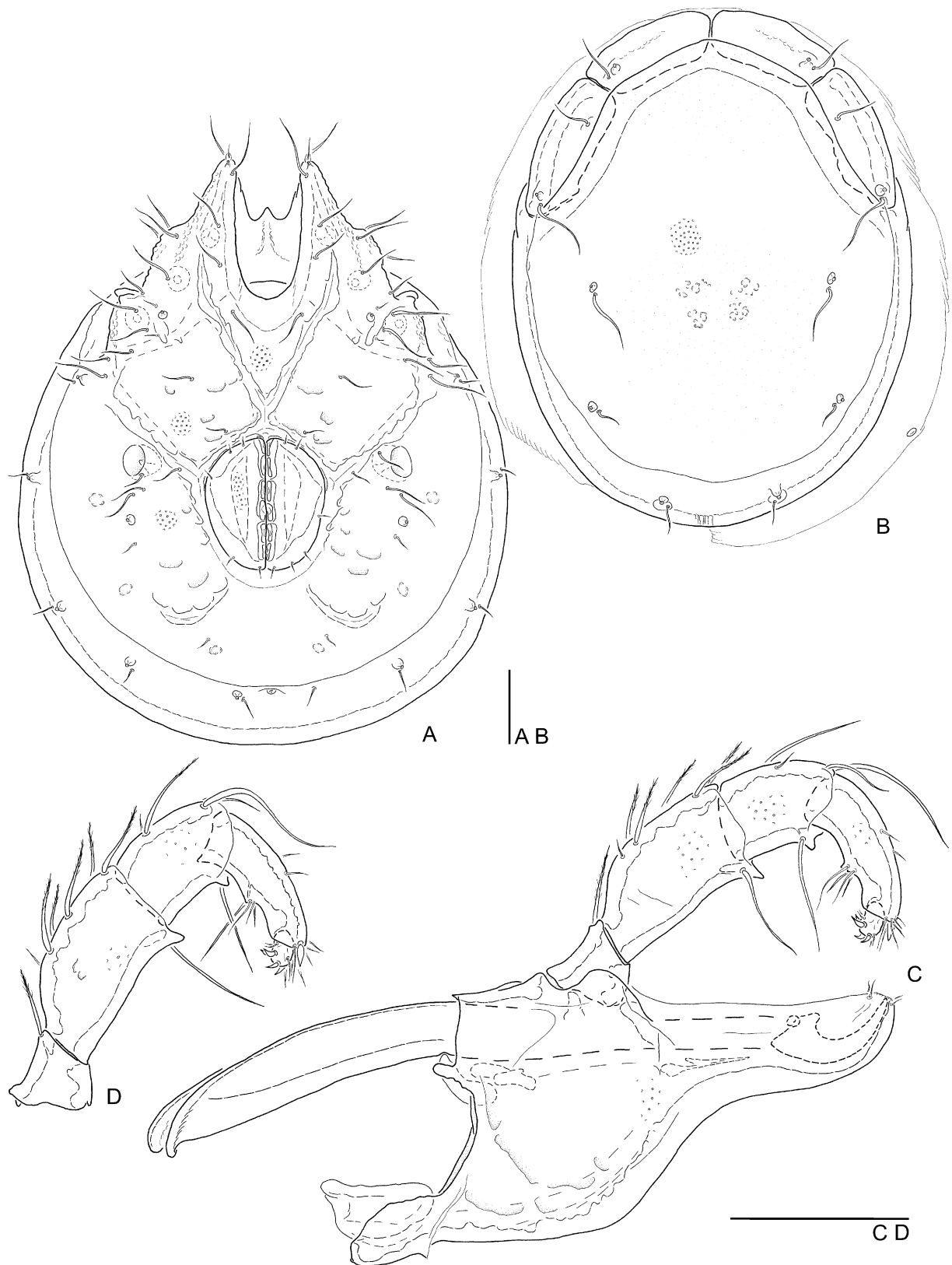


Figure 63. *Torrenticola ambigua*. A–D, paratype female (CR 218). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

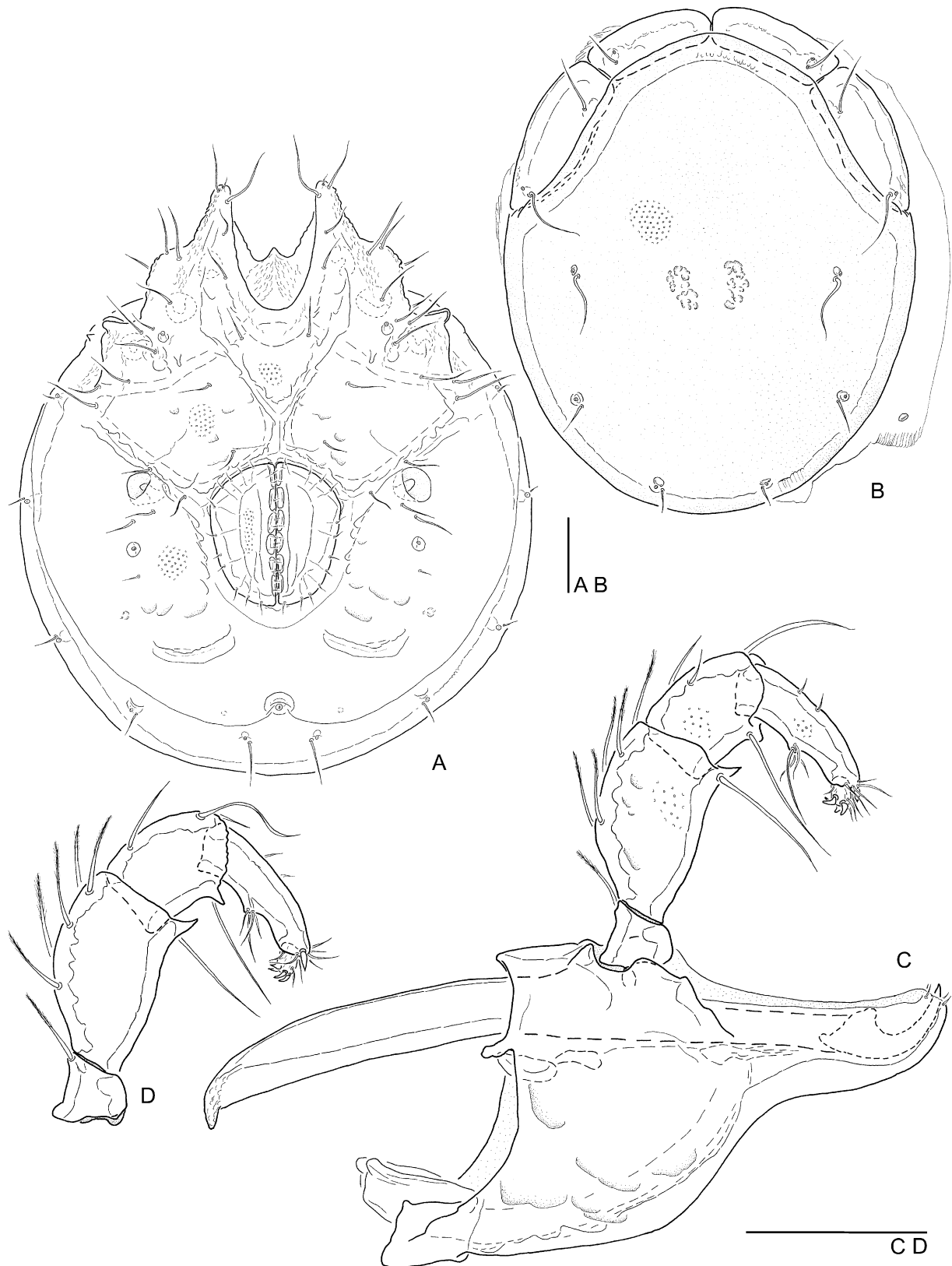


Figure 64. *Torrenticola ambigua*. A–D, female (CR 15). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

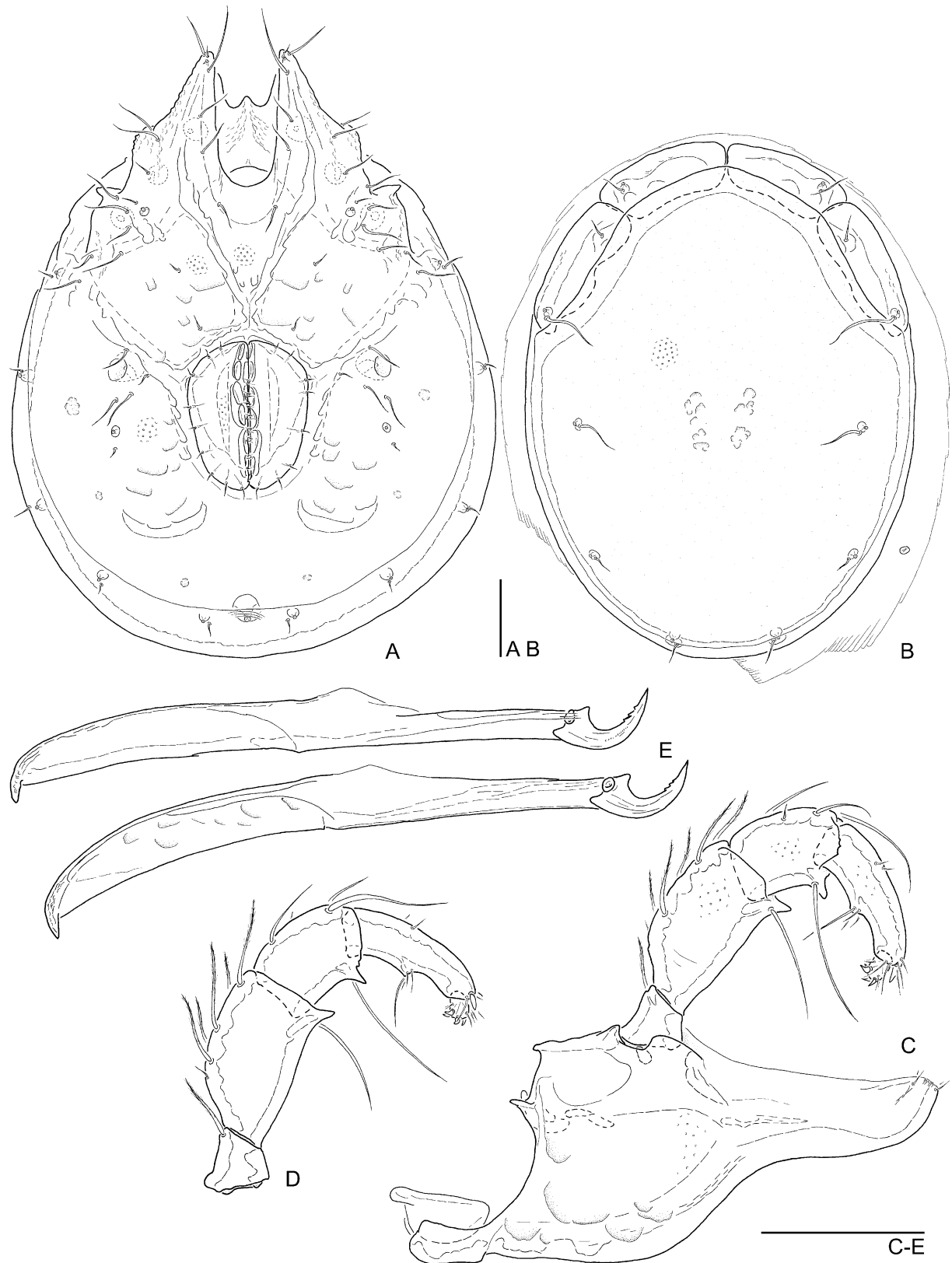


Figure 65. *Torrenticola ambigua*. A–E, female (CR 207). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, chelicera, lateral and medial view. Scale bars = 100 µm.

Table 29. Measurements (μm) of *Torrenticola ambigua*; $N = 8$ (male), 5 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	657	662	643	736	34.1	750	657	770	52.9
Idiosoma W	559	554	525	579	19.4	618	549	662	45.5
Idiosoma L/W	1.18	1.23	1.15	1.32	0.1	1.18	1.15	1.21	0.03
Cx-I tL	304	287	265	314	21.1	309	275	319	21.8
Cx-III W	368	373	358	392	13.6	412	378	456	29.8
Cx-I tL/Cx-III W	0.83	0.75	0.71	0.83	0.1	0.73	0.68	0.76	0.04
Ds L	598	574	535	618	31.9	652	569	677	51.9
Dp L	559	544	500	589	32.0	623	535	638	50.9
Ds W	466	459	446	491	18.7	491	451	540	40.7
Ds L/W	1.28	1.25	1.18	1.29	0.04	1.26	1.21	1.34	0.05
Dp L/W	1.20	1.18	1.11	1.20	0.03	1.20	1.15	1.28	0.05
A-m platelet L	154	158	145	176	11.6	167	157	176	8.8
A-m platelet W	61	59	49	61	4.9	62	49	66	7.7
A-m platelet L/W	2.52	2.91	2.44	3.00	0.2	2.67	2.59	3.20	0.3
A-l platelet L	186	186	167	203	14.7	186	176	213	15.1
A-l platelet W	69	65	56	69	4.3	66	61	78	7.6
A-m pl L/a-l pl L	0.83	0.88	0.81	0.90	0.03	0.89	0.78	0.92	0.1
Capitular bay L	152	149	138	160	7.8	165	145	180	14.3
Capitular bay W	69	74	66	83	6.4	89	83	113	11.7
Cb L/W	2.21	1.92	1.76	2.21	0.2	1.74	1.48	2.01	0.2
Dist cb – gf	225	213	198	238	16.4	184	164	201	14.6
Cx-I mL	152	143	127	162	13.2	145	125	152	11.3
Cx-II + III mL	66	66	61	71	3.4	34	27	45	8.4
Cx-I tL/Cx-II/III mL	4.60	4.49	3.86	4.80	0.3	9.15	6.23	10.84	2.0
Cx-I/Cx-II + III mL	2.30	2.21	1.89	2.44	0.2	4.43	2.83	4.92	1.0
Genital field L	154	160	151	179	8.9	178	156	194	15.6
Gf L/Cx-II + III mL	2.33	2.44	2.28	2.70	0.2	5.64	3.86	6.04	1.0
Genital field W	127	129	115	142	9.1	157	145	172	9.6
Genital field L/W	1.21	1.27	1.13	1.36	0.1	1.11	1.08	1.23	0.1
Gf L/Id L	0.23	0.24	0.23	0.25	0.01	0.25	0.23	0.26	0.01
Gf L/dist cb – gf	0.68	0.75	0.68	0.80	0.04	0.95	0.95	0.99	0.02
Dist gf – expo	96	103	88	110	6.9	137	113	164	23.4
Dist gf – cauda	132	163	132	172	12.7	201	185	230	18.0
Gs L	257	270	252	292	13.2				
Gs aL	93	94	91	105	5.4				
Gs W	145	145	125	156	12.1				
Gs aL/tL	0.36	0.36	0.32	0.40	0.03				
Gs tL/W	1.78	1.89	1.77	2.19	0.2				
Capitulum vL	289	284	260	328	25.3	333	263	338	36.3
Capitulum dL	213	212	189	228	14.4	249	208	252	22.0
Rostrum L	110	108	96	118	8.3	125	103	127	10.4
Capitulum H	130	132	118	142	9.2	149	132	172	15.2
R L/c dL	0.52	0.52	0.49	0.53	0.02	0.50	0.49	0.55	0.02
R L/c vL	0.38	0.38	0.35	0.40	0.02	0.38	0.37	0.45	0.03
Gn bend depth	20	16	12	22	3.6	20	15	23	3.3
Chelicera L	345	340	314	377	26.1	409	331	417	40.5
Chelicera H	27	27	25	31	2.0	32	27	34	3.2
Chelicera L/H	12.82	12.81	12.00	13.82	0.6	12.38	12.14	12.69	0.2
Chelicera bs L	287	281	257	316	23.6	341	272	348	35.9
Chelicera claw L	59	59	54	61	2.9	64	59	71	5.1
Chel bs/claw L	4.88	4.94	4.57	5.25	0.2	4.94	4.63	5.35	0.3
P1 dorsal L	34	34	31	37	1.9	38	34	42	3.2

Table 29. Continued

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P2 dL	85	85	78	91	5.7	100	83	103	9.5
P3 dL	56	56	51	62	4.9	69	56	70	6.3
P4 dL	80	78	71	86	4.9	91	76	96	8.9
P5 dL	15	14	12	16	1.4	17	10	17	3.3
Palp total L	270	265	244	290	17.7	317	260	323	29.8
P4 vL	58	56	54	64	3.5	64	55	71	6.7
P4 vL to seta	33	33	29	34	1.7	38	28	42	5.8
P4 vL/L to seta	1.74	1.73	1.67	1.93	0.1	1.74	1.63	2.00	0.1
P1 rel L	0.13	0.13	0.12	0.13	0.00	0.13	0.12	0.13	0.01
P2 rel L	0.31	0.32	0.31	0.32	0.01	0.32	0.31	0.32	0.00
P3 rel L	0.21	0.21	0.20	0.22	0.01	0.22	0.21	0.22	0.00
P4 rel L	0.30	0.29	0.29	0.30	0.00	0.29	0.29	0.30	0.01
P5 rel L	0.05	0.05	0.05	0.06	0.00	0.05	0.04	0.06	0.01
P1 H	39	36	31	39	3.4	39	31	47	6.0
P2 H	47	48	44	54	3.1	54	49	59	4.4
P3 H	40	40	38	44	2.4	47	39	49	4.3
P4 H	27	26	25	27	1.3	29	26	32	2.5
P5 H	12	10	10	12	1.1	12	10	12	1.1
P1 L/H	0.88	0.93	0.87	1.12	0.1	0.97	0.89	1.12	0.1
P2 L/H	1.82	1.77	1.64	1.82	0.1	1.75	1.70	1.91	0.1
P3 L/H	1.39	1.41	1.31	1.46	0.05	1.45	1.40	1.50	0.04
P4 L/H	2.95	3.00	2.90	3.18	0.1	3.04	2.82	3.08	0.1
P5 L/H	1.20	1.28	1.20	1.50	0.1	1.40	1.00	1.56	0.2
P2/P4 L	1.06	1.09	1.03	1.12	0.03	1.10	1.05	1.12	0.03
P3/P4 L	0.71	0.73	0.68	0.77	0.03	0.74	0.73	0.76	0.01

(0.29–0.30), L/H 2.95 (2.90–3.18), P2/P4 1.06 (1.03–1.12), P3/P4 0.71 (0.68–0.77)], ventral setae on small hump, slightly distal [vL/L to seta 1.74 (1.67–1.93)] (Figs 61C, D, 62C, D).

Female ($N = 5$): Idiosoma similar to male; medial margin of Cx-II/III relatively long (Cx-I/Cx-II/III mL 2.83–4.92); genital field rounded (Fig. 63A), blunt rhombic (Fig. 64A) or rarely elongated-rhombic (Fig. 65A); posterior margins of Cx-IV more extended to caudal; gnathosoma similar to male (Figs 63C, D, 64C, D, 65C–E).

Discussion: The species *T. ambigua* and *T. esferica* are characterized (and separated from the other species of this group) by a rounded idiosoma. *Torrenticola ambigua* is distinguished from the latter mainly in longer, more slender Cx-I tips and shorter P4. Populations of *T. ambigua* were found in different habitats – mountain streams, as well as lowland and mountain springs. Furthermore several characteristics vary significantly within the different specimens: dorsal plate red or with red pattern; excretory pore nearly between (Figs 61A, 63A, 65A) or far anterior Vgl-2 (Figs 62A, 64A); rostrum compact, basely very high (Fig. 62C) or more slender; female genital field more compact or

very slender (Fig. 65A). In some specimens the ventral P2 cones are very prominent (e.g. Fig. 64D). However, as the differences in these characteristics are not consistent with each other or with the differences in their habitats, the specimens should be kept together in one single species (probably split into distinct populations). The name given to the species is taking into account this uncertainty and heterogeneity.

TORRENTICOLA CHIRRIPOENSIS SP. NOV.

(FIGS 66A–E, 67A–D; TABLE 30)

Type series: Holotype male, CR 175, San José, NP Chirripó, Valle de los Leones, Río Terbi, small stream, 3100 m asl, 15.iii.1996, mounted; paratypes, same locality and date 5/3/0 mounted, 18/24/0 unmounted.

Additional specimens examined: CR 169, San José, NP Chirripó, Río Talari, small stream, 3340 m asl, 12.iii.1996, 2/1/0 mounted, 4/2/0 unmounted; CR 170, Cartago, NP Chirripó, Río Chirripó Atlantico, small stream, 3430 m asl, 13.iii.1996, 2/1/0 mounted, 5/12/0 unmounted; CR 172, San José, NP Chirripó, Valle Chirripó, Río Chirripó Pacifico, small stream, 3500 m

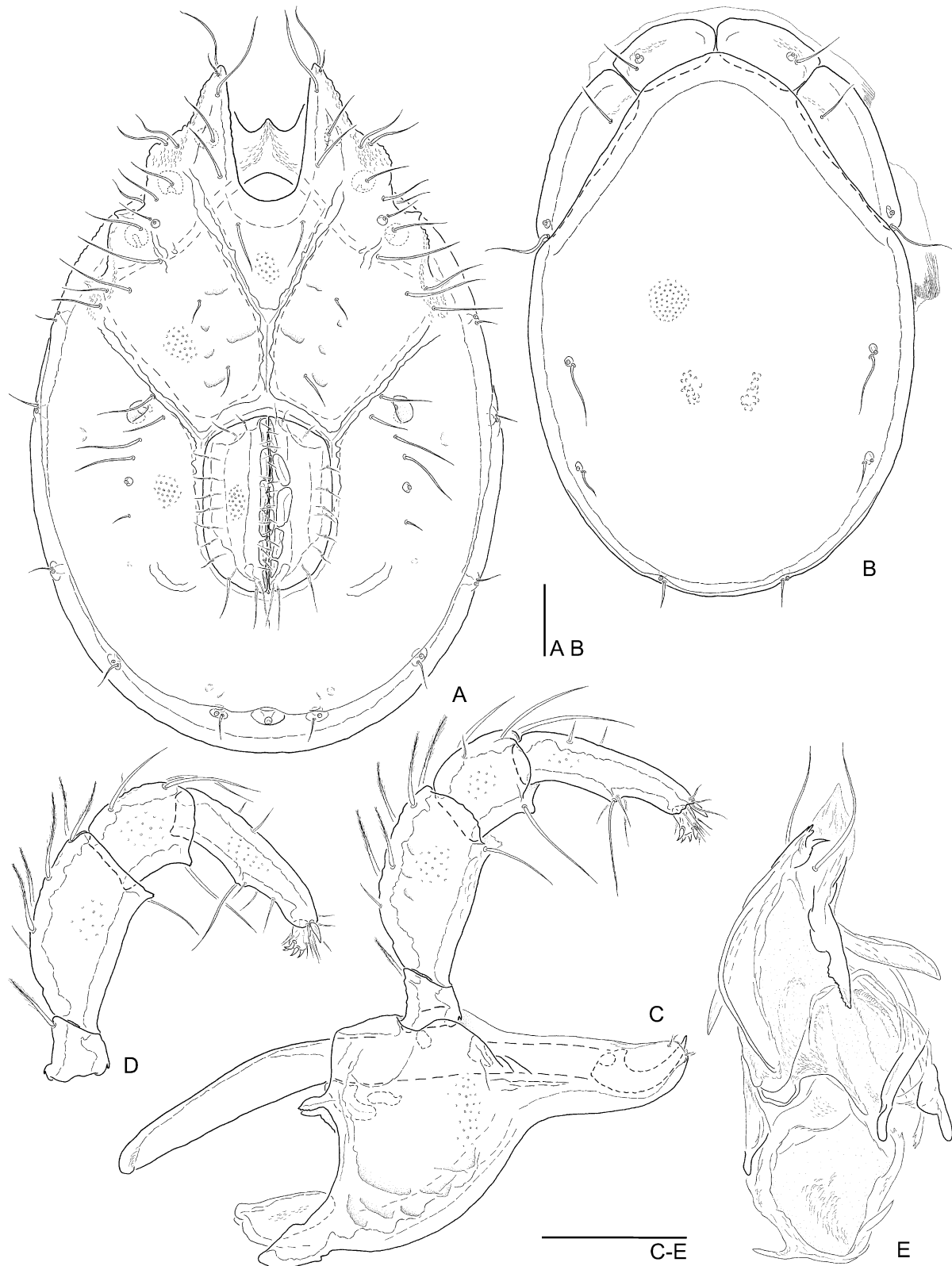


Figure 66. *Torrenticola chirripoensis*. A–E, holotype male (CR 175). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 μ m.

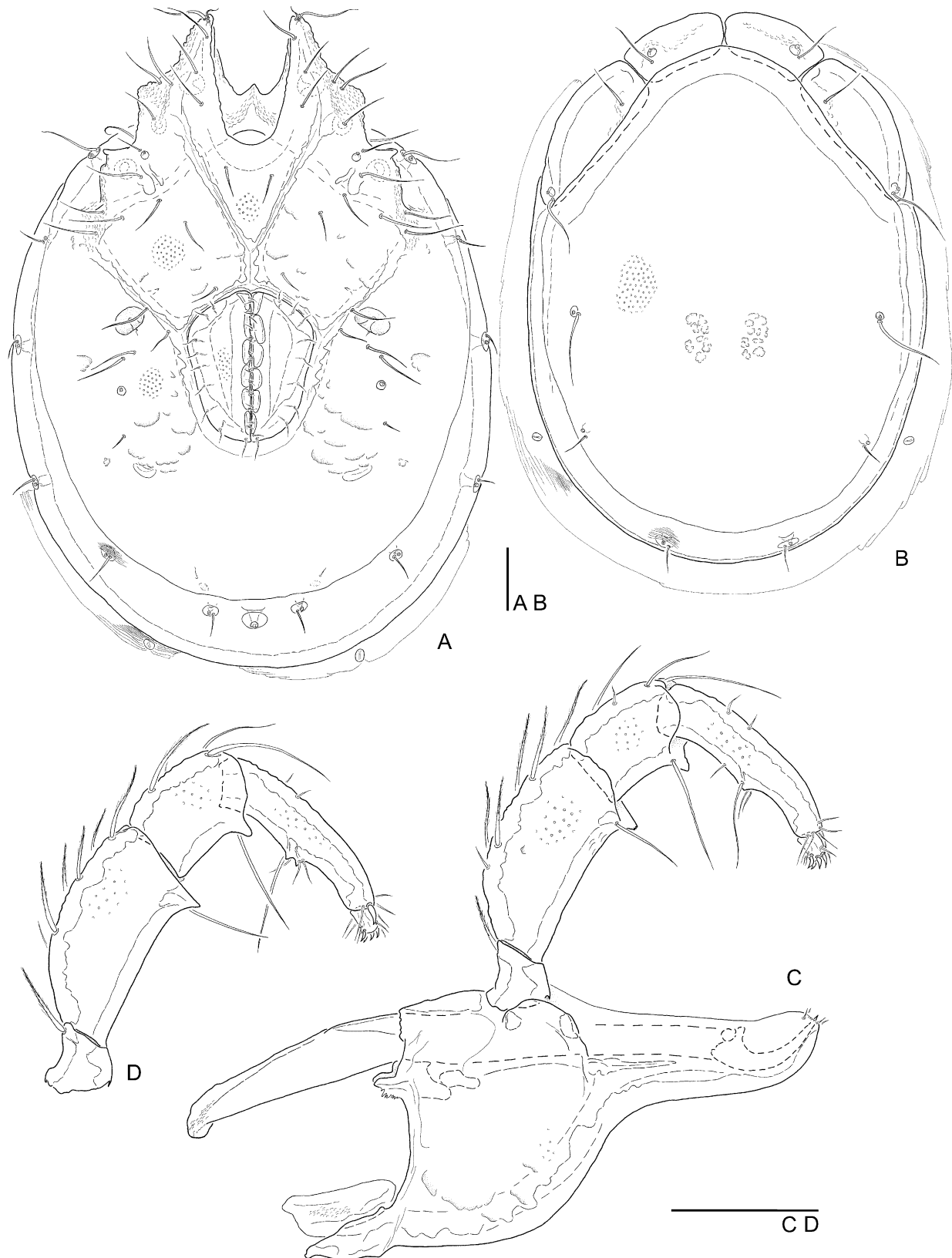


Figure 67. *Torrenticola chirripoensis*. A–D, female (CR 172). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 30. Measurements (μm) of *Torrenticola chirripoensis*; $N = 10$ (male), 6 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	932	937	873	1020	47.0	1020	961	1089	44.2
Idiosoma W	628	647	628	731	33.9	760	687	814	44.4
Idiosoma L/W	1.48	1.41	1.35	1.50	0.1	1.36	1.33	1.40	0.03
Cx-I tL	353	351	319	392	26.0	373	363	402	14.8
Cx-III W	432	437	407	471	18.8	466	436	510	28.7
Cx-I tL/Cx-III W	0.82	0.81	0.76	0.85	0.03	0.81	0.77	0.83	0.02
Ds L	770	775	706	888	55.6	858	790	947	56.2
Dp L	726	733	667	834	51.3	809	750	893	51.8
Ds W	530	540	510	623	34.4	616	579	657	25.1
Ds L/W	1.45	1.42	1.38	1.51	0.04	1.39	1.36	1.49	0.05
Dp L/W	1.37	1.35	1.31	1.43	0.04	1.31	1.30	1.41	0.04
A-m platelet L	145	154	145	172	8.4	165	159	176	7.3
A-m platelet W	69	65	59	78	5.4	73	69	82	4.9
A-m platelet L/W	2.11	2.35	2.11	2.56	0.2	2.30	2.15	2.43	0.1
A-l platelet L	252	238	213	273	19.0	252	230	277	15.2
A-l platelet W	76	81	74	98	7.2	88	81	113	11.1
A-m pl L/a-l pl L	0.57	0.65	0.57	0.69	0.03	0.65	0.64	0.72	0.03
Capitular bay L	184	183	159	208	13.7	195	189	203	6.6
Capitular bay W	110	110	103	123	6.8	118	103	125	7.5
Cb L/W	1.67	1.65	1.43	1.87	0.1	1.65	1.63	1.86	0.1
Dist cb – gf	292	271	240	299	21.5	224	218	245	10.2
Cx-I mL	172	172	152	198	14.8	185	172	198	10.4
Cx-II + III mL	100	91	78	103	8.0	32	15	51	11.7
Cx-I tL/Cx-II/III mL	3.52	3.94	3.52	4.37	0.3	11.72	7.25	26.69	6.7
Cx-I/Cx-II + III mL	1.71	1.89	1.67	2.22	0.2	5.85	3.33	13.17	3.4
Genital field L	241	208	191	277	29.5	248	228	274	17.8
Gf L/Cx-II + III mL	2.40	2.35	2.10	2.90	0.3	7.50	4.60	18.67	4.9
Genital field W	178	159	149	191	14.8	203	201	235	13.8
Genital field L/W	1.36	1.31	1.24	1.45	0.1	1.17	1.12	1.28	0.1
Gf L/Id L	0.26	0.22	0.21	0.27	0.02	0.24	0.23	0.25	0.01
Gf L/dist cb – gf	0.83	0.79	0.75	0.94	0.1	1.05	1.02	1.24	0.1
Dist gf – expo	179	209	179	238	20.4	274	265	309	17.0
Dist gf – cauda	216	268	216	289	25.8	358	331	392	20.2
Gs L	309	235	219	350	50.2				
Gs aL	198	165	147	228	28.5				
Gs aL/tL	0.64	0.70	0.64	0.71	0.03				
Capitulum vL	328	349	328	381	16.7	376	360	394	13.0
Capitulum dL	247	265	245	284	13.3	281	272	300	10.0
Rostrum L	137	149	135	159	8.7	156	147	164	7.2
Capitulum H	164	162	152	185	8.7	181	174	189	5.7
R L/c dL	0.55	0.56	0.53	0.60	0.02	0.55	0.54	0.59	0.02
R L/c vL	0.42	0.42	0.40	0.44	0.01	0.41	0.41	0.44	0.01
Gn bend depth	28	29	25	32	2.1	31	29	37	3.1
Chelicera L	392	410	380	430	17.0	437	434	468	13.2
Chelicera H	34	34	31	38	2.3	37	34	38	1.2
Chelicera L/H	11.43	12.13	11.32	12.89	0.6	11.98	11.42	12.73	0.5
Chelicera bs L	326	338	316	355	12.9	363	358	392	12.9
Chelicera claw L	66	71	64	81	5.3	75	74	76	1.3
Chel bs/claw L	4.93	4.83	4.32	5.11	0.3	4.94	4.71	5.16	0.2
P1 dorsal L	44	42	39	49	2.9	45	42	48	2.1
P2 dL	130	132	124	141	5.7	143	140	146	2.4
P3 dL	74	72	66	80	4.1	81	74	82	3.3

Table 30. Continued

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P4 dL	135	136	124	152	7.8	145	142	149	2.5
P5 dL	20	19	17	22	1.6	18	17	22	1.8
Palp total L	402	404	380	443	20.2	431	420	439	6.1
P4 vL	108	108	100	120	5.5	117	113	120	2.9
P4 vL to seta	60	61	56	66	3.1	64	60	66	2.5
P4 vL/L to seta	1.80	1.84	1.58	1.88	0.1	1.85	1.70	1.92	0.1
P1 rel L	0.11	0.11	0.10	0.11	0.00	0.10	0.10	0.11	0.01
P2 rel L	0.32	0.33	0.32	0.33	0.00	0.33	0.33	0.34	0.00
P3 rel L	0.18	0.18	0.17	0.19	0.00	0.19	0.17	0.19	0.01
P4 rel L	0.34	0.34	0.33	0.35	0.01	0.34	0.33	0.34	0.01
P5 rel L	0.05	0.05	0.04	0.05	0.00	0.04	0.04	0.05	0.00
P1 H	44	40	39	49	3.7	44	42	49	2.7
P2 H	66	64	60	71	3.8	70	66	74	2.9
P3 H	59	55	50	62	4.3	59	58	61	1.3
P4 H	34	33	29	38	2.8	36	34	39	2.0
P5 H	12	12	12	15	0.9	14	12	15	1.2
P1 L/H	1.00	1.02	0.97	1.13	0.04	0.99	0.94	1.06	0.04
P2 L/H	1.96	2.01	1.88	2.12	0.1	2.03	1.93	2.20	0.1
P3 L/H	1.25	1.31	1.22	1.41	0.1	1.36	1.25	1.43	0.1
P4 L/H	3.93	4.15	3.73	4.42	0.2	4.06	3.69	4.36	0.3
P5 L/H	1.60	1.45	1.27	1.60	0.1	1.38	1.17	1.50	0.1
P2/P4 L	0.96	0.96	0.93	1.00	0.02	0.98	0.97	1.01	0.02
P3/P4 L	0.55	0.53	0.50	0.57	0.02	0.55	0.51	0.57	0.02

asl, 14.iii.1996, 1/1/0 mounted; CR 178, San José, NP Chirripó, Valle de los Conejos, spring brook, 3400 m asl, 16.iii.1996, 4/1/0 mounted, 10/7/0 unmounted.

Habitat: Slow and fast flowing small streams and one spring brook at highest elevations (3100–3500 m asl); mesolithal, lithophyal, macrolithal; temperature 7.1–12.8 °C; conductivity 40–128 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Central Cordillera de Talamanca, only Chirripó National Park).

Derivatio nominis: *Chirripó* = highest summit in the Central Cordillera de Talamanca (and in whole of Costa Rica); all sample sites are within this region.

Diagnosis: Characters of the *columbiana*-like species; idiosoma large, elongated-oval; dorsal plate yellowish; antero-medial dorsal platelets short, broad, antero-lateral dorsal platelets long; coxal field laterally graded; genital field relatively large, elongated; genital skeleton apically long, cella proximalis small; P4 long and slender.

Description – Male ($N = 15$): Idiosoma elongated-oval [L 932 μm (873–1020 μm), L/W 1.48 (1.35–1.50)]; dorsal plate yellowish, elongated; antero-medial dorsal platelets short, broad, medially rounded, poste-

rior straight, antero-lateral platelets long, anterior straight, towards posterior strongly tapering, rounded [a-m/a-l pl L 0.57 (0.62–0.69)]; Dgl-4 slightly lateral to Dgl-5 (Dgl-4–6 far caudal and lateral) (Fig. 66B); coxal field laterally sharply graded; Cx-I relatively short, +/- triangular, pointed; Cxgl-4 slightly postero-lateral anterior tips of Cx-I; capitular bay broad, diverging U-shaped, basely broad, laterally straight; medial margin of Cx-II/III mid-sized; genital field long [gf L/Cx-II/III mL 2.40 (2.10–2.90)], elongated-rectangular, anterior truncated, sharp edges towards straight to convex lateral margins, caudally rounded; posterior margin of Cx-IV lateral to caudal end of genital field; excretory pore between Vgl-2, pore and glandularia slightly posterior primary sclerotization (Fig. 66A); genital skeleton apically long, strong carina anterior and posterior, brachia distalia and proximalia thin, cella proximalis small, with strong, short processus proximalia (aL/tL 0.64 (0.65–0.71) (Fig. 66E)); capitulum basely high, short, ventro-proximal apodeme oblique, ventral margin basely bellied, sigmoid curved, rostrum clearly separated, compact; palp long, P2 and P4 of equal length, ventral projections of P2 and P3 short, cone-shaped, P4 long, slender [rel L 0.34 (0.33–0.35), L/H 3.93 (3.73–4.42)], ventral setae on flat hump, slightly distally (Fig. 66C, D, Table 30).

Female ($N = 7$): Idiosoma similar to male, slightly larger, less elongated (L 961–1089, L/W 1.33–1.40); dorsal plate broader (Fig. 67B); Cx-I tips truncated, rounded; medial margin of Cx-II/III relatively long; genital field elongated-rhombic, anterior margins lightly convex, oblique, lateral margins straight, caudally rounded; excretory pore slightly posterior Vgl-2 (Fig. 67A); gnathosoma similar to male (Fig. 67C, D).

Discussion: The species is mainly characterized by its large, elongated idiosoma, large genital field and relatively slender rostrum. *Torrenticola chirripoensis* is the most abundant species of the Costa Rican torrenticolid fauna restricted to a small region. Together with *T. altifontana*, *T. baderi* and *T. cumbrensis* it forms the strictly endemic elements of the specific fauna of the Chirripó National Park.

***TORRENTICOLA COLUMBIANA* (LUNDBLAD, 1941)**

(FIGS 68A–I, 69A, B, 70A–H; TABLES 31, 32)

Type series: Holotype male, Colombia, El Tambo, under waterfall, 1700 m asl, February 1939, leg. K. von Sneidern, prep. no. 2746 SMNH; allotype female, Colombia, Río San Juan, affluent of Río de La Plata, 2600 m asl, March 1939, leg. K. von Sneidern, prep. no. 2747 SMNH.

Further material: Colombia, leg. K. von Sneidern: El Tambo, stream, 1700 m asl, May 1936, 0/1/0; El Tambo, small stream, 1700 m asl, 25.x.1936, 0/1/0; same locality as holotype, 16.vi.1938, 4/0/0; February 1939, 4/1/0; August 1939, 4/1/0; Manchique, stream, 2000 m asl, 01.iii.1940, 54/57/4; Manchique, stream under waterfall, 2200 m asl, March 1940, 151/154/0; Cauca, Coconuco, stream, 3500 m asl, 10.iii.1940, 26/73/0 (2/0/0 mounted, prep. no. 3858, 3859 SMNH, 0/1/0 mounted, prep. no. 3865 SMNH); Río San Juan, La Plata, 2600 m asl, May 1939, 1/0/0 mounted, prep. no. 2857 SMNH, 0/1/0 mounted, prep. no. 3252 SMNH [not mentioned in publication]. Argentina, leg. Dave Cook: Salta, near Metan, branch of Río Metan, 27.viii.1975, 0/2/0; Jujuy, 15 km north-east of Liberator Grl. San Martín, Río Zora, 28.viii.1975, 1/0/0; Salta, north of Abra de la Sierra, stream, 01.ix.1975, 0/1/0; Tucumán, Arroyo Artesa, 05.ix.1975, 2/1/0; Tucumán, Río del Nio, 12/5/40; Tucumán, south-east Tafi del Valle, small stream, 06.ix.1975, 2/6/0; Catamarca, west of Dique Sumampa, small stream, 08.ix.1975, 0/4/0; Catamarca, Río de las Casa Viejas, 09.ix.1975, 0/2/0 (slides at FMC: 2/2/0 mounted, prep. no. DC 27–75, DC 29–75).

Geographical distribution: Colombia, Argentina.

Habitat: Colombia: Fast flowing mountain streams and waterfalls at 1700–3500 m asl, mainly moss-

covered stones, grass; Argentina: Streams in forests at the eastern foothills of the Andes (Yungas).

Published records: Lundblad (1953), Cook (1980).

Diagnosis: Characters of the *columbiana*-like species; idiosoma relatively large, rounded-oval (L 697–873 μm , L/W 1.35–1.48); dorsal plate in posterior half red (Fig. 6C-II); medial margin Cx-II/III short, genital field large (males, gf L/Cx-II/III mL 2.24–3.29).

Description: See Lundblad (1953).

Discussion: *Torrenticola columbiana* is – relatively weakly – characterized by a comparatively large, rounded-oval idiosoma, a dorsal red pattern (Fig. 6C-II), relatively short medial margins of Cx-II/III and a large genital field. At the current state, the species probably represents a species-complex, as there are clear differences between the populations described from Colombia (Lundblad, 1953) and Argentina (Cook, 1980) (Table 32). However, the specimens from Argentina should be kept in this species until more material from other regions in South America has been investigated.

***TORRENTICOLA CORTA* SP. NOV.**

(FIG. 71A–E; TABLE 33)

Type series: Holotype male, CR 96, San José, 10 km south-east Salsipuedes, below Cabinas Quetzales, Río Savegre, stream, 2160 m asl, 28.vii.1995, mounted.

Habitat: Fast flowing mountain stream at 2160 m asl; mesolihal; temperature 11.9 °C; conductivity 83 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (only known from type locality in the central Cordillera de Talamanca).

Derivatio nominis: *corto* (Spanish = short); referring to the compact shape of the idiosoma, especially the very short coxal field.

Diagnosis: (only 1 male) Characters of the *columbiana*-like species; rostrum short, sharp bent; idiosoma mid-sized, rounded; dorsal plate yellow; antero-medial dorsal platelets mid-sized, antero-lateral platelets relatively short; coxal field short and compact, especially Cx-I very short, only slightly extending beyond dorsal part of idiosoma, laterally graded; genital field large; genital skeleton compact; ventro-distal projections at P2/P3 short, compact, P2 and P4 of equal size.

Description – *Male* ($N = 1$): Idiosoma rounded (L 736 μm , L/W 1.25); dorsal plate yellow; antero-medial dorsal platelets broad, medial and posterior margins convex, antero-lateral platelets short, anterior rounded, posterior greatly tapering (a-m/a-l pl L 0.75); Dgl-4 lateral of Dgl-5 (Fig. 71B); coxal field laterally

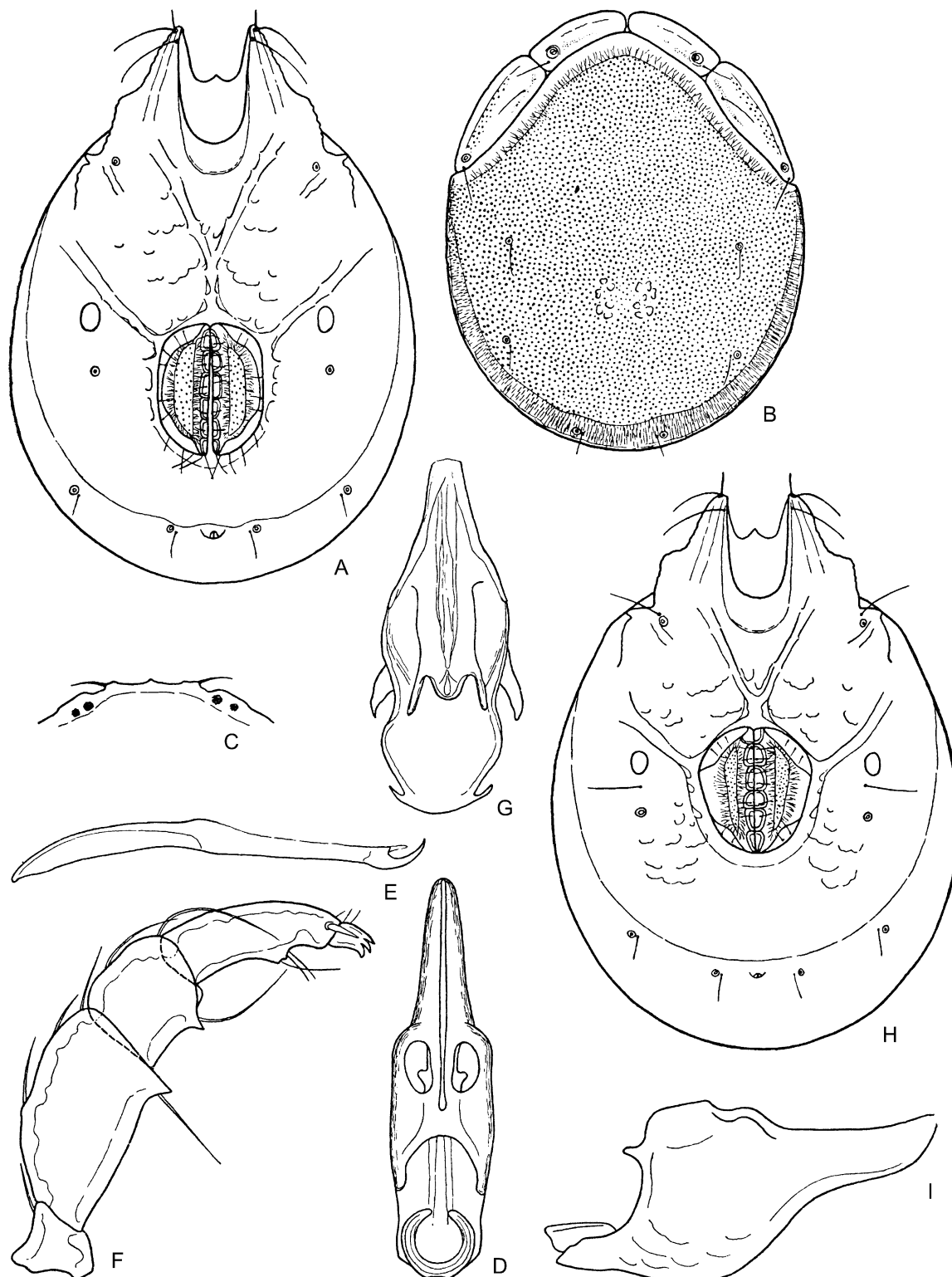


Figure 68. *Torrenticola columbiana*. A–G, holotype male, prep. no. 2746 SMNH Lundblad collection; H, allotype female, prep. no. 2747 SMNH Lundblad collection; I, paratype, female, prep. no. 3252 SMNH Lundblad collection; after Lundblad (1953). A, H, idiosoma, ventral view; B, idiosoma, dorsal view [according to the description (Lundblad, 1953) the posterior half of the dorsal plate is red, with a sharp margin]; C, frontal region, dorsal view; D, capitulum, dorsal view; E, chelicera; F, palp; G, genital skeleton, anterior view; I, capitulum, lateral view. No measurement scale bars available.

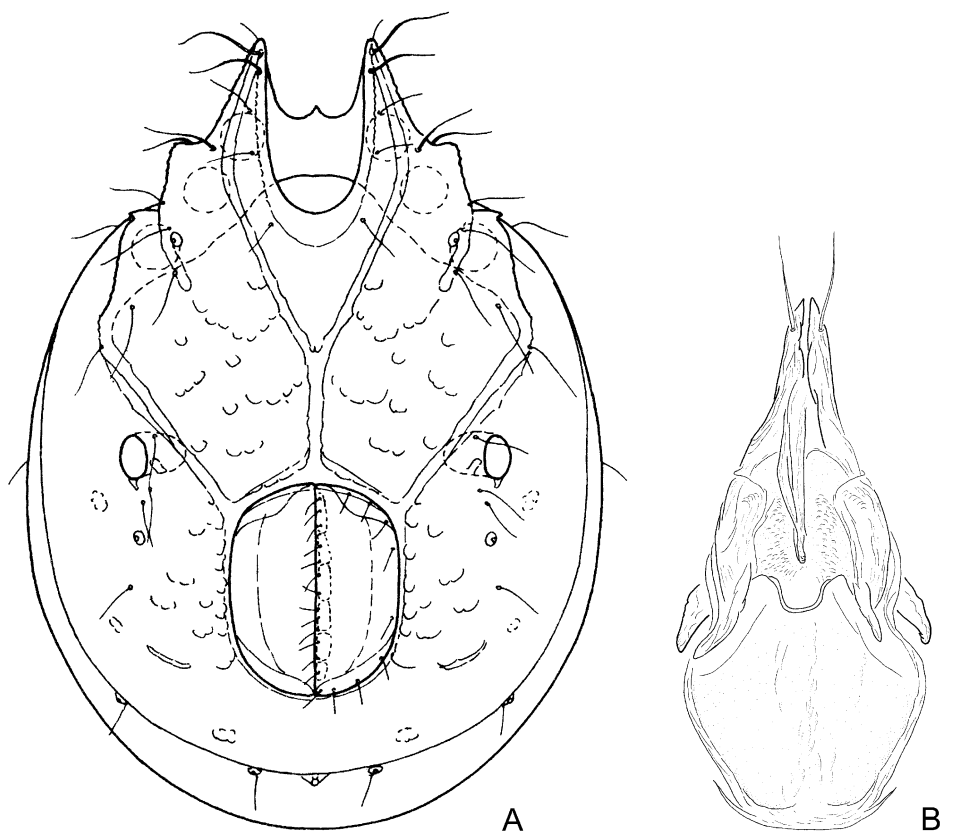


Figure 69. *Torrenticola columbiana*. A, male, after Cook (1980); B, male, prep. no. 3859 SMNH Lundblad collection. A, idiosoma, ventral view; B, genital skeleton, anterior view. Scale bar = 100 μ m (no measurement scale bar available for A).

graded, very short and compact (Cx-I tL/Cx-III W 0.66), only slightly surpassing dorsal part of idiosoma, Cx-I very short, apically rounded, blunt; Cxgl-4 postero-lateral of Cx-I tips; capitular bay relatively broad, \pm U-shaped, basely narrowing; medial margin Cx-II/III short (gf L/Cx-II/III mL 3.13); genital field anterior truncated, laterally slightly tapering to posterior, postero-lateral edges rounded, caudally truncated; posterior margin of Cx-IV lateral besides caudal margin of genital field; excretory pore between Vgl-2, in flat indentation of caudal margin of primary sclerotization (Fig. 71A); genital skeleton large, compact, apically relatively short, cella proximalis mid-sized, with well-developed processus proximalia (aL/tL 0.57), brachia distalia short, brachia proximalia well developed (Fig. 71E); capitulum basely high, bellied, ventral margin sharply bent towards comparatively short rostrum; chelicera crooked (Fig. 71C); P2 and P4 of equal length (P2/P4 1.00), P3 compact, ventral projections of P2/P3 short, indistinct (Fig. 71C, D).

Female: Unknown.

Discussion: *Torrenticola corta* is clearly defined by the extremely short coxal field; furthermore, the basely

high, bellied capitulum and the sharply separated, short rostrum are characteristic. Therefore, although only one single male has been found, the status of the species is undoubted.

***TORRENTICOLA CORTOBRAZO* SP. NOV.**

(FIG. 72A–D; TABLE 34)

Type series: Holotype female, CR 286, Guanacaste, ACG, El Hacha, Quebrada Jorco, small stream, 280 m asl, 02.ii.1997, mounted.

Habitat: Fast flowing small stream at 280 m asl; mesolithal, macrolithal, akal, macropelal; temperature 23.2 $^{\circ}$ C; conductivity 197 μ S cm^{-1} .

Distribution: Costa Rica (only known from type locality in the dry forest area on the pacific slope of the Cordillera de Guanacaste).

Derivatio nominis: *corto* (Spanish = short), *brazo* (Spanish = arm); referring to the short palp, especially P4.

Diagnosis: (only 1 female) Characters of the *columbiana*-like species; idiosoma mid-sized, oval

Table 31. Measurements (μm) of *Torrenticola columbiana*; $N = 6$ (male), 5 (female). The measurements were completed by new measurements of slide material from Colombia (SMNH, Lundblad collection) and from Argentina (FMC and CNC, Cook collection)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	697	755	697	765	29.0	849	741	873	65.0
Idiosoma W	515	527	515	549	12.8	613	500	638	65.4
Idiosoma L/W	1.35	1.39	1.35	1.47	0.1	1.38	1.37	1.48	0.05
Cx-I tL	294	304	294	314	7.9	334	284	348	24.6
Cx-III W	348	361	348	383	11.9	402	334	422	41.0
Cx-I tL/Cx-III W	0.85	0.85	0.81	0.86	0.02	0.83	0.81	0.94	0.1
Ds L	559	623	559	647	32.0	697	594	726	66.9
Dp L	535	579	535	603	24.2	657	554	687	66.9
Ds W	461	473	461	491	11.4	535	437	569	58.7
Ds L/W	1.21	1.28	1.21	1.36	0.1	1.30	1.28	1.36	0.03
Dp L/W	1.16	1.20	1.16	1.27	0.04	1.23	1.20	1.27	0.03
A-m platelet L	132	136	132	149	7.0	142	121	169	23.1
A-m platelet W	47	51	47	62	5.9	56	49	61	5.1
A-m platelet L/W	2.84	2.77	2.12	2.90	0.3	2.52	2.27	2.76	0.2
A-l platelet L	174	185	174	194	7.5	206	169	211	19.2
A-l platelet W	61	66	61	72	4.0	71	69	78	4.5
A-m pl L/a-l pl L	0.76	0.75	0.72	0.77	0.02	0.74	0.68	0.81	0.1
Capitular bay L	145	156	142	164	8.8	167	156	174	7.8
Capitular bay W	82	81	70	83	5.1	93	74	93	8.9
Cb L/W	1.76	1.93	1.76	2.21	0.2	1.87	1.79	2.12	0.1
Dist cb – gf	223	234	223	244	9.1	194	173	201	12.4
Cx-I mL	147	148	145	167	8.3	164	132	174	17.1
Cx-II + III mL	64	72	59	83	10.7	25	20	34	5.6
Cx-I tL/Cx-II/III mL	4.62	4.20	3.65	5.17	0.6	14.21	8.29	17.02	3.2
Cx-I/Cx-II + III mL	2.31	2.05	1.74	2.83	0.4	6.89	3.86	8.75	1.8
Genital field L	176	190	176	201	8.9	195	181	208	11.4
Gf L/Cx-II + III mL	2.77	2.67	2.24	3.29	0.4	8.22	5.50	10.50	1.8
Genital field W	135	145	135	157	8.0	181	159	194	13.4
Genital field L/W	1.31	1.32	1.19	1.41	0.1	1.08	1.06	1.18	0.1
Gf L/Id L	0.25	0.26	0.25	0.26	0.01	0.24	0.23	0.25	0.01
Gf L/dist cb – gf	0.79	0.81	0.77	0.88	0.04	1.04	1.01	1.09	0.03
Dist gf – expo	103	107	88	147	23.5	201	132	225	40.7
Dist gf – cauda	162	162	140	201	24.2	284	225	306	36.8
Gs L	240	277	240	288	19.0				
Gs aL	167	169	164	176	5.4				
Gs W	103	124	103	140	14.1				
Gs aL/tL	0.69	0.61	0.60	0.69	0.05				
Gs tL/W	2.33	2.30	2.06	2.33	0.1				
Capitulum vL	260	284	260	309	20.4	331	279	349	27.1
Capitulum dL	221	217	190	236	15.6	233	198	267	26.4
Rostrum L	110	115	103	123	8.0	125	108	135	10.6
Capitulum H		123	120	125	2.5	137	125	157	15.4
R L/c dL	0.50	0.53	0.49	0.57	0.03	0.54	0.50	0.57	0.03
R L/c vL	0.42	0.39	0.39	0.42	0.02	0.39	0.37	0.40	0.01
Gn bend depth		16	15	17	1.2	17	16	21	2.1
Chelicera L	336	333	323	364	17.7	402	321	419	44.0
Chelicera H	25	25	22	29	3.1	29	23	29	3.1
Chelicera L/H	13.70	13.28	12.38	14.67	1.0	13.73	13.67	14.25	0.3
Chelicera bs L	282	279	272	303	13.5	336	265	353	39.3
Chelicera claw L	54	54	51	61	4.2	65	56	69	5.3

Table 31. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Chel bs/claw L	5.23	5.18	4.94	5.29	0.2	5.08	4.70	5.33	0.3
P1 dorsal L	29	31	29	36	2.3	36	27	39	4.8
P2 dL	89	91	76	104	11.9	103	81	110	11.3
P3 dL	44	51	44	54	3.5	61	49	64	6.2
P4 dL	82	84	76	92	6.5	93	75	96	8.8
P5 dL	17	17	15	17	1.2	17	17	20	1.1
Palp total L	262	273	246	295	20.4	307	249	323	29.0
P4 vL	61	62	54	76	8.1	69	56	76	7.2
P4 vL to seta	39	38	32	44	4.8	42	37	43	2.5
P4 vL/L to seta	1.56	1.63	1.69	1.73	0.2	1.65	1.53	1.77	0.1
P1 rel L	0.11	0.12	0.10	0.13	0.01	0.12	0.11	0.12	0.01
P2 rel L	0.34	0.33	0.31	0.36	0.02	0.33	0.32	0.36	0.02
P3 rel L	0.17	0.18	0.17	0.20	0.01	0.20	0.18	0.20	0.01
P4 rel L	0.31	0.31	0.30	0.31	0.00	0.30	0.27	0.31	0.01
P5 rel L	0.07	0.06	0.05	0.07	0.01	0.06	0.06	0.07	0.01
P1 H	37	36	34	37	1.1	39	34	44	3.9
P2 H	51	51	50	55	1.8	59	49	61	5.7
P3 H	44	44	44	49	2.0	53	42	53	5.2
P4 H	28	28	27	31	1.5	32	27	34	3.0
P5 H	12	12	12	12	0.00	12	12	13	0.7
P1 L/H	0.80	0.88	0.80	0.97	0.1	0.94	0.76	1.00	0.11
P2 L/H	1.74	1.71	1.51	2.02	0.2	1.72	1.65	2.00	0.14
P3 L/H	1.00	1.13	1.00	1.22	0.1	1.19	1.16	1.22	0.02
P4 L/H	2.91	2.87	2.80	3.41	0.2	2.81	2.43	3.17	0.28
P5 L/H	1.40	1.35	1.20	1.40	0.1	1.40	1.27	1.45	0.07
P2/P4 L	1.09	1.09	1.00	1.18	0.1	1.10	1.08	1.32	0.10
P3/P4 L	0.54	0.60	0.54	0.66	0.05	0.67	0.59	0.74	0.05

Table 32. Differences in the populations of *Torrenticola columbiana* described from Colombia (Lundblad, 1953) and Argentina (Cook, 1980); only males are regarded

	Colombia	Argentina
Cx-I tL/Cx-II/III mL	3.94–5.17	3.65–3.77
Cx-I/Cx-II + III mL	1.91–2.83	1.74–1.79
Gf L/Cx-II + III mL	2.56–3.29	2.24
Gf L/W	1.31–1.41	1.19–1.27
P1 rel L	0.11–0.13	0.10
P2 rel L	0.31–0.34	0.35–0.36
P2 L/H	1.51–1.74	2.00–2.02
P3 L/H	1.00–1.14	1.17–1.22
P4 L/H	2.80–2.91	3.00–3.41
P4 vL/L to seta	1.49–1.69	1.72–2.07
P2/P4 L	1.00–1.09	1.12–1.18

drop-shaped; dorsal plate very pale reddish; antero-medial dorsal platelets relatively small, short, antero-lateral platelets mid-sized; coxal field clearly elongated, laterally softly graded; genital field rounded-rhombic; palp very short, especially P4, ventro-distal projections at P2/P3 small, cone-shaped.

Description – Male: Unknown.

Female ($N = 1$): Idiosoma oval drop-shaped (L 687 μm , L/W 1.46); dorsal plate very pale reddish; antero-medial dorsal platelets small, medial and posterior margins convex, antero-lateral platelets longer, anterior +/- straight, posterior slightly tapering, rounded (a-m/a-l pl L 0.70); Dgl-4 lateral of Dgl-5; caudal margin of primary sclerotization far anterior (Fig. 72B); coxal field very elongated (Cx-I tL/Cx-III W 1.00), laterally only softly graded, antero-lateral corners of Cx-II and Cx-III only slightly extended; Cx-I apically rounded, Cxgl-4 slightly posterior of Cx-I tips; capitular bay deep, narrow U-shaped, basely narrowing; genital field anterior equally rounded, softly rounded towards

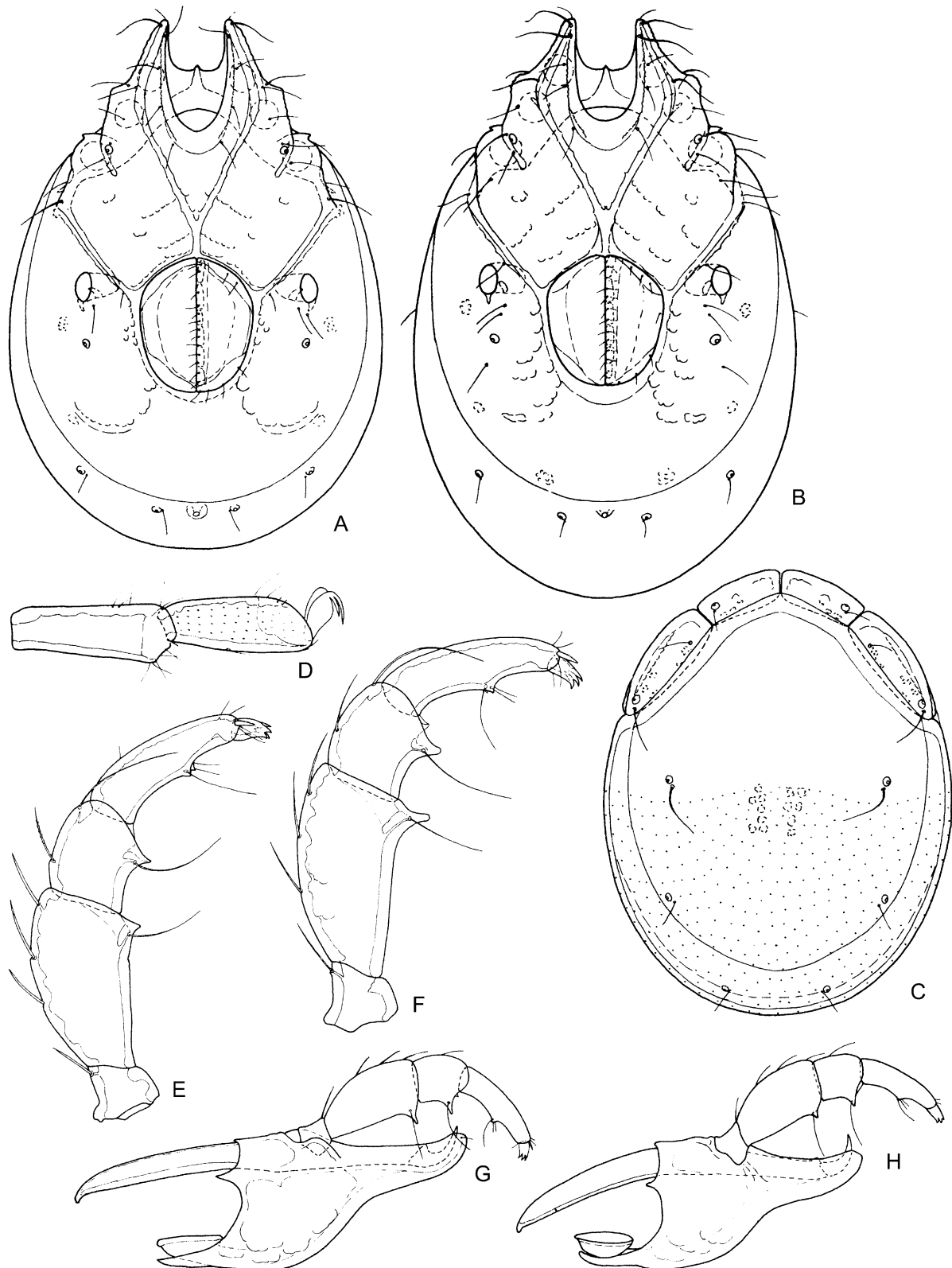


Figure 70. *Torrenticola columbiana*. A–H, female, after Cook (1980). A, B, idiosoma, ventral view; C, idiosoma, dorsal view; D, first leg, terminal segments; E, F, left palp, lateral view; G, H, capitulum with right palp, lateral view. No measurement scale bars available.

Table 33. Measurements (μm) of *Torrenticola corta*; $N = 1$ (male, holotype)

Idiosoma L	736	Cb L/W	1.85	Capitulum vL	246	P1 rel L	0.12
Idiosoma W	589	Dist cb – gf	191	Capitulum dL	194	P2 rel L	0.32
Idiosoma L/W	1.25	Cx-I mL	118	Rostrum L	96	P3 rel L	0.17
Cx-I tL	265	Cx-II + III mL	59	Capitulum H	132	P4 rel L	0.32
Cx-III W	402	Cx-I tL/Cx-II/III mL	4.50	R L/c dL	0.49	P5 rel L	0.06
Cx-I tL/Cx-III W	0.66	Cx-I/Cx-II + III mL	2.00	R L/c vL	0.39	P1 H	37
Ds L	618	Genital field L	184	Gn bend depth	18	P2 H	49
Dp L	579	Gf L/Cx-II + III mL	3.13	Chelicera H	32	P3 H	43
Ds W	456	Genital field W	147	Chelicera claw L	61	P4 H	29
Ds L/W	1.35	Genital field L/W	1.25	P1 dorsal L	34	P5 H	12
Dp L/W	1.27	Gf L/Id L	0.25	P2 dL	88	P1 L/H	0.93
A-m platelet L	137	Gf L/dist cb – gf	0.96	P3 dL	48	P2 L/H	1.80
A-m platelet W	56	Dist gf – expo	91	P4 dL	88	P3 L/H	1.11
A-m platelet L/W	2.43	Dist gf – cauda	208	P5 dL	17	P4 L/H	3.00
A-l platelet L	184	Gs L	240	Palp total L	276	P5 L/H	1.40
A-l platelet W	64	Gs aL	136	P4 vL	69	P2/P4 L	1.00
A-m pl L/a-l pl L	0.75	Gs W	162	P4 vL to seta	39	P3/P4 L	0.54
Capitular bay L	152	Gs aL/tL	0.57	P4 vL/L to seta	1.75		
Capitular bay W	82	Gs tL/W	1.48				

Table 34. Measurements (μm) of *Torrenticola cortobrazo*; $N = 1$ (female, holotype)

Idiosoma L	687	Capitular bay W	51	R L/c dL	0.42	P1 rel L	0.15
Idiosoma W	471	Cb L/W	2.81	R L/c vL	0.28	P2 rel L	0.30
Idiosoma L/W	1.46	Dist cb – gf	159	Gn bend depth	12	P3 rel L	0.22
Cx-I tL	270	Cx-I mL	120	Chelicera L	299	P4 rel L	0.27
Cx-III W	270	Cx-II + III mL	39	Chelicera H	25	P5 rel L	0.05
Cx-I tL/Cx-III W	1.00	Cx-I tL/Cx-II/III mL	6.88	Chelicera L/H	12.20	P1 H	29
Ds L	549	Cx-I/Cx-II + III mL	3.06	Chelicera bs L	247	P2 H	37
Dp L	530	Genital field L	160	Chelicera claw L	51	P3 H	33
Ds W	378	Gf L/Cx-II + III mL	4.09	Chel bs/claw L	4.81	P4 H	21
Ds L/W	1.45	Genital field W	137	P1 dorsal L	27	P5 H	10
Dp L/W	1.40	Genital field L/W	1.17	P2 dL	54	P1 L/H	0.92
A-m platelet L	108	Gf L/Id L	0.23	P3 dL	39	P2 L/H	1.47
A-m platelet W	40	Dist gf – expo	123	P4 dL	49	P3 L/H	1.19
A-m platelet L/W	2.67	Dist gf – cauda	223	P5 dL	10	P4 L/H	2.35
A-l platelet L	154	Capitulum vL	233	Palp total L	179	P5 L/H	1.00
A-l platelet W	50	Capitulum dL	158	P4 vL	32	P2/P4 L	1.10
A-m pl L/a-l pl L	0.70	Rostrum L	66	P4 vL to seta	23	P3/P4 L	0.80
Capitular bay L	145	Capitulum H	103	P4 vL/L to seta	1.37		

slightly convex lateral margins, slightly tapering to rounded caudal margin; posterior margin of Cx-IV clearly developed, curved from posterior of genital field further caudal to postero-lateral of genital field; excretory pore far anterior of Vgl-2, posterior to flat indentation of primary sclerotization; pore and glands in very extended area of secondary sclerotization (Fig. 72A); capitulum basely high, ventro-caudal apodeme elongated, ventral margin basely straight with sharp bend, towards rostrum sigmoid curved; rostrum mid-sized, basely high; chelicera basely

straight, elongated; palps very short, compact; ventral projections of P2/P3 small, cone-shaped pointed, P2 compact (L/H 1.47), P4 short, compact (L/H 2.35, P3/P4 0.80) (Fig. 72C, D).

Discussion: *Torrenticola cortobrazo* and *T. torpebrazo* are separated from the other species of this group due to their very short P4. Furthermore, *T. cortobrazo* is characterized by a slender coxal field, a deep and narrow capitular bay, a relatively short rostrum and long chelicera.

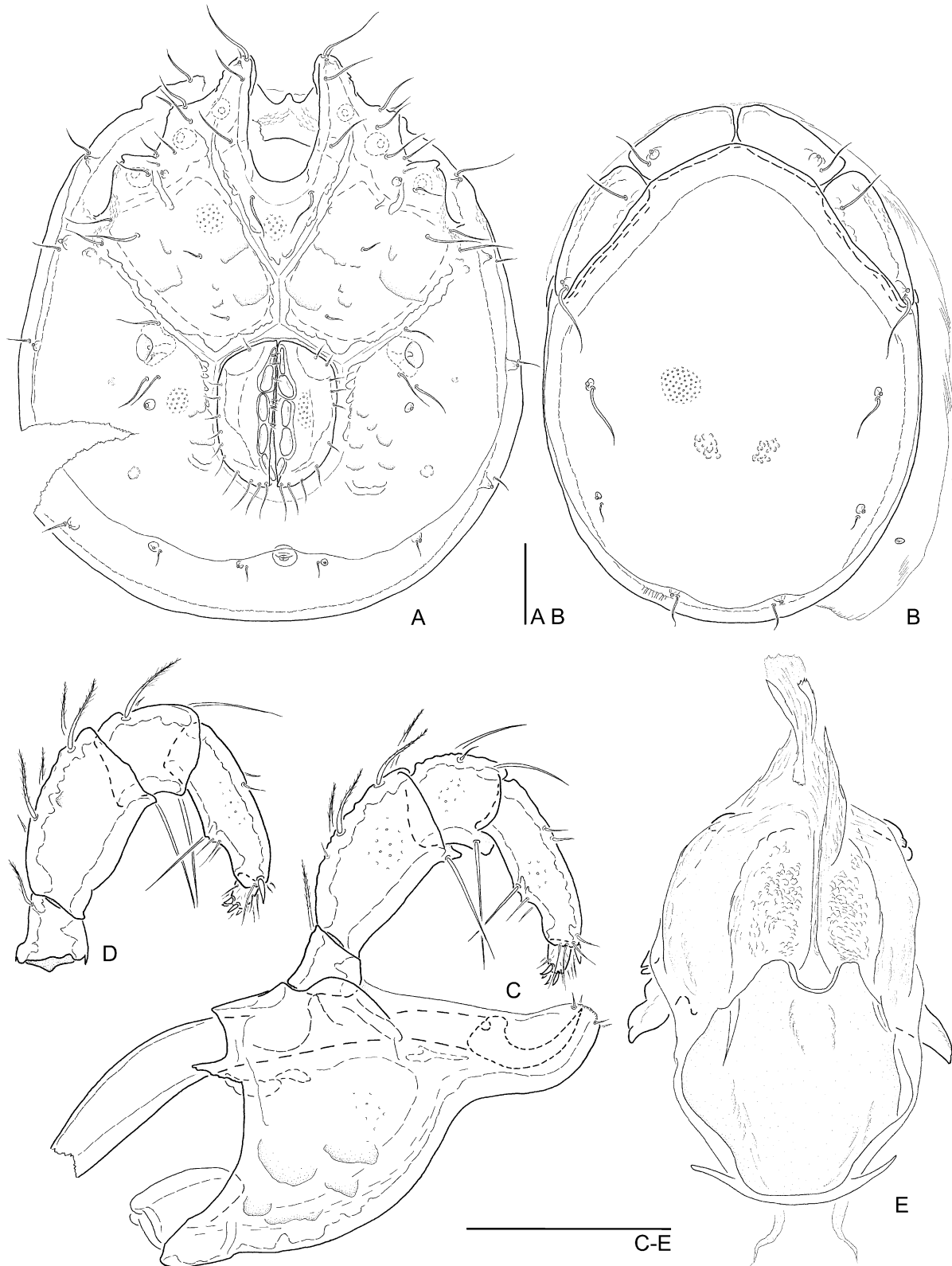


Figure 71. *Torrenticola corta*. A–E, holotype male (CR 96). A, idiosoma (slightly damaged in preparation), ventral view; B, idiosoma, dorsal view; C, capitulum with right palp (chelicera incomplete), lateral view; D, left palp, medial view; E, genital skeleton (apically damaged), anterior view. Scale bars = 100 μ m.

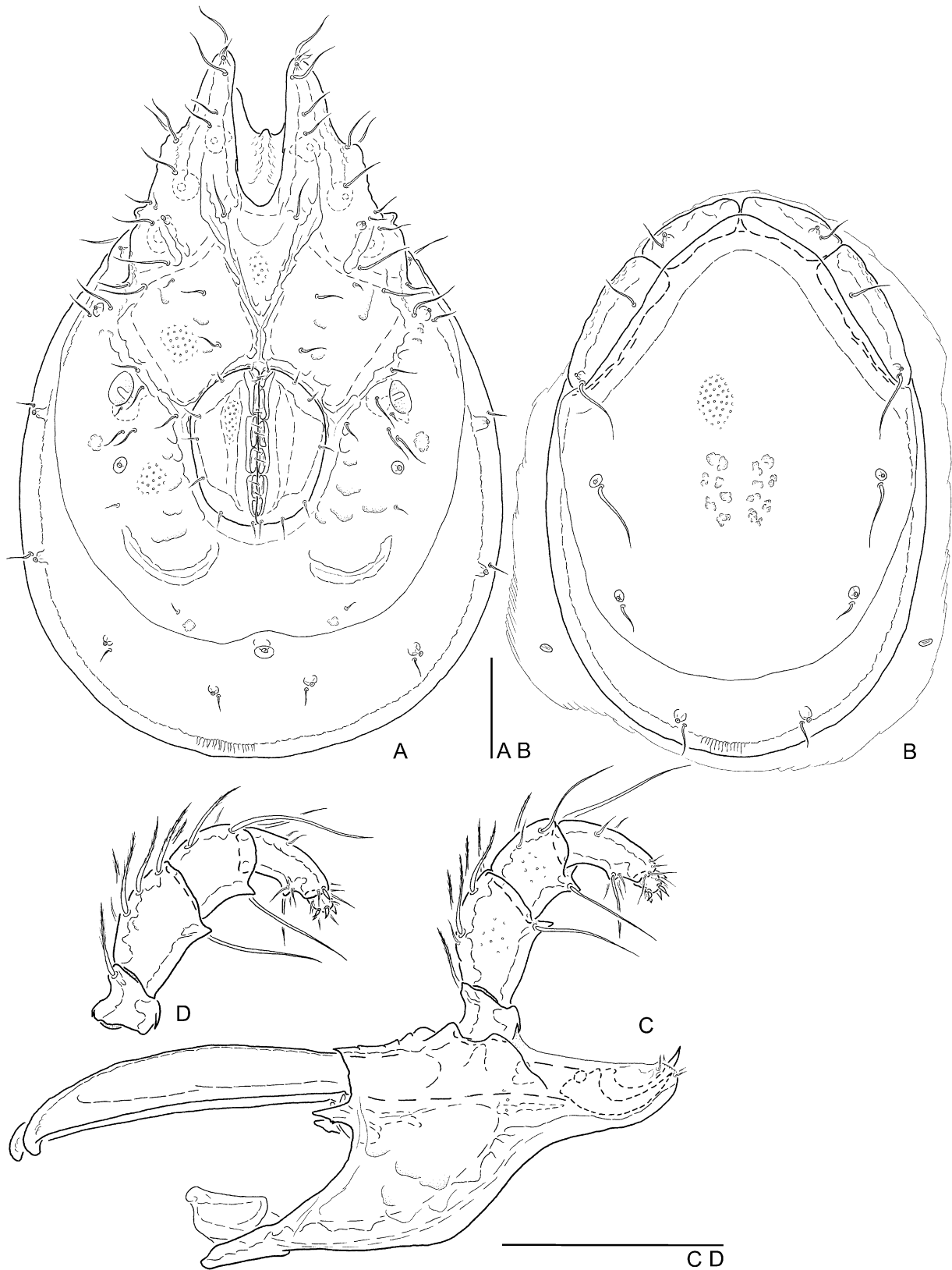


Figure 72. *Torrenticola cortobrazo*. A–D, holotype female (CR 286). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

TORRENTICOLA ESFERICA SP. NOV.

(FIG. 73A–E; TABLE 35)

Type series: Holotype male, CR 98, Cartago, Finca los Lagos, Río Macho, small stream, 2340 m asl, 28.vii.1995, mounted.

Habitat: Fast flowing small high mountain stream at 2340 m asl; lithophytal; temperature 12.8 °C; conductivity 21 µS cm⁻¹.

Distribution: Costa Rica (only known from type locality, central Cordillera de Talamanca).

Derivatio nominis: *esferica* (Spanish = spherical); referring to the rounded shape of the idiosoma.

Diagnosis: (only 1 male) Characters of the *columbiana*-like species; idiosoma rounded; dorsal plate rounded, pale reddish; antero-medial dorsal platelets relatively large; coxal field broad, Cx-I very short; genital field elongated; capitulum basely high with sharp bend, rostrum compact; P3 long and slender, P4 slender (longer than P2); genital skeleton apically relatively short, cella proximalis large.

Description – Male (*N* = 1): Idiosoma relatively large, round (apart from coxal field nearly circular) (L 775 µm, L/W 1.12); dorsal plate rounded (L/W 1.16), pale reddish; anterior dorsal platelets broad, antero-medial platelets nearly as long as antero-lateral ones (a-m/a-l pl L 0.89), medial margins of antero-medial platelets straight to convex, posterior margins straight to concave, oblique, antero-lateral platelets with straight anterior margins, posterior tapering,

rounded; Dgl-4 lateral to Dgl-5 (Fig. 73B); coxal field short and broad (Cx-I tL/Cx-III W 0.70), lateral margins graded, Cx-I tips very short, triangular, apically rounded, Cxgl-4 slightly posterior tips of Cx-I; capitular bay deep U-shaped, basely narrowing; medial margin of Cx-II/III short (Cx-I/Cx-II/III mL 2.70); posterior margin of Cx-IV slightly postero-lateral to genital field, straight across; genital field elongated, slender (L/W 1.33, gf L/Cx-II/III mL 3.39, gf L/Id L 0.25), anterior truncated, antero-lateral rounded, lateral margins in anterior half straight, posterior tapering towards rounded caudal margin; excretory pore between Vgl-2, glandularia and pore posterior primary sclerotization (Fig. 73A); genital skeleton apically relatively short, cella proximalis large, with strong, mid-sized processus proximalia (aL/tL 0.43), brachia distalia short, strong, directed postero-laterally, brachia proximalia long, strong, directed postero-laterally (Fig. 73E); capitulum high, ventro-caudally slightly elongated, ventral margin with sharp bend towards short, basely high rostrum (Fig. 73C); P2 < P4, ventral projection small cone-shaped, pointed, far distal, directed ventro-distally; P3 long and slender (L/H 1.51), ventral projection small cone-shaped, directed ventrally, P4 slender (L/H 3.67, P2/P4 0.91, P3/P4 0.64), distally curved, not tapering, ventral setae on flat hump, centrally (vL/L to seta 1.94) (Fig. 73C, D).

Female: Unknown.

Discussion: *Torrenticola esferica* and *T. ambigua* (see above) are separated from the other species of this

Table 35. Measurements (µm) of *Torrenticola esferica*; *N* = 1 (male, holotype)

Idiosoma L	775	Dist cb – gf	223	Rostrum L	123	P1 rel L	0.13
Idiosoma W	692	Cx-I mL	152	Capitulum H	148	P2 rel L	0.29
Idiosoma L/W	1.12	Cx-II + III mL	56	R L/c dL	0.54	P3 rel L	0.21
Cx-I tL	314	Cx-I tL/Cx-II/III mL	5.57	R L/c vL	0.41	P4 rel L	0.32
Cx-III W	446	Cx-I/Cx-II + III mL	2.70	Gn bend depth	15	P5 rel L	0.05
Cx-I tL/Cx-III W	0.70	Genital field L	191	Chelicera L	370	P1 H	42
Ds L	677	Gf L/Cx-II + III mL	3.39	Chelicera H	32	P2 H	51
Dp L	633	Genital field W	143	Chelicera L/H	11.62	P3 H	45
Ds W	544	Genital field L/W	1.33	Chelicera bs L	304	P4 H	29
Ds L/W	1.24	Gf L/Id L	0.25	Chelicera claw L	66	P5 H	11
Dp L/W	1.16	Gf L/dist cb – gf	0.86	Chel bs/claw L	4.59	P1 L/H	1.00
A-m platelet L	179	Dist gf – expo	135	P1 dorsal L	42	P2 L/H	1.90
A-m platelet W	66	Dist gf – cauda	206	P2 dL	98	P3 L/H	1.51
A-m platelet L/W	2.70	Gs L	294	P3 dL	69	P4 L/H	3.67
A-l platelet L	201	Gs aL	125	P4 dL	108	P5 L/H	1.56
A-l platelet W	71	Gs W	192	P5 dL	17	P2/P4 L	0.91
A-m pl L/a-l pl L	0.89	Gs aL/tL	0.43	Palp total L	333	P3/P4 L	0.64
Capitular bay L	162	Gs tL/W	1.53	P4 vL	81		
Capitular bay W	78	Capitulum vL	301	P4 vL to seta	42		
Cb L/W	2.06	Capitulum dL	225	P4 vL/L to seta	1.94		

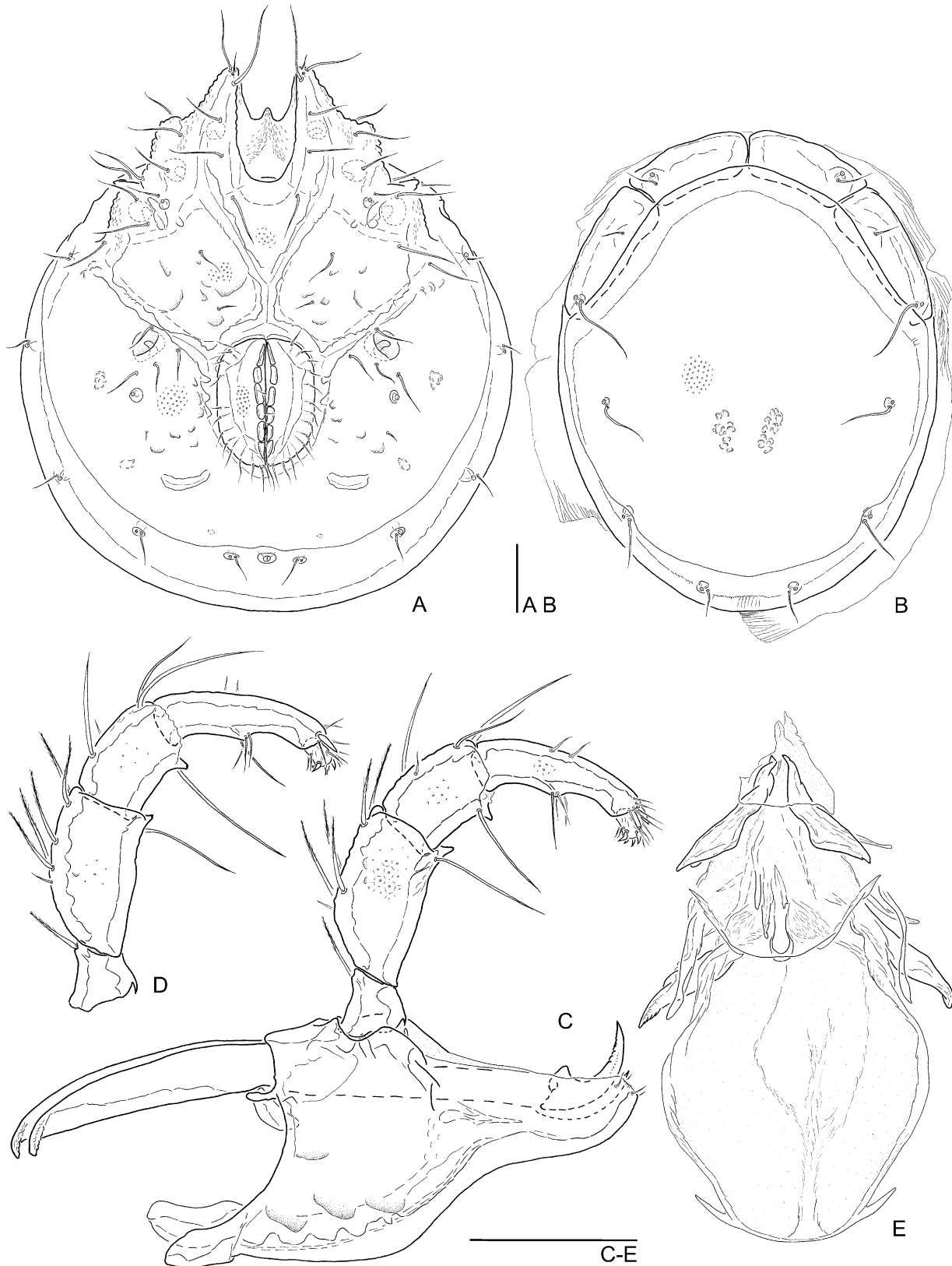


Figure 73. *Torrenticola esferica*. A–E, holotype male (CR 98). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

group by a rounded idiosoma. *Torrenticola esferica* is furthermore characterized by short triangular Cx-I tips, a compact rostrum and more slender P4.

***TORRENTICOLA ESQUINADA* SP. NOV.**

(FIG. 74A–E; TABLE 36)

Type series: Holotype male, CR 37, Alajuela, 4 km east Aguas Zarcas, Río Negritos, stream, 330 m asl, 30.vi.1995, mounted.

Habitat: Fast flowing stream at 330 m asl, mesolihal; temperature 24.0 °C; 41 µS cm⁻¹.

Distribution: Costa Rica (only known from type locality, Caribbean slope of Cordillera Central).

Derivatio nominis: *esquinado* (Spanish = edged); referring to the sharp ventral and especially lateral edge at the capitulum of this species.

Diagnosis: (only 1 male) Characters of the *columbiana*-like species; idiosoma small, rounded; dorsal plate with red patch in posterior half (Fig. 6C-4); coxal field laterally graded, Cx-II/III medial margin relatively short; capitular bay large, box-shaped; genital field large; genital skeleton apically long, cella proximalis relatively small, carina anterior high; basal part of capitulum high with lateral ridge, ventral margin with sharp bend towards rostrum; chelicera compact; palp compact, P2 = P4.

Description – Male (*N* = 1): Idiosoma rounded (L 549 µm, L/W 1.32); dorsal plate with crescent-shaped, pale red patch medio-caudal of Dgl-4 (Fig. 6C-4);

antero-medial dorsal platelets slender, anterior margins convex, posterior concave to straight, slightly oblique, anterior margins of antero-lateral platelets straight, posterior tapering, rounded; Dgl-4 slightly medial to Dgl-5 (Fig. 74B); lateral margins of coxal field graded, Cx-I tips relatively short, rounded, antero-medially pointed, Cxgl-4 at tips of Cx-I; capitular bay wide and deep U-shaped to box-shaped; medial margin of Cx-II/III short (Cx-I/Cx-II/III mL 2.13, gf L/Cx-II/III mL 2.61); posterior margin of Cx-IV laterally besides caudal end of genital field, merely visible; genital field relatively large (gf L/Id L 0.27), rectangular-oval, slightly diverging caudally, anterior truncated, sharp edges towards +/- straight lateral margins, posterior rounded; excretory pore between Vgl-2 (close together), pore and glands slightly posterior primary sclerotization (Fig. 74A); genital skeleton apically long (aL/tL 0.66), carina anterior high vaulted, carina posterior large, brachia distalia and proximalia slender, cella proximalis relatively small, mid-sized processus proximalia (Fig. 74E); capitulum basely high, ventral margin bellied, with deep curved bend to short rostrum, at base of rostrum sharp lateral ridge (Fig. 74C); chelicera relatively compact (L/H 10.80); palp short, compact; P2 slightly longer than P4; ventral projections of P2 and P3 short cone-shaped; P4 compact (L/H 3.00), bowed, distally tapering, ventral setae on small two-pointed hump, slightly distally (Fig. 74C, D).

Female: Unknown.

Discussion: The species is characterized by a sharp lateral ridge and clear ventral bend at the capitulum,

Table 36. Measurements (µm) of *Torrenticola esquinada*; *N* = 1 (male, holotype)

Idiosoma L	549	Cb L/W	1.81	Rostrum L	91	P1 rel L	0.10
Idiosoma W	417	Dist cb – gf	184	Capitulum H	107	P2 rel L	0.34
Idiosoma L/W	1.32	Cx-I mL	120	R L/c dL	0.54	P3 rel L	0.18
Cx-I tL	250	Cx-II + III mL	56	R L/c vL	0.43	P4 rel L	0.31
Cx-III W	284	Cx-I tL/Cx-II/III mL	4.44	Gn bend depth	20	P5 rel L	0.06
Cx-I tL/Cx-III W	0.88	Cx-I/Cx-II + III mL	2.13	Chelicera L	265	P1 H	32
Ds L	461	Genital field L	147	Chelicera H	25	P2 H	49
Dp L	441	Gf L/Cx-II + III mL	2.61	Chelicera L/H	10.80	P3 H	40
Ds W	368	Genital field W	110	Chelicera bs L	218	P4 H	25
Ds L/W	1.25	Genital field L/W	1.33	Chelicera claw L	47	P5 H	10
Dp L/W	1.20	Gf L/Id L	0.27	Chel bs/claw L	4.68	P1 L/H	0.77
A-m platelet L	108	Gf L/dist cb – gf	0.80	P1 dorsal L	25	P2 L/H	1.63
A-m platelet W	33	Dist gf – expo	69	P2 dL	80	P3 L/H	1.06
A-m platelet L/W	3.26	Dist gf – cauda	96	P3 dL	43	P4 L/H	3.00
A-l platelet L	135	Gs L	214	P4 dL	74	P5 L/H	1.50
A-l platelet W	49	Gs aL	142	P5 dL	15	P2/P4 L	1.08
A-m pl L/a-l pl L	0.80	Gs aL/tL	0.66	Palp total L	235	P3/P4 L	0.58
Capitular bay L	129	Capitulum vL	213	P4 vL	58		
Capitular bay W	71	Capitulum dL	168	P4 vL to seta	31		
				P4 vL/L to seta	1.88		

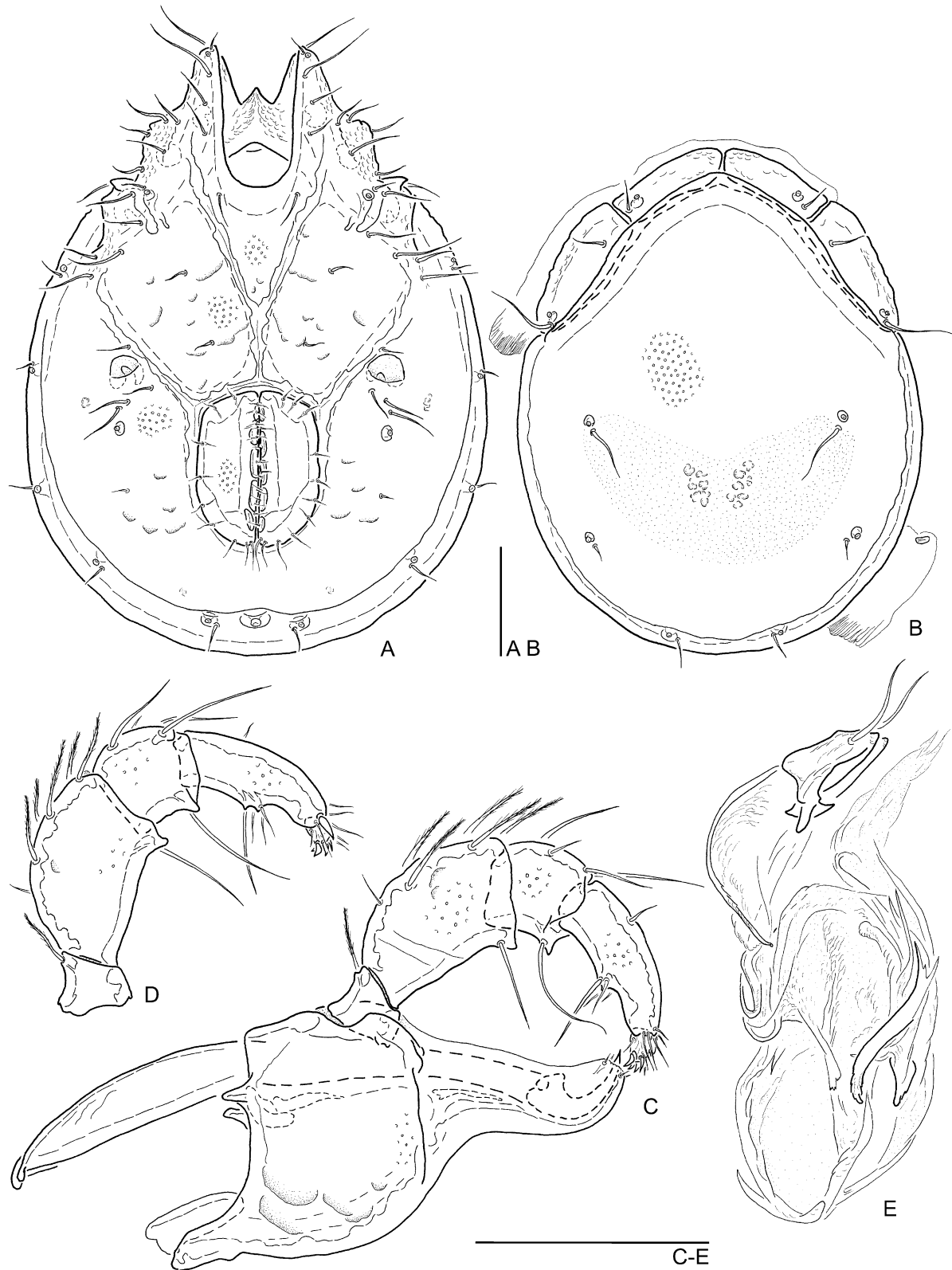


Figure 74. *Torrenticola esquinada*. A–E, holotype male (CR 37). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 μ m.

and on the basis of a small idiosoma and a large genital field. *Torrenticola esquinada* represents one of the very few rare species found at low elevations, and the only singleton from the foothills at the Caribbean slope of Costa Rica.

***TORRENTICOLA FASTIGATA* SP. NOV.**

(FIG. 75A–E; TABLE 37)

Type series: Holotype male, CR 175, San José, NP Chirripó, Valle de los Leones, Río Terbi, small stream, 3100 m asl, 15.iii.1996, mounted; paratype: same date and locality, 1/0/0 mounted.

Additional specimens examined: CR 96, San José, 10 km south-east Salsipuedes, below Cabinas Quetzales, Río Savegre, stream, 2160 m asl, 28.vii.1995, 1/0/0 mounted, 1/0/0 unmounted; CR 98, Cartago, Finca Los Lagos, Río Macho, small stream, 2340 m asl, 28.vii.1995, 4/0/0 mounted, 1/1/0 unmounted.

Habitat: Fast flowing small streams and one stream at 2160–3100 m asl; lithophytal, mesolital; temperature 10.7–12.8 °C; conductivity 21–84 µS cm⁻¹.

Distribution: Costa Rica (central Cordillera de Talamanca).

Table 37. Measurements (µm) of *Torrenticola fastigata*; *N* = 6 (male)

	ht	mean	min.	max.	SD		ht	mean	min.	max.	SD
Idiosoma L	819	797	687	819	48.3	Capitulum vL	306	309	299	331	12.0
Idiosoma W	579	574	491	638	47.1	Capitulum dL	227	228	221	250	10.2
Idiosoma L/W	1.42	1.39	1.27	1.42	0.1	Rostrum L	120	123	119	130	4.5
Cx-I tL	309	311	294	338	16.6	Capitulum H	140	137	118	149	10.5
Cx-III W	392	380	343	417	24.2	R L/c dL	0.53	0.53	0.52	0.55	0.01
Cx-I tL/Cx-III W	0.79	0.83	0.79	0.87	0.03	R L/c vL	0.39	0.39	0.39	0.41	0.01
Ds L	677	672	559	687	50.9	Gn bend depth	22	25	17	26	3.1
Dp L	643	638	520	652	51.5	Chelicera L	355	363	353	392	14.3
Ds W	491	486	422	520	32.5	Chelicera H	31	30	27	32	1.7
Ds L/W	1.38	1.35	1.27	1.42	0.1	Chelicera L/H	11.60	12.27	11.31	13.33	0.8
Dp L/W	1.31	1.28	1.22	1.34	0.1	Chelicera bs L	294	304	294	328	12.3
A-m platelet L	125	132	125	147	9.4	Chelicera claw L	61	61	56	64	2.5
A-m platelet W	59	56	51	59	3.0	Chel bs/claw L	4.80	5.11	4.80	5.26	0.2
A-m platelet L/W	2.13	2.54	2.13	2.61	0.2	P1 dorsal L	37	37	34	39	1.5
A-l platelet L	213	206	176	218	15.5	P2 dL	108	107	99	110	4.1
A-l platelet W	71	71	61	76	5.1	P3 dL	60	59	56	64	2.4
A-m pl L/a-l pl L	0.59	0.67	0.59	0.75	0.1	P4 dL	93	96	93	103	4.3
Capitular bay L	164	169	159	176	6.9	P5 dL	17	17	17	17	0.00
Capitular bay W	93	86	81	93	4.1	Palp total L	315	313	305	333	10.3
Cb L/W	1.76	1.96	1.76	2.12	0.1	P4 vL	69	72	69	78	4.3
Dist cb – gf	252	247	223	270	16.4	P4 vL to seta	43	44	42	49	2.7
Cx-I mL	142	141	130	162	11.2	P4 vL/L to seta	1.60	1.64	1.60	1.68	0.04
Cx-II + III mL	96	93	83	100	6.8	P1 rel L	0.12	0.12	0.11	0.12	0.00
Cx-I tL/Cx-II/III mL	3.23	3.45	3.23	3.71	0.2	P2 rel L	0.34	0.34	0.33	0.34	0.01
Cx-I/Cx-II + III mL	1.49	1.57	1.49	1.65	0.1	P3 rel L	0.19	0.19	0.18	0.19	0.00
Genital field L	211	202	179	218	13.2	P4 rel L	0.30	0.31	0.30	0.32	0.01
Gf L/Cx-II + III mL	2.21	2.19	2.09	2.38	0.1	P5 rel L	0.05	0.05	0.05	0.06	0.00
Genital field W	157	154	137	162	8.6	P1 H	42	39	34	42	2.7
Genital field L/W	1.34	1.33	1.29	1.38	0.03	P2 H	56	56	54	59	1.8
Gf L/Id L	0.26	0.26	0.25	0.27	0.01	P3 H	48	49	47	50	1.8
Gf L/dist cb – gf	0.83	0.82	0.77	0.85	0.03	P4 H	32	32	29	32	1.0
Dist gf – expo	145	116	96	145	19.2	P5 H	12	12	12	12	0.00
Dist gf – cauda	201	166	123	201	26.9	P1 L/H	0.88	0.94	0.88	1.00	0.04
Gs L	274	289	252	309	21.1	P2 L/H	1.91	1.90	1.80	1.91	0.04
Gs aL	172	174	167	196	13.4	P3 L/H	1.26	1.23	1.17	1.27	0.05
Gs W	167	158	147	206	27.2	P4 L/H	2.92	3.10	2.92	3.33	0.2
Gs aL/tL	0.63	0.63	0.59	0.66	0.03	P5 L/H	1.40	1.40	1.40	1.40	0.00
Gs tL/W	1.65	1.76	1.46	2.10	0.3	P2/P4 L	1.16	1.10	1.01	1.16	0.1
						P3/P4 L	0.64	0.63	0.58	0.64	0.03

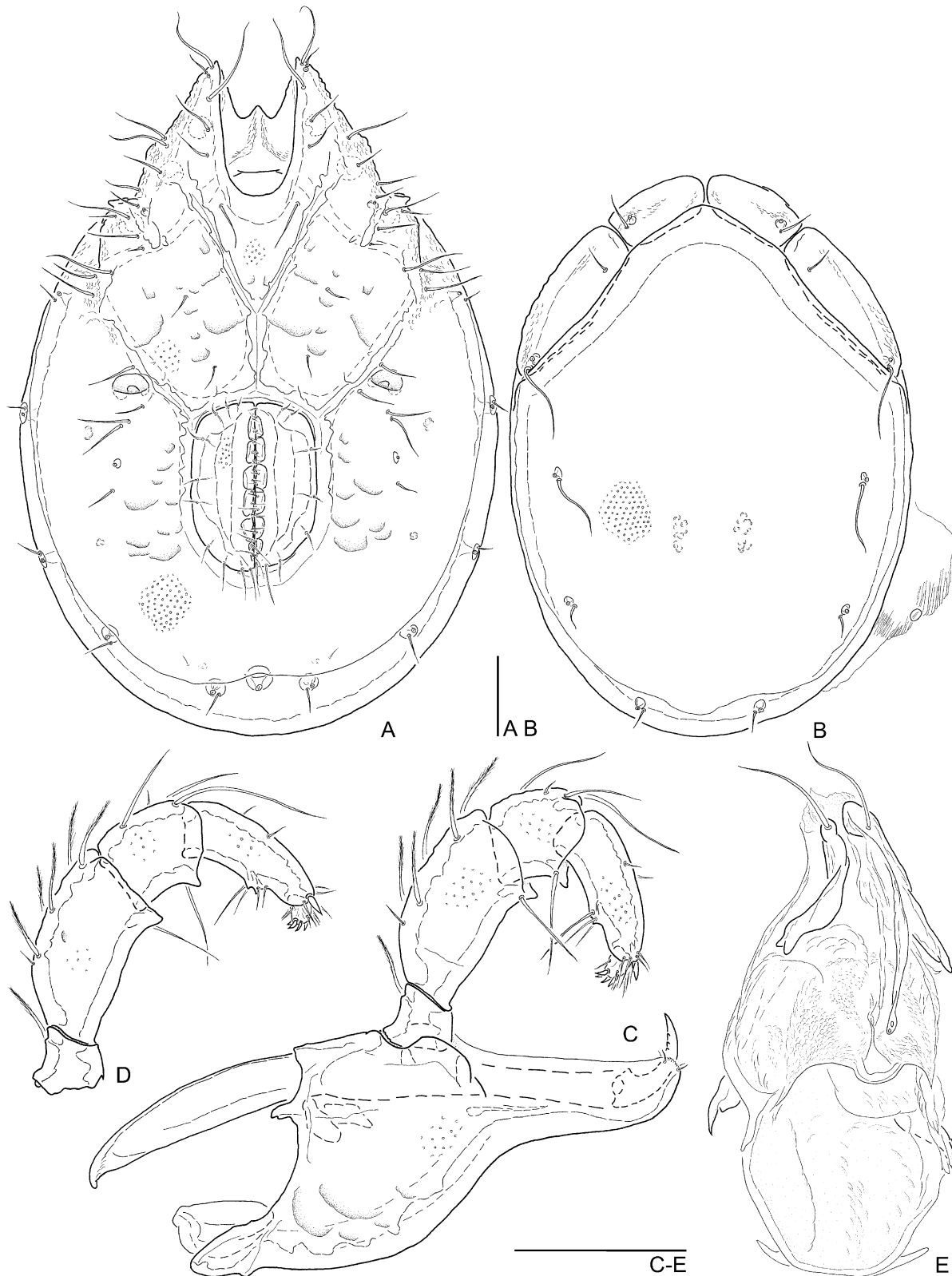


Figure 75. *Torrenticola fastigata*. A–E, holotype male (CR 175). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

Derivatio nominis: *fastigatus* (Latin = pointed); referring to the pointed tips of the Cx-I.

Diagnosis: Characters of the *columbiana*-like species; idiosoma large, oval; dorsal plate pale reddish; coxal field laterally smooth, Cx-I tips sharp pointed, medial margin Cx-II/III long; genital field elongated; genital skeleton apically relatively long, cella proximalis mid-sized; rostrum relatively slender; P4 short, ventral setae on P4 relatively far in distal half.

Description – Male ($N = 7$): Idiosoma elongated-oval [L 819 (687–809), L/W 1.42 (1.27–1.41)]; dorsal plate yellow to very pale reddish; antero-medial dorsal platelets short, medial rounded, posterior \pm straight, antero-lateral platelets long, anterior convex, posterior tapering, pointed [a-m/a-l pl L 0.59 (0.66–0.75)]; Dgl-4 slightly lateral to Dgl-5 (Fig. 75B); coxal field laterally smooth (especially Cx-I/II only with very flat lateral corner), Cx-I nearly triangular, tips sharp pointed; Cxgl-4 postero-lateral of Cx-I tips; capitular bay \pm U-shaped; medial margin of Cx-II/III relatively long [Cx-I/Cx-II/III mL 1.49 (1.51–1.65), gf L/Cx-II/III mL 2.21 (2.09–2.38)]; posterior margin of Cx-IV very small, merely visible, besides genital field (anterior to caudal end); genital field relatively long, rectangular-oval, anterior flat truncated, sharp edges towards straight lateral margins, posterior tapering [rel L 0.26 (0.25–0.27), L/W 1.34 (1.29–1.38)]; excretory pore between Vgl-2, pore and glands slightly under caudal margin of primary sclerotization (Fig. 75A); genital skeleton apically mid-sized to long [aL/tL 0.63 (0.59–0.66)], brachia distalia and proximalia well developed, cella proximalis mid-sized, with small processus proximalia (Fig. 75E); ventral margin of capitulum sigmoid curved with clear bend towards rostrum, basely high, distally tapering; basal segment of cheliceral claw relatively long [basal segment/claw L 4.80 (5.04–5.26)]; palp relatively compact; P2 > P4, ventral projections of P2/P3 cone-shaped, strong; P4 relatively short, compact, distally tapering [rel L 0.30 (0.30–0.32), L/H 2.92 (2.92–3.33)], setae on ventral margin on two-pointed hump in distal half [vL/L to seta 1.60 (1.60–1.68)] (Fig. 75C, D).

Female: Unknown.

Discussion: Due to the laterally smooth coxal field, sharp Cx-I tips and a large genital field, *T. fastigata* is clearly distinct from other species of the *columbiana*-like group.

***TORRENTICOLA FLAVESCENS* K.O. VIETS, 1977**
(FIGS 76A–H, 77; TABLE 38)

Type series: Holotype male, Guatemala, south-east Cobán near San Juan Chamelco, Río Chilax, 1300 m

asl, 13.viii.1974, leg. Böttger, prep. no. 5849 SMF; allotype female, same locality, 14.viii.1974, leg. Böttger, prep. no. 5872 SMF; paratypes, leg. Böttger, same locality, 12.viii.1974, 5/3/0 (0/1/0 mounted), prep. no. 5953 SMF; same locality, 13.viii.1974, 2/0/0 mounted, prep. no. 5850, 5851 SMF; same locality, 14.viii.1974, 1/0/0.

Further material: Guatemala, leg. Böttger: south Cobán, Río Cahabón, headwaters between Tactic and Purulhá, 11.vii.1974, 0/1/0.

Habitat: Small mountain streams.

Geographical distribution: Guatemala.

Published records: K.O. Viets (1977/78 Teil II).

Diagnosis: Characters of the *columbiana*-like species; idiosoma rounded-oval (Fig. 76A); dorsal plate yellowish (Fig. 76B); genital field of male relatively small (gf L/Cx-II/III mL 1.33–1.48), genital field of female slightly rhombic (Fig. 76F); ventral margin of capitulum relatively flat sigmoid, rostrum basely high (Fig. 76D, G); P2 about same length as P4 (P2/P4 L 0.97–1.00) (Fig. 76E, H).

Description: See K.O. Viets (1977/78 Teil II).

Discussion: *Torrenticola flavescens* and *T. semicolor* are characterized by a short genital field and a typical structure of the genital skeleton (weakly developed scleritum proximale mediale, with fine tip). The two species are very similar, but *T. flavescens* is separated from the latter by a more rounded-oval idiosoma and a wider capitular bay.

***TORRENTICOLA RAPIDENSIS* SP. NOV.**

(FIGS 78A–E, 79A–D, 80A–D; TABLE 39)

Type series: Holotype male, CR 96, San José, 10 km south-east Salsipuedes, below Cabinas Quetzales, Río Savegre, stream, 2160 m asl, 28.vii.1995, mounted; paratype, same locality and date, 3/0/0 mounted, 3/7/0 unmounted.

Additional specimens examined: CR 95, San José, 10 km south-east Salsipuedes, Río Savegre valley, Quebrada de Ojo de Agua, small stream, 2340 m asl, 27.vii.1995, 4/3/0 mounted, 2/9/0 unmounted; CR 98, Cartago, Río Macho, small stream, 2340 m asl, 28.vii.1995, 1/0/0 mounted, 3/6/0 unmounted; CR 157, Cartago, NP Tapanti, Río Badilla, small stream, 1540 m asl, 06.iii.1996, 2/0/0 mounted, 2/2/0 unmounted.

Habitat: Fast flowing small streams and streams in high mountains at 1540–2340 m asl; mesolithal, lithophytal, macrolithal; temperature 11.2–14.3 °C; conductivity 21–83 $\mu\text{S cm}^{-1}$.

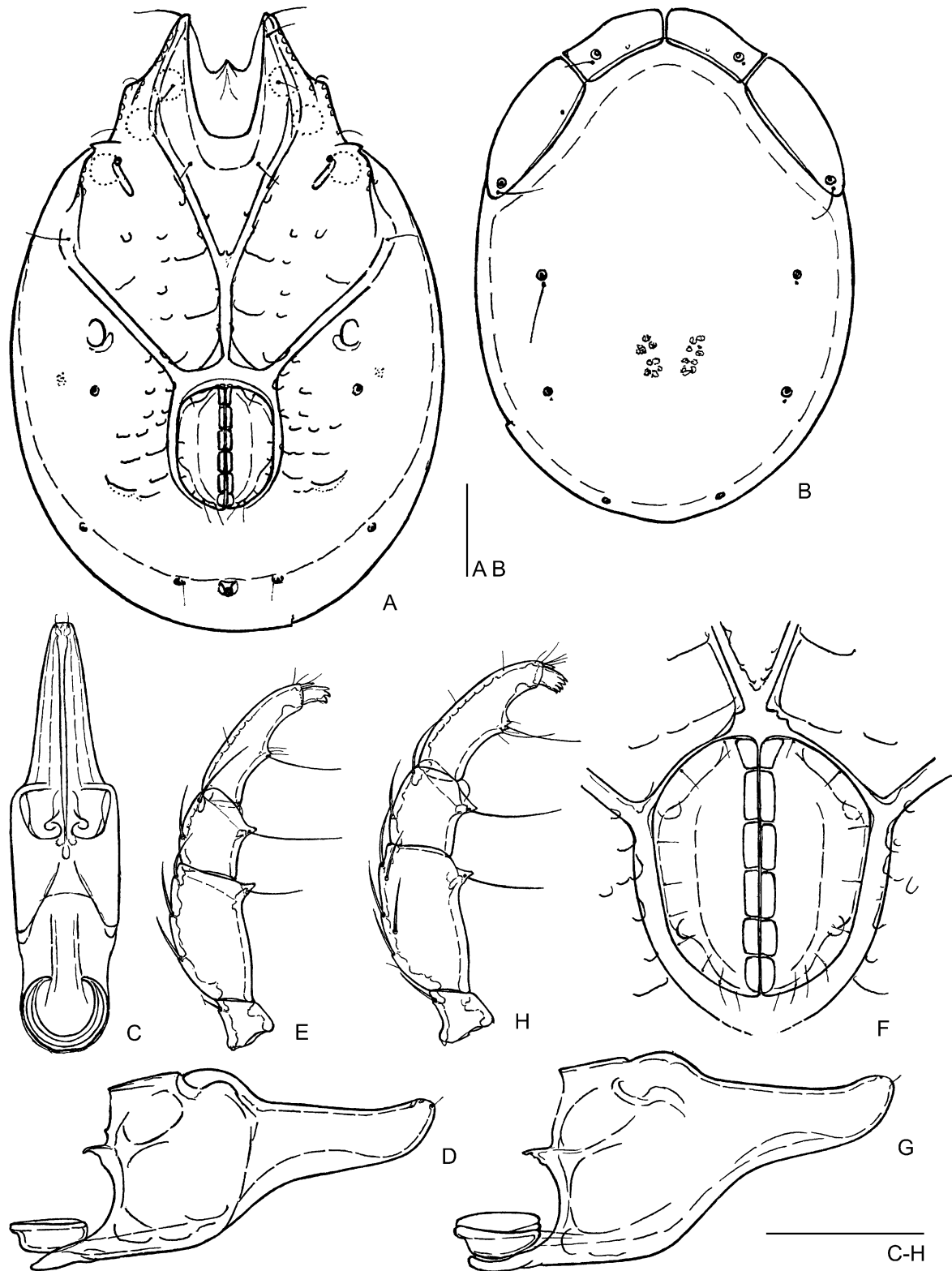


Figure 76. *Torrenticola flavescens*. A, B, C, E, holotype male, prep. no. 5849 SMF Viets collection; D, paratype, male, prep. no. 5955 SMF Viets collection; F, H, allotype female, prep. no. 5872 SMF Viets collection; G, paratype, female, prep. no. 5959 SMF Viets collection; after K.O. Viets (1977/78, Teil II). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, dorsal view; D, G, capitulum, lateral view; E, left palp; F, genital field; H, right palp. Scale bars = 100 µm.



Figure 77. *Torrenticola flavescens*. Paratype male, prep. no. 5851 SMF Viets collection. Genital skeleton, anterior view. Scale bar = 100 μ m.

Distribution: Costa Rica (northern and central Cordillera de Talamanca).

Derivatio nominis: *rápido* (Spanish = rapids); as all sample sites of the species are fast flowing mountain streams.

Diagnosis: Characters of the *columbiana*-like mites; idiosoma large, elongated-oval; dorsal shield elongated, yellowish; coxal field laterally graded, capitular bay wide, basely rounded, Cx-I apically truncated, Cx-II/III medially long, genital field mid-sized; genital skeleton broad, apical part relatively long, cella proximalis small; rostrum relatively slender; P2 and P4 of equal length.

Description – Male ($N = 11$): Idiosoma elongated-oval [L 804 μ m (785–863 μ m), L/W 1.44 (1.34–1.49)], with slight, rounded ‘shoulders’ (Fig. 78A); dorsal shield slender [L/W 1.53 (1.39–1.55)], lateral margins nearly parallel, yellowish; antero-medial dorsal platelets medial convex, posterior convex or straight, slightly oblique, antero-lateral platelets anterior convex, posterior tapering, rounded, clearly longer than

Table 38. Measurements (μ m) of *Torrenticola flavescens*; $N = 3$ (male), 2 (female). The measurements not given in the original descriptions (K.O. Viets, 1977/78 Teil II) as far as possible were completed by new measurements of the preparations of the type specimens (SMF, Viets collection)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	687	643	569	687	59.5	731	726	736	6.9
Idiosoma W	486	446	441	486	24.2	525	520	530	6.9
Idiosoma L/W	1.41	1.41	1.29	1.44	0.1	1.39	1.39	1.40	0.01
Cx-I tL	280	270	255	280	12.3	280	275	284	6.9
Cx-III W	324	314	309	324	7.5	331	329	334	3.5
Cx-I tL/Cx-III W	0.86	0.86	0.83	0.86	0.02	0.84	0.84	0.85	0.01
Ds L	559	505	500	559	32.7	589	579	598	13.9
Dp L	530	471	461	530	37.1	552	544	559	10.4
Ds W	432	392	383	432	26.0	456	451	461	6.9
Ds L/W	1.30	1.30	1.29	1.31	0.01	1.29	1.28	1.30	0.01
Dp L/W	1.23	1.21	1.20	1.23	0.01	1.21	1.21	1.21	0.00
A-m platelet L	115	115	115	120	2.8	127	125	129	2.6
A-m platelet W	49	49	49	51	1.4	54	54	54	0.00
A-m platelet L/W	2.35	2.35	2.33	2.35	0.01	2.35	2.32	2.39	0.05
A-l platelet L	179	162	159	179	10.7	167	165	169	2.6
A-l platelet W	67	61	56	67	5.5	69	67	71	2.6
A-m pl L/a-l pl L	0.64	0.71	0.64	0.75	0.1	0.76	0.76	0.76	0.00
Capitular bay L	135	135	131	135	2.1	145	140	149	6.9
Capitular bay W	74	72	70	74	1.9	80	80	80	0.00
Cb L/W	1.83	1.86	1.83	1.88	0.02	1.82	1.75	1.88	0.1
Dist cb – gf	265	247	236	265	14.2	159	157	162	3.5
Cx-I mL	147	135	130	147	8.8	138	137	140	1.7
Cx-II + III mL	110	108	98	110	6.5	17	15	20	3.5
Cx-I tL/Cx-II/III mL	2.54	2.54	2.37	2.75	0.2	16.68	14.01	19.35	3.8

Table 38. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Cx-I/Cx-II + III mL	1.33	1.33	1.20	1.38	0.1	8.25	7.00	9.50	1.8
Genital field L	148	145	143	148	2.6	169	167	172	3.5
Gf L/Cx-II + III mL	1.34	1.34	1.33	1.48	0.1	10.08	8.50	11.67	2.2
Genital field W	111	110	103	111	4.6	144	141	147	4.3
Genital field L/W	1.33	1.33	1.31	1.39	0.04	1.18	1.13	1.22	0.1
Gf L/Id L	0.22	0.22	0.22	0.25	0.02	0.23	0.23	0.24	0.01
Gf L/dist cb – gf	0.56	0.58	0.56	0.61	0.03	1.06	1.03	1.09	0.04
Dist gf – expo	96	80	51	96	22.3	163	162	164	1.7
Dist gf – cauda	138	132	126	138	8.7	260	247	272	17.3
Gs L	235	235	230	236	3.2				
Gs aL	118	100	100	118	9.9				
Gs W	123	115	109	123	6.7				
Gs aL/tL	0.50	0.44	0.42	0.50	0.04				
Gs tL/W	1.92	2.00	1.92	2.17	0.1				
Capitulum vL	255	235	233	255	12.1	261	250	272	15.6
Capitulum dL	208	196	196	208	7.1	224	206	243	26.0
Rostrum L	99	99	96	105	5.0	110	110	110	0.00
R L/c dL	0.48	0.49	0.48	0.54	0.03	0.50	0.45	0.54	0.06
R L/c vL	0.39	0.41	0.39	0.45	0.03	0.42	0.41	0.44	0.03
Chelicera L	316	314	311	316	3.5	355	353	358	3.5
Chelicera H	25	25	25	26	0.9	26	25	27	1.7
Chelicera L/H	12.90	12.50	12.10	12.90	0.6	13.84	13.27	14.40	0.8
Chelicera bs L	260	258	257	260	1.7	292	289	294	3.5
Chelicera claw L	56	55	54	56	1.7	64	64	64	0.00
Chel bs/claw L	4.61	4.69	4.61	4.77	0.1	4.58	4.54	4.62	0.1
P1 dorsal L	33	32	32	33	0.9	35	34	36	0.9
P2 dL	91	87	86	91	2.6	96	93	98	3.5
P3 dL	51	51	51	51	0.0	55	53	56	2.6
P4 dL	91	87	87	91	2.1	98	96	100	3.5
P5 dL	17	17	16	17	0.7	18	17	20	1.7
Palp total L	283	273	241	283	21.8	301	294	309	10.4
P4 vL	72	66	66	72	3.5	74	71	76	3.5
P4 vL to seta	37	33	28	37	4.3	39	37	42	3.5
P4 vL/L to seta	1.97	2.00	1.97	2.35	0.2	1.88	1.82	1.93	0.1
P1 rel L	0.12	0.12	0.12	0.12	0.00	0.12	0.11	0.12	0.01
P2 rel L	0.32	0.32	0.32	0.36	0.02	0.32	0.32	0.32	0.00
P3 rel L	0.18	0.19	0.18	0.21	0.02	0.18	0.18	0.18	0.00
P4 rel L	0.32	0.32	0.32	0.36	0.02	0.33	0.33	0.33	0.00
P5 rel L	0.06	0.06	0.06	0.07	0.01	0.06	0.06	0.06	0.00
P1 H	34	33	32	34	1.7	37	37	38	0.9
P2 H	47	47	47	47	0.00	51	51	51	0.00
P3 H	39	38	38	39	0.7	40	39	42	1.7
P4 H	27	26	26	27	0.7	29	28	29	0.9
P5 H	11	11	10	12	1.2	12	12	12	0.00
P1 L/H	0.96	0.98	0.96	1.00	0.03	0.93	0.90	0.97	0.04
P2 L/H	1.95	1.87	1.84	1.95	0.1	1.86	1.81	1.90	0.1
P3 L/H	1.31	1.35	1.31	1.35	0.02	1.35	1.34	1.35	0.01
P4 L/H	3.36	3.38	3.36	3.38	0.01	3.40	3.39	3.42	0.02
P5 L/H	1.56	1.56	1.40	1.63	0.1	1.50	1.40	1.60	0.1
P2/P4 L	1.00	1.00	0.99	1.00	0.01	0.97	0.97	0.98	0.00
P3/P4 L	0.57	0.59	0.57	0.59	0.01	0.56	0.55	0.56	0.01

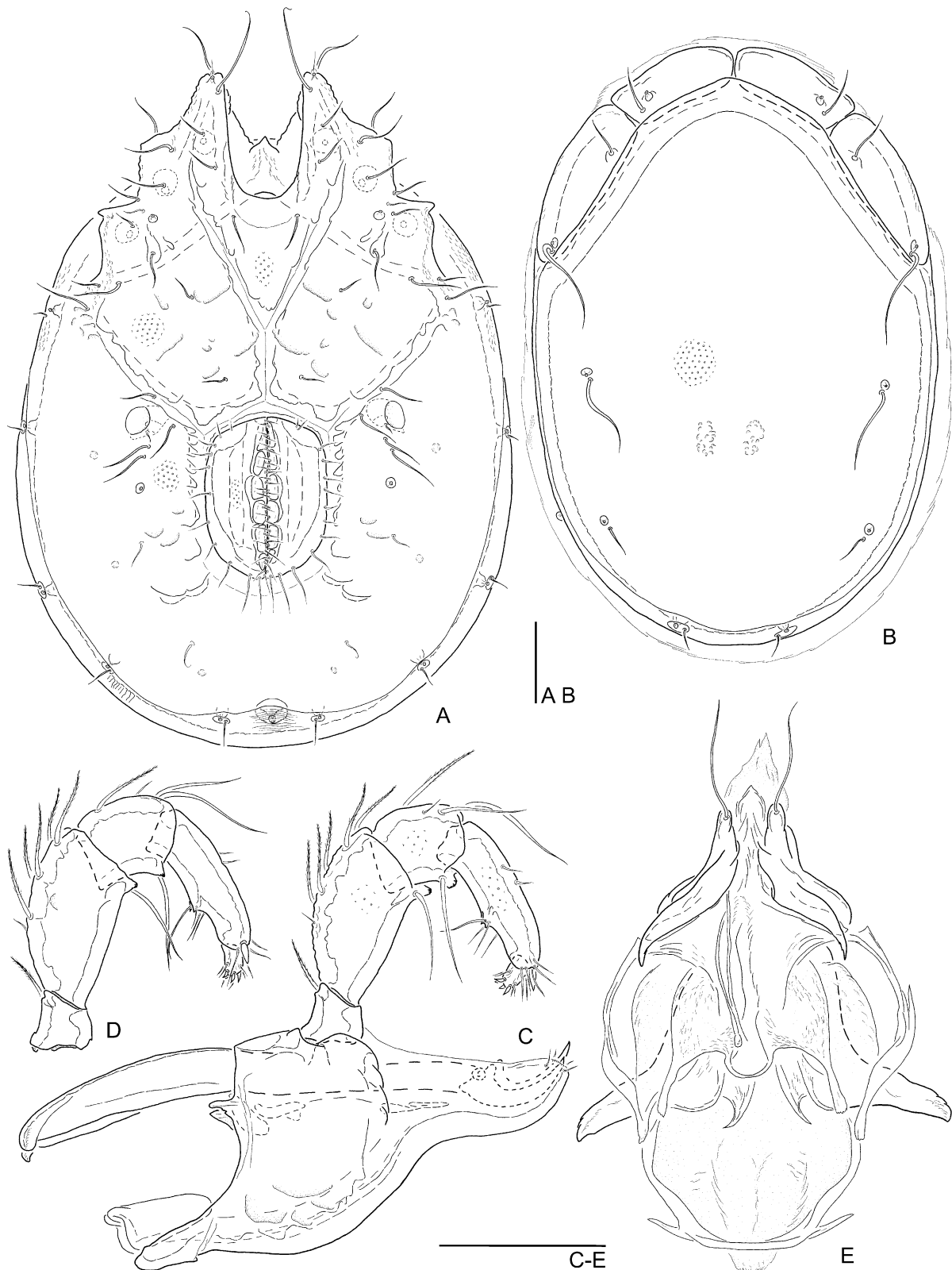


Figure 78. *Torrenticola rapidensis*. A–D, male (CR 157); E, male (CR 95). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

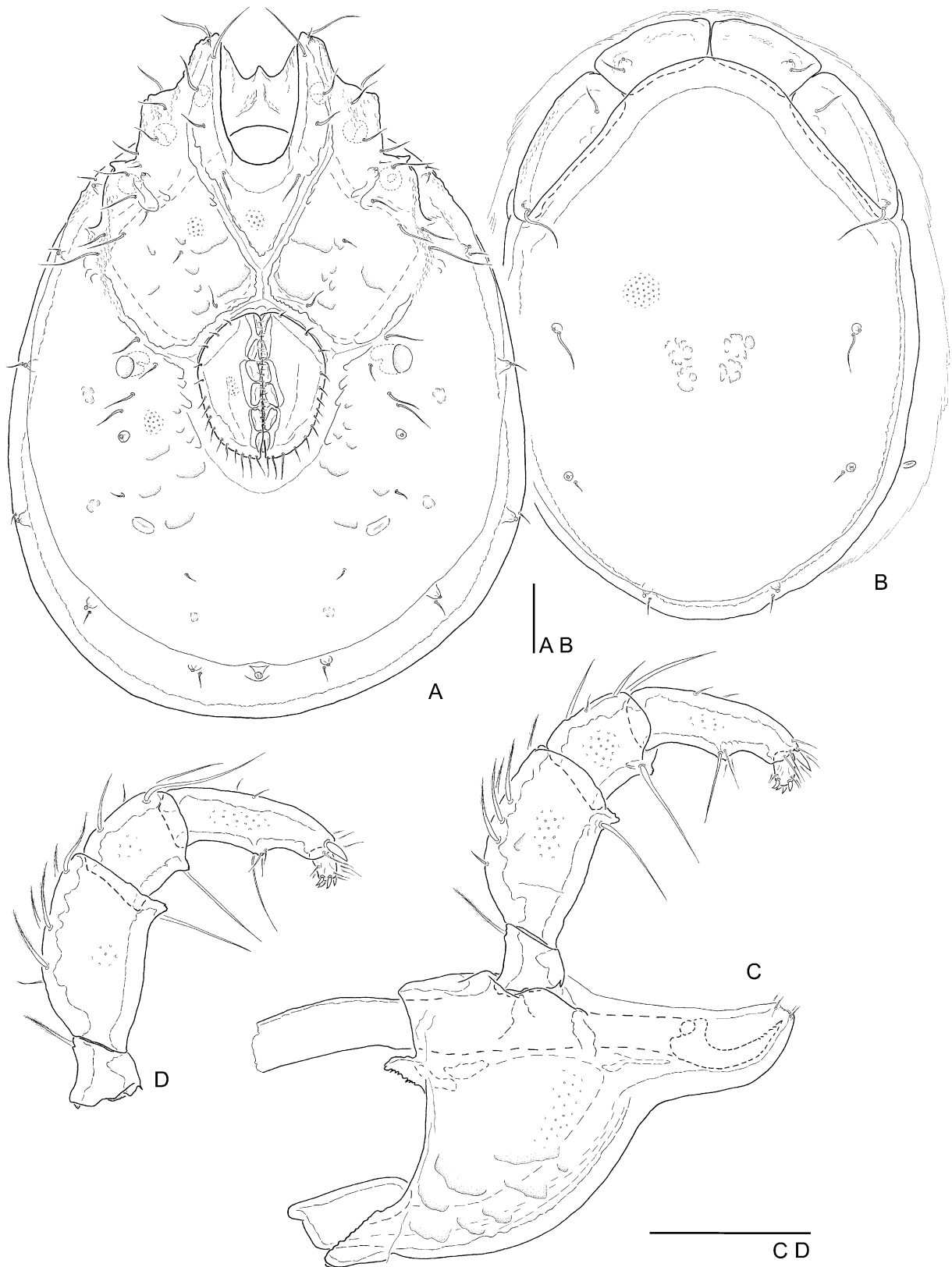


Figure 79. *Torrenticola rapidensis*. A–D, female (CR 95). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp (chelicera incomplete), lateral view; D, left palp, medial view. Scale bars = 100 µm.

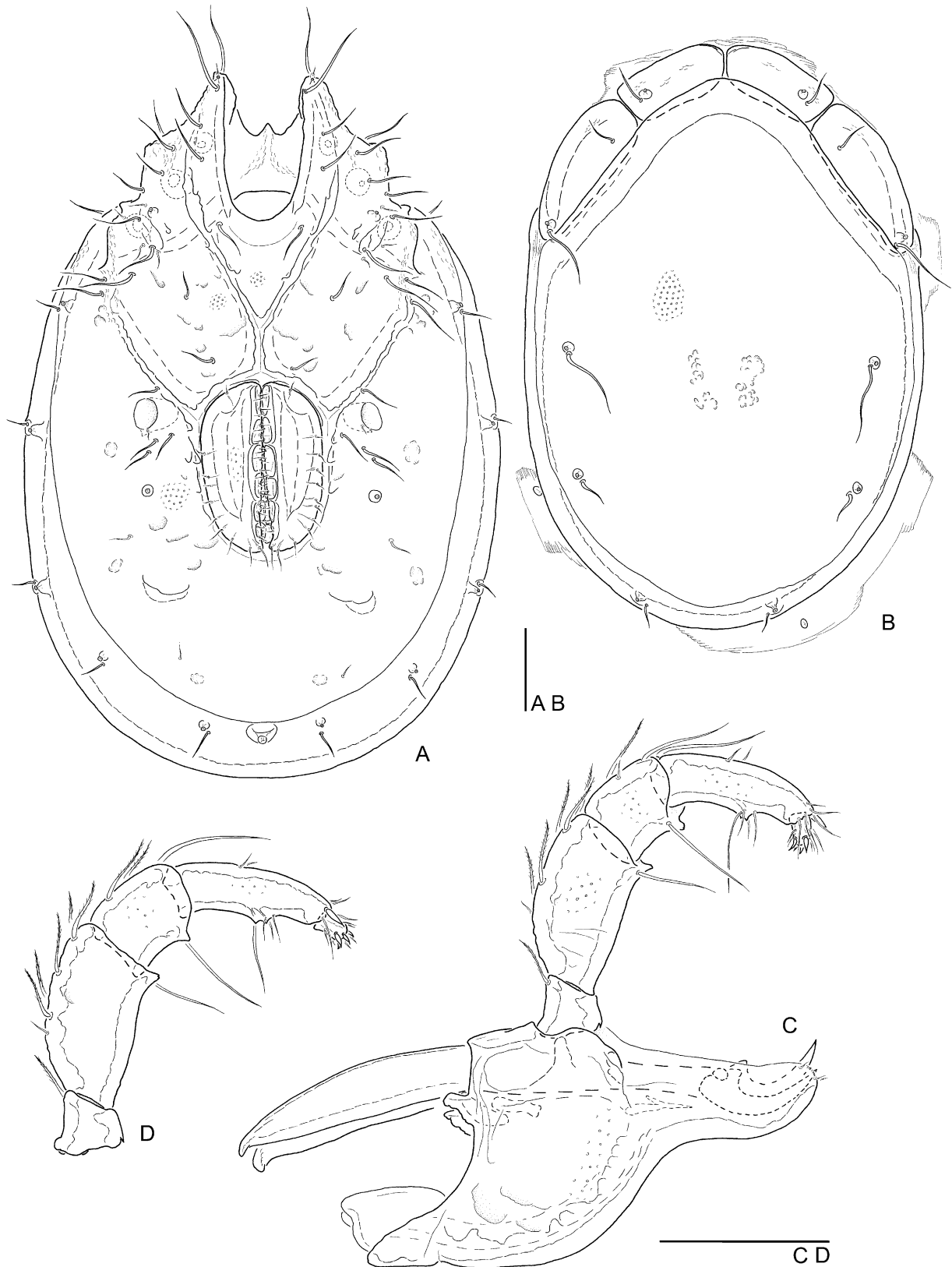


Figure 80. *Torrenticola rapidensis*. A–D, female (CR 95). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 μ m.

Table 39. Measurements (μm) of *Torrenticola rapidensis*; $N = 10$ (male), 3 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	804	834	785	863	28.5	937	839	971	68.7
Idiosoma W	559	586	559	623	24.2	726	559	736	99.2
Idiosoma L/W	1.44	1.43	1.34	1.49	0.04	1.32	1.29	1.50	0.1
Cx-I tL	324	324	314	329	5.2	343	304	343	22.7
Cx-III W	392	402	392	432	12.3	437	373	461	45.6
Cx-I tL/Cx-III W	0.83	0.81	0.75	0.83	0.03	0.79	0.74	0.82	0.04
Ds L	697	719	687	755	24.7	839	687	853	92.3
Dp L	652	682	647	716	23.8	790	647	795	83.6
Ds W	456	483	456	530	25.0	549	471	598	64.3
Ds L/W	1.53	1.48	1.39	1.55	0.05	1.46	1.43	1.53	0.1
Dp L/W	1.43	1.40	1.31	1.47	0.04	1.38	1.33	1.44	0.1
A-m platelet L	146	152	135	154	6.5	164	134	176	22.1
A-m platelet W	62	59	53	81	7.9	70	59	74	7.7
A-m platelet L/W	2.33	2.48	1.88	2.81	0.3	2.35	2.27	2.40	0.1
A-l platelet L	201	207	189	216	7.4	225	189	235	24.5
A-l platelet W	66	67	61	74	3.3	80	71	86	7.4
A-m pl L/a-l pl L	0.73	0.72	0.66	0.75	0.02	0.73	0.71	0.75	0.02
Capitular bay L	146	162	146	164	7.0	180	172	186	7.4
Capitular bay W	98	89	85	98	4.4	97	91	110	10.0
Cb L/W	1.49	1.77	1.49	1.93	0.1	1.86	1.69	1.89	0.1
Dist cb – gf	278	273	257	287	9.1	213	194	216	12.1
Cx-I mL	164	160	149	174	7.5	157	135	164	15.3
Cx-II + III mL	100	98	86	113	10.0	39	39	49	5.7
Cx-I tL/Cx-II/III mL	3.22	3.30	2.87	3.83	0.3	8.76	6.21	8.76	1.5
Cx-I/Cx-II + III mL	1.63	1.63	1.39	2.03	0.2	4.00	2.75	4.19	0.8
Genital field L	184	208	184	217	9.7	208	203	216	6.2
Gf L/Cx-II + III mL	1.83	2.16	1.83	2.38	0.2	5.31	4.15	5.50	0.7
Genital field W	145	154	145	164	5.8	184	149	186	20.5
Genital field L/W	1.27	1.34	1.27	1.40	0.05	1.17	1.12	1.36	0.1
Gf L/Id L	0.23	0.25	0.23	0.26	0.01	0.23	0.21	0.24	0.01
Gf L/dist cb – gf	0.66	0.77	0.66	0.81	0.04	1.01	0.97	1.05	0.04
Dist gf – expo	167	168	149	189	11.1	284	228	316	44.7
Dist gf – cauda	201	203	181	221	13.2	326	270	370	50.3
Gs L	289	293	274	311	11.2				
Gs aL	179	181	162	201	10.7				
Gs W		205	172	227	24.2				
Gs aL/tL	0.62	0.63	0.59	0.66	0.02				
Gs tL/W		1.44	1.24	1.73	0.2				
Capitulum vL	283	292	282	311	8.9	319	287	336	24.9
Capitulum dL	203	214	201	223	7.0	235	211	250	19.8
Rostrum L	108	110	105	120	4.2	123	114	123	5.0
Capitulum H	135	143	135	154	7.4	167	147	176	15.0
R L/c dL	0.53	0.53	0.50	0.55	0.01	0.52	0.49	0.54	0.03
R L/c vL	0.38	0.38	0.37	0.40	0.01	0.38	0.36	0.40	0.02
Gn bend depth	20	20	18	21	0.7	22	22	22	0.00
Chelicera L	322	337	322	360	11.3	363	341	385	31.2
Chelicera H	32	29	28	34	1.7	33	32	34	1.2
Chelicera L/H	10.12	11.13	10.00	12.25	0.7	11.16	10.69	11.63	0.7
Chelicera bs L	258	271	258	294	10.3	292	272	311	27.7
Chelicera claw L	64	66	59	69	2.6	74	69	76	3.7
Chel bs/claw L	4.06	4.09	3.96	4.54	0.2	4.10	3.96	4.23	0.2
P1 dorsal L	34	37	34	39	1.8	42	37	44	3.7
P2 dL	96	97	91	103	3.5	108	98	115	8.6
P3 dL	54	58	54	60	1.8	64	58	64	3.5
P4 dL	96	98	96	103	2.6	104	97	110	6.7

Table 39. Continued

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P5 dL	17	17	17	25	2.6	18	18	26	4.2
Palp total L	296	308	296	323	9.0	336	307	359	25.8
P4 vL	74	76	74	77	1.4	76	74	78	3.5
P4 vL to seta	42	47	42	49	2.6	45	44	47	1.7
P4 vL/L to seta	1.76	1.61	1.55	1.76	0.1	1.68	1.67	1.68	0.01
P1 rel L	0.12	0.12	0.11	0.13	0.00	0.12	0.12	0.12	0.00
P2 rel L	0.32	0.32	0.30	0.32	0.01	0.32	0.32	0.32	0.00
P3 rel L	0.18	0.19	0.18	0.19	0.00	0.19	0.18	0.19	0.01
P4 rel L	0.32	0.32	0.31	0.32	0.00	0.31	0.31	0.31	0.00
P5 rel L	0.06	0.06	0.05	0.08	0.01	0.06	0.05	0.07	0.01
P1 H	37	39	37	42	1.9	44	39	47	3.7
P2 H	54	56	51	59	2.0	61	54	66	6.2
P3 H	44	47	44	49	1.6	51	44	54	5.1
P4 H	28	32	28	32	1.3	34	29	37	3.7
P5 H	12	12	11	12	0.5	12	12	12	0.00
P1 L/H	0.93	0.94	0.88	1.00	0.04	0.94	0.89	1.00	0.1
P2 L/H	1.77	1.76	1.70	1.82	0.04	1.76	1.74	1.82	0.04
P3 L/H	1.22	1.24	1.20	1.28	0.03	1.24	1.18	1.31	0.1
P4 L/H	3.39	3.18	3.00	3.39	0.1	3.04	3.00	3.29	0.2
P5 L/H	1.40	1.45	1.40	2.00	0.2	1.50	1.50	2.10	0.3
P2/P4 L	1.00	0.98	0.95	1.01	0.02	1.04	1.01	1.04	0.02
P3/P4 L	0.56	0.59	0.56	0.60	0.01	0.59	0.58	0.61	0.02

antero-medial platelets; Dgl-4 slightly lateral to Dgl-5 (Fig. 78B); coxal field laterally sharply graded, Cx-I short, apically truncated, Cxgl-4 in slight indentation of apical tips of Cx-I; capitular bay rounded U-shaped, large; medial margin of Cx-II/III relatively long [Cx-I/Cx-II/III mL 1.63 (1.39–2.03)]; genital field elongated-rectangular, anterior margin truncated, lateral margins straight to slightly convex, caudally rounded [gf L/Cx-II/III mL 1.83 (1.87–2.38)]; posterior margins of Cx-IV lateral to caudal end of genital field, very short, merely visible; excretory pore between Vgl-2, pore and glandularia partly under caudal margin of primary sclerotization, close to caudal end of idiosoma (Fig. 78A); genital skeleton broad, apically relatively long [gs aL/tL 0.62 (0.59–0.65)], carina anterior flat, brachia distalia well developed, curved, brachia proximalia relatively small, cella proximalis small, with strong, short processus proximalia (Fig. 78E); capitulum slightly high with small lateral ridge, postero-ventral apodeme oblique, ventral margin sigmoid curved, rostrum clearly separated, relatively short, slender; P2 and P4 of equal length, ventral projections of P2 and P3 cone-shaped, relatively small, truncated, P4 relatively straight, distally slightly tapering, ventral setae on flat hump, in distal half of P4 (Fig. 78C, D).

Female ($N = 3$): Idiosoma similar to male, slightly larger, more rounded [L 839–971 μm , L/W 1.27–1.32

(one specimen 1.50)]; Cx-I shorter (Fig. 79A); genital field in most specimens rhombic-rounded (Fig. 79A) [one specimen with elongated genital field (Fig. 80A), see discussion], anterior rounded, lateral margins convex, tapering to posterior, caudally rounded [L/W 1.12–1.18 (1.36)]; posterior margins of Cx-IV further caudal than in males (Figs 79A, 80A); capitulum slightly more compact (Fig. 79C).

Discussion: *Torrenticola rapidensis* is characterized by a relatively large idiosoma, an elongated dorsal plate and a laterally sharply graded coxal field. One female (Fig. 80) is much more elongated than the others; in particular, the genital field is elongated, merely tapering to posterior (similar to the shape of a male genital field, although the specimen was bearing eggs).

TORRENTICOLA SEMICOLOR K.O. VIETS, 1977
(FIGS 81A–G, 82A–C, 83A–E, 84A–D; TABLE 40)

Type series: Holotype male, Guatemala, km 150–151 Road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 11.viii.1974, leg. Böttger, prep. no. 5810 SMF; allotype female, same locality and date, SMF 5805; paratypes, same locality and date, 2/3/0, 2/0/0 mounted prep. no. 5811, 5813 SMF; same locality, 16.viii.1974, 6/0/0.

Table 40. Measurements (μm) of *Torrenticola semicolor*; $N = 15$ (male), 4 (female). The measurements contain data from the original description (Guatemala; K.O. Viets, 1977/78 Teil II) and material collected and published by Dave Cook (Costa Rica; Cook 1980), completed by new measurements of slides from SMF (Viets collection), CNC and FMC (Cook collection) as well as new material from Costa Rica

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	559	549	520	579	18.8	640	633	657	10.6
Idiosoma W	353	373	343	412	21.2	437	432	461	13.9
Idiosoma L/W	1.58	1.47	1.38	1.58	0.1	1.47	1.39	1.49	0.04
Cx-I tL	240	235	226	260	9.3	260	250	270	9.0
Cx-III W	260	265	245	314	16.9	299	289	309	8.0
Cx-I tL/Cx-III W	0.92	0.91	0.83	0.96	0.04	0.87	0.85	0.89	0.01
Ds L	451	441	412	481	18.3	521	515	530	6.2
Dp L	417	417	378	451	19.2	491	486	500	6.2
Ds W	319	319	299	353	16.2	387	383	395	6.6
Ds L/W	1.42	1.38	1.33	1.47	0.04	1.34	1.33	1.37	0.02
Dp L/W	1.31	1.29	1.23	1.38	0.04	1.27	1.25	1.28	0.01
A-m platelet L	103	100	88	113	6.9	119	115	123	3.2
A-m platelet W	45	43	37	47	2.8	43	34	51	7.1
A-m platelet L/W	2.27	2.32	2.00	2.75	0.2	2.77	2.38	3.36	0.4
A-l platelet L	132	135	126	149	7.1	154	142	159	7.2
A-l platelet W	49	49	44	51	2.4	55	51	56	2.3
A-m pl L/a-l pl L	0.78	0.74	0.67	0.78	0.04	0.77	0.75	0.83	0.04
Capitular bay L	129	125	119	130	3.2	146	145	150	2.7
Capitular bay W	61	59	55	69	3.7	69	69	72	1.7
Cb L/W	2.10	2.13	1.82	2.30	0.1	2.11	2.08	2.11	0.01
Dist cb – gf	203	206	184	230	10.5	153	140	159	9.7
Cx-I mL	110	115	110	127	4.9	119	110	123	5.3
Cx-II + III mL	88	85	62	91	7.7	31	17	32	7.0
Cx-I tL/Cx-II/III mL	2.73	2.87	2.63	3.77	0.3	8.49	8.32	14.87	3.2
Cx-I/Cx-II + III mL	1.25	1.38	1.25	1.84	0.2	3.81	3.75	6.86	1.5
Genital field L	126	124	114	132	6.3	149	145	152	3.2
Gf L/Cx-II + III mL	1.43	1.46	1.34	1.86	0.1	4.89	4.54	8.86	2.1
Genital field W	104	97	89	104	4.2	135	125	145	8.0
Genital field L/W	1.21	1.26	1.18	1.35	0.1	1.10	1.00	1.22	0.1
Gf L/Id L	0.23	0.22	0.21	0.23	0.01	0.23	0.22	0.24	0.01
Gf L/dist cb – gf	0.62	0.60	0.54	0.65	0.03	0.98	0.91	1.09	0.1
Dist gf – expo	81	78	69	83	4.9	142	130	145	6.6
Dist gf – cauda	105	103	91	115	6.8	205	194	206	5.8
Gs L	157	174	152	181	9.8				
Gs aL	77	83	71	88	5.5				
Gs W	69	81	69	115	15.5				
Gs aL/tL	0.49	0.48	0.44	0.50	0.02				
Gs tL/W	2.29	2.00	1.57	2.43	0.3				
Capitulum vL	233	230	211	240	7.5	271	267	274	3.2
Capitulum dL	167	164	159	172	3.2	196	189	202	5.9
Rostrum L	91	91	83	92	2.9	107	105	109	1.6
Capitulum H	140	92	88	140	13.2	116	114	118	1.8
R L/c dL	0.54	0.54	0.51	0.56	0.01	0.55	0.54	0.56	0.01
R L/c vL	0.39	0.39	0.37	0.44	0.02	0.40	0.39	0.40	0.00
Gn bend depth	16	13	2	16	3.2	19	17	20	1.2
Chelicera L	261	260	250	277	6.6	321	321	321	0.0
Chelicera H	22	20	17	22	1.5	22	22	26	2.1
Chelicera L/H	11.83	12.72	11.78	14.57	0.8	13.52	12.48	14.56	1.5
Chelicera bs L	221	218	208	233	6.1	270	268	272	2.6

Table 40. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Chelicera claw L	40	44	40	47	1.7	51	49	53	1.9
Chel bs/claw L	5.45	4.99	4.68	5.45	0.2	5.32	5.09	5.55	0.3
P1 dorsal L	25	25	22	27	1.5	29	29	32	1.4
P2 dL	76	74	69	78	2.5	93	86	93	4.2
P3 dL	39	39	39	42	1.0	49	49	51	1.4
P4 dL	71	74	70	78	2.3	88	82	91	4.4
P5 dL	15	13	12	17	1.5	15	15	15	0.0
Palp total L	225	225	214	243	6.2	277	261	279	10.0
P4 vL	55	56	54	61	2.1	66	62	66	2.1
P4 vL to seta	32	34	32	39	2.4	39	37	42	2.5
P4 vL/L to seta	1.73	1.62	1.53	1.77	0.1	1.69	1.59	1.70	0.1
P1 rel L	0.11	0.11	0.10	0.12	0.01	0.11	0.11	0.12	0.01
P2 rel L	0.34	0.33	0.31	0.34	0.01	0.33	0.33	0.34	0.00
P3 rel L	0.17	0.17	0.17	0.18	0.00	0.18	0.18	0.19	0.01
P4 rel L	0.32	0.32	0.32	0.33	0.01	0.32	0.31	0.32	0.01
P5 rel L	0.07	0.06	0.05	0.07	0.01	0.05	0.05	0.06	0.00
P1 H	27	29	27	29	1.0	32	32	34	1.4
P2 H	40	40	39	42	0.9	49	47	51	2.5
P3 H	34	34	32	37	1.4	42	39	43	1.9
P4 H	22	22	20	23	0.9	27	25	27	1.4
P5 H	10	10	9	10	0.4	10	10	11	0.7
P1 L/H	0.91	0.91	0.78	1.00	0.1	0.92	0.92	0.93	0.00
P2 L/H	1.88	1.82	1.70	1.88	0.1	1.84	1.81	1.90	0.05
P3 L/H	1.14	1.14	1.10	1.23	0.03	1.24	1.14	1.25	0.1
P4 L/H	3.22	3.39	3.11	3.63	0.1	3.35	3.27	3.36	0.05
P5 L/H	1.50	1.40	1.25	1.75	0.2	1.50	1.33	1.50	0.1
P2/P4 L	1.07	1.00	0.95	1.07	0.03	1.04	1.03	1.06	0.01
P3/P4 L	0.55	0.54	0.52	0.58	0.01	0.57	0.56	0.60	0.02

Further material: Costa Rica, leg. Dave Cook: Alajuela, 27 km east of Esparta, mountain stream, 15.xii.1973, 1/1/0 mounted, female DC 9–73 FMC, male DC 9–73 CNC; Puntarenas, 10 km south-east Buenos Aires, tributary of Río General, 18.xii.1973, 0/1/0 mounted, DC 16–73 CNC.

Material examined: CR 5, Alajuela, Río Sarchí, 900 m asl, 17.vi.1995, 3/0/0 mounted; CR 26, Puntarenas, Ecolodge San Luis, Río San Luis, small stream, 1000 m asl, 27.vi.1995, 3/0/0 mounted, 2/6/0 unmounted; CR 30, Heredia, Río La Paz, stream, 1270 m asl, 29.vi.1995, 1/0/0 mounted, 1/0/0 unmounted; CR 31, Alajuela, 4 km north Varablanca, hygropetric area under waterfall La Paz, 1300 m asl, 29.vi.1995, 1/0/0 mounted; CR 40, Alajuela, Río Barranca, small stream, 1540 m asl, 01.vii.1995, 3/0/0 mounted, 2/7/0 unmounted; CR 45, Limón, Río Corinto, stream, 500 m asl, 04.vii.1995, 2/0/0 unmounted; CR 67 Puntarenas, Ecolodge San Luis,

left affluent of Río San Luis, spring brook, 1100 m asl, 16.vii.1995, 1/0/0 mounted; CR 107, Puntarenas, Las Alturas, Biological Station, Río Colon, stream, 1340 m asl, 01.viii.1995, 5/0/0 mounted, 21/0/0 unmounted; CR 124, Guanacaste, ACG, 5 km north Quebrada Grande, Río Góngora, small stream, 540 m asl, 22.ii.1996, 1/0/0 mounted, 0/2/0 unmounted; CR 168, San José, San Gerardo, Río Blanco, small stream, 1220 m asl, 11.iii.1996, 1/0/0 mounted; CR 190, Puntarenas, Península de Osa, Río Pavon, stream, riffle, 110 m asl, 19.iii.1996, 1/0/0 unmounted; CR 281, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Río Negro, small stream, 760 m asl, 31.i.1997, 1/1/0 mounted, 0/4/0 unmounted; CR 283, Guanacaste, ACG, Rincon de la Vieja, Santa Maria, Quebrada Zopilote, stream, 790 m asl, 31.i.1997, 1/5/0 unmounted; CR 314, Limón, Hitoy Cerere, left affluent to Río Hitoy Cerere, small stream, 190 m asl, 13.ii.1997, 1/1/0 unmounted; CR 350, Guanacaste, ACG, Pitilla, Río Coloncito, stream, 640 m asl, 09.iii.1997, 1/13/0 unmounted.

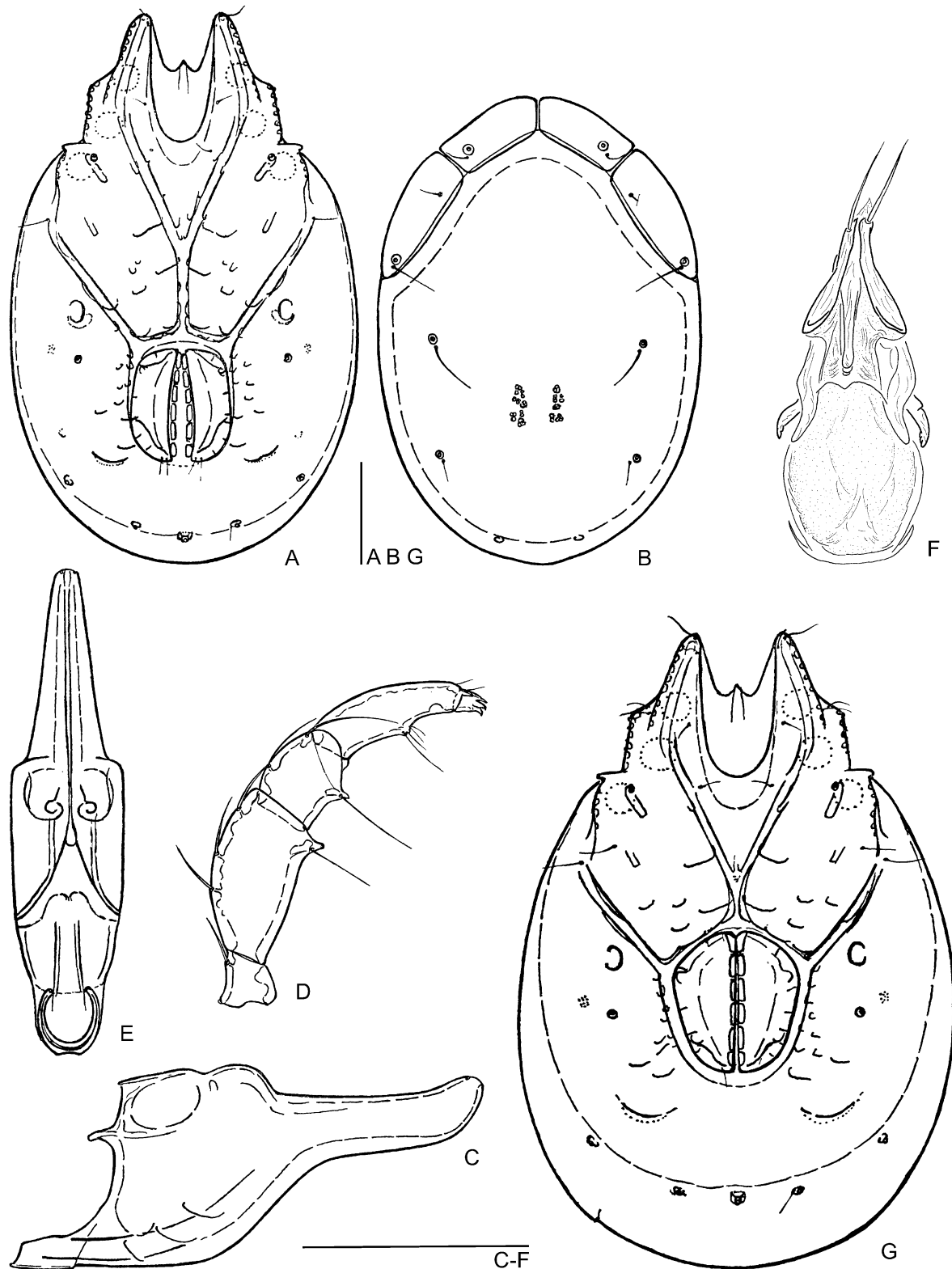


Figure 81. *Torrenticola semicolor*. A–D, holotype male, prep. no. 5810 SMF Viets collection; E, paratype male, prep. no. 5723 SMF Viets collection; F, holotype male, prep. no. 5810 SMF Viets collection; G, allotype female, prep. no. 5805 SMF Viets collection; A–E, G after K.O. Viets (1977/78, Teil II). A, G, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, left palp; E, capitulum, dorsal view; F, genital skeleton, anterior view. Scale bars = 100 µm.

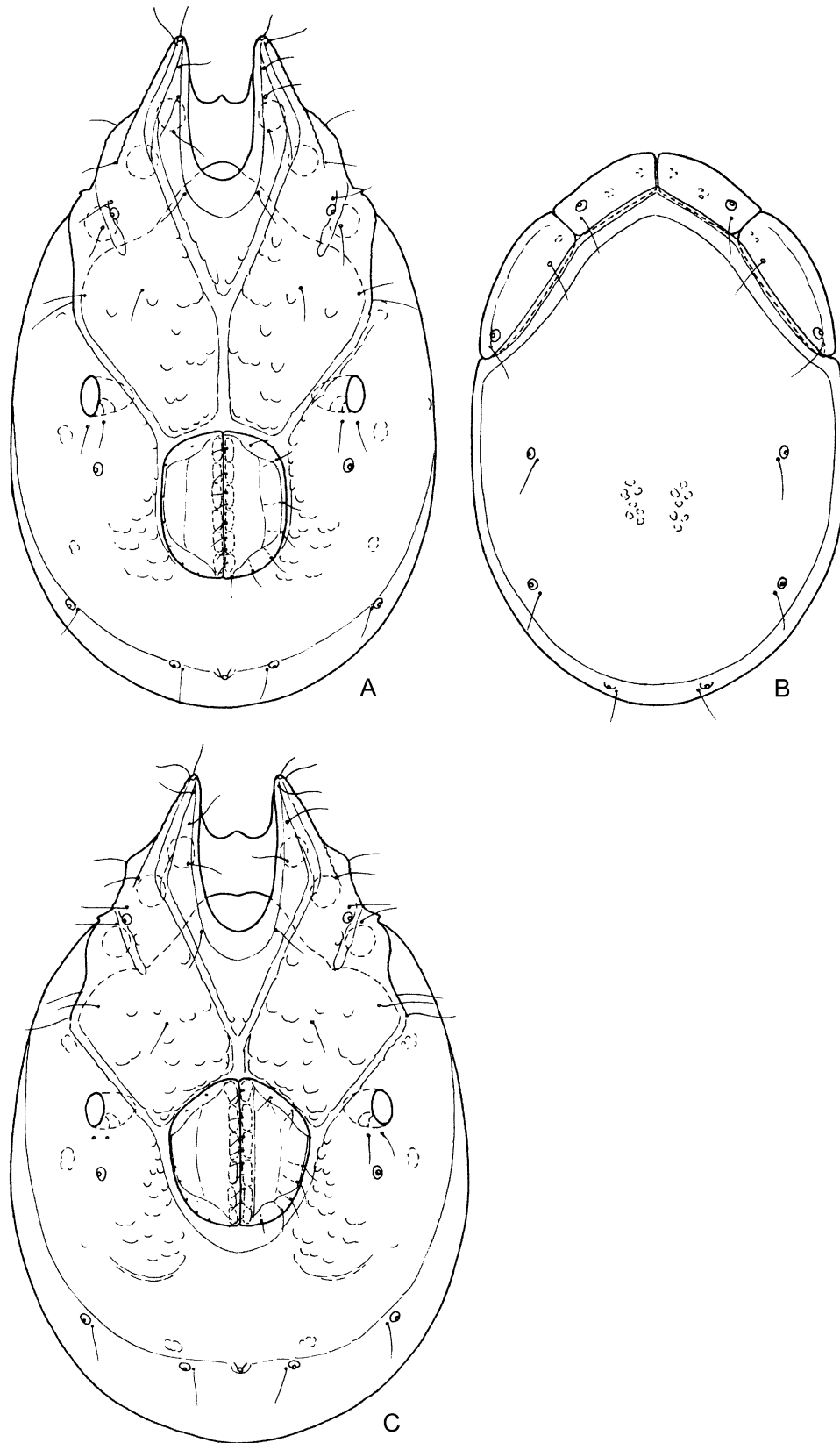


Figure 82. *Torrenticola semicolor*. A, B, male; C, female, after Cook (1980). A, C, idiosoma, ventral view; B, idiosoma, dorsal view. No measurement scale bars available.

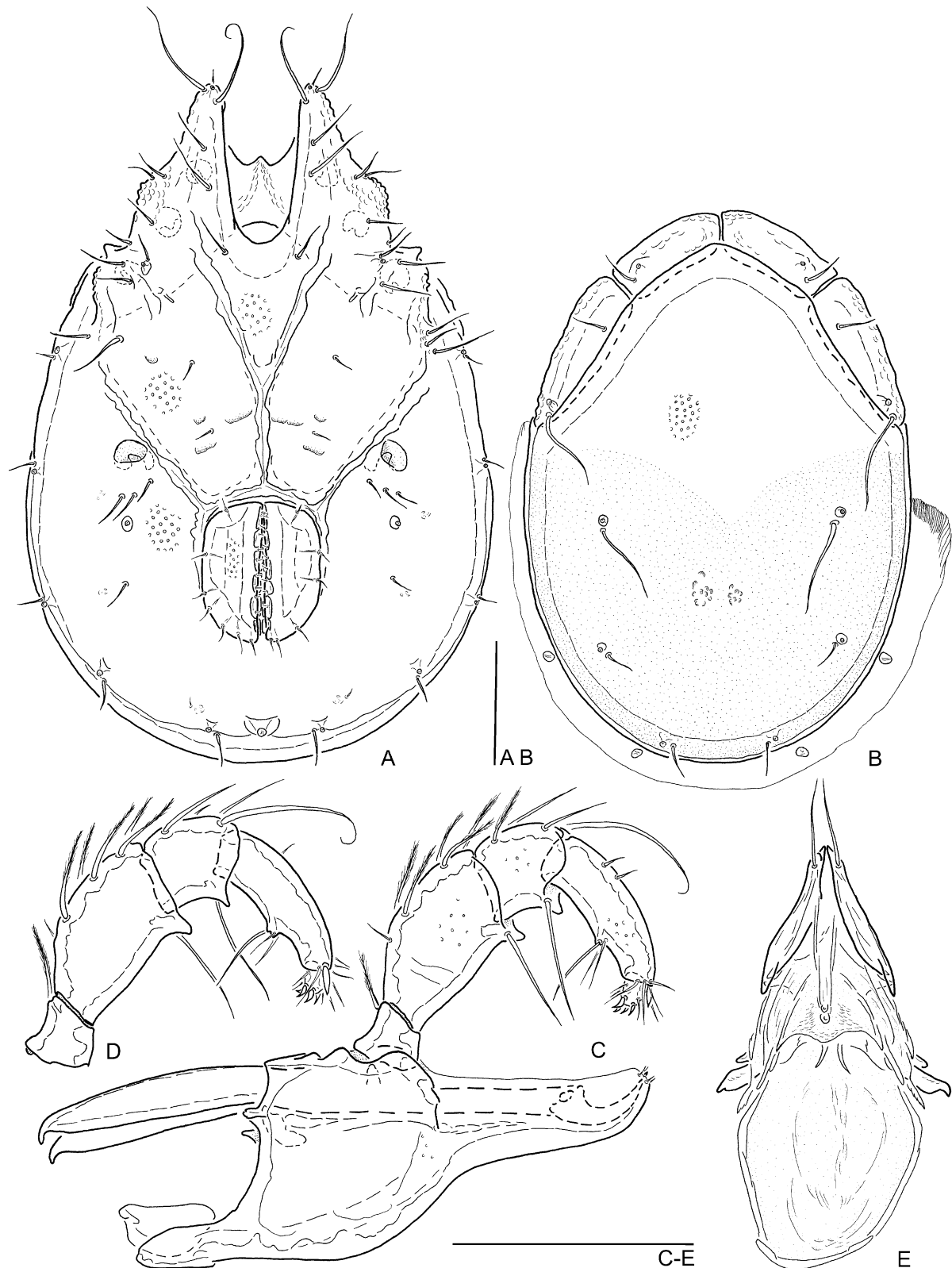


Figure 83. *Torrenticola semicolor*. A–D, male (CR 26); E, male (CR 107). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

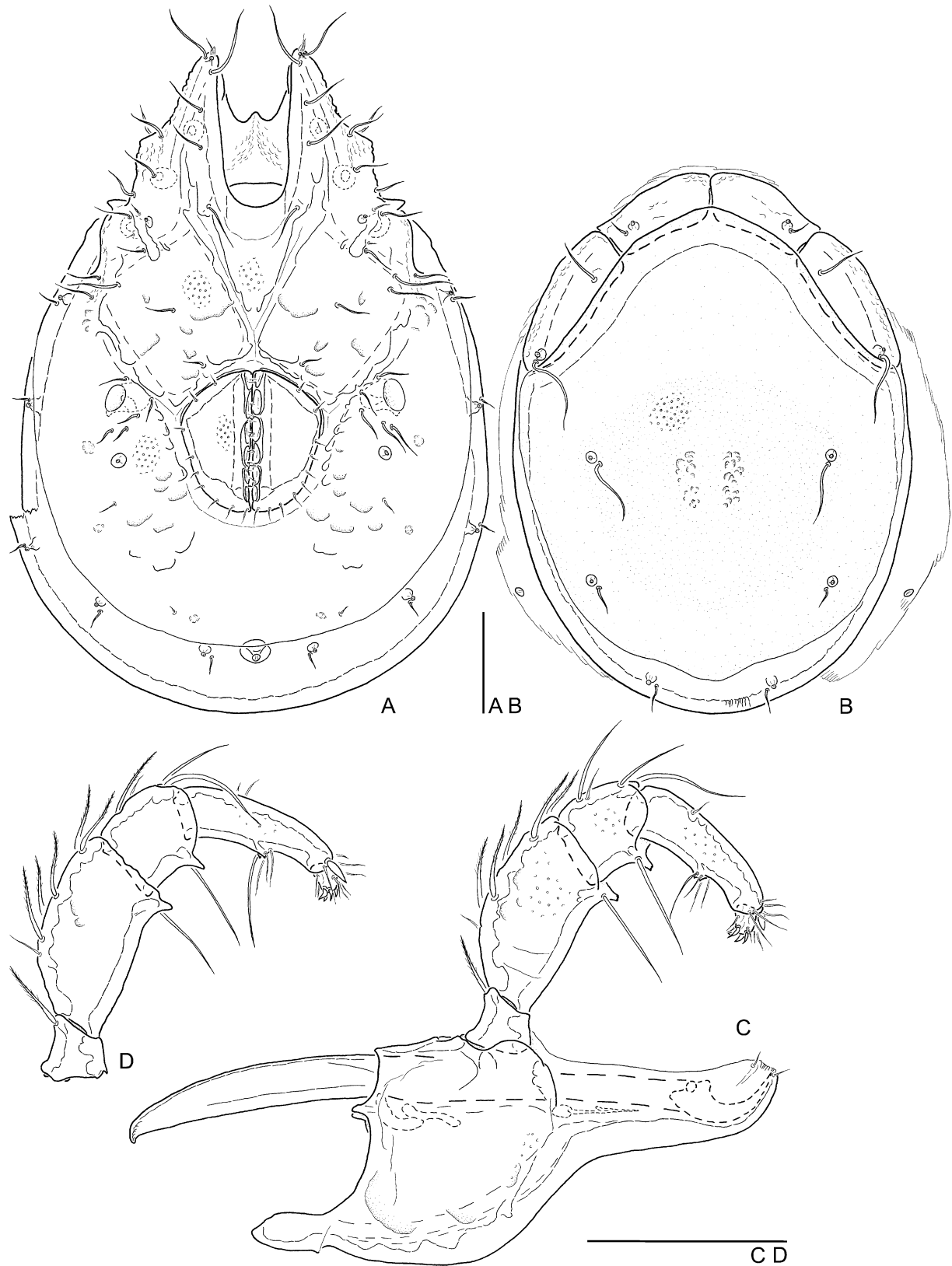


Figure 84. *Torrenticola semicolor*. A–D, female (CR 281). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Habitat: Mainly fast flowing (one very fast, two slow flowing) small mountain streams and streams (one spring brook, one hygropetric area under a waterfall) at 540–1540 m asl; mainly mesolithal and akal (also lithophyal, macropelal, macrolithal, leaf packages); one polluted stream, one with high sulphur concentration; temperature 17.0–21.6 °C; conductivity 48–114 $\mu\text{S cm}^{-1}$.

Geographical distribution: Guatemala, Costa Rica (at mid elevations in all mountain ranges).

Published records: K.O. Viets (1977/78 Teil II); Cook (1980).

Diagnosis: Characters of the *columbiana*-like species; idiosoma small [L 559 μm (males 520–579 μm , females 633–657 μm); elongated [L/W 1.58 (males 1.38–1.56, females 1.39–1.49)]; posterior half of dorsal plate red (sometimes pale, complete shield yellowish or reddish) (Figs 6A, C-1, C-2, 83B, 84B); coxal field elongated, lateral margin graded, Cx-I tips short, rounded; genital field relatively short, far posterior [gf L/Cx-II/III mL 1.43 (males 1.34–1.86)] (Figs 81A, 82A, 83A, 84A); genital skeleton apical of intermediate length [aL/tL 0.49 (0.44–0.50)], scleritum proximale mediale weakly developed (Figs 81F, 83E); P2 and P4 of similar length [P2/P4 1.07 (0.95–1.06)] (Figs 81D, 83C, D, 84C, D).

Description: See K.O. Viets (1977/78 Teil II).

Discussion: *Torrenticola semicolor* – together with *T. flavescens* – is characterized by a short genital field and a weakly developed scleritum proximale mediale. The species is separated from *T. flavescens* by a more elongated idiosoma and a narrower capitular bay. However, in most specimens from Costa Rica the idiosoma is less elongated (Table 40). According to the figure of the capitulum published in the description of this species, *T. semicolor* could also be placed within the *bicolor*-like species. Therefore, the species is also included in the key of that group (see below). However, only the holotype shows a very slender rostrum; in the other specimens of the type series (prep no. 5805, 5811, 5813 SMF Viets collection), as well as in the specimens from Costa Rica, the rostrum is basely higher, therefore appearing more compact. In the Costa Rican specimens described by Cook (1980), there is no colour pattern on the dorsal plate. Most specimens of the new material from Costa Rica show a very pale reddish pattern on the dorsal plate [as in the species description by K.O. Viets (1977/78 Teil II)] or a more or less completely reddish plate.

***TORRENTICOLA TORPEBRAZO* SP. NOV.**

(FIGS 85A–E, 86A–D; TABLE 41)

Type series: Holotype male, CR 70, Puntarenas, Monteverde, Quebrada Quecha, small stream, 1560 m asl,

17.vii.1995, mounted; paratype, same locality and date, 1/0/0 unmounted.

Additional specimens examined: CR 206, San José, above San Antonio de Escazu, Quebrada Londres, small stream, 1620 m asl, 25.iii.1996, 2/1/0, mounted, 1/0/0 unmounted.

Habitat: Fast flowing small mountain streams at 1560–1620 m asl; mesolithal with leave packages in the current; temperature 16.1–18.1 °C; conductivity 32–62 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (Cordillera de Tilarán, northern Cordillera de Talamanca).

Derivatio nominis: *torpe* (Spanish = clumsy), *brazo* (Spanish = arm); referring to the compact palp, especially the short P4.

Diagnosis: Characters of the *columbiana*-like species; idiosoma small, oval; dorsal plate red; coxal field moderately elongated; genital field small; genital skeleton apically mid-sized, cella proximalis small; P4 very short, compact.

Description – Male ($N = 3$): Idiosoma oval [L 579 μm (569–623 μm), L/W 1.51 (1.38–1.41)]; dorsal plate red (to reddish); antero-medial dorsal platelets thin, medial straight to convex, posterior nearly straight, antero-lateral platelets anterior convex to straight, posterior tapering, rounded; Dgl-4 slightly lateral to Dgl-5 (Fig. 85B); coxal field slightly elongated, laterally moderately graded, Cx-I tips rounded; Cxgl-4 at the tip of Cx-I; capitular bay large, U-shaped; medial margin Cx-II/III mid-sized; posterior margin of Cx-IV slightly postero-lateral of genital field, not very distinct, +/- regularly curved; genital field elongated-rectangular [gf L/Cx-II/III mL 1.81 (1.98–2.04, gf L/dist cb-gf 0.66 (0.65–0.70)], anterior truncated, laterally straight, posterior tapering (posterior to postero-lateral bend); excretory pore between Vgl-2, pore and glandularia caudal to primary sclerotization (Fig. 85A); genital skeleton compact, apically relatively long [aL/tL 0.67 (0.65–0.67)], brachia distalia and brachia proximalia well developed, cella proximalis small, with long, thin processus proximalia (Fig. 85E); ventral margin of capitulum sigmoid curved, ventro-proximal apodeme strong, rostrum relatively slender; palp short, compact; ventral projections of P2 and P3 cone-shaped, pointed or truncated; P4 very short [rel L 0.28 (0.28–0.29), L/H 2.29 (2.45–2.70), P2/P4 1.21 (1.15–1.22), P3/P4 0.71 (0.70–0.74)], ventral setae slightly distally on small projection (Fig. 85C, D).

Female ($N = 1$): Idiosoma similar to male; medial margin of Cx-II/III moderately long (Cx-I/Cx-II/III mL 3.36); genital field broad, blunt rhombic (L/W 1.07);

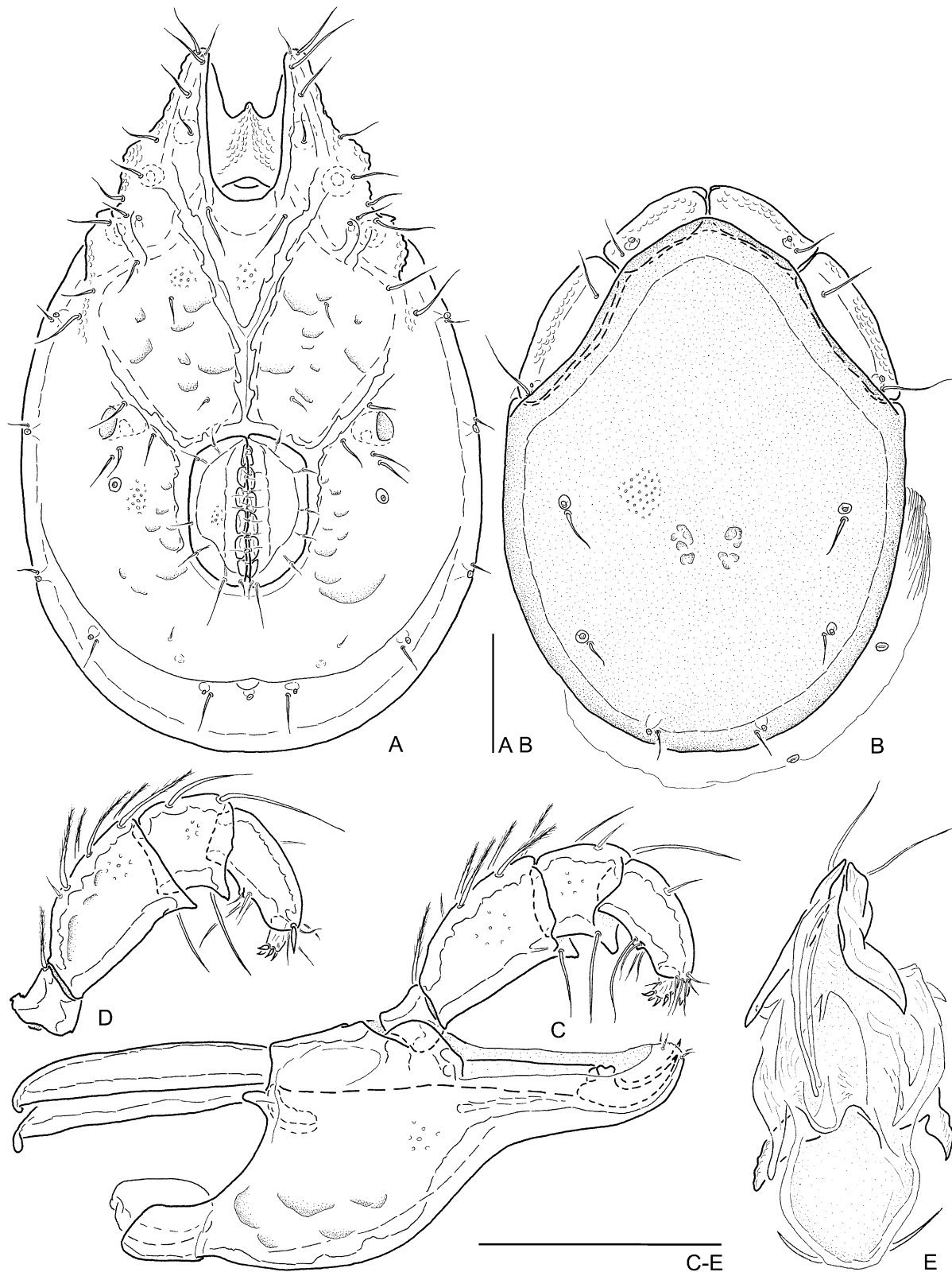


Figure 85. *Torrenticola torpebrazo*. A–E, holotype male (CR 70). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

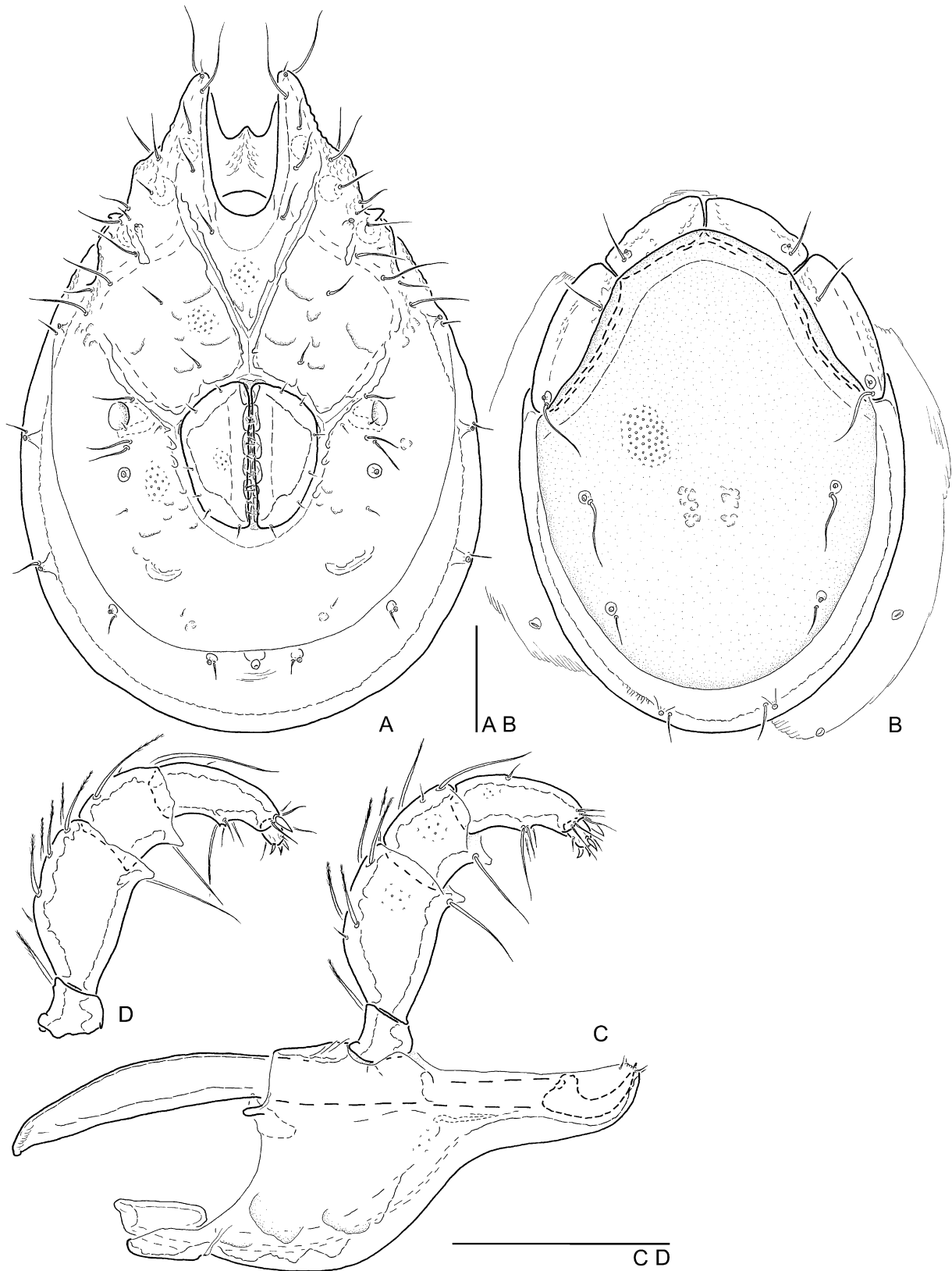


Figure 86. *Torrenticola torpebrazo*. A–D, female (CR 206). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 μ m.

Table 41. Measurements (μm) of *Torrenticola torpebrazo*; $N = 3$ (male), 1 (female)

	male					female
	ht	mean	min.	max.	SD	
Idiosoma L	579	579	569	623	28.7	608
Idiosoma W	383	412	383	441	29.4	432
Idiosoma L/W	1.51	1.41	1.38	1.51	0.1	1.41
Cx-I tL	245	245	235	270	17.7	250
Cx-III W	265	284	265	304	19.6	275
Cx-I tL/Cx-III W	0.93	0.89	0.83	0.93	0.05	0.91
Ds L	466	466	466	510	25.5	495
Dp L	441	446	441	486	24.2	471
Ds W	334	353	334	378	22.1	358
Ds L/W	1.40	1.35	1.32	1.40	0.04	1.38
Dp L/W	1.32	1.29	1.26	1.32	0.03	1.32
A-m platelet L	100	110	100	118	8.6	105
A-m platelet W	39	40	39	44	2.6	40
A-m platelet L/W	2.56	2.67	2.56	2.73	0.1	2.63
A-l platelet L	138	140	138	159	11.7	154
A-l platelet W	49	49	49	54	2.8	51
A-m pl L/a-l pl L	0.73	0.74	0.73	0.79	0.03	0.68
Capitular bay L	126	126	125	138	7.5	130
Capitular bay W	61	64	61	71	5.1	61
Cb L/W	2.06	1.96	1.95	2.06	0.1	2.12
Dist cb – gf	194	194	187	214	14.1	154
Cx-I mL	115	115	115	135	11.3	115
Cx-II + III mL	71	69	66	71	2.5	34
Cx-I tL/Cx-II/III mL	3.45	3.56	3.45	3.93	0.3	7.29
Cx-I/Cx-II + III mL	1.62	1.74	1.62	1.96	0.2	3.36
Genital field L	129	131	129	140	5.8	142
Gf L/Cx-II + III mL	1.81	1.98	1.81	2.04	0.1	4.14
Genital field W	100	108	100	115	7.4	132
Genital field L/W	1.28	1.22	1.21	1.28	0.04	1.07
Gf L/Id L	0.22	0.22	0.22	0.23	0.00	0.23
Gf L/dist cb – gf	0.66	0.66	0.65	0.70	0.02	0.92
Dist gf – expo	88	88	88	98	5.7	127
Dist gf – cauda	131	131	125	137	6.1	186
Gs L	172	181	172	197	13.0	
Gs aL	115	118	115	132	9.3	
Gs W	86	80	74	86	8.7	
Gs aL/tL	0.67	0.67	0.65	0.67	0.01	
Gs tL/W	2.00	2.23	2.00	2.47	0.3	
Capitulum vL	245	245	243	265	12.1	252
Capitulum dL	173	179	173	189	8.0	172
Rostrum L	93	96	93	100	3.7	96
Capitulum H	100	105	100	111	5.5	105
R L/c dL	0.54	0.53	0.53	0.54	0.00	0.56
R L/c vL	0.38	0.38	0.38	0.39	0.01	0.38
Gn bend depth	16	16	15	17	1.2	17
Chelicera L	281	282	281	301	11.7	292
Chelicera H	22	23	22	26	1.9	25
Chelicera L/H	12.72	12.11	11.71	12.72	0.5	11.90
Chelicera bs L	234	234	233	255	12.4	245
Chelicera claw L	47	47	47	49	1.4	47
Chel bs/claw L	5.03	5.03	4.75	5.47	0.4	5.26
P1 dorsal L	25	25	25	27	1.4	27

Table 41. *Continued*

	male					female
	ht	mean	min.	max.	SD	
P2 dL	71	76	71	81	4.9	75
P3 dL	42	47	42	49	3.7	44
P4 dL	59	66	59	66	4.2	64
P5 dL	15	15	15	15	0.0	12
Palp total L	211	228	211	238	13.6	222
P4 vL	40	47	40	47	3.5	44
P4 vL to seta	23	27	23	27	2.1	25
P4 vL/L to seta	1.74	1.73	1.73	1.74	0.01	1.80
P1 rel L	0.12	0.11	0.11	0.12	0.00	0.12
P2 rel L	0.34	0.34	0.33	0.34	0.00	0.34
P3 rel L	0.20	0.20	0.20	0.21	0.00	0.20
P4 rel L	0.28	0.28	0.28	0.29	0.01	0.29
P5 rel L	0.07	0.06	0.06	0.07	0.00	0.06
P1 H	29	31	29	32	1.2	29
P2 H	44	44	44	47	1.4	44
P3 H	40	40	38	42	1.9	37
P4 H	26	26	25	27	1.2	25
P5 H	9	10	9	12	1.9	10
P1 L/H	0.83	0.83	0.80	0.85	0.02	0.92
P2 L/H	1.61	1.72	1.61	1.74	0.1	1.69
P3 L/H	1.03	1.18	1.03	1.23	0.1	1.20
P4 L/H	2.29	2.45	2.29	2.70	0.2	2.60
P5 L/H	1.71	1.50	1.20	1.71	0.3	1.25
P2/P4 L	1.21	1.21	1.15	1.22	0.04	1.17
P3/P4 L	0.71	0.71	0.70	0.74	0.02	0.69

posterior margins of Cx-IV slightly more caudal (Fig. 86A); gnathosoma similar to male (Fig. 86C, D).

Discussion: The very short P4 separates the species *T. torpebrazo* and *T. cortobrazo* from the others of the *columbiana*-like group. *Torrenticola torpebrazo* is differentiated from the latter by a more compact coxal field, a wider capitular bay and a longer rostrum.

BICOLOR-LIKE SPECIES

Previously known species: *T. bicolor* (Lundblad, 1941) (Colombia), *T. acuticoxalis* K.O. Viets, 1977 (Guatemala), *T. curtisipalpis* K.O. Viets, 1977 (Guatemala), *T. maceripalpis* K.O. Viets, 1977 (Guatemala), *T. carlbaderi* Cramer, 1992 (Mexico).

New species from Costa Rica: *T. adunca*, *T. alticola*, *T. baderi*, *T. chicacoxalis*, *T. collina*, *T. cumbrensis*, *T. delgada*, *T. levicoxalis*, *T. pervagata*, *T. rubella*, *T. tilaranensis*.

Differential diagnosis of the species group: Idiosoma rounded-oval; dorsal plate yellow, red or with red to reddish pattern in posterior half; rostrum long and

slender, clearly separated from basal part of capitulum by a sharp ventral bend; ventral projections of P2 and P3 cone-shaped (pointed, truncated or distally with fine denticles – not developed as lamellae).

Discussion: Several species of this group are not very clearly separated from the others. For the identification of most species the combination of all given features should be considered. The species *T. semicolor* – actually belonging to the *columbiana*-like species – is also included in the following key, as in some specimens of this species the rostrum shows an intermediate shape between that of the two species groups (see also discussion of *T. semicolor* in the previous group). In some other species the allocation to the *bicolor*-like or the *columbiana*-like species group may be unclear, and in doubtful cases, both keys should be tested. In some of the *bicolor*-like species, the ventral projections at P2 and P3 are truncated, thin and very finely serrate (Figs 9A, 107D); these species represent transitional forms towards the *serratipalpis*-group, although no real lamellae are developed. The species *T. maceripalpis* and *T. acuticoxalis* from Guatemala are included in this group due to their long and

slender rostrum; however, they are separated from the other species by a very different shape of their genital skeleton (Figs 88, 106E, F). Due to these transitions

towards other species groups and the unclear systematic position of some species, the *bicolor*-like species group should not be regarded as a phylogenetic entity.

Key to the species

- 1a Coxal field very short, only tips of Cx-I surpassing idiosoma anterior (Fig. 96A); idiosoma large, rounded (L 893 µm, L/W 1.21) (male unknown) *T. chicacoxalis*
- b Coxal field longer (Fig. 93A, etc.); idiosoma mostly more oval (L/W 1.21–1.58) 2
- 2a Idiosoma large [males L 765–907 µm (mostly > 800), females L 907–1001 µm] and dorsal plate yellow; rostrum separated from basal part of capitulum by a sharp edge (Figs 90C, 91C, 92C, 100C); anterior tips of coxal field short, truncated (Figs 90A, 91A, 92A, 100A) (high mountain species, above 2000 m, mostly above 3000 m asl) 3
- b Idiosoma smaller (males L 510–755 µm, females 549–780 µm), dorsally mostly reddish or with colour pattern (sometimes pale), if larger (males up to 800 µm, females up to 850 µm), dorsal plate red; rostrum clearly separated from basal part of capitulum (however, in some species rather curved than with a sharp edge) (Fig. 93B, etc.); coxal field often more elongated (Fig. 93A, etc.) (lower elevations, 140–2340 m asl) 6
- 3a P4 short (rel L 0.29–0.31; L/H 2.80–3.17; P3/P4 0.61–0.65); rostrum relatively shorter (r L/c dL 0.51–0.53) (Figs 90C, D, 91C, 100C) 4
- b P4 long (rel L 0.32–0.35; L/H 3.92–4.42; P3/P4 0.0.49–0.55); rostrum relatively longer (r L/c dL 0.55–0.61) (Figs 92C, 103C) 5
- 4a In female, medial margins of Cx-II/III do not meet (Fig. 100A); basal part of capitulum higher, sharper bend towards rostrum (Fig. 100C); chelicera more compact (L/H 10.81) (male unknown) *T. cumbrensis*
- b In female, medial margins of Cx-II/III meet well anterior of genital field (Fig. 91A); ventral margins of capitulum slightly smoother curved towards rostrum (Fig. 91C); chelicera more slender (L/H 11.43–12.08) *T. alticola*
- 5a Cx-I/II tips short, broad, +/- triangular; coxal field short, broad (Cx-I L/Cx-III W 0.73); idiosoma elongated (L/W 1.43), lateral margins relatively parallel, clear 'shoulders' (Fig. 92A); chelicera compact (L/H 12.31); P2 shorter (rel L 0.32) (Fig. 92C) (only 1 male) *T. baderi*
- b Cx-I tips more slender, not triangular; coxal field more elongated (Cx-I L/Cx-III W 0.79–0.89); idiosoma rounded-oval (L/W 1.25–1.40) (Fig. 103A); chelicera slightly more slender (L/H 12.81–15.79); P2 relatively longer (rel L 0.33–0.36) (Fig. 103C) *T. delgada*
- 6a Palps long and slender, especially P4 [L/H 3.77–5.00 (one female 3.38)]; Cx-I apically sharply pointed, lateral margin of Cx-II/III only slightly graded; genital skeleton extremely slender, apical part strongly elongated (L/W 4.35–4.72) (Figs 87, 88, 106) 7
- b Palps more compact, especially P4 (L/H 2.67–3.63); Cx-I apically blunt, lateral margin of Cx-II/III mostly graded; genital skeleton less elongated (L/W 1.48–2.70) (Figs 89, 93, etc.) 8
- 7a Idiosoma small (L < 600 µm), elongated (L/W 1.49), especially anterior part of coxal field; genital field of male slightly elongated (L/W 1.26); capitular bay basely V-shaped; ventral margin of capitulum smoothly curved; P4 longer than P2 (P2/P4 0.86–0.88), very slender (Fig. 106) *T. maceripalpis*
- b Idiosoma mid-sized (L > 600 µm), rounded-oval (L/W 1.31–1.34); genital field of male compact (L/W 1.16–1.18); capitular bay basely rounded; capitulum with sharp bend at ventral margin and lateral edge; P2 and P4 of equal length (P2/P4 0.98–1.05) (Figs 87, 88) *T. acuticoxalis*
- 8a Rostrum slightly down-curved, very slender; capitulum basely very short, high (Fig. 89C); genital field of female posterior relatively broad, only slightly tapering (Fig. 89A) (male unknown) *T. adunca*
- b Rostrum slender, +/- straight (not down-curved); capitulum basely longer (Fig. 93B, etc.); genital field of female mostly clearly tapering (Fig. 93D, etc.) 9
- 9a Idiosoma mostly elongated (males L/W 1.38–1.58, females 1.39–1.49); dorsal shield elongate (L/W 1.33–1.47); coxal field elongated, Cx-II/III medially long, genital field relatively short (males gf L/Cx-II/III mL 1.34–1.86); genital skeleton apically relatively short (aL/tL 0.44–0.50), scleritum proximale medially weakly developed, with fine tip; P2 and P4 of similar length (P2/P4 0.95–1.07); idiosoma relatively small (males L 520–579 µm, females 633–657 µm) (Figs 81–84) *T. semicolor* (see also *columbiana*-like species)
- b Idiosoma rounded-oval (males L/W 1.23–1.51, females 1.26–1.47); dorsal shield rounded-oval (L/W 1.15–1.38); Cx-II/III medially shorter, genital field longer (males gf L/Cx-II/III mL 1.73–3.48); genital skeleton apically longer (aL/tL 0.61–0.73), scleritum proximale medially well developed, with strongly curved scleritum; P2 mostly longer than P4 (P2/P4 1.02–1.27); idiosoma variable in size (males L 500–755 µm, females 569–780 µm) (Fig. 93, etc.) 10

10a	Rostrum very slender, straight, ventral margin of capitulum with sharp bend (Figs 93B, 94D, 95C, etc.)	11
b	Rostrum higher attached, shorter, tapering, ventral margin of capitulum equally curved (Figs 97C, 98C, 105C, etc.)	13
11a	P2 long, P4 short (Fig. 93I) (P2 rel L 0.36, P4 rel L 0.29, P2/P4 1.27); male genital field +/- elongated, anterior rounded (Fig. 93A) (gf L/dist gf – cb 0.78–0.82)	<i>T. bicolor</i>
b	P2 shorter, P4 longer (Figs 94D, 95C, D, 101C, etc.) (P2 rel L 0.34–0.35, P4 rel L 0.30–0.31, P2/P4 1.10–1.18); male genital field shorter, anterior strongly truncated or pointed (gf L/dist gf – cb 0.62–0.74) (Figs 94A, 101A, 113A)	12
12a	Genital field subrectangular (anterior +/- straight), slightly elongated (L/W males 1.20–1.21); antero-lateral platelets in males relatively shorter (a-m pl L/a-l pl L 0.74); in males, Cx-I medially relatively long (Cx-I/Cx-II/III mL 1.77–2.35) (Fig. 101A, B)	<i>T. curtispalpis</i>
b	Genital field anterior truncated, compact (L/W males 1.06–1.17); antero-lateral platelets in males relatively shorter (a-m pl L/a-l pl L 0.71–0.82); in males, Cx-I medially (mostly) relatively long (Cx-I/Cx-II/III mL 1.53–2.32) (Fig. 113A, B)	<i>T. tilaranensis</i>
c	Genital field anterior +/- pointed (L/W male 1.19); antero-lateral platelets relatively longer (a-m pl L/a-l pl L 0.68); in males, Cx-I medially shorter (Cx-I/Cx-II/III mL 1.55) (Fig. 94A, B)	<i>T. carlbaderi</i>
The following species can be distinguished definitively only in the male sex; compared measurements refer to males only.		
13a	Genital field large (gf L/Id L 0.24–0.27, gf L/dist gf – cb 0.73–0.89); idiosoma larger (L > 640 µm); dorsal plate yellow, reddish or red; posterior margin of Cx-IV indistinctly besides caudal end of genital field (Figs 97A, 105A, 110A)	14
b	Genital field shorter (gf L/Id L 0.22–0.23, gf L/dist gf – cb 0.62–0.73); idiosoma smaller (L 500–608 µm); dorsal plate with reddish pattern (clear or pale); posterior margin of Cx-IV indistinctly besides or posterior to caudal end of genital field (Fig. 107A)	<i>T. pervagata</i>
14a	Cx-I elongated (Cx-I tL/Cx-II/III mL 4.36–6.01) (Fig. 110A)	<i>T. rubella</i>
b	Cx-I shorter (Cx-I tL/Cx-II/III mL 3.65–4.16) (Figs 97A, 105A)	15
15a	Idiosoma rounded-oval (L/W 1.26–1.37); capitular bay basely broad (box-shaped); coxal field laterally graded; P4 more compact (L/H 3.09–3.33, P3/P4 0.58–0.60); rostrum relatively short (r L/gn dL 0.51–0.56); dorsal plate yellow to very pale reddish (Fig. 97)	<i>T. collina</i>
b	Idiosoma elongated-oval (L/W 1.43); capitular bay basely rounded; coxal field laterally very smooth; P4 more elongated, longer (L/H 3.70, P3/P4 0.55); rostrum long (r L/gn dL 0.58); dorsal plate red (Fig. 105)	<i>T. levicoxalis</i>

TORRENTICOLA ACUTICOXALIS K.O. VIETS, 1977
(FIGS 87A–F, 88; TABLE 42)

Type series: Holotype male, Guatemala, km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 16.viii.1974, leg. Böttger, prep. no. 5725 SMF; allotype female, same locality and date, prep. no. 5754 SMF; paratypes, same locality and date, 5/1/0 (2/0/0 mounted, prep. no. 5726, 5753 SMF, 0/1/0 mounted, prep. no. 5756 SMF); same locality, 11.viii.1974, 1/0/0.

Habitat: Small mountain stream at 1520 m asl.

Geographical distribution: Guatemala.

Published records: K.O. Viets (1977/78 Teil II).

Diagnosis: Characters of the *bicolor*-like species; idiosoma rounded-oval (L/W 1.31–1.34); posterior half of dorsal plate reddish; coxal field laterally smooth, Cx-I tips pointed, lateral margin of Cx-I apically concave, capitular bay basely rounded; genital field compact

(L/W 1.16–1.18) (Fig. 87A, E); capitulum with sharp ventral and lateral bend (Fig. 87C, F), P2 and P4 of equal length (P2/P4 0.98–1.05) (Fig. 87D).

Description: See K.O. Viets (1977/78 Teil II).

Discussion: *Torrenticola acuticoxalis* is most similar to *T. maceripalpis*; the two species are separated from all other neotropical species of the genus in the combination of slender palps (especially P4), pointed Cx-I tips and particularly the very slender, unusually shaped genital skeleton (Fig. 88). The species is separated from the latter due to a larger, more rounded-oval idiosoma, more compact genital field, and the laterally and ventrally sharply bent capitulum.

TORRENTICOLA ADUNCA SP. NOV.
(FIG. 89A–D; TABLE 42)

Type series: Holotype female, CR 104, Puntarenas, Biological Station Las Alturas, left affluent of Río

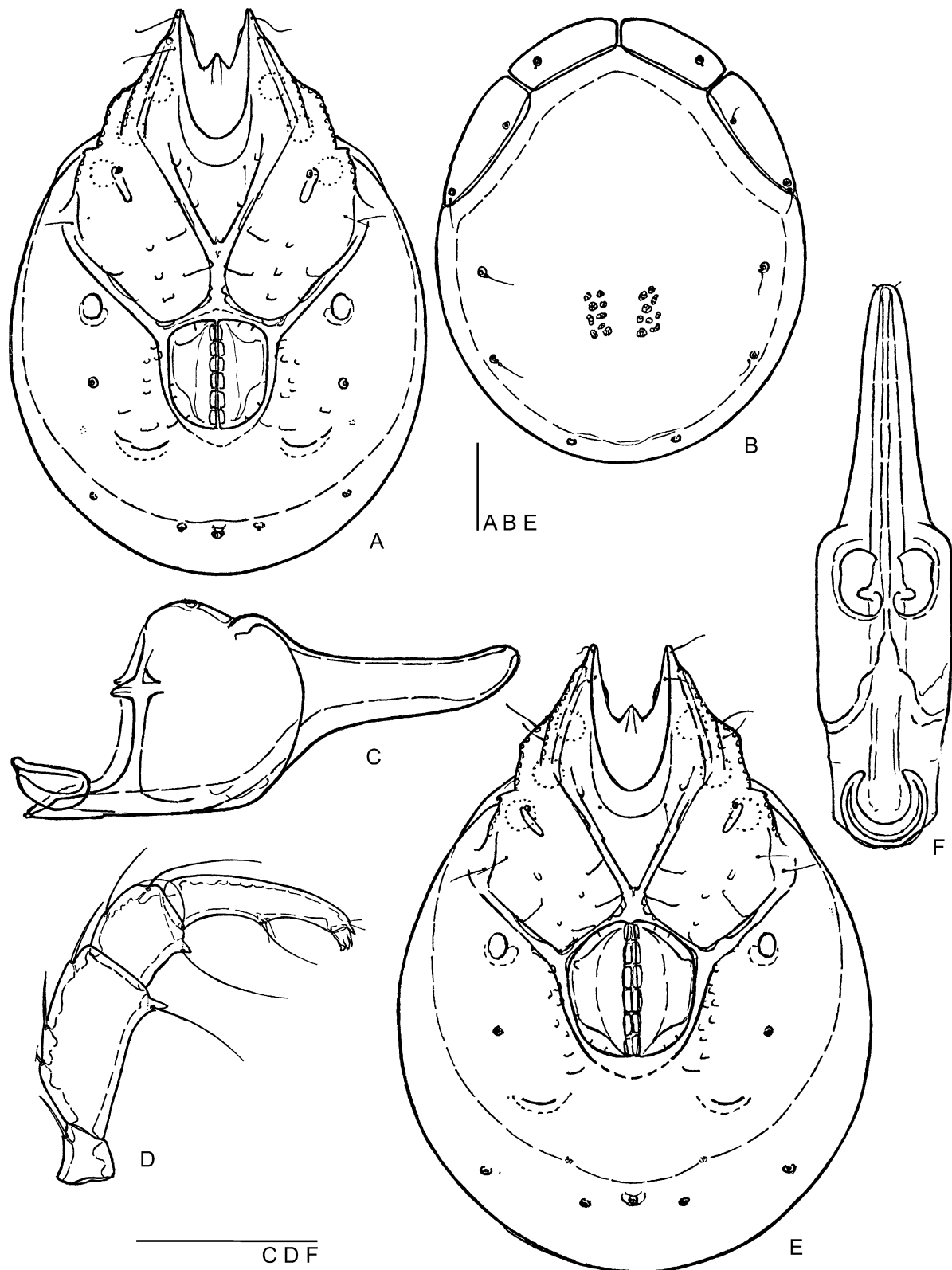


Figure 87. *Torrenticola acuticoxalis*. A–D, holotype male, prep. no. 5725 SMF Viets collection; E, F, allotype female, prep. no. 5754 SMF Viets collection; after K.O. Viets (1977/78, Teil II). A, E, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, left palp; F, capitulum, dorsal view. Scale bars = 100 μ m.



Figure 88. *Torrenticola acuticoxalis*. Holotype male, prep. no. 5725 SMF Viets collection. Genital skeleton, anterior view. Scale bar = 100 μ m.

Bellavista, small stream, 1580 m asl, 01.viii.1995, mounted.

Habitat: Fast flowing small mountain stream at 1580 m asl; lithophyal; temperature 17.2 °C; conductivity 19 μ S cm^{-1} .

Distribution: Costa Rica (only known from type locality, southern Cordillera de Talamanca).

Derivatio nominis: *aduncus* (Latin = hooked, down-curved, crooked beaked); referring to the characteristic shape of the rostrum.

Diagnosis: (only 1 female) Characters of the *bicolor*-like species; idiosoma small, rounded; dorsal plate yellow; coxal field broad, laterally moderately graded; genital field of female posterior relatively broad, only slightly tapering; capitulum basely very short, high; rostrum long, very slender, down-curved; P4 relatively short, ventral setae far distally.

Description – Male: Unknown.

Female ($N = 1$): Idiosoma rounded (L 603 μ m, L/W 1.23); dorsal plate yellow; antero-medial dorsal plate-

lets relatively short, medial margins convex, antero-lateral margins laterally curved, posterior margins straight, slightly oblique, antero-lateral platelets longer, anterior margins convex, posterior tapering, blunt; Dgl-4 medial to Dgl-5, caudal margin of primary sclerotization relatively far anterior (Fig. 89B); coxal field compact, relatively short (Cx-I tL/Cx-III W 0.73), Cx-I tips rounded, Cxgl-4 nearly at Cx-I tips, lateral margins of Cx-I/II graded; capitular bay U-shaped; posterior margin of Cx-IV latero-caudal from genital field, across; genital field broad-rhombic, anterior slightly truncated, relatively sharp edge towards straight lateral margins, posterior tapering, caudal margins rounded; excretory pore between Vgl-2 posterior to caudal margin of primary sclerotization (Fig. 89A); capitulum basely very high and short, ventral margin bellied, smooth but very high curve towards long, slender rostrum, rostrum down-curved; chelicera slender (L/H 12.40); ventro-distal projection of P2 truncated cone-shaped, on P3 sharp pointed cone-shaped, P4 relatively short (rel L 0.29, L/H 3.11, P2/P4 1.18), setae on ventral margin far distally (vL P4/L to setae 1.63) (Fig. 89C, D).

Discussion: *Torrenticola adunca* differs from all other neotropical species of the genus in the very characteristic shape of the capitulum with a short and high basal part and a slender, down-curved rostrum.

***TORRENTICOLA ALTICOLA* SP. NOV.**

(FIGS 90A–F, 91A–D; TABLE 43)

Type series: Holotype male, CR 95, San José, 10 km south-east Salsipuedes, Río Savegre valley, Quebrada de Ojo de Agua, small stream, 2340 m asl, 27.vii.1995, mounted; paratype, same locality and date, 1/0/0 unmounted.

Additional specimens: CR 170, Cartago, NP Chirripó, Río Chirripó Atlantico, small stream, 13.iii.1996, 3430 m asl, 1/1/0 mounted, 0/1/0 unmounted; CR 175, San José, NP Chirripó, Río Terbi, small stream, 3100 m asl, 15.iii.1996, 0/1/0 mounted, 0/1/0 unmounted.

Habitat: Fast flowing, small high mountain streams at 2340–3430 m asl; mesolithal and lithophyal; temperature 10.0–11.2 °C; conductivity 80–128 μ S cm^{-1} .

Distribution: Costa Rica (Central Cordillera de Talamanca).

Derivatio nominis: *altus* (Latin = at high elevation), *colere* (Latin = inhabit).

Diagnosis: Characters of the *bicolor*-like species; idiosoma relatively large, oval; dorsal plate yellowish; coxal field laterally graded, Cx-I tips slender,

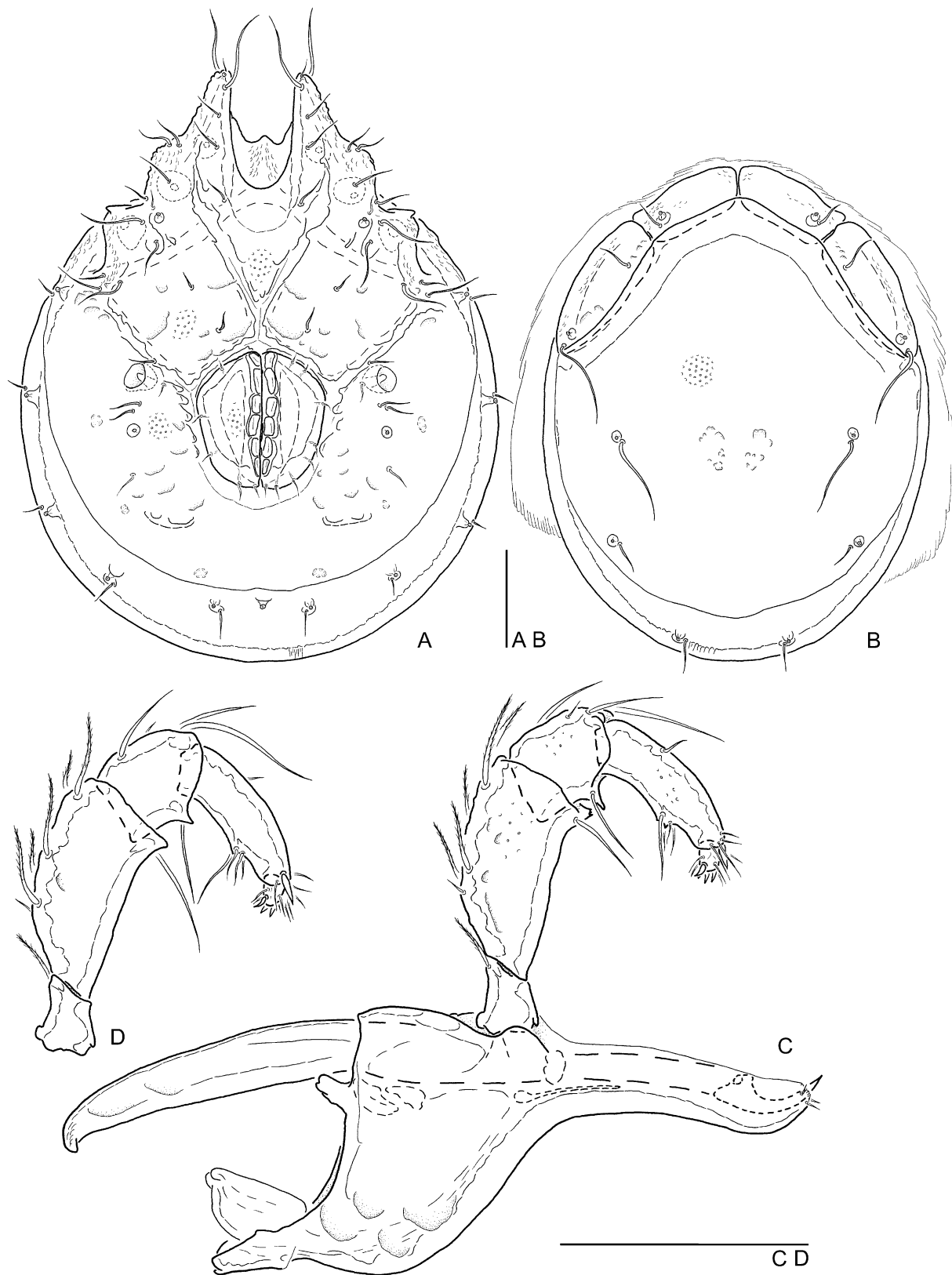


Figure 89. *Torrenticola adunca*. A–D, holotype female (CR 104). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 42. Measurements (μm) of *Torrenticola acuticoxalis*; $N = 2$ (male), 1 (female) and *T. adunca*; $N = 1$ (female, holotype). The measurements for *T. acuticoxalis* not given in the original description (K.O. Viets, 1977/78 Teil II) were completed by new measurements of the preparations of the type specimens (SMF, Viets collection)

	<i>acuticoxalis</i>			<i>adunca</i>	
	male			female	female
	ht	pt	SD	pt	ht
Idiosoma L	657	657	0.00	741	603
Idiosoma W	493	491	2.1	564	491
Idiosoma L/W	1.33	1.34	0.01	1.31	1.23
Cx-I tL	284	275	6.9	299	235
Cx-III W	334	324	6.9	343	324
Cx-I tL/Cx-III W	0.85	0.85	0.00	0.87	0.73
Ds L	530	530	0.00	594	505
Dp L	495	491	3.5	554	481
Ds W	441	439	2.1	500	397
Ds L/W	1.20	1.21	0.01	1.19	1.27
Dp L/W	1.12	1.12	0.00	1.11	1.21
A-m platelet L	147	140	5.2	147	118
A-m platelet W	55	53	1.7	56	49
A-l platelet L	178	162	11.3	181	157
A-l platelet W	61	61	0.00	69	59
A-m pl L/a-l pl L	0.83	0.86	0.03	0.81	0.75
Capitular bay L	147	147	0.00	167	118
Capitular bay W	74	76	1.7	83	66
Cb L/W	2.00	1.94	0.05	2.00	1.78
Dist cb – gf	198	196	1.7	152	169
Cx-I mL	142	129	9.5	137	120
Cx-II + III mL	51	61	6.9	12	37
Cx-I tL/Cx-II/III mL	5.53	4.48	0.7	24.42	6.41
Cx-I/Cx-II + III mL	2.76	2.10	0.5	11.20	3.27
Genital field L	141	142	0.9	165	145
Gf L/Cx-II + III mL	2.74	2.32	0.3	13.50	3.93
Genital field W	121	120	0.9	164	135
Genital field L/W	1.16	1.18	0.02	1.01	1.07
Gf L/Id L	0.21	0.22	0.00	0.22	0.24
Gf L/dist cb – gf	0.71	0.73	0.01	1.09	0.86
Dist gf – expo	127	124	2.6	178	125
Dist gf – cauda	174	174	0.00	255	178
Gs L	289	294	3.5		
Gs aL	194	221	19.1		
Gs W	61				
Gs aL/tL	0.67	0.75	0.1		
Gs tL/W	4.72				
Capitulum vL	296	296	0.00	319	251
Capitulum dL	225	229	2.6	245	189
Rostrum L	125	123	1.7	135	100
Capitulum H	118	115	1.7		110
R L/c dL	0.55	0.53	0.01	0.55	0.53
R L/c vL	0.42	0.41	0.01	0.42	0.40
Gn bend depth	18	18	0.00		34
Chelicera L	355	352	2.6	410	304
Chelicera H	25	27	1.7	29	25

Table 42. *Continued*

	<i>acuticoxalis</i>			<i>adunca</i>	
	male			female	
	ht	pt	SD	pt	ht
Chelicera L/H	14.50	13.05	1.0	13.96	12.40
Chelicera bs L	296	298	0.9	349	262
Chelicera claw L	59	54	3.5	61	42
Chel bs/claw L	5.04	5.52	0.3	5.70	6.29
P1 dorsal L	32	33	0.9	36	29
P2 dL	100	103	1.7	113	81
P3 dL	55	56	0.9	60	42
P4 dL	103	102	0.9	108	69
P5 dL	12	11	0.9	12	15
Palp total L	303	305	1.7	328	235
P4 vL	81	81	0.00	88	54
P4 vL to seta	43	42	0.9	45	33
P4 vL/L to seta	1.89	1.94	0.04	1.95	1.63
P1 rel L	0.11	0.11	0.00	0.11	0.13
P2 rel L	0.33	0.34	0.00	0.34	0.34
P3 rel L	0.18	0.18	0.00	0.18	0.18
P4 rel L	0.34	0.33	0.00	0.33	0.29
P5 rel L	0.04	0.04	0.00	0.04	0.06
P1 H	34	32	1.7	38	25
P2 H	51	50	0.9	58	39
P3 H	45	44	0.9	49	37
P4 H	27	27	0.00	32	22
P5 H	10	9	0.9	12	9
P1 L/H	0.93	1.04	0.1	0.94	1.20
P2 L/H	1.95	2.05	0.1	1.96	2.06
P3 L/H	1.22	1.28	0.04	1.23	1.13
P4 L/H	3.82	3.77	0.03	3.38	3.11
P5 L/H	1.25	1.29	0.03	1.00	1.71
P2/P4 L	0.98	1.01	0.03	1.05	1.18
P3/P4 L	0.54	0.55	0.01	0.56	0.61

medial margin Cx-II/III long; genital field relatively long; genital skeleton apically long, cella proximalis mid-sized; capitulum basely rounded, rostrum slender; ventral setae on P4 slightly in distal half, P4 short.

Description – Male ($N = 2$): Idiosoma oval (L 765–834 μm , L/W 1.32–1.35); dorsal plate pale yellow; antero-medial dorsal platelets medially convex, laterally \pm straight, antero-lateral platelets anterior straight, posterior tapering, rounded; Dgl-4 slightly lateral to Dgl-5 (Fig. 90B); coxal field laterally graded, Cx-I tips slender, apically rounded, Cxgl-4 at tips of Cx-I; capitular bay relatively narrow U-shaped; medial margins of Cx-II/III relatively long (Cx-I/Cx-II/III mL 1.54–1.76); genital field elongated, anterior truncated, lateral \pm straight, posterior strongly tapering (Fig. 90A); excretory pore between Vgl-2,

slightly posterior to caudal margin of primary sclerotization (Fig. 90A); genital skeleton apically long, cella proximalis mid-sized, with strong, short processus proximalia (aL/tL 0.61), brachia distalia and proximalia well developed (Fig. 90F); ventral margin of capitulum basely bellied, smoothly curved towards slender, straight rostrum (Fig. 90C); ventral projections of P2/P3 cone-shaped, strong, at P3 long, pointed; P4 short, distally tapering (P4 rel L 0.30–0.31, L/H 2.86–3.17, P2/P4 1.11–1.20), ventral setae on small projection slightly distally (vL/L to seta 1.66–1.76) (Fig. 90D, E).

Female ($N = 2$): Idiosoma similar to male; genital field elongated-rhombic, anterior rounded, smoothly bend to straight lateral margins, tapering to rounded posterior margin (Fig. 91A); excretory pore and Vgl-2 further posterior to primary sclerotization (Fig. 91A); gnathosoma similar to male (Fig. 91C, D).

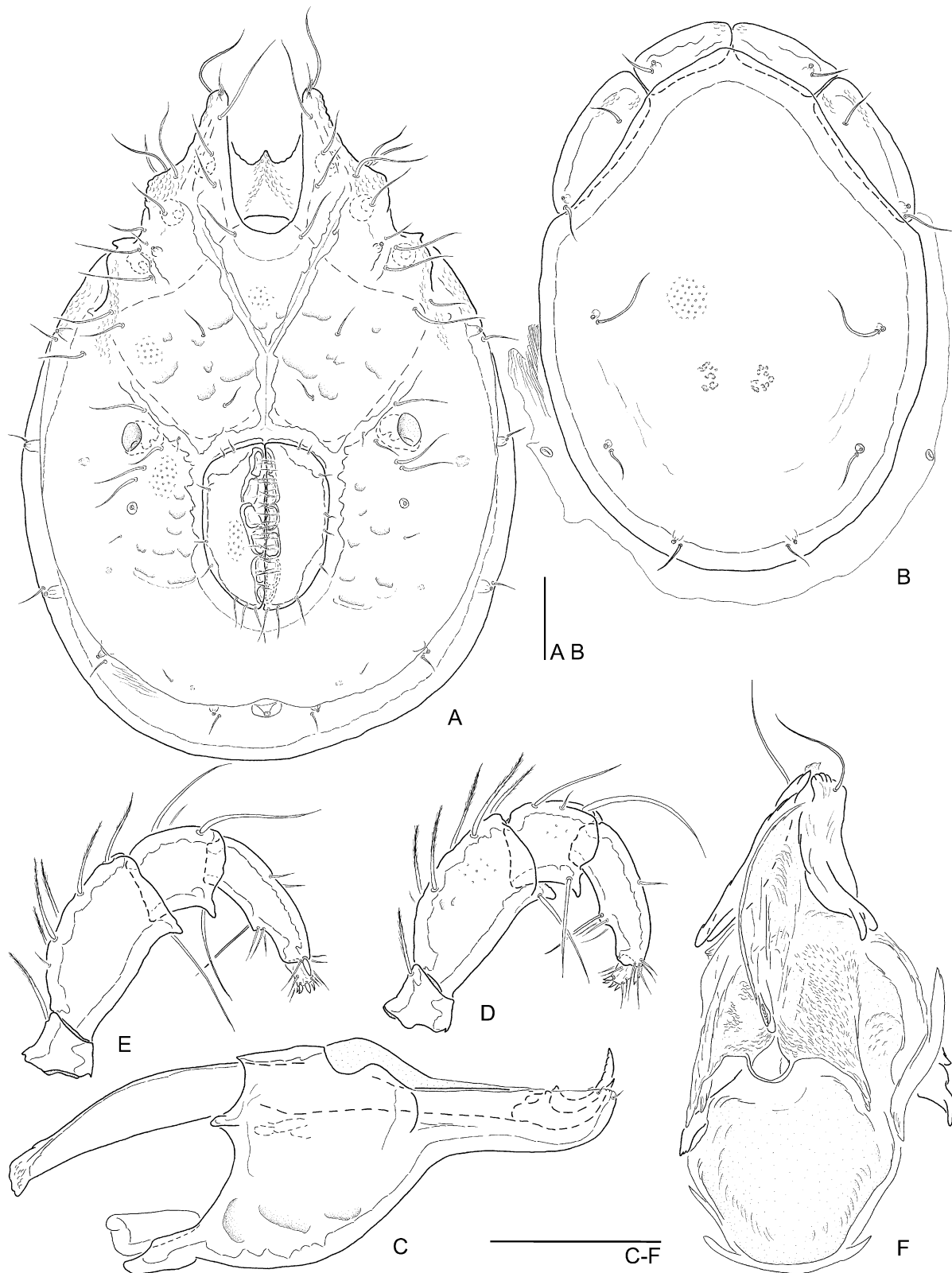


Figure 90. *Torrenticola alticola*. A–E, holotype male (CR 95); F, male (CR170). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, right palp, lateral view; E, left palp, medial view; F, genital skeleton, antero-lateral view. Scale bars = 100 µm.

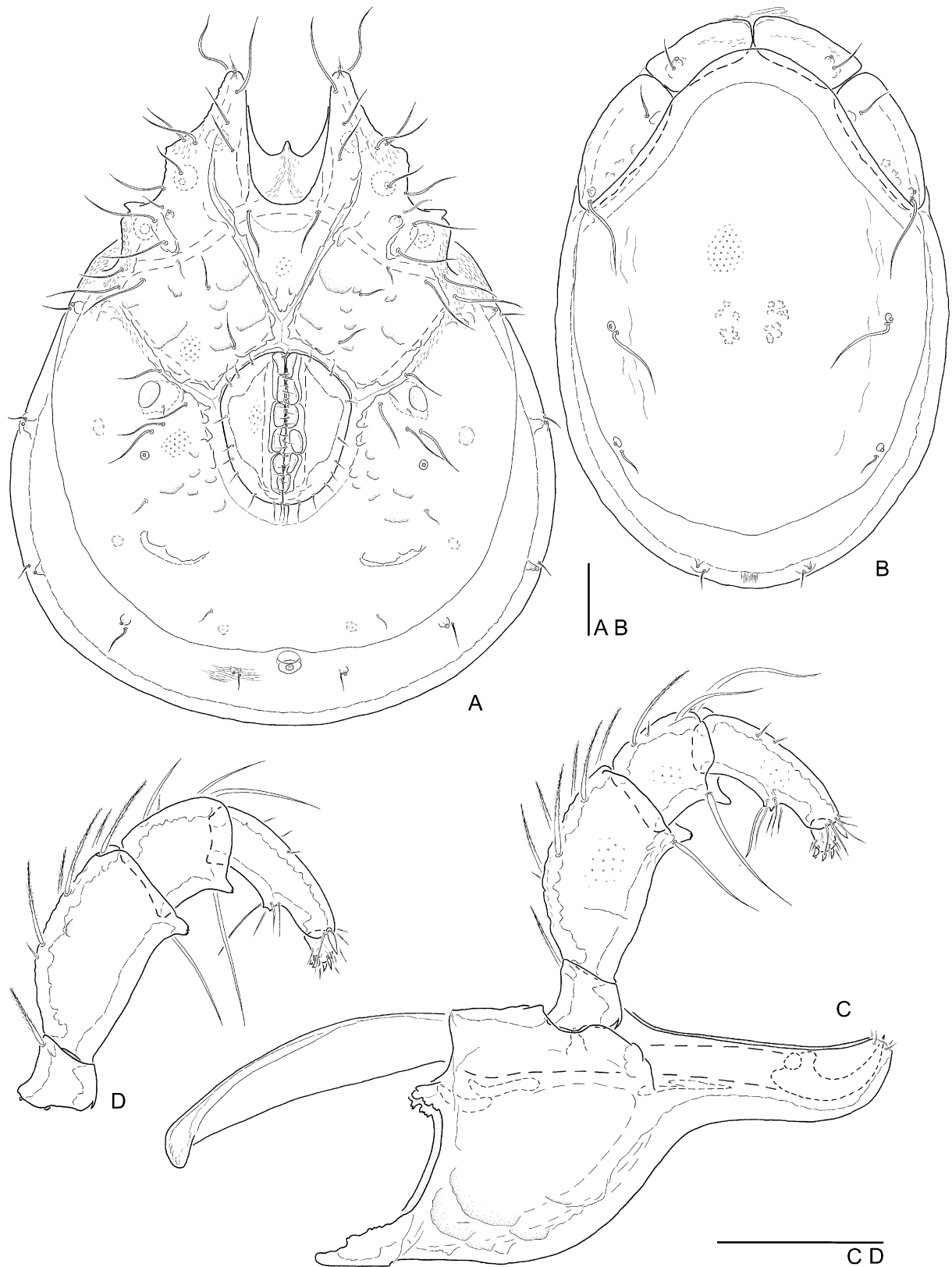


Figure 91. *Torrenticola alticola*. A–D, female (CR 170). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Table 43. Measurements (μm) of *Torrenticola alticola*; $N = 2$ (male), 2 (female)

	male			female			
	ht	pt	SD	mean	min.	max.	SD
Idiosoma L	765	834	48.6	885	878	893	10.4
Idiosoma W	579	618	27.7	667	598	736	97.1
Idiosoma L/W	1.32	1.35	0.02	1.34	1.21	1.47	0.2
Cx-I tL	304	338	24.3	334	334	334	0.00
Cx-III W	383	412	20.8	412	373	451	55.5
Cx-I tL/Cx-III W	0.79	0.82	0.02	0.82	0.74	0.89	0.1
Ds L	638	706	48.6	738	716	760	31.2
Dp L	608	677	48.6	699	677	721	31.2
Ds W	451	491	27.7	510	491	530	27.7
Ds L/W	1.41	1.44	0.02	1.45	1.44	1.46	0.02
Dp L/W	1.35	1.38	0.02	1.37	1.36	1.38	0.01
A-m platelet L	130	147	12.1	146	135	157	15.6
A-m platelet W	51	54	1.7	59	56	61	3.5
A-l platelet L	187	206	13.0	200	197	203	4.3
A-l platelet W	69	71	1.7	78	76	80	2.6
A-m pl L/a-l pl L	0.69	0.71	0.02	0.7	0.7	0.8	0.1
Capitular bay L	167	179	8.7	181	175	186	7.8
Capitular bay W	89	96	4.3	104	89	118	19.9
Cb L/W	1.86	1.87	0.01	1.79	1.49	2.08	0.4
Dist cb – gf	243	272	20.8	192	187	196	6.1
Cx-I mL	140	162	15.6	154	147	162	10.4
Cx-II + III mL	91	92	0.9	30	29	31	0.9
Cx-I tL/Cx-II/III mL	3.35	3.68	0.2	11.12	10.89	11.34	0.3
Cx-I/Cx-II + III mL	1.54	1.76	0.2	5.14	5.00	5.28	0.2
Genital field L	195	213	13.0	206	194	218	17.3
Gf L/Cx-II + III mL	2.15	2.32	0.1	6.85	6.58	7.12	0.4
Genital field W	151	159	6.1	179	174	184	6.9
Genital field L/W	1.29	1.34	0.03	1.15	1.11	1.19	0.1
Gf L/Id L	0.25	0.26	0.00	0.23	0.22	0.24	0.02
Gf L/dist cb – gf	0.80	0.78	0.01	1.07	1.03	1.11	0.1
Dist gf – expo	120	145	17.3	227	225	228	1.7
Dist gf – cauda	164	173	6.1	306	301	311	6.9
Gs L	284	296	8.7				
Gs aL	174	189	10.4				
Gs W	142	162	13.9				
Gs aL/tL	0.61	0.64	0.02				
Gs tL/W	2.00	1.83	0.1				
Capitulum vL	307	328	14.7	352	342	363	14.7
Capitulum dL	224	243	13.0	261	255	267	8.7
Rostrum L	114	129	10.4	141	140	142	1.7
Capitulum H	132	145	8.7	154	152	157	3.5
R L/c dL	0.51	0.53	0.02	0.54	0.53	0.55	0.01
R L/c vL	0.37	0.39	0.02	0.40	0.39	0.41	0.01
Gn bend depth	26	28	1.7	31	29	32	1.7
Chelicera L	355	392	26.0	431	423	439	11.3
Chelicera H	29	34	3.5	34	32	37	3.5
Chelicera L/H	12.08	11.43	0.5	12.60	11.93	13.27	0.9
Chelicera bs L	294	328	24.3	362	356	368	7.8
Chelicera claw L	61	64	1.7	69	66	71	3.5
Chel bs/claw L	4.80	5.15	0.3	5.28	5.17	5.39	0.2
P1 dorsal L	32	37	3.5	40	39	42	1.7
P2 dL	103	118	10.4	120	120	120	0.00

Table 43. Continued

	male			female			
	ht	pt	SD	mean	min.	max.	SD
P3 dL	56	61	3.5	64	64	64	0.00
P4 dL	93	98	3.5	103	103	103	0.00
P5 dL	17	15	1.7	18	17	20	1.7
Palp total L	301	328	19.1	345	345	345	0.00
P4 vL	71	71	0.00	75	74	76	1.7
P4 vL to seta	40	43	1.73	47	45	48	1.7
P4 vL/L to seta	1.76	1.66	0.07	1.61	1.54	1.68	0.1
P1 rel L	0.11	0.11	0.00	0.12	0.11	0.12	0.01
P2 rel L	0.34	0.36	0.01	0.35	0.35	0.35	0.00
P3 rel L	0.19	0.19	0.00	0.18	0.18	0.18	0.00
P4 rel L	0.31	0.30	0.01	0.30	0.30	0.30	0.00
P5 rel L	0.06	0.04	0.01	0.05	0.05	0.06	0.01
P1 H	42	44	1.73	45	44	47	1.7
P2 H	56	59	1.73	61	59	64	3.5
P3 H	49	51	1.73	54	54	54	0.00
P4 H	29	34	3.46	36	36	37	0.9
P5 H	12	12	0.00	13	12	13	0.9
P1 L/H	0.76	0.83	0.05	0.89	0.89	0.89	0.00
P2 L/H	1.83	2.00	0.12	1.96	1.88	2.04	0.1
P3 L/H	1.15	1.19	0.03	1.18	1.18	1.18	0.00
P4 L/H	3.17	2.86	0.22	2.85	2.80	2.90	0.1
P5 L/H	1.40	1.20	0.14	1.43	1.40	1.45	0.04
P2/P4 L	1.11	1.20	0.07	1.17	1.17	1.17	0.00
P3/P4 L	0.61	0.63	0.01	0.62	0.62	0.62	0.00

Discussion: The species is most similar to *T. cumbrensis*, especially with regard to the combination of a large idiosoma and a relatively short P4. *Torrenticola alticola* is separated from the latter on the basis of a smaller, ventrally smoother curved capitulum and, in the female sex, a longer medial margin of Cx-II/III (in *T. cumbrensis* no medial margin of Cx-II/III is present). The two females examined differ greatly in the shape of the posterior part of the idiosoma (rounded vs. slender); however, the coxal field, genital field and gnathosoma are very similar.

TORRENTICOLA BADERI SP. NOV.

(FIG. 92A–D; TABLE 44)

Type series: Holotype male, CR 169, San José, NP Chirripó, besides ranger station, Río Talari, stream, 3340 m asl, 12.iii.1996, mounted.

Habitat: Slow flowing high mountain stream at 3340 m asl; mesolihal; temperature 7.1 °C; conductivity 85 µS cm⁻¹.

Distribution: Costa Rica (central Cordillera de Talamanca, Chirripó region, only known from type locality).

Derivatio nominis: *baderi*; named after the Swiss acarologist Carl Bader.

Diagnosis: (only 1 male) Characters of the *bicolor*-like species; idiosoma rectangular-oval, broad 'shoulders', large; dorsal plate yellowish; antero-dorsal platelets broad; coxal field compact, Cx-I apically short, Cx-II broad, Cx-I/II laterally graded, nearly triangular; capitular bay broad V-shaped, basely rounded; genital field small, elongated, tapering posterior; capitulum basely high, rostrum clearly separated (however, with relatively smooth edge); palp long and slender; genital skeleton with small cella proximalis, high carina anterior and posterior.

Description – Male (*N* = 1): Idiosoma elongated, nearly rectangular (L 888 µm, L/W 1.43), antero-lateral corners ('shoulders', dorsal of coxal field) well developed (Fig. 92A); dorsal plate yellowish, antero-medial dorsal platelets relatively short and broad, medial margins nearly straight, posterior margins concave, antero-lateral platelets longer, anterior margin convex, posterior clearly tapering (a-m pl L/a-l pl L 0.65–0.66), dorsal glands close to lateral margins, Dgl-4 slightly lateral to Dgl-5 (Fig. 92B); coxal field broad, greatly graded, Cx-I tips short, Cx-II broad,

Table 44. Measurements (μm) of *Torrenticola baderi*; $N = 1$ (male, holotype)

Idiosoma L	888	Dist cb – gf	277	Capitulum H	147	P1 rel L	0.10
Idiosoma W	623	Cx-I mL	172	R L/c dL	0.58	P2 rel L	0.32
Idiosoma L/W	1.43	Cx-II + III mL	93	R L/c vL	0.43	P3 rel L	0.18
Cx-I tL	324	Cx-I tL/Cx-II/III mL	3.48	Gn bend depth	28	P4 rel L	0.35
Cx-III W	446	Cx-I/Cx-II + III mL	1.84	Chelicera L	392	P5 rel L	0.05
Cx-I tL/Cx-III W	0.73	Genital field L	201	Chelicera H	32	P1 H	39
Ds L	741	Gf L/Cx-II + III mL	2.16	Chelicera L/H	12.31	P2 H	64
Dp L	692	Genital field W	154	Chelicera bs L	326	P3 H	53
Ds W	540	Genital field L/W	1.30	Chelicera claw L	66	P4 H	32
Ds L/W	1.37	Gf L/Id L	0.23	Chel bs/claw L	4.93	P5 H	12
Dp L/W	1.28	Gf L/dist cb – gf	0.73	P1 dorsal L	42	P1 L/H	1.06
A-m platelet L	157	Dist gf – expo	216	P2 dL	130	P2 L/H	2.04
A-m platelet W	69	Dist gf – cauda	260	P3 dL	75	P3 L/H	1.42
A-l platelet L	238	Gs L	223	P4 dL	140	P4 L/H	4.38
A-l platelet W	83	Gs aL	159	P5 dL	18	P5 L/H	1.50
A-m pl L/a-l pl L	0.66	Gs aL/tL	0.71	Palp total L	404	P2/P4 L	0.93
Capitular bay L	160	Capitulum vL	348	P4 vL	115	P3/P4 L	0.54
Capitular bay W	110	Capitulum dL	260	P4 vL to seta	60		
Cb L/W	1.46	Rostrum L	149	P4 vL/L to seta	1.92		

lateral margins straight, Cx-I/II antero-laterally nearly straight therefore appearing triangular, Cxgl-4 at tips of Cx-I; capitular bay basely rounded, lateral margins wide V-shaped (L/W 1.46); genital field, elongated (L/W 1.30), anterior truncated, antero-laterally rounded, laterally slightly convex, postero-laterally rounded, tapering, posterior truncated; excretory pore between Vgl-2, at posterior margin of primary sclerotization, far posterior genital field (Fig. 92A); genital skeleton with strong carina anterior and carina posterior, apical part long, cella proximalis small, with mid-sized, strong processus proximalia (aL/tL 0.71), brachia distalia and proximalia strong, not very extended (Fig. 92D); capitulum basely high, relatively short, ventral margin of basal part curved, clearly separated from rostrum by rounded bend, rostrum slender, slightly tapering; chelicera posterior slightly crooked, compact (L/H 12.31), cheliceral claws long (bs/claw 4.93); palp slender, P2, P3 and especially P4 long (rel L 0.35, L/H 4.38, P2/P4 0.93), distally curved; P2- and P3-projections strong, truncated; setae on ventral margin of P4 on a single smooth projection near the centre (vL P4/L to seta 1.92) (Fig. 92C).

Female: Unknown.

Discussion: *Torrenticola baderi* is characterized by nearly triangular Cx-I/II tips, a large, rectangular-oval idiosoma with heavy shoulders and large palps (with slender P4). It is one of several species that until now have only been known from the highest elevations in the Central Talamanca.

TORRENTICOLA BICOLOR (LUNDBLAD, 1941)
(FIG. 93A–I; TABLE 45)

Type series: Holotype female, Colombia, Cauca, Manchique, north El Tambo, stream, 2000 m asl, 01.iii.1940, leg. K. von Sneidern, prep. no. 2748 SMNH; allotype male, Colombia, Cauca, El Tambo, under waterfall, 1700 m asl, August 1939, leg. K. von Sneidern, prep. no. 3260 SMNH; paratypes, same locality and date as allotype, 13/19/0, 2/2/0 mounted prep. no. 3251 SMNH.

Further material: Colombia, leg. K. von Sneidern: Cauca, El Tambo, stream, 1700 m asl, April 1936, 0/1/0, mounted prep. no. 3964 SMNH; Cauca, El Tambo, stream, 1700 m asl, May 1936, 2/2/0; Cauca, El Tambo 1700 m asl, 20.xi.1936, 1/8/0; Cauca, El Tambo, small stream, 1700 m asl, 26.xi.1936, 1/0/0; Cauca, El Tambo, small stream, 1700 m asl, 04.xii.1936, 1/1/0; Cauca, El Tambo, under waterfall, 1700 m asl, 16.vi.1938, 9/0/0; Cauca, El Tambo, under waterfall, 1700 m asl, February 1939, 5/1/0; Cauca, Manchique, north El Tambo, stream under waterfall, 2200 m asl, March 1940, 8/4/0.

Habitat: Slow to fast flowing small streams, streams and waterfalls at 1700–2200 m asl; mainly moss-covered stones, also grass.

Geographical distribution: Colombia.

Published records: Lundblad (1953).

Diagnosis: Characters of the *bicolor*-like species; idiosoma rounded-oval (L/W 1.40–1.51); posterior half of dorsal plate red; male genital field relatively long

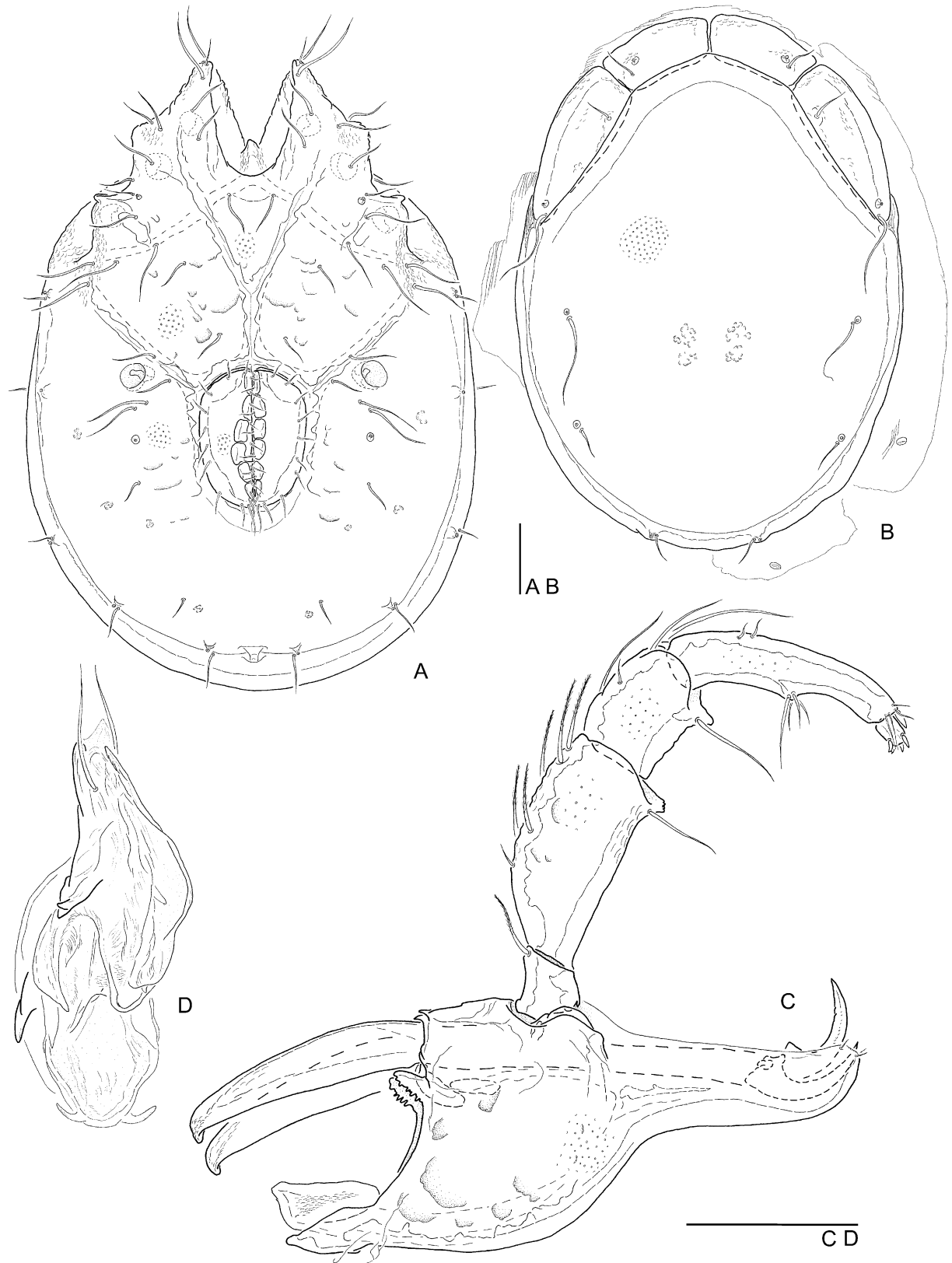


Figure 92. *Torrenticola baderi*. A–D, holotype male (CR 169). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, genital skeleton, antero-lateral view. Scale bars = 100 µm.

(gf L/Cx-II/III mL 2.39–2.84, gf L/dist cb-gf 0.78–0.82); genital skeleton apically long (aL/tL 0.71); P2 long, P4 short (P2 rel L 0.35–0.36, P4 rel L 0.28–0.29, P2/P4 1.22–1.28, P3/P4 0.63–0.69).

Description: See Lundblad (1953).

Discussion: *Torrenticola bicolor* is mainly characterized due to its very slender rostrum, elongated genital field, relatively long P2 and short P4 (in combination with a relatively small idiosoma).

TORRENTICOLA CARLBADERI CRAMER, 1992

(FIGS 94A–E, 95A–D; TABLE 46)

Type series: Holotype female, México, Estado de México, Municipio de Temascaltepec, San Francisco Oxtotilpan, arroyo Peña Blanca 1800 m asl, 12.x.1982, leg. Cramer, coll. Cristina Cramer, Instituto de Biología, UNAM; allotype male, same locality, 04.ii.1983; paratypes, same locality, 04.ii.1983, 0/4/0.

Material examined: Mexico, Avándaro, Arroyo Hondo B, 29.ii.1990, 0/1/0 mounted, coll. Cristina Cramer, prep. Q. Benito; Mexico, Avándaro, Arroyo Hondo D,

17.iii.1990, 0/1/0 mounted, coll. Cristina Cramer, prep. Q. Benito.

Habitat: Small stream at 1800 m asl.

Geographical distribution: Mexico.

Published records: Cramer (1992).

Diagnosis: Characters of the *bicolor*-like species; idiosoma oval (L/W 1.44 in male, 1.26–1.29 in female); dorsal plate with reddish pattern (Fig. 6C-3); antero-lateral dorsal platelets broad; male genital field anterior pointed; P2 short, P4 relatively long (P2 rel L 0.35–0.36, P4 rel L 0.30–0.31, P2/P4 1.11–1.22).

Description: See Cramer (1992).

Discussion: *Torrenticola carlbaderi* is most similar to *T. tilaranensis* and *T. curtispalpis* – all three species are characterized by a very slender, straight rostrum and P2 slightly longer than P4. The differentiation within this group of species is not very clear. *Torrenticola carlbaderi* is mainly separated due to an anterior pointed genital field in the male sex. The illustration of the female in the species description of *T. carlbaderi* (Cramer, 1992) is incomplete, and

Table 45. Measurements (μm) of *Torrenticola bicolor*; $N = 3$ (male), 4 (female). The measurements not given in the original description (Lundblad, 1953) as far as possible were completed by new measurements of the preparations of the type specimens (SMNH, Lundblad collection)

	male					female				
	pt	mean	min.	max.	SD	ht	mean	min.	max.	SD
Idiosoma L	741	711	706	741	18.6	770	764	746	780	14.8
Idiosoma W	520	505	471	520	25.2	525	532	525	546	10.8
Idiosoma L/W	1.42	1.42	1.40	1.51	0.1	1.47	1.42	1.41	1.47	0.03
Cx-I tL	304	294	284	304	9.8	338	309	294	338	22.1
Cx-III W	343	343	324	343	11.3	358	346	334	358	14.2
Cx-I tL/Cx-III W	0.89	0.89	0.83	0.91	0.04	0.95	0.89	0.88	0.95	0.03
Ds L	598	598				594	616	594	638	31.2
Dp L	569	569				559	584	559	608	34.7
Ds W	471	471				466	471	466	476	6.9
Ds L/W	1.27	1.27				1.27	1.31	1.27	1.34	0.05
Dp L/W	1.21	1.21				1.20	1.24	1.20	1.28	0.1
A-m platelet L	145	145				149	148	147	149	1.7
A-m platelet W	48	48				55	52	49	55	4.3
A-l platelet L	178	178				173	176	173	179	4.3
A-l platelet W	65	65				65	68	65	71	4.3
A-m pl L/a-l pl L	0.81	0.81				0.87	0.84	0.82	0.87	0.03
Capitular bay L	167	159	154	167	6.2	173	174	173	181	3.9
Capitular bay W	71	71	71	76	2.8	77	75	71	77	2.7
Cb L/W	2.34	2.24	2.03	2.34	0.2	2.24	2.37	2.24	2.47	0.1
Dist cb – gf	233	213	213	233	11.3	203	175	164	203	17.8
Cx-I mL	142	142	140	145	2.5	164	135	123	164	19.4
Cx-II + III mL	76	64	61	76	7.9	34	37	29	39	4.7
Cx-I tL/Cx-II/III mL	4.00	4.62	4.00	4.64	0.4	9.87	8.69	7.51	11.01	1.8
Cx-I/Cx-II + III mL	1.87	2.19	1.87	2.36	0.2	4.79	3.99	3.13	4.92	1.0

Table 45. *Continued*

	male					female				
	pt	mean	min.	max.	SD	ht	mean	min.	max.	SD
Genital field L	181	174	174	181	4.2	178	178	176	184	3.2
Gf L/Cx-II + III mL	2.39	2.73	2.39	2.84	0.2	5.18	4.87	4.50	6.25	0.8
Genital field W	136	145	136	145	5.0	157	156	154	157	1.4
Genital field L/W	1.33	1.20	1.20	1.33	0.1	1.13	1.15	1.13	1.17	0.02
Gf L/Id L	0.24	0.24	0.24	0.25	0.00	0.23	0.24	0.23	0.24	0.00
Gf L/dist cb – gf	0.78	0.82	0.78	0.82	0.02	0.87	1.04	0.87	1.07	0.1
Dist gf – expo	105	103	93	105	6.5	147	148	145	169	11.2
Dist gf – cauda	167	168	167	174	3.9	217	236	217	243	11.2
Gs L	257	257								
Gs aL	184	184								
Gs W	118	118								
Gs aL/tL	0.71	0.71								
Gs tL/W	2.19	2.19								
Capitulum vL	319	319				349	340	331	349	13.0
Capitulum dL	233	233				262	261	260	262	1.7
Rostrum L	132	132				149	143	137	149	8.7
Capitulum H	127	127								
R L/c dL	0.57	0.57				0.57	0.55	0.53	0.57	0.03
R L/c vL	0.42	0.42				0.43	0.42	0.41	0.43	0.01
Gn bend depth	25	25								
Chelicera L	371	371				410	415	410	419	6.1
Chelicera H	25	25				25	27	25	29	3.5
Chelicera L/H	15.15	15.15				16.75	15.50	14.25	16.75	1.8
Chelicera bs L	316	316				354	357	354	360	4.3
Chelicera claw L	55	55				56	58	56	59	1.7
Chel bs/claw L	5.73	5.73				6.28	6.20	6.13	6.28	0.1
P1 dorsal L	32	32				34	34	33	34	0.9
P2 dL	98	98				102	101	100	102	0.9
P3 dL	49	49				54	54	54	54	0.00
P4 dL	77	77				83	81	78	83	3.5
P5 dL	15	15				13	14	13	15	0.9
Palp total L	271	271				287	284	281	287	4.3
P4 vL	56	56				61	61	61	61	0.00
P4 vL to seta	37	37				36	37	36	39	2.6
P4 vL/L to seta	1.53	1.53				1.72	1.64	1.56	1.72	0.1
P1 rel L	0.12	0.12				0.12	0.12	0.12	0.12	0.00
P2 rel L	0.36	0.36				0.35	0.36	0.35	0.36	0.00
P3 rel L	0.18	0.18				0.19	0.19	0.19	0.19	0.00
P4 rel L	0.29	0.29				0.29	0.29	0.28	0.29	0.01
P5 rel L	0.05	0.05				0.05	0.05	0.05	0.05	0.00
P1 H	32	32				31	32	31	33	1.7
P2 H	47	47				54	52	50	54	2.6
P3 H	42	42				45	45	45	45	0.00
P4 H	27	27				27	28	27	29	1.7
P5 H	11	11				10	11	10	12	1.7
P1 L/H	1.00	1.00				1.12	1.06	1.00	1.12	0.1
P2 L/H	2.11	2.11				1.89	1.94	1.89	2.00	0.1
P3 L/H	1.18	1.18				1.19	1.19	1.19	1.19	0.00
P4 L/H	2.86	2.86				3.09	2.88	2.67	3.09	0.3
P5 L/H	1.33	1.33				1.38	1.29	1.20	1.38	0.1
P2/P4 L	1.27	1.27				1.22	1.25	1.22	1.28	0.04
P3/P4 L	0.63	0.63				0.65	0.67	0.65	0.69	0.03

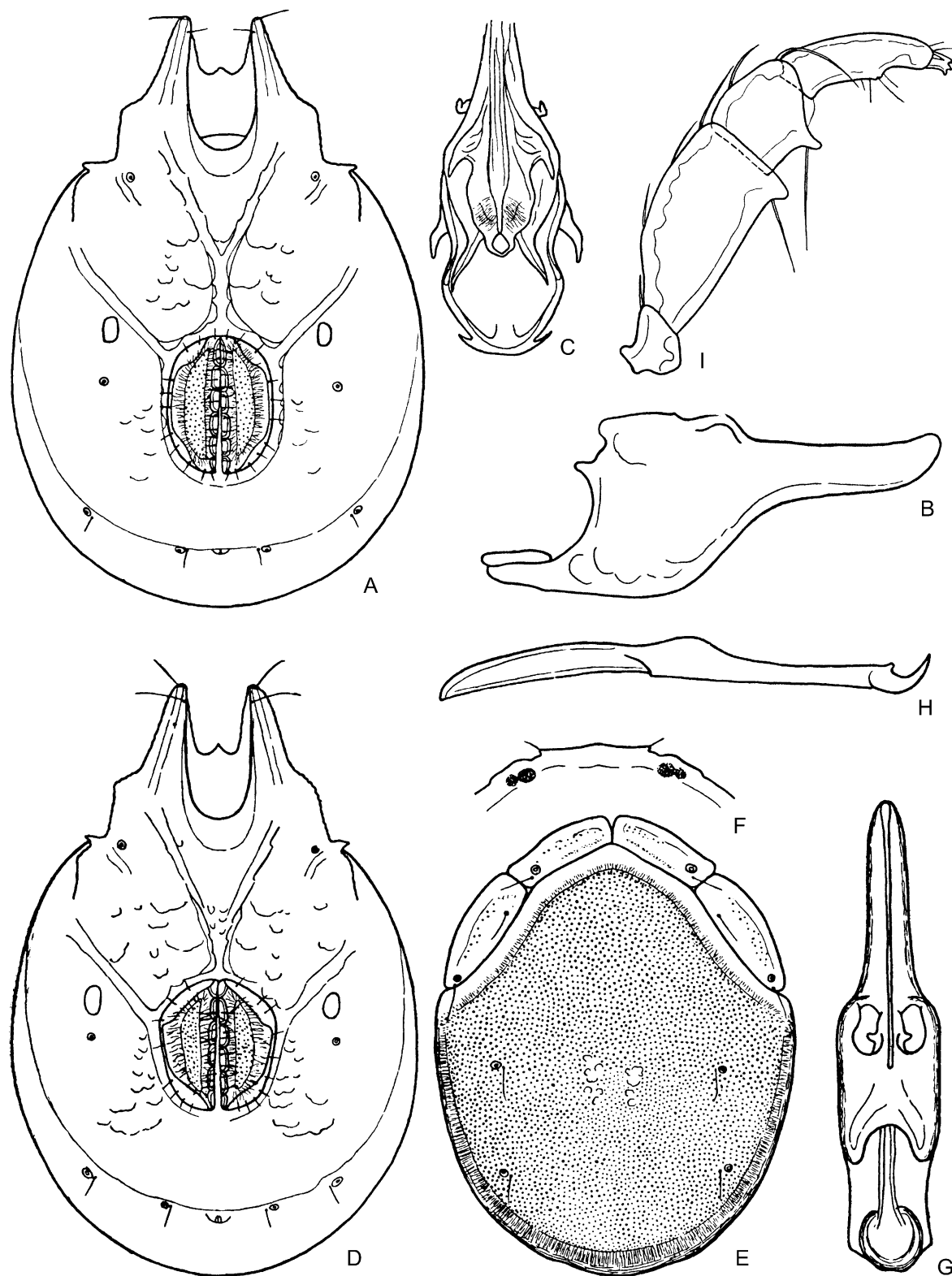


Figure 93. *Torrenticola bicolor*. A–C, allotype male, prep. no. 3260 SMNH Lundblad collection; D–I, holotype female, prep. no. 2748 SMNH Lundblad collection; after Lundblad (1953). A, D, idiosoma, ventral view; B, capitulum, lateral view; C, genital skeleton, anterior view; E, idiosoma, dorsal view; F, frontal region, dorsal view; G, capitulum, dorsal view; H, chelicera; I, palp. No measurement scale bars available.

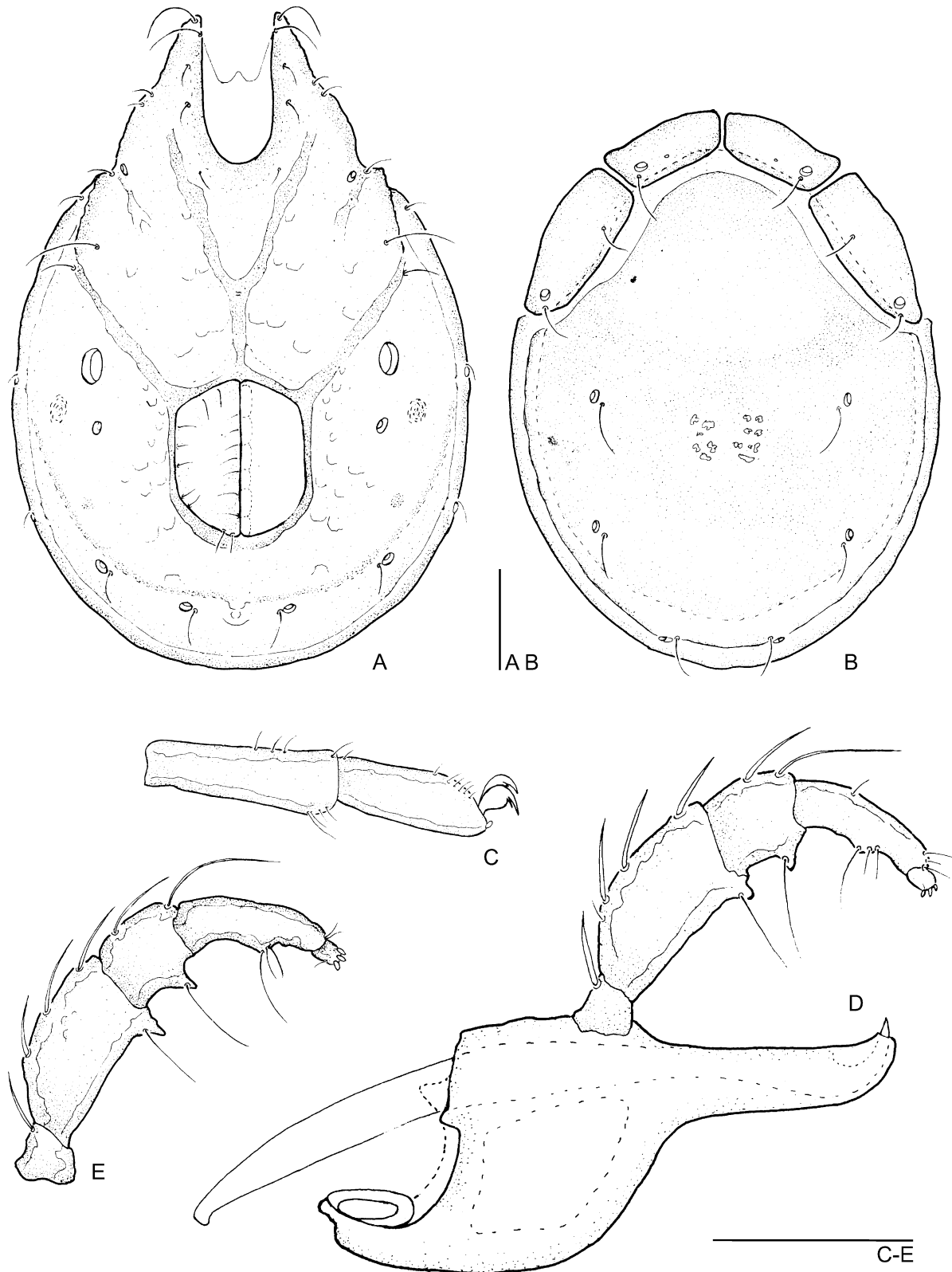


Figure 94. *Torrenticola carlbaderi*. A, C, E, male, prep. Cramer; B, D, female, prep. Cramer; after Cramer (1992). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, first leg, distal segments; D, capitulum with right palp, lateral view; E, palp. Scale bars = 100 µm.

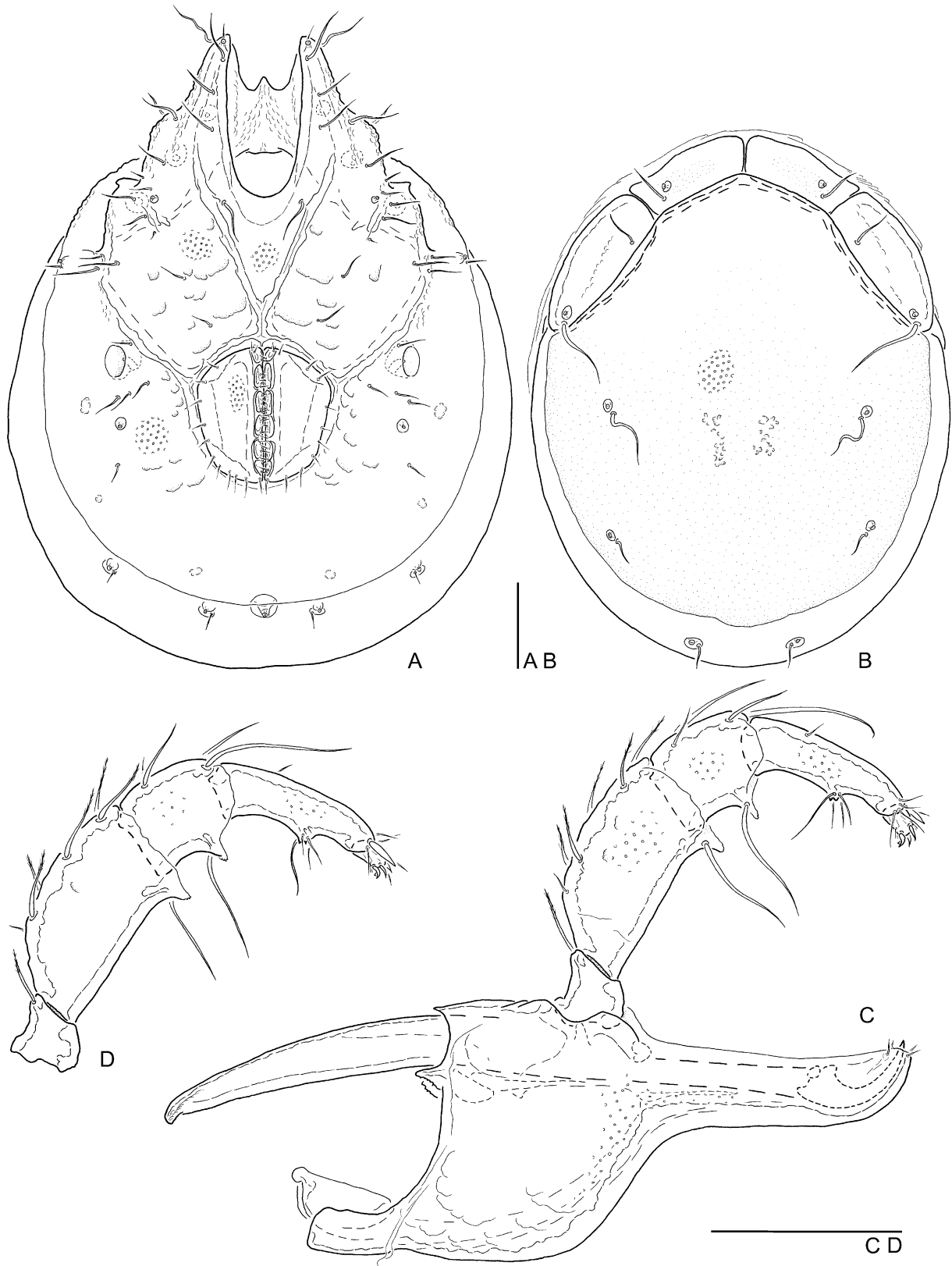


Figure 95. *Torrenticola carlbaderi*. A–D, female, prep. Cramer. A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 μ m.

Table 46. Measurements (μm) of *Torrenticola carlbaderi*; $N = 1$ (male), 3 (female) and *Torrenticola chicacoxalis*; $N = 1$ (female, holotype). The measurements of *T. carlbaderi* not given in the original description (Cramer, 1992) as far as possible were completed by new measurements of slide material from Mexico (UNAM, Cramer collection)

	<i>carlbaderi</i>				<i>chicacoxalis</i>	
	male	female			female	
		mean	min.	max.	SD	ht
Idiosoma L	489	697	677	716	27.7	893
Idiosoma W	442	525	508	569	31.5	736
Idiosoma L/W	1.44	1.27	1.26	1.29	0.02	1.21
Cx-I tL		324	324	324	0.00	363
Cx-III W		363	363	363	0.00	441
Cx-I tL/Cx-III W		0.89	0.89	0.89	0.00	0.82
Ds L	461	574	518	608	45.5	755
Dp L		542	520	564	31.2	706
Ds W	395	471	452	481	14.6	569
Ds L/W	1.17	1.22	1.15	1.27	0.1	1.33
Dp L/W	1.21	1.14	1.10	1.17	0.05	1.24
A-m platelet L	103	142	122	147	13.2	157
A-m platelet W	38	55	47	58	5.5	66
A-l platelet L	151	181	169	183	7.5	228
A-l platelet W	66	74	66	80	6.8	83
A-m pl L/a-l pl L	0.68	0.78	0.72	0.81	0.05	0.69
Capitular bay L	147	184	176	185	4.9	200
Capitular bay W	69	80	78	83	2.4	105
Cb L/W	2.13	2.33	2.31	2.36	0.04	1.90
Dist cb – gf		160	157	164	5.2	191
Cx-I mL		138	137	140	1.7	162
Cx-II + III mL		21	17	25	5.2	15
Cx-I tL/Cx-II/III mL	3.36	16.04	13.21	18.88	4.0	24.69
Cx-I/Cx-II + III mL	1.55	6.87	5.60	8.14	1.8	11.00
Genital field L	150	167	162	172	4.8	194
Gf L/Cx-II + III mL	2.00	8	7	10	2.3	13.17
Genital field W	132	158	157	159	1.1	179
Genital field L/W	1.14	1.05	1.03	1.08	0.02	1.08
Gf L/Id L	0.24	0.24	0.23	0.25	0.01	0.22
Gf L/dist cb – gf		1.05	1.01	1.09	0.1	1.01
Dist gf – expo		151	149	152	1.7	233
Dist gf – cauda		185	167	203	26.0	311
Capitulum vL	263	316	301	331	21.0	358
Capitulum dL		252	251	252	0.9	270
Rostrum L		138	137	140	1.7	147
Capitulum H		142				167
R L/c dL		0.55	0.54	0.56	0.01	0.55
R L/c vL		0.41				0.41
Gn bend depth		34				32
Chelicera L	320	392	376	396	10.5	431
Chelicera H		26	25	27	1.7	33
Chelicera L/H		15.34	14.68	16.00	0.9	13.04
Chelicera bs L		335	333	337	2.6	363
Chelicera claw L		59	59	59	0.00	69
Chel bs/claw L		5.70	5.67	5.73	0.04	5.29
P1 dorsal L	26	33	31	34	1.7	39
P2 dL	90	105	105	109	2.2	121
P3 dL	48	61	52	61	5.3	59

Table 46. *Continued*

	<i>carlbaderi</i>					<i>chicacoxalis</i>
	male	female				female
		mean	min.	max.	SD	ht
P4 dL	81	93	86	96	5.0	104
P5 dL	14	17	15	17	1.4	20
Palp total L	259	307	291	317	13.3	343
P4 vL		72	70	74	2.6	78
P4 vL to seta		43	43	44	0.9	47
P4 vL/L to seta	1.65	1.63	1.67	0.03	1.68	
P1 rel L	0.10	0.11	0.11	0.11	0.00	0.11
P2 rel L	0.35	0.34	0.34	0.36	0.01	0.35
P3 rel L	0.19	0.19	0.18	0.20	0.01	0.17
P4 rel L	0.31	0.30	0.30	0.30	0.00	0.30
P5 rel L	0.05	0.05	0.05	0.06	0.01	0.06
P1 H		37	37	37	0.00	44
P2 H		55	54	56	1.7	64
P3 H		47	47	47	0.00	56
P4 H		30	29	31	0.9	37
P5 H		11	10	12	1.7	12
P1 L/H		0.92	0.90	0.93	0.02	0.89
P2 L/H		1.94	1.93	1.95	0.01	1.90
P3 L/H		1.32	1.32	1.32	0.00	1.04
P4 L/H		3.14	3.12	3.17	0.03	2.83
P5 L/H		1.45	1.40	1.50	0.1	1.60
P2/P4 L	1.11	1.14	1.13	1.22	0.05	1.16
P3/P4 L	0.59	0.64	0.60	0.66	0.03	0.56

therefore additional figures of the female are given here, according to slide material available (see above).

***TORRENTICOLA CHICACOXALIS* SP. NOV.**

(FIG. 96A–D; TABLE 46)

Type series: Holotype female, CR 95, San José, 10 km south-east Salsipuedes, Río Savegre valley, Quebrada Ojo de Agua, small stream, 2340 m asl, 27.vii.1995, mounted.

Habitat: Fast flowing, small high mountain stream at 2340 m asl; mesolihal; temperature 11.2 °C; conductivity 80 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (only known from type locality, Cordillera de Talamanca).

Derivatio nominis: *chica* (Spanish = small), *coxa* (Latin = hip); the coxal field of this species is very small, relative to the idiosoma.

Diagnosis: (only 1 female) Characters of the *bicolor*-like species; idiosoma large, rounded; dorsal plate red; coxal field sharply graded, short, only tips of Cx-I surpass frontal margin of idiosoma; genital field blunt

rhombic; capitulum basely high, rostrum relatively slender, straight, separated by a sharp bend; P2 > P4, P3 short, P3-projection long.

Description – Male: Unknown.

Female ($N = 1$): Idiosoma rounded-oval (L 893 μm , L/W 1.21); dorsal plate red, anterior platelets broad, antero-medial platelets medially straight, posterior slightly convex, antero-lateral platelets anterior convex, posterior slightly tapering, rounded, Dgl-4 directly anterior Dgl-5 (Fig. 96B); coxal field small, laterally sharply graded, Cx-I tips short and slender, apically rounded, Cxgl-4 near anterior tips of Cx-I, medial margin of Cx-II/III very short; primary sclerotization antero-laterally surpassing coxal field (Fig. 96A); capitular bay deep U-shaped; posterior margin of Cx-IV far postero-lateral of genital field; genital field anterior truncated-rounded, lateral margins straight, converging to posterior, posterior margin rounded; excretory pore slightly anterior to Vgl-2, glandularia and pore clearly posterior to primary sclerotization (Fig. 96A); capitulum high, basely short, ventral margin sigmoid curved, rostrum separated by sharp bend, straight, slender (Fig. 96C); P2

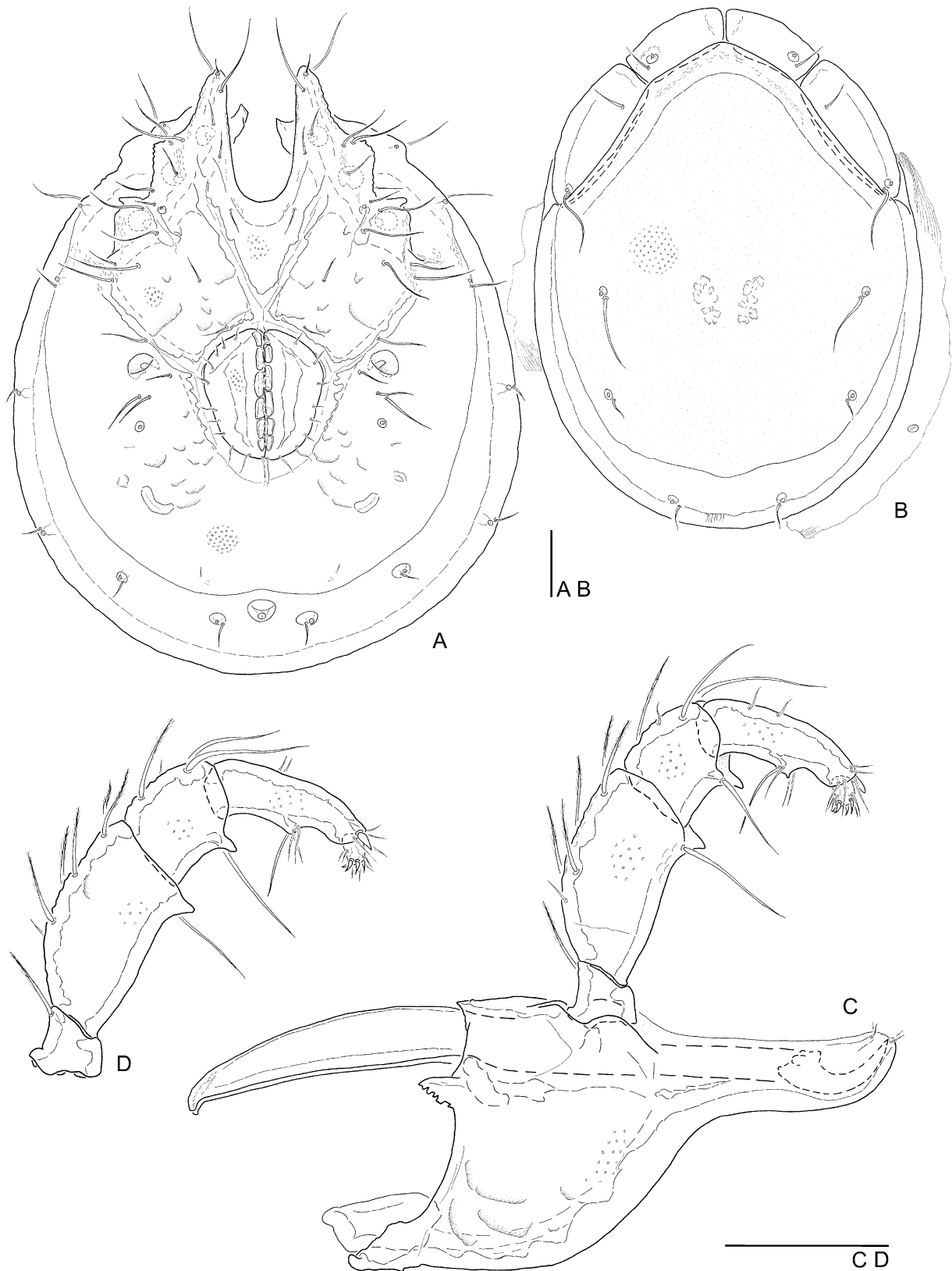


Figure 96. *Torrenticola chicacoxalis*. A–D, holotype female (CR 95). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

long (rel L 0.35, P2/P4 1.16), P2-projection cone-shaped, directed ventrally, P3 short (rel L 0.17, L/H 1.04), P3-projection long, elongated cone-shaped, P4 short, distally curved (rel L 0.30, L/H 2.83, P3/P4 0.56), ventral setae on distinct hump, distally (vL/L to seta 1.68) (Fig. 96C, D).

Discussion: *Torrenticola chicacoxalis* and *T. corta* are the only species bearing an extremely small coxal field (compared with the idiosoma). The latter is also characterized by a short, compact rostrum (Fig. 71C), whereas *T. chicacoxalis* bears an elongated slender rostrum (Fig. 96C). Furthermore, the coxal field of *T. chicacoxalis* is narrow, Cx-I/II tips are slender (and much longer than those of *T. corta*).

***TORRENTICOLA COLLINA* SP. NOV.**

(FIGS 97A–E, 98A–D, 99; TABLE 47)

Type series: Holotype male, CR 98, Cartago, Finca Los Lagos, Río Macho, small stream, 2340 m asl, 28.vii.1995, mounted; paratypes, same locality and date, 2/0/0 mounted.

Additional specimens examined: CR 96, San José, Río Savegre, stream, 2160 m asl, 28.vii.1995, 1/1/0 mounted; CR 160, Cartago, Quebrada Palmitas, small stream, 1500 m asl, 06.iii.1996, 1/0/0 mounted; CR 168, San José, San Gerardo, Río Blanco, small stream, 1220 m asl, 11.iii.1996, 1/0/0 mounted, 0/4/0 unmounted.

Habitat: Fast and very fast flowing small mountain streams at mid to high elevations (1220–2340 m asl); lithophytal and mesolital; temperature 11.9–19.4 °C; conductivity 21–99 µS cm⁻¹.

Distribution: Costa Rica (Central Cordillera de Talamanca).

Derivatio nominis: *collinus* (Latin = to be situated at the hill); referring to the fact that the distribution of the species is restricted to mid-elevations in the Cordillera de Talamanca.

Diagnosis: Characters of the *bicolor*-like mites; idiosoma mid-sized, oval-rounded; yellowish to reddish; capitular bay (in males) box-shaped, apically diverging (in males); coxal field laterally graded; genital field large, elongated; ventral margin of capitulum relatively flat sigmoid (more bellied in female); palp relatively compact.

Description – Male (*N* = 6): Idiosoma oval-rounded [L 736 µm (657–716 µm), L/W 1.32 (1.26–1.37)]; dorsal plate yellowish to pale reddish; antero-medial dorsal platelets relatively short, medial margins rounded, antero-lateral margins laterally curved, posterior margins concave, oblique, antero-lateral platelets

longer, anterior margins +/- straight, posterior tapering; Dgl-4 slightly lateral to Dgl-5 (Fig. 97B); coxal field laterally graded, Cx-I tips slightly pointed, Cxgl-4 postero-lateral to Cx-I tips, Cx-I nearly triangular, relatively short [Cx-I tL/Cx-II/III mL 3.82 (3.65–4.00)]; capitular bay basely +/- straight, lateral margins straight (box-shaped), apically diverging; posterior margin of Cx-IV lateral to caudal end of genital field, across; genital field elongated subrectangular, anterior truncated, sharp edge towards straight lateral margins, caudally rounded; excretory pore between Vgl-2 slightly under caudal margin of primary sclerotization (Fig. 97A); genital skeleton relatively compact, broad, cella proximalis mid-sized, broad, with slender processus proximalia [aL/tL 0.63 (0.57–0.70)], brachia distalia relatively short, brachia proximalia strong, postero-laterally curved (Fig. 97E); capitulum basely mid-sized, ventral margin smoothly curved towards relatively short rostrum (Fig. 97C); ventro-distal projection on P2 truncated cone-shaped, on P3 pointed cone-shaped, P4 distally tapering, setae on ventral margin far distally [vL P4/L to setae 1.60 (1.59–1.71)] (Fig. 97C, D).

Female (*N* = 1): Idiosoma similar to male, larger (L 814 µm), Cx-I tips more elongated; genital field large rhombic, broad (Fig. 99A) to slightly elongated (Fig. 98A); palp similar to male, capitulum basely higher, ventral margin stronger bent, slightly bellied (Fig. 98C); palps similar to male (Fig. 98C, D).

Discussion: *Torrenticola collina* is most similar to *T. rubella* and *T. levicoxalis* in bearing a large genital field, a mid-sized idiosoma and the posterior margin of Cx-IV besides caudal end of genital field. *T. collina* is separated from the two other species on the basis of a relatively short, laterally sharply graded coxal field, rather box-shaped capitular bay and a yellow to pale reddish dorsal shield.

***TORRENTICOLA CUMBRENSIS* SP. NOV.**

(FIG. 100A–D; TABLE 47)

Type series: Holotype female, CR 169, San José, NP Chirripó, besides ranger station, Río Talari, stream, 3340 m asl, 12.iii.1996, mounted.

Habitat: Slow flowing high mountain stream at 3340 m asl; mesolital; temperature 7.1 °C; conductivity 85 µS cm⁻¹.

Distribution: Costa Rica (central Cordillera de Talamanca, Chirripó region, only known from type locality).

Derivatio nominis: *cumbre* (Spanish = summit); as the species in its distribution is restricted to the highest mountain region.

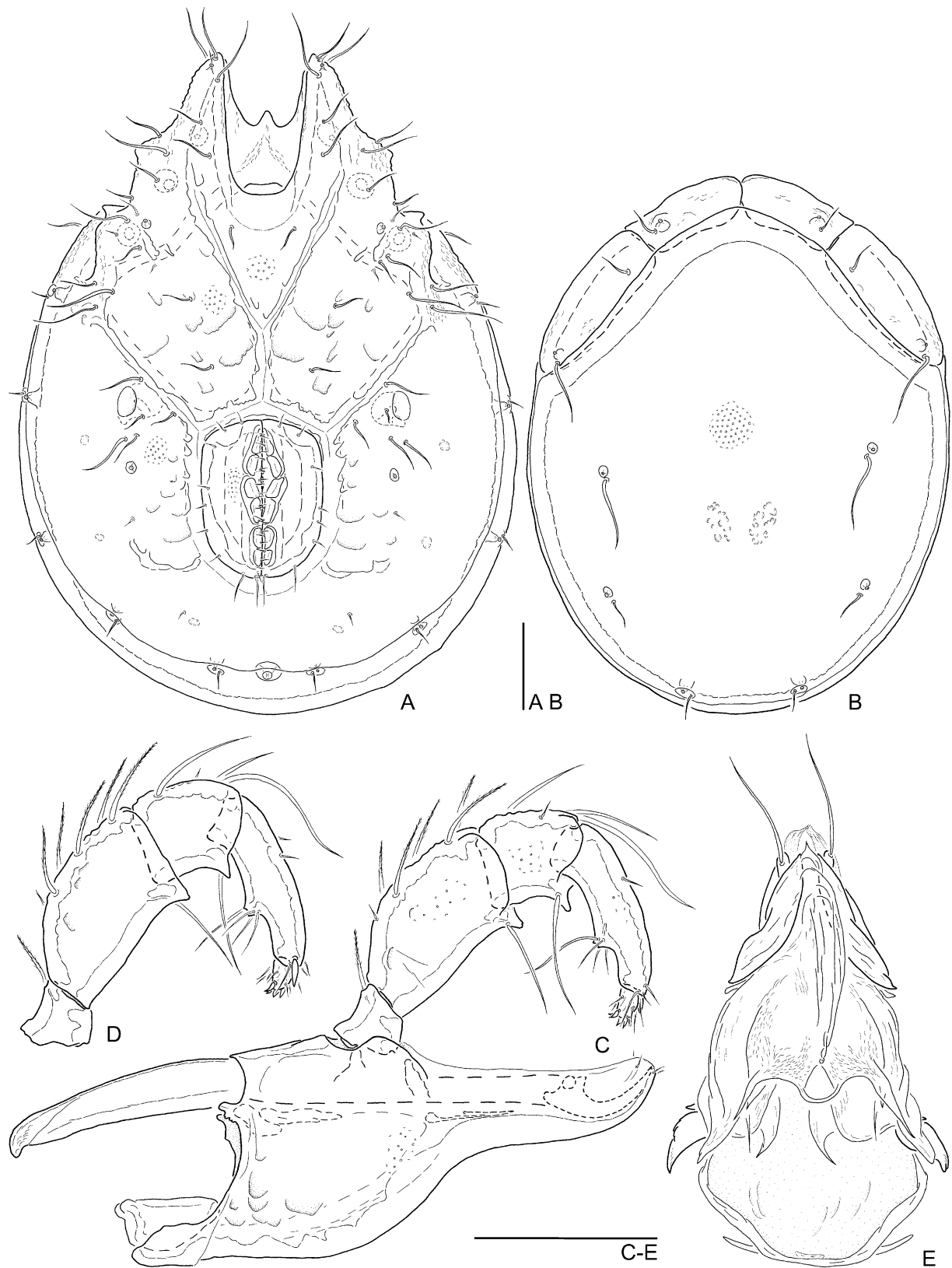


Figure 97. *Torrenticola collina*. A–E, holotype male (CR 98). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

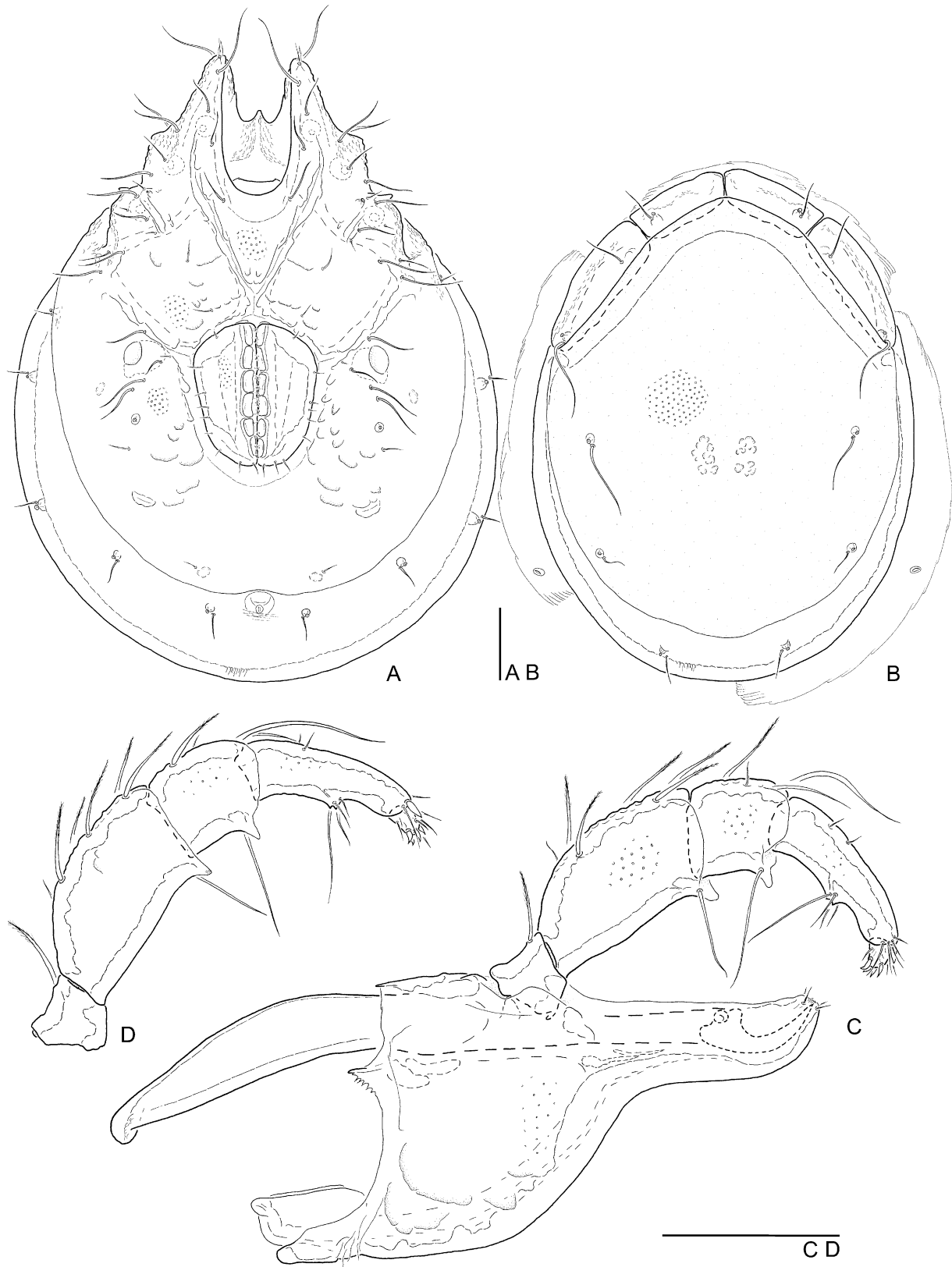


Figure 98. *Torrenticola collina*. A–D, paratype female (CR 98). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

Diagnosis: (only 1 female) Characters of the *bicolor*-like species; idiosoma rounded, large; dorsal plate yellowish, antero-medial dorsal platelets clearly smaller than antero-lateral platelets; coxal field compact, Cx-I tips slender, capitular bay wide U-shaped, medial margins of Cx-II/III do not meet anterior to genital field; genital field elongated-rhombic; capitulum basely high, short, rostrum straight; palps, especially P4, relatively compact.

Description – Male: Unknown.

Female (N = 1): Idiosoma rounded (L 888 µm, L/W 1.27); dorsal shield yellowish, anterior slightly tapering, antero-medial dorsal platelets relatively small, medial margins +/- rounded, posterior margins straight, oblique, antero-lateral platelets long and broad, anterior margins slightly convex, posterior rounded; Dgl-4 slightly lateral to Dgl-5 (Fig. 100B); coxal field broad, lateral margins graded, Cx-I tips short, however, very slender, apically rounded, Cxgl-4

nearly at the tips of Cx-I, capitular bay wide U-shaped, no medial margin of Cx-II/III (Cx-III do not meet anterior to genital field, Cx-I postero-medially extended to genital field); genital field rhombic, anterior rounded, sharp edges towards straight lateral margins, clearly tapering, posterior rounded; excretory pore between Vgl-2, clearly posterior to primary sclerotization (Fig. 100A); capitulum basely high, short, ventral margin regularly curved, sigmoid, rostrum clearly separated, straight; chelicera compact (L/H 10.81), posterior crooked, large cheliceral claws (bs/claw 4.97); palps strong, compact, especially P4 relatively short (L/H 2.87, P2/P4 1.19), ventral setae of P4 on double-pointed hump, P2/3 projections irregular (relatively small cone-shaped at left palp, right palp with strong, truncated cones) (Fig. 100C, D).

Discussion: *Torrenticola cumbrensis* is most similar to *T. alticola*, both characterized as having a large idiosoma, yellow dorsal plate and relatively short P4.

Table 47. Measurements (µm) of *Torrenticola collina*; N = 6 (male), 1 (female) and *Torrenticola cumbrensis*; N = 1 (female, holotype)

	<i>collina</i>					<i>cumbrensis</i>	
	male					female	female
	ht	mean	min.	max.	SD	ht	
Idiosoma L	736	697	657	736	32.0	814	888
Idiosoma W	559	522	500	559	19.6	618	697
Idiosoma L/W	1.32	1.31	1.26	1.37	0.04	1.32	1.27
Cx-I tL	314	299	270	314	19.2	334	353
Cx-III W	378	361	358	378	7.6	412	444
Cx-I tL/Cx-III W	0.83	0.83	0.75	0.86	0.04	0.81	0.79
Ds L	598	576	540	598	22.3	687	750
Dp L	569	544	510	569	22.7	657	711
Ds W	476	439	412	476	22.9	525	540
Ds L/W	1.26	1.31	1.26	1.32	0.02	1.31	1.39
Dp L/W	1.20	1.24	1.20	1.25	0.02	1.25	1.32
A-m platelet L	140	126	113	140	9.4	149	149
A-m platelet W	54	51	47	54	2.7	59	61
A-l platelet L	189	178	169	194	9.9	201	221
A-l platelet W	64	62	58	64	2.4	74	78
A-m pl L/a-l pl L	0.74	0.71	0.62	0.77	0.1	0.74	0.68
Capitular bay L	154	152	137	159	8.0	194	195
Capitular bay W	91	85	78	91	4.5	98	116
Cb L/W	1.70	1.73	1.56	2.03	0.2	1.98	1.67
Dist cb – gf	252	232	219	252	13.9	184	184
Cx-I mL	154	141	135	154	8.1	147	176
Cx-II + III mL	82	77	74	83	4.0	27	
Cx-I tL/Cx-II/III mL	3.82	3.75	3.65	4.00	0.1	12.38	
Cx-I/Cx-II + III mL	1.88	1.84	1.74	1.94	0.1	5.45	
Genital field L	185	180	169	191	8.0	192	214
Gf L/Cx-II + III mL	2.25	2.29	2.21	2.44	0.1	7.14	
Genital field W	142	140	135	142	3.7	176	186

Table 47. *Continued*

	<i>collina</i>					<i>cumbrensis</i>	
	male					female	female
	ht	mean	min.	max.	SD	ht	ht
Genital field L/W	1.30	1.30	1.25	1.34	0.03	1.09	1.15
Gf L/Id L	0.25	0.26	0.25	0.27	0.01	0.24	0.24
Gf L/dist cb – gf	0.73	0.78	0.73	0.80	0.03	1.04	1.17
Dist gf – expo	113	103	98	113	5.5	194	240
Dist gf – cauda	147	132	123	147	9.4	255	299
Gs L	238	252	238	260	9.0		
Gs aL	149	164	141	180	14.0		
Gs W	152	130	127	152	13.5		
Gs aL/tL	0.63	0.64	0.57	0.70	0.05		
Gs tL/W	1.56	1.90	1.56	2.02	0.2		
Capitulum vL	301	295	277	304	10.6	338	358
Capitulum dL	233	213	208	233	10.1	257	272
Rostrum L	120	116	110	123	4.7	137	145
Capitulum H	125	120	115	125	3.9	157	169
R L/c dL	0.52	0.54	0.51	0.56	0.02	0.53	0.53
R L/c vL	0.40	0.40	0.37	0.41	0.01	0.41	0.40
Gn bend depth	20	20	17	21	1.3	32	34
Chelicera L	353	347	326	353	11.7	360	424
Chelicera H	27	27	25	29	1.5	34	39
Chelicera L/H	13.09	13.05	11.25	13.30	0.8	10.50	10.81
Chelicera bs L	296	290	277	296	9.3	294	353
Chelicera claw L	56	56	49	56	3.0	66	71
Chel bs/claw L	5.26	5.24	5.09	5.65	0.2	4.44	4.97
P1 dorsal L	34	32	29	34	1.8	37	43
P2 dL	103	98	96	103	3.7	118	125
P3 dL	59	54	50	59	3.5	61	69
P4 dL	100	97	83	100	6.7	100	105
P5 dL	17	17	15	17	1.2	18	20
Palp total L	314	296	273	314	15.9	334	361
P4 vL	78	74	64	78	5.7	76	78
P4 vL to seta	49	46	38	49	4.5	44	42
P4 vL/L to seta	1.60	1.61	1.59	1.71	0.05	1.72	1.88
P1 rel L	0.11	0.11	0.10	0.11	0.00	0.11	0.12
P2 rel L	0.33	0.33	0.33	0.35	0.01	0.35	0.35
P3 rel L	0.19	0.18	0.18	0.19	0.00	0.18	0.19
P4 rel L	0.32	0.32	0.30	0.33	0.01	0.30	0.29
P5 rel L	0.05	0.06	0.05	0.06	0.00	0.05	0.05
P1 H	37	34	32	37	1.5	44	49
P2 H	58	53	49	58	2.9	64	66
P3 H	47	47	42	48	2.2	54	56
P4 H	31	29	27	31	1.5	33	37
P5 H	10	10	10	11	0.5	12	12
P1 L/H	0.93	0.93	0.86	1.00	0.1	0.83	0.88
P2 L/H	1.79	1.86	1.79	1.95	0.1	1.85	1.89
P3 L/H	1.26	1.20	1.11	1.26	0.1	1.14	1.22
P4 L/H	3.28	3.28	3.09	3.33	0.1	3.04	2.87
P5 L/H	1.75	1.69	1.33	1.75	0.2	1.50	1.60
P2/P4 L	1.02	1.04	1.00	1.15	0.1	1.17	1.19
P3/P4 L	0.59	0.58	0.54	0.60	0.02	0.61	0.65



Figure 99. *Torrenticola collina*. Female (CR 96). Idiosoma, ventral view. Scale bar = 100 µm.

However, due to a basely higher capitulum and the absence of a medial margin of Cx-II/III in the female sex *T. cumbrensis* is clearly separated from the latter.

TORRENTICOLA CURTIPALPIS K.O. VIETS, 1977
(FIGS 101A–G, 102; TABLE 48)

Type series: Holotype male, Guatemala, km 150–151 road Guatemala Ciudad to Cobán, Río Lima, 1520 m asl, 11.viii.1974, leg. Böttger, prep. no. 5804 SMF; allotype female, same locality and date, prep. no. 5797 SMF; paratypes, same locality and date, 3/4/0 (3/1/0 mounted, prep. no. 5803, 5799, 5812, 5796 SMF); same locality, 16.viii.1974, 7/1/0.

Further material: *Guatemala*, leg. Böttger: km 148 road Guatemala Ciudad to Cobán, Niño Perdido, Quebrada del Niño, 11.vii.1974, 0/1/0; north-west Cobán, near Finca Sacté, Río Cuxja, 800 m asl, 22.vii.1974, 0/1/0.

Habitat: Mountain streams at 800–1520 m asl.

Geographical distribution: Guatemala.

Published records: K.O. Viets (1977/78 Teil II).

Diagnosis: Characters of the *bicolor*-like species; rostrum very long and slender; idiosoma rounded-oval [L/W 1.38–1.41 (male), 1.43–1.44 (female)]; posterior half of dorsal plate reddish; male genital field subrectangular, relatively short (gf L/Cx-II/III mL 1.98–2.31, gf L/dist cb-gf 0.64–0.74); genital skeleton apically long (aL/tL 0.64–0.70); P2 relatively short, P4 relatively long (P2 rel L 0.35–0.36, P4 rel L 0.30–0.31, P2/P4 1.13–1.19, P3/P4 0.55–0.63).

Description: See K.O. Viets (1977/78 Teil II).

Discussion: *Torrenticola curtispalpis*, *T. carlbaderi* and *T. tilaranensis* form a group of very similar species, characterized by a rounded-oval, small to mid-sized idiosoma, very slender, straight rostrum and relatively short male genital field. The group is separated from *T. bicolor* (also characterized by a very slender rostrum) by the relative length of the genital field (*curtispalpis*, *carlbaderi* and *tilaranensis* – short; *bicolor* – long) and the length-relation of P2/P4 (*curtispalpis*, *carlbaderi* and *tilaranensis* – P2 and P4 likewise mid-sized; *bicolor* – P2 long, P4 short). The differentiation of *T. curtispalpis* from *T. carlbaderi* and *T. tilaranensis* is not very clear; the main difference is found in the shape of the male genital field: subrectangular and slightly elongated in *T. curtispalpis*; anterior pointed in *T. carlbaderi* and anterior truncated, compact in *T. tilaranensis*. The genital skeleton of *T. curtispalpis* is apically more elongated than in *T. tilaranensis*; unfortunately the genital skeleton of *T. carlbaderi* is not known.

TORRENTICOLA DELGADA SP. NOV.
(FIGS 103A–E, 104A–E; TABLE 49)

Type series: Holotype male, CR 175, San José, NP Chirripó, Río Terbi, small stream, 3100 m asl, 15.iii.1996, mounted; paratypes, same date and locality, 8/2/0 mounted, 12/16/0 unmounted.

Additional specimens examined: CR 94, Cartago, Panamericana, 2 km south of Salsipuedes, lake formed by the Río Humo, 2700 m asl, 27.vii.1995, 0/1/0 mounted, 0/1/0 unmounted; CR 96, San José, Río Savegre, stream, 2160 m asl, 28.vii.1995, 0/1/0 mounted.

Habitat: Fast flowing, small high mountain streams, stream (also one lake, probably dammed stream) at 2160–3100 m asl; mesolitoral, lithophytal (and akal, terrestrial vegetation); temperature 10.7–11.9 °C; conductivity 72–84 µS cm⁻¹.

Distribution: Costa Rica (central Cordillera de Talamanca, Chirripó region).

Derivatio nominis: *delgada* (Spanish = slender); referring to the elongated, very slender rostrum, slen-

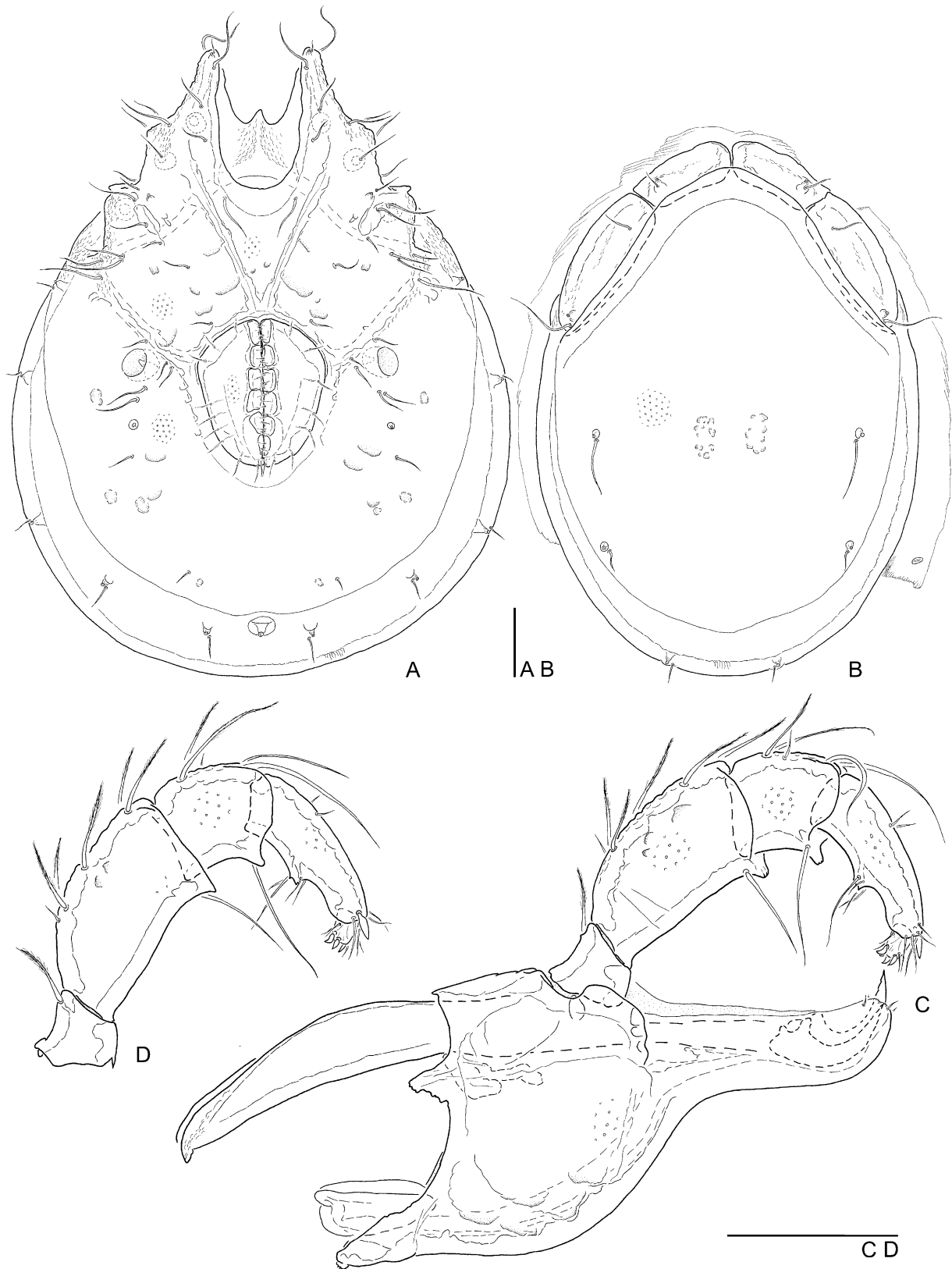


Figure 100. *Torrenticola cumbrensis*. A–D, holotype female (CR 169). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

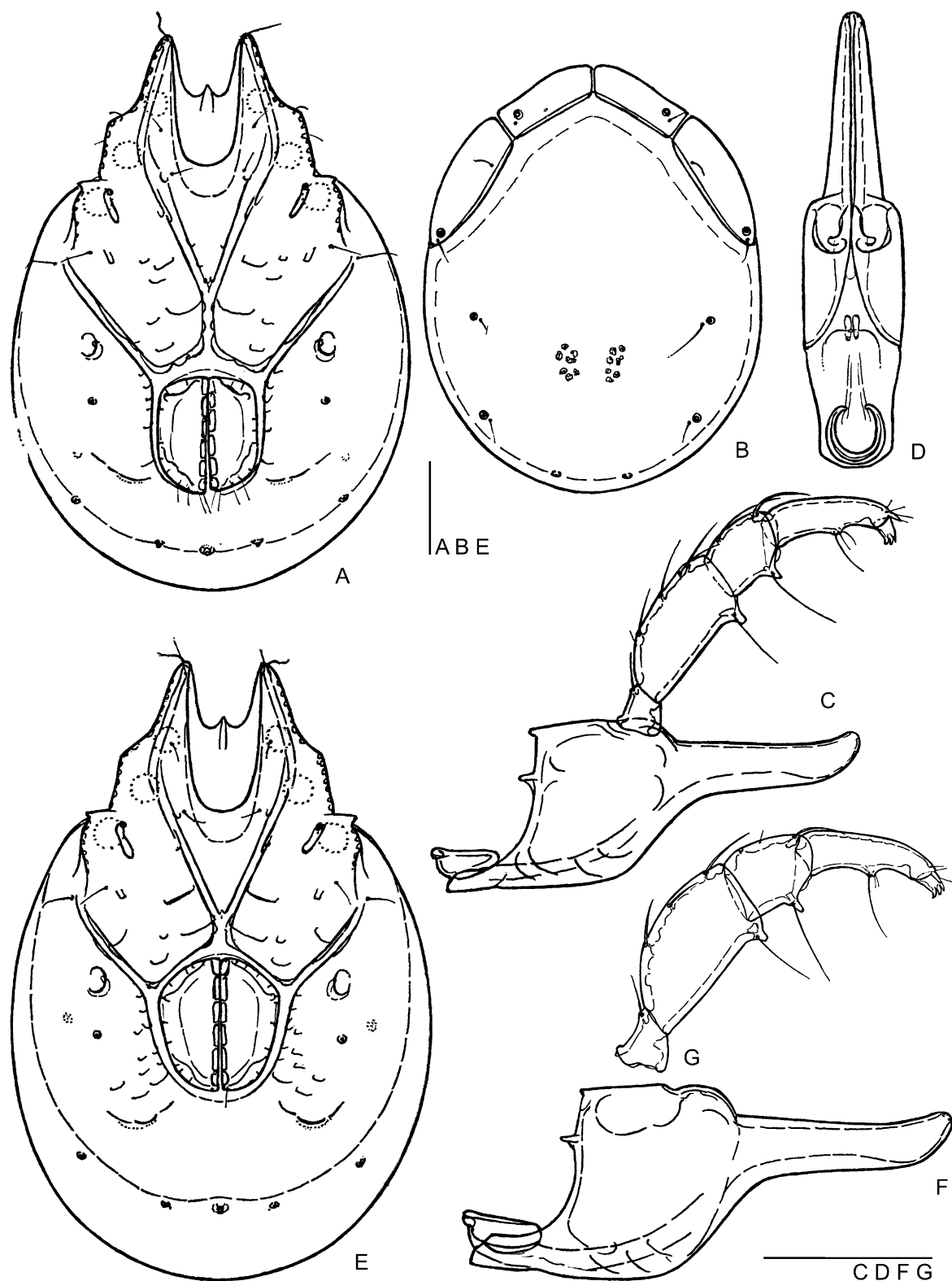


Figure 101. *Torrenticola curtipalpis*. A–C, holotype male, prep. no. 5804 SMF Viets collection; D, paratype, male, prep. no. 5803 SMF Viets collection; E–G, allotype female, prep. no. 5797 SMF Viets collection; after K.O. Viets (1977/78, Teil II). A, E, idiosoma ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, capitulum, dorsal view; F, capitulum, lateral view; G, left palp. Scale bars = 100 μ m.

der palp and genital skeleton (in contrast to the more rounded idiosoma).

Diagnosis: Characters of the *bicolor*-like species; idiosoma large, rounded; dorsal plate yellow, antero-medial dorsal platelets much smaller than antero-lateral platelets; coxal field relatively broad, laterally greatly graded, Cx-I tips short, rounded; genital field elongated; capitular bay rounded V-shaped; capitulum basely high, short, very strong, but rounded bend towards long and slender rostrum; palp large, all segments relatively slender.

Description – Male ($N=9$): Idiosoma rounded [L 834 μm (765–907 μm), L/W 1.25 (1.27–1.40)]; dorsal plate yellow; antero-medial dorsal platelets short and wide, medial and anterior margins convex, postero-laterally straight to convex, antero-lateral platelets larger, antero-lateral margin rounded, posterior tapering; Dgl-4 lateral to Dgl-5 (Dgl-3 to -5 on a straight line) (Fig. 103B); coxal field compact, sharply graded, Cx-I apically short and truncated, Cxgl-4 at tips of Cx-I, Cx-II broad, antero-lateral corners extended; capitular bay wide V-shaped, basely rounded [L/W 1.62 (1.58–1.91)]; posterior margin of

Cx-IV lateral to posterior end of genital field, across, weakly developed; genital field rectangular-oval, anterior truncated, lateral margins straight, posterior rounded; excretory pore between Vgl-2 half under indentation of posterior margin of primary sclerotization (Fig. 103A); genital skeleton long and very slender, apical part much longer than cella proximalis, processus proximalia strong, pointed, brachia distalia and brachia proximalia strong, brachia distalia closely attached to longitudinal axis of genital skeleton, brachia proximalia sharply curved, distally parallel to longitudinal axis, carina anterior and carina posterior high, strong (Fig. 103E); capitulum high, basely relatively short, ventral margin of basal part bellied, with very strong rounded edge clearly separated from long, slender and straight rostrum (with parallel margins) (Fig. 103C); palps relatively long and slender (Table 49), especially P2 and P4 long, slender and straight [P4 rel L 0.34 (0.33–0.35), L/H 4.23 (3.92–4.42), P3/P4 0.51 (0.49–0.54)], setae on ventral margin of P4 on a single smooth projection near the centre (vL P4/L to seta 1.79–1.96), P2- and P3-projections strong irregular cone-shaped, apically fine serrate (Fig. 103C, D).

Table 48. Measurements (μm) of *Torrenticola curtispalpis*; $N=3$ (male), 2 (female). The measurements not given in the original description (K.O. Viets, 1977/78 Teil II) were completed by new measurements of the preparations of type specimens (SMF, Viets collection)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	608	608	603	638	18.6	687	677	697	13.9
Idiosoma W	432	437	432	456	13.0	477	469	486	11.8
Idiosoma L/W	1.41	1.40	1.38	1.41	0.01	1.44	1.43	1.44	0.01
Cx-I tL	289	289	280	294	7.5	287	284	289	3.5
Cx-III W	294	299	294	319	13.0	309	304	314	6.9
Cx-I tL/Cx-III W	0.98	0.93	0.92	0.98	0.03	0.93	0.91	0.95	0.03
Ds L	476	486	476	500	12.3	539	535	542	5.5
Dp L	446	451	446	466	10.2	503	500	505	3.5
Ds W	383	383	383	412	17.0	419	417	422	3.5
Ds L/W	1.24	1.24	1.21	1.27	0.03	1.28	1.27	1.30	0.02
Dp L/W	1.17	1.17	1.13	1.18	0.03	1.20	1.19	1.21	0.02
A-m platelet L	118	120	118	123	2.5	125	123	127	3.5
A-m platelet W	45	47	45	51	3.2	47	47	47	0.00
A-l platelet L	159	163	159	167	3.7	160	157	164	5.2
A-l platelet W	59	59	59	62	2.1	60	56	64	5.2
A-m pl L/a-l pl L	0.74	0.74	0.74	0.74	0.00	0.78	0.75	0.81	0.05
Capitular bay L	141	142	141	152	6.0	162	159	164	3.5
Capitular bay W	64	64	64	69	2.8	71	69	74	3.5
Cb L/W	2.21	2.21	2.21	2.23	0.01	2.28	2.23	2.32	0.1
Dist cb – gf	221	221	203	223	10.7	157	156	159	2.6
Cx-I mL	145	145	135	149	7.5	127	125	130	3.5
Cx-II + III mL	66	66	64	76	6.5	26	25	27	1.7
Cx-I tL/Cx-II/III mL	4.37	4.37	3.68	4.62	0.5	11.18	10.56	11.81	0.9
Cx-I/Cx-II + III mL	2.19	2.19	1.77	2.35	0.3	4.97	4.64	5.30	0.5

Table 48. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Genital field L	142	147	142	151	4.3	159	159	159	0.00
Gf L/Cx-II + III mL	2.15	2.15	1.98	2.31	0.2	6.20	5.91	6.50	0.4
Genital field W	118	123	118	125	3.7	140	140	141	0.9
Genital field L/W	1.21	1.21	1.20	1.21	0.00	1.14	1.13	1.14	0.01
Gf L/Id L	0.23	0.23	0.23	0.25	0.01	0.23	0.23	0.24	0.00
Gf L/dist cb – gf	0.64	0.66	0.64	0.74	0.1	1.01	1.00	1.02	0.02
Dist gf – expo	66	76	66	88	11.0	136	132	140	5.2
Dist gf – cauda	103	113	103	120	8.6	212	208	216	5.2
Gs L	208	208	206	209	1.9				
Gs aL	142	142	135	143	4.6				
Gs W	91	94	91	98	3.7				
Gs aL/tL	0.68	0.68	0.64	0.70	0.03				
Gs tL/W	2.30	2.18	2.14	2.30	0.1				
Capitulum vL	270	272	270	274	3.5	306	301	311	6.9
Capitulum dL	201	203	201	206	3.5	228	223	233	6.9
Rostrum L	115	111	107	115	6.1	128	125	131	4.3
Capitulum H	103	103				121	120	123	1.7
R L/c dL	0.57	0.55	0.52	0.57	0.04	0.56	0.56	0.56	0.00
R L/c vL	0.43	0.41	0.39	0.43	0.03	0.42	0.41	0.42	0.00
Gn bend depth	20	20				27	27	27	0.00
Chelicera L	311	309	307	311	2.6	387			
Chelicera H	21	21	21	22	0.9	25			
Chelicera L/H	14.94	14.44	13.94	14.94	0.7	15.80			
Chelicera bs L	265	263	262	265	1.7	336			
Chelicera claw L	47	46	45	47	0.9	55	51	59	5.2
Chel bs/claw L	5.68	5.73	5.68	5.78	0.1	6.52			
P1 dorsal L	29	29	29	32	1.4	31	31	32	0.9
P2 dL	86	89	86	93	3.7	100	99	100	0.9
P3 dL	42	47	42	47	2.8	51	49	54	3.5
P4 dL	76	76	76	80	2.1	85	83	86	1.7
P5 dL	13	15	13	15	0.7	15	15	16	0.9
Palp total L	246	256	246	266	9.8	282	278	287	6.1
P4 vL	59	59	58	60	1.2	62	61	64	1.7
P4 vL to seta	36	34	33	36	1.2	36	36	37	0.9
P4 vL/L to seta	1.66	1.74	1.66	1.75	0.1	1.73	1.72	1.73	0.01
P1 rel L	0.12	0.12	0.11	0.12	0.00	0.11	0.11	0.11	0.01
P2 rel L	0.35	0.35	0.35	0.35	0.00	0.35	0.35	0.36	0.00
P3 rel L	0.17	0.18	0.17	0.18	0.01	0.18	0.18	0.19	0.01
P4 rel L	0.31	0.30	0.30	0.31	0.01	0.30	0.30	0.30	0.00
P5 rel L	0.05	0.06	0.05	0.06	0.00	0.05	0.05	0.06	0.00
P1 H	29	29	29	31	0.7	34	33	34	0.9
P2 H	44	44	44	44	0.00	50	48	51	2.6
P3 H	39	38	38	39	0.7	42	42	42	0.00
P4 H	27	26	23	27	1.9	28	26	29	2.6
P5 H	10	10	10	10	0.00	10	10	11	0.9
P1 L/H	1.00	1.00	1.00	1.04	0.02	0.93	0.89	0.96	0.05
P2 L/H	1.94	2.03	1.94	2.11	0.1	2.02	1.93	2.10	0.1
P3 L/H	1.06	1.23	1.06	1.23	0.1	1.24	1.18	1.29	0.1
P4 L/H	2.82	2.95	2.82	3.42	0.3	3.08	2.92	3.24	0.2
P5 L/H	1.38	1.50	1.38	1.50	0.1	1.48	1.33	1.63	0.2
P2/P4 L	1.13	1.17	1.13	1.18	0.03	1.18	1.17	1.19	0.01
P3/P4 L	0.55	0.58	0.55	0.61	0.03	0.61	0.59	0.63	0.03



Figure 102. *Torrenticola curtipalpis*. Holotype male, prep. no. 5804 SMF Viets collection. Genital skeleton, anterior view. Scale bar = 100 μ m.

Female ($N = 4$): Idiosoma similar to male, slightly more drop-shaped (largest width posterior centre), larger (L 873–1001 μ m); antero-dorsal platelets anterior wider than lateral (Fig. 104B); medial margin of Cx-II/III relatively long (Table 49); genital field elongated rhombic, anterior rounded, lateral margins nearly straight, strongly tapering to posterior, posterior margin rounded truncate; excretory pore anterior to Vgl-2, pore and glands well posterior primary sclerotization (Fig. 104A); gnathosoma similar to male; chelicera long and straight (Table 49, Fig. 104C, D, E).

Discussion: This species is characterized by an interesting combination of a compact, nearly rounded idiosoma and very slender palps and rostrum. The males also bear a very slender genital skeleton. *Torrenticola delgada* is most similar to *T. baderi* – both species are separated from the others of the group in a large, dorsally yellow idiosoma, slender palps and rostrum and a relatively long P4. In comparison with the latter, *T. delgada* bears a more elongated coxal field with slender Cx-I tips and a more rounded idiosoma.

TORRENTICOLA LEVICOXALIS SP. NOV.

(FIG. 105A–E; TABLE 50)

Type series: Holotype male, CR 69, Puntarenas, Monteverde Reserve, small stream, 1540 m asl, 17.vii.1995, mounted.

Habitat: Slow flowing small mountain stream at 1540 m asl; mesolithal, akal, macrolithal; temperature 17.8 °C; conductivity 27 μ S cm^{-1} .

Distribution: Costa Rica (only known from type locality, Cordillera de Tilaran).

Derivatio nominis: *levis* (Latin = smooth), *coxa* (Latin = hip); referring to the smooth, merely graded lateral margin of the coxal field.

Diagnosis: Characters of the *bicolor*-like species; idiosoma mid-sized, oval; dorsal plate red; coxal field laterally very smooth; genital field relatively large; capitulum smoothly bend to slender rostrum; P4 mid-sized.

Description – Male ($N = 1$): Idiosoma oval drop-shaped (L 652 μ m, L/W 1.43); dorsal plate red; antero-medial dorsal platelets medially convex, laterally straight, antero-lateral platelets anterior straight, posterior clearly tapering, pointed; Dgl-4 slightly lateral to Dgl-5 (Fig. 105B); coxal field laterally very smooth, Cx-I tips short, truncated, apically bent to medial, Cxgl-4 postero-lateral to tips of Cx-I, antero-lateral corners of Cx-II very flat, antero-lateral corners of Cx-III very small; capitular bay relatively deep U-shaped, apically narrowing; Cx-I relatively short (Cx-I tL/Cx-II/III mL 4.16); genital field large, rectangular-oval, anterior truncated, lateral \pm straight, posterior rounded (Table 50); excretory pore slightly anterior to Vgl-2, in indentation of primary sclerotization (Fig. 105A); genital skeleton apically relatively short, cella proximalis mid-sized, with short processus proximalia (aL/tL 0.62), brachia distalia and proximalia well developed, slender (Fig. 105E); basal part of capitulum relatively high, ventral margin sigmoid, smoothly curved towards slender rostrum; ventral projections of P2/P3 strong, cone-shaped, pointed; P4 mid-sized (P4 rel L 0.32, L/H 3.70, P2/P4 1.04), ventral setae on double pointed projection slightly distally (vL/L to seta 1.79) (Fig. 105C, D).

Female: Unknown.

Discussion: *Torrenticola levicoxalis* together with *T. collina* and *T. rubella* forms a group of species characterized by a mid-sized idiosoma with the posterior margin of Cx-IV besides the caudal end of a large genital field. *T. levicoxalis* is separated from the others based on the combination of a relatively short coxal field with very smooth lateral margins and a red dorsal plate.

TORRENTICOLA MACERIPALPIS K.O. VIETS, 1977

(FIG. 106A–F; TABLE 50)

Type series: Holotype male, Guatemala, south-east Cobán, near San Juan Chamelco, Río Chilax, 1300 m

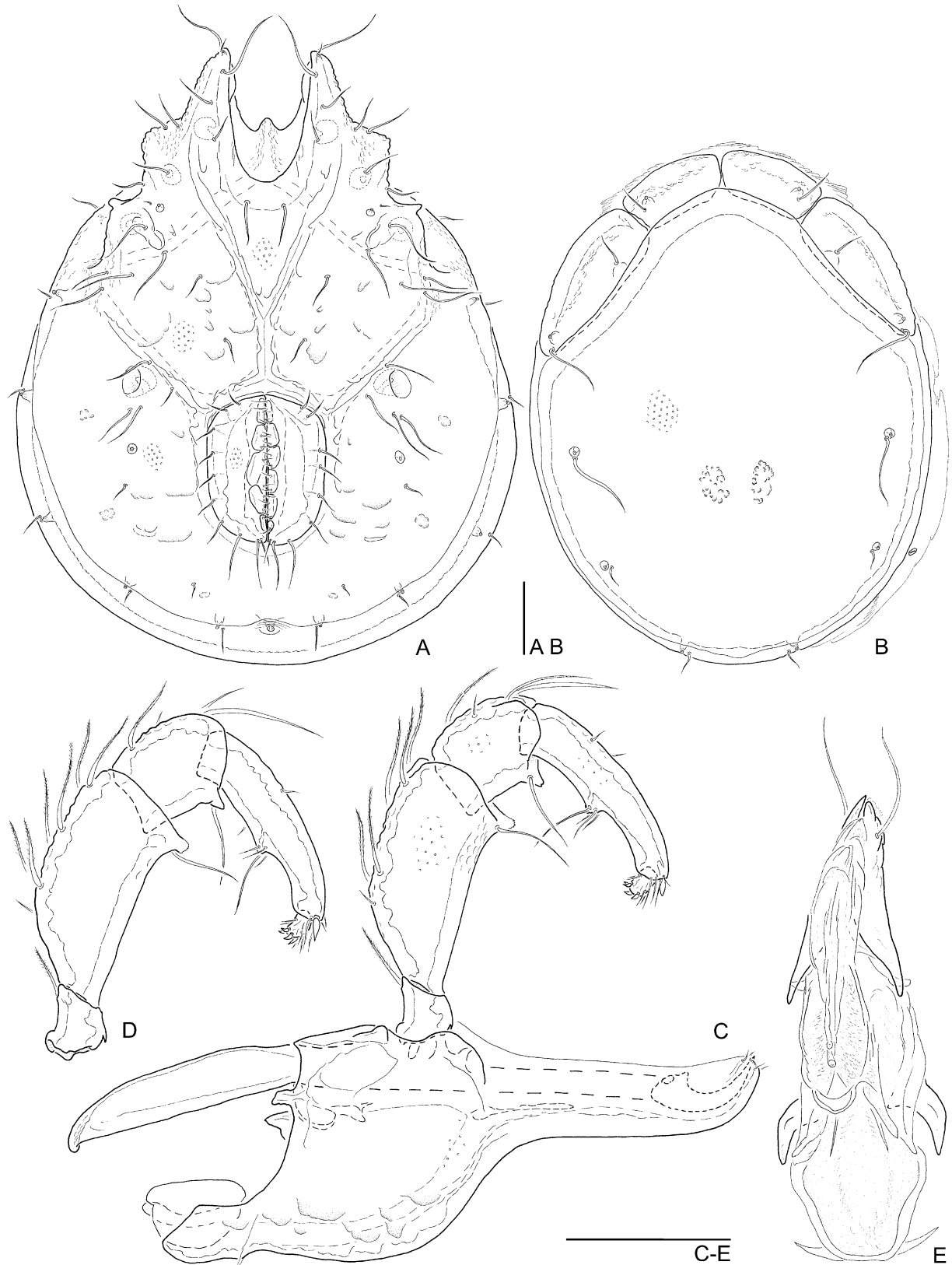


Figure 103. *Torrenticola delgada*. A–E, holotype male (CR 175). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

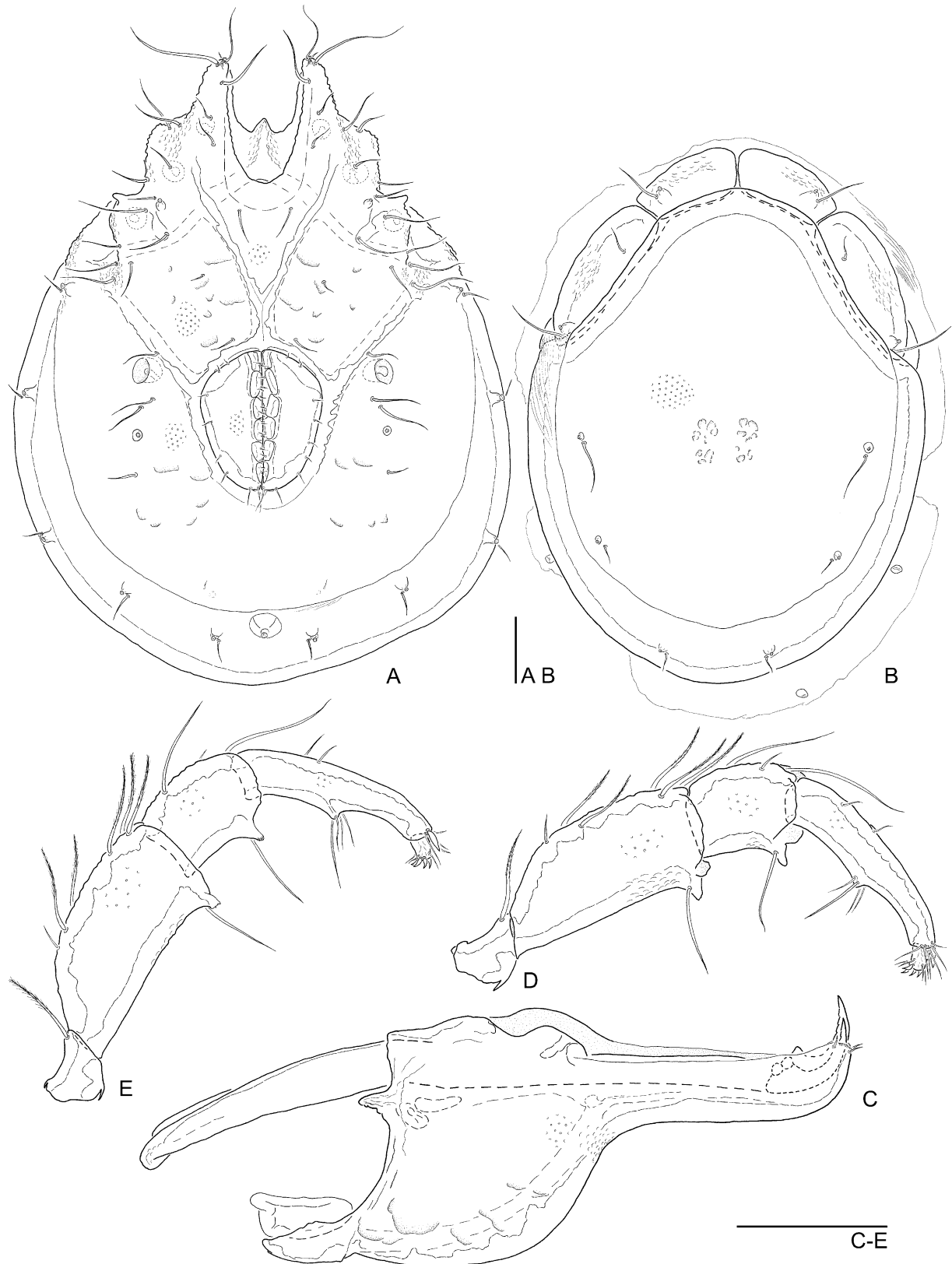


Figure 104. *Torrenticola delgada*. A–E, female (CR 94). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum, lateral view; D, right palp, lateral view; E, left palp, medial view. Scale bars = 100 µm.

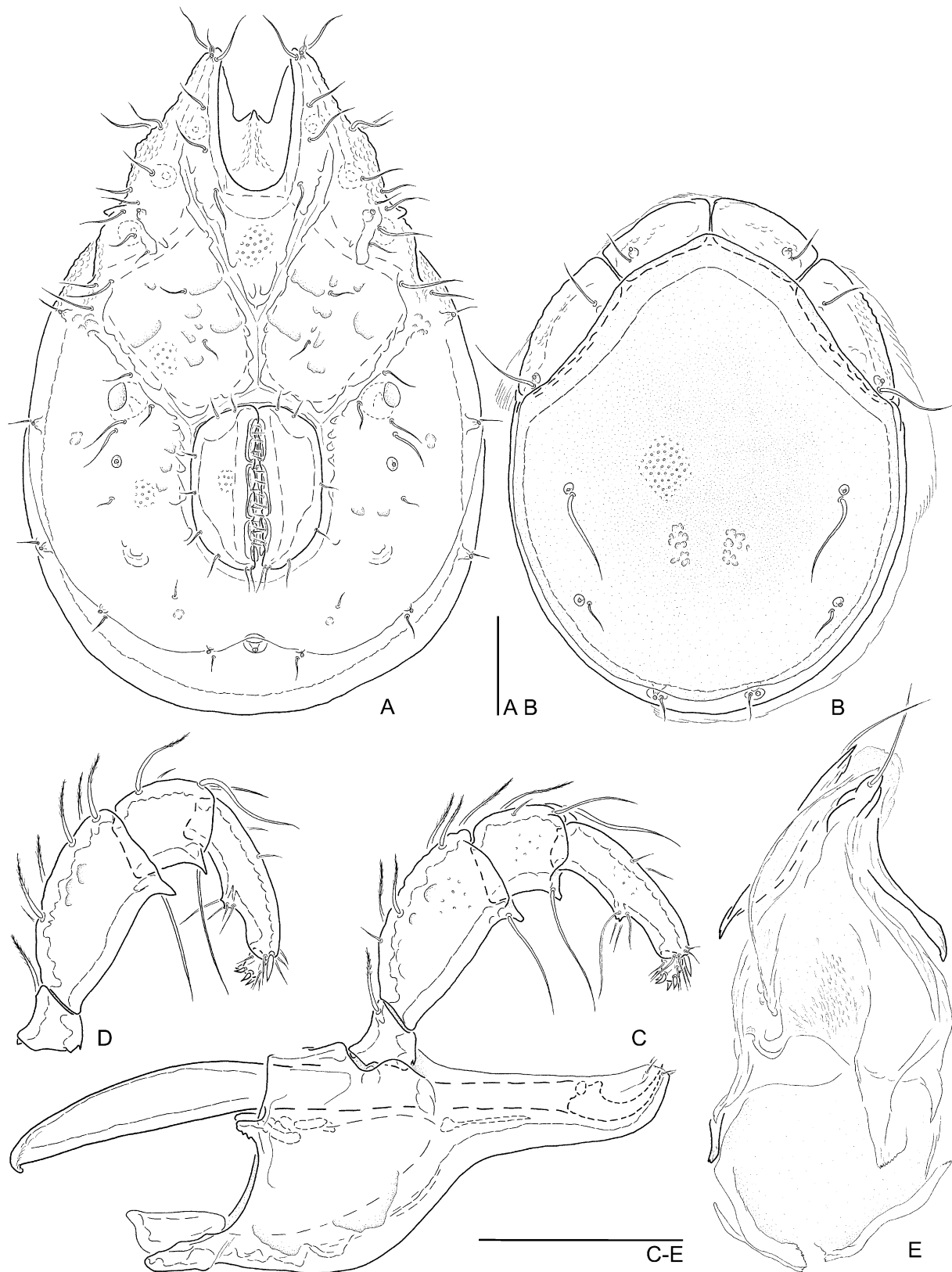


Figure 105. *Torrenticola levicoxalis*. A–E, holotype male (CR 69). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 μ m.

Table 49. Measurements (μm) of *Torrenticola delgada*; $N = 9$ (male), 4 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	834	824	765	907	45.1	910	873	1001	54.7
Idiosoma W	667	633	549	672	39.6	709	682	736	22.1
Idiosoma L/W	1.25	1.36	1.25	1.40	0.1	1.29	1.28	1.36	0.04
Cx-I tL	373	343	324	392	22.4	361	343	383	17.2
Cx-III W	437	417	373	441	25.3	444	422	461	16.2
Cx-I tL/Cx-III W	0.85	0.85	0.79	0.89	0.04	0.82	0.80	0.83	0.01
Ds L	687	677	618	750	40.9	763	711	819	45.2
Dp L	643	633	569	697	39.0	711	667	770	43.0
Ds W	544	525	451	579	37.9	581	549	623	30.8
Ds L/W	1.26	1.31	1.25	1.38	0.04	1.31	1.29	1.32	0.01
Dp L/W	1.18	1.22	1.18	1.29	0.04	1.22	1.21	1.24	0.01
A-m platelet L	142	145	135	159	6.9	158	149	174	10.3
A-m platelet W	66	66	64	77	4.1	70	66	76	4.2
A-l platelet L	225	225	211	243	10.2	241	225	252	11.5
A-l platelet W	87	83	77	88	4.0	85	76	88	5.6
A-m pl L/a-l pl L	0.63	0.64	0.63	0.67	0.02	0.67	0.62	0.71	0.04
Capitular bay L	176	174	164	191	8.6	190	190	198	4.1
Capitular bay W	109	100	86	123	11.2	104	98	108	5.1
Cb L/W	1.62	1.78	1.44	1.91	0.2	1.87	1.76	1.95	0.1
Dist cb – gf	285	282	252	307	17.8	245	233	272	16.7
Cx-I mL	196	169	157	198	14.4	171	162	186	11.6
Cx-II + III mL	74	88	74	100	10.0	62	53	76	10.0
Cx-I tL/Cx-II/III mL	5.07	4.31	3.39	5.07	0.5	5.59	5.04	6.98	0.9
Cx-I/Cx-II + III mL	2.67	2.12	1.64	2.67	0.3	2.62	2.45	3.37	0.4
Genital field L	211	203	186	218	9.1	214	201	233	13.4
Gf L/Cx-II + III mL	2.87	2.45	2.02	2.87	0.3	3.35	3.06	4.00	0.4
Genital field W	164	157	145	167	6.8	189	184	198	7.4
Genital field L/W	1.28	1.31	1.21	1.33	0.04	1.13	1.09	1.17	0.03
Gf L/Id L	0.25	0.24	0.22	0.25	0.01	0.23	0.23	0.24	0.00
Gf L/dist cb – gf	0.74	0.74	0.69	0.79	0.03	0.86	0.85	0.89	0.02
Dist gf – expo	120	132	118	216	30.3	201	189	221	13.8
Dist gf – cauda	164	179	164	272	33.6	265	257	304	21.9
Gs L	284	274	233	292	19.3				
Gs aL	196	189	169	211	14.9				
Gs W	105	105	105	105					
Gs aL/tL	0.69	0.70	0.66	0.74	0.03				
Gs tL/W	2.70	2.70	2.70	2.70					
Capitulum vL	372	360	343	390	16.3	417	382	434	21.6
Capitulum dL	284	273	250	287	12.8	315	284	323	17.5
Rostrum L	162	157	147	167	6.4	182	167	187	9.1
Capitulum H	145	145	135	165	9.5	167	159	176	7.0
R L/c dL	0.57	0.58	0.55	0.61	0.02	0.58	0.58	0.59	0.00
R L/c vL	0.43	0.44	0.40	0.45	0.02	0.43	0.43	0.44	0.00
Gn bend depth	34	34	29	37	2.5	42	40	44	1.6
Chelicera L	421	421	385	453	21.9	486	464	497	14.7
Chelicera H	31	31	27	33	2.1	33	29	34	2.3
Chelicera L/H	13.76	13.76	12.81	14.73	0.6	14.99	14.00	15.79	0.9
Chelicera bs L	358	355	326	390	20.4	417	399	426	11.9
Chelicera claw L	64	61	59	69	2.8	70	65	71	2.9
Chel bs/claw L	5.62	5.62	5.18	6.12	0.3	6.00	5.93	6.15	0.1
P1 dorsal L	37	39	36	42	2.4	44	39	49	4.0
P2 dL	135	132	123	142	5.9	147	140	149	4.2

Table 49. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	69	66	62	74	3.2	77	70	78	4.0
P4 dL	135	130	123	140	6.2	146	127	148	9.7
P5 dL	17	17	16	20	1.0	18	17	20	1.4
Palp total L	392	390	364	412	16.0	435	393	440	21.8
P4 vL	108	108	96	115	5.6	118	103	120	8.0
P4 vL to seta	59	58	51	60	2.5	64	56	69	5.1
P4 vL/L to seta	1.83	1.84	1.77	1.96	0.1	1.84	1.75	1.87	0.1
P1 rel L	0.09	0.10	0.09	0.11	0.01	0.10	0.10	0.11	0.01
P2 rel L	0.34	0.34	0.33	0.35	0.00	0.34	0.34	0.36	0.01
P3 rel L	0.18	0.18	0.17	0.18	0.00	0.18	0.17	0.18	0.00
P4 rel L	0.34	0.34	0.33	0.35	0.00	0.33	0.32	0.34	0.01
P5 rel L	0.04	0.04	0.04	0.05	0.00	0.04	0.04	0.04	0.00
P1 H	37	37	34	39	1.5	39	39	40	0.6
P2 H	66	61	56	66	3.3	69	64	71	3.5
P3 H	54	54	49	54	1.7	57	53	59	2.6
P4 H	32	32	29	33	1.4	34	32	34	1.2
P5 H	12	12	10	12	0.9	12	11	12	0.6
P1 L/H	1.00	1.10	1.00	1.13	0.1	1.11	1.00	1.25	0.1
P2 L/H	2.04	2.13	2.04	2.17	0.1	2.14	2.07	2.19	0.1
P3 L/H	1.27	1.27	1.21	1.36	0.1	1.34	1.29	1.39	0.04
P4 L/H	4.23	4.22	3.92	4.42	0.1	4.25	4.00	4.32	0.1
P5 L/H	1.40	1.40	1.30	2.00	0.2	1.50	1.40	1.78	0.2
P2/P4 L	1.00	1.00	0.96	1.04	0.02	1.01	1.00	1.10	0.04
P3/P4 L	0.51	0.52	0.49	0.54	0.02	0.53	0.53	0.55	0.01

asl, 13.viii.1974, leg. Böttger, prep. no. 5854 SMF; allo-type female, same locality and date, prep. no. 5857 SMF; paratypes same locality and date, 5/0/0 (2/0/0 mounted) prep. no. 5855, 5856 SMF; same locality, 29.vii.1975, leg. Böttger, 0/1/0 mounted, prep. no. 6345 SMF [not mentioned in the publication].

Habitat: Small mountain stream at 1300 m asl.

Geographical distribution: Guatemala.

Published records: K.O. Viets (1977/78 Teil II).

Diagnosis: Characters of the *bicolor*-like species; idiosoma elongated (L/W 1.45–1.49), especially anterior part of coxal field; posterior half of dorsal plate red; Cx-I tips pointed; capitular bay basely V-shaped, basis straight; genital field small; ventral margin of capitulum smoothly curved; palp long and slender, especially P4 (L/H 4.39–5.00, P2/P4 0.86–0.88); apical part of genital skeleton elongated and very slender.

Description: See K.O. Viets (1977/78 Teil II).

Discussion: *Torrenticola maceripalpis* and *T. acuticoxalis* (see above) form a group of species clearly characterized by a combination of slender palps (especially P4), pointed Cx-I tips and a very slender, apically

heavily elongated genital skeleton. *Torrenticola maceripalpis* is separated from the latter by means of a smaller, more elongated idiosoma, a very small, slightly elongated genital field and a ventrally smooth sigmoid and even more slender P4.

***TORRENTICOLA PERVAGATA* SP. NOV.**

(FIGS 107A–E, 108A–D, 109A–E; TABLE 51)

Type series: Holotype male, CR 208, Alajuela, San Ramon Field Station, left affluent Río San Lorencito, small stream, 900 m asl, 26.iii.1996, mounted; paratypes, same locality and date, 5/1/0 mounted, 31/59/0 unmounted.

Additional specimens examined: CR 23 Puntarenas, Ecolodge San Luis, Quebrada Alondra (100 m upstream of CR 24), small stream, 1020 m asl, 26.vi.1995, 1/0/0 unmounted; CR 24, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1010 m asl, 26.vi.1995, 1/0/0 mounted; CR 56, Alajuela, San Ramon Field Station, Río San Lorencito, small stream, 940 m asl, 09.vii.1995, 4/8/0 unmounted; CR 57, Alajuela, San Ramon Field Station, hygropetric area below waterfall at Río San

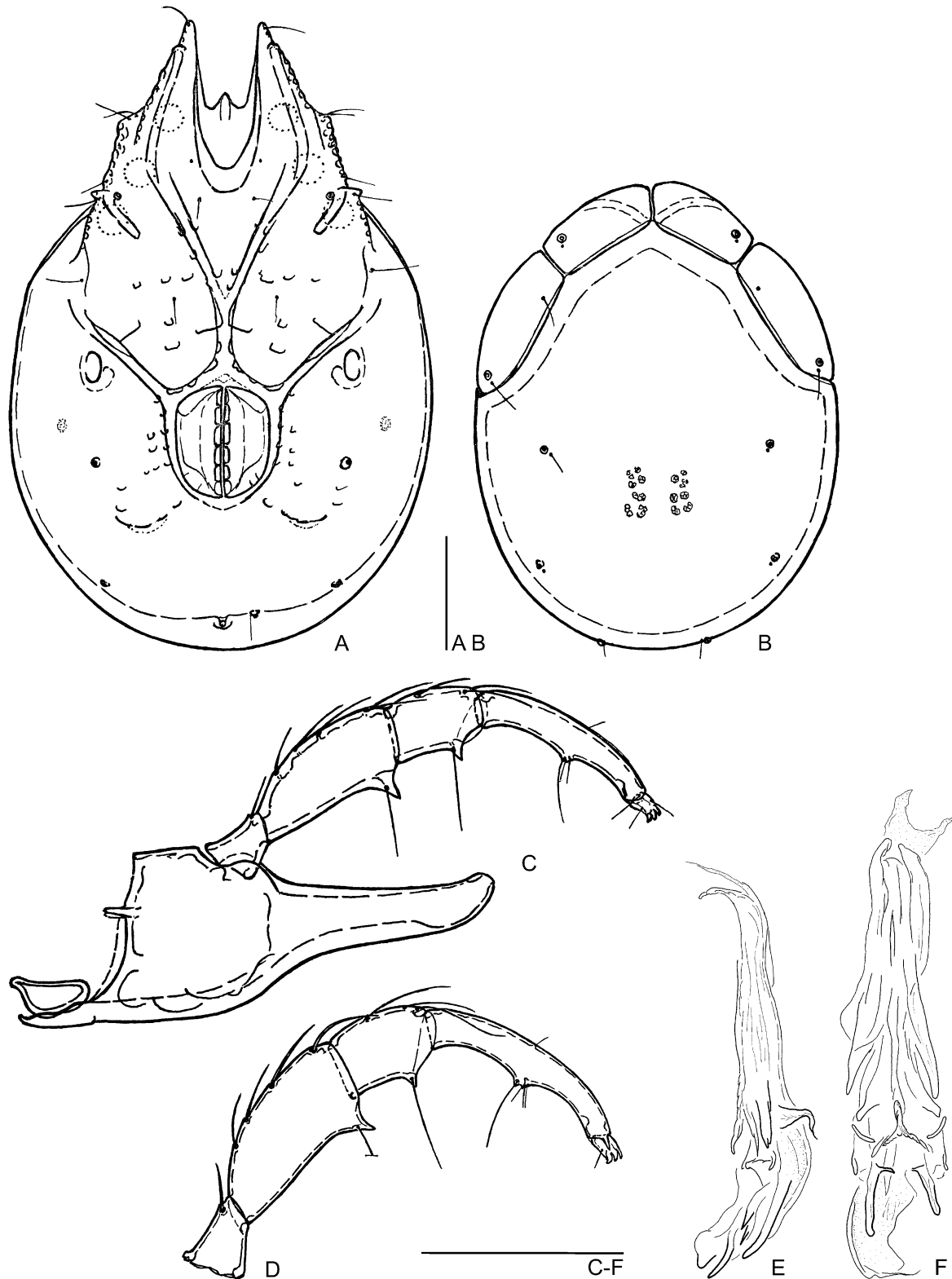


Figure 106. *Torrenticola maceripalpis*. A–C, holotype male, prep. no. 5854 SMF Viets collection; D, allotype female, prep. no. 5857 SMF Viets collection; after K.O. Viets (1977/78, Teil II); E, paratype male, prep. no. 5855 SMF Viets collection; F, holotype male, prep. no. 5854 SMF Viets collection. A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp; E, genital skeleton, lateral view; F, genital skeleton, anterior view. Scale bars = 100 µm.

Table 50. Measurements (μm) of *Torrenticola levicoxalis*; $N = 1$ (male, holotype) and *T. maceripalpis*; $N = 2$ (male), 1 (juvenile female). Measurements of *T. maceripalpis* not given in the original description (K.O. Viets, 1977)/78 Teil II) were completed by new measurements of the preparations of type specimens (SMF, Viets collection)

	<i>levicoxalis</i>	<i>maceripalpis</i>			
	male	male			female
	ht	ht	pt	SD	pt
Idiosoma L	652	540	542	2.1	554
Idiosoma W	456	363	363	0.00	383
Idiosoma L/W	1.43	1.49	1.49	0.01	1.45
Cx-I tL	270	235	235	0.00	260
Cx-III W	319	255	250	3.5	255
Cx-I tL/Cx-III W	0.85	0.92	0.94	0.01	1.02
Ds L	510	414	422	5.6	481
Dp L	481	378	383	3.5	441
Ds W	397	319	319	0.00	348
Ds L/W	1.28	1.30	1.32	0.02	1.38
Dp L/W	1.21	1.18	1.20	0.01	1.27
A-m platelet L	118	105	106	0.5	120
A-m platelet W	54	49	51	1.7	49
A-l platelet L	162	135	142	5.2	142
A-l platelet W	61	49	42	5.2	49
A-m pl L/a-l pl L	0.73	0.78	0.75	0.02	0.84
Capitular bay L	138	123	123	0.00	151
Capitular bay W	69	51	54	1.7	59
Cb L/W	2.02	2.38	2.27	0.1	2.56
Dist cb – gf	216	178	169	6.1	149
Cx-I mL	136	120	113	5.2	113
Cx-II + III mL	65	56	54	1.7	34
Cx-I tL/Cx-II/III mL	4.16	4.18	4.37	0.1	7.58
Cx-I/Cx-II + III mL	2.09	2.13	2.09	0.03	3.29
Genital field L	167	108	111	2.6	142
Gf L/Cx-II + III mL	2.57	1.91	2.07	0.1	4.14
Genital field W	132	86	88	1.7	120
Genital field L/W	1.26	1.26	1.26	0.00	1.18
Gf L/Id L	0.26	0.20	0.21	0.00	0.26
Gf L/dist cb – gf	0.77	0.61	0.66	0.04	0.95
Dist gf – expo	78	111	118	4.3	113
Dist gf – cauda	138	135	142	5.2	115
Gs L	256	213	196	12.1	
Gs aL	159	142	135	5.2	
Gs W		49			
Gs aL/tL	0.62	0.67	0.69	0.01	
Gs tL/W		4.35			
Capitulum vL	274	252	240	8.7	277
Capitulum dL	198	190	195	3.5	208
Rostrum L	115	118	110	5.2	110
Capitulum H	115	91			108
R L/c dL	0.58	0.62	0.57	0.04	0.53
R L/c vL	0.42	0.47	0.46	0.00	0.40
Gn bend depth	22	11			15
Chelicera L	325	307			343
Chelicera H	28	18			22
Chelicera L/H	11.52	16.73			15.59

Table 50. *Continued*

	<i>levicoxalis</i>	<i>macripalpis</i>			
	male	male			female
	ht	ht	pt	SD	pt
Chelicera bs L	276	261			294
Chelicera claw L	49	47			49
Chel bs/claw L	5.63	5.61			6.00
P1 dorsal L	32	33	34	0.9	37
P2 dL	94	86	83	1.7	93
P3 dL	50	49	48	0.9	51
P4 dL	91	98	97	0.9	108
P5 dL	15	10	11	0.9	12
Palp total L	282	276	273	1.7	301
P4 vL	72	81	80	0.9	88
P4 vL to seta	40	43	43	0.00	47
P4 vL/L to seta	1.79	1.89	1.86	0.02	1.89
P1 rel L	0.11	0.12	0.13	0.00	0.12
P2 rel L	0.33	0.31	0.30	0.00	0.31
P3 rel L	0.18	0.18	0.17	0.00	0.17
P4 rel L	0.32	0.36	0.35	0.00	0.36
P5 rel L	0.05	0.04	0.04	0.00	0.04
P1 H	32	28	29	0.9	32
P2 H	49	39	39	0.00	44
P3 H	42	32	34	1.7	34
P4 H	25	20	22	1.7	22
P5 H	10	10	10	0.00	10
P1 L/H	1.00	1.17	1.17	0.01	1.15
P2 L/H	1.93	2.19	2.13	0.04	2.11
P3 L/H	1.21	1.54	1.39	0.1	1.50
P4 L/H	3.70	5.00	4.39	0.4	4.89
P5 L/H	1.50	1.00	1.13	0.1	1.25
P2/P4 L	1.04	0.88	0.86	0.01	0.86
P3/P4 L	0.55	0.50	0.49	0.00	0.48

Lorencito, 1040 m asl, 09.vii.1995, 0/3/0 unmounted; CR 59, Alajuela, San Ramon Field Station, left affluent Río San Lorencito, small stream, 1000 m asl, 10.vii.1995, 5/0/0 mounted, 4/8/0 unmounted; CR 73, Alajuela, Río Centendo, small stream, 300 m asl, 20.vii.1995, 1/0/0 mounted, 6/2/0 unmounted; CR 87, Guanacaste, Peninsula de Nicoya, Río Nosara, small stream, 200 m asl, 25.vii.1995, 0/1/0 unmounted; CR 89, Guanacaste, Río Lajas, small stream, 150 m asl, 26.vii.1995, 0/1/0 unmounted; CR 138, Guanacaste, ACG, Cacao, spring brook, 1170 m asl, 27.ii.1996, 0/1/0 unmounted; CR 140, Guanacaste, ACG, Cacao, Quebrada Florcita, small stream, 740 m asl, 28.ii.1996, 0/2/0 unmounted; CR 152, Guanacaste, ACG, Maritza, Quebrada Marilin, small stream, 560 m asl, 02.iii.1996, 0/2/0 unmounted; CR 158, Cartago, NP Tapanti, small stream, 1420 m asl,

06.iii.1996, 1/1/0 mounted; CR 159, Cartago, NP Tapanti, hygropetric area, 1500 m asl, 06.iii.1996, 0/2/0 unmounted; CR 160, Cartago, NP Tapanti, Quebrada Palmitas, small stream, 1500 m asl, 06.iii.1996, 1/0/0 mounted; CR 161, Limón, Río Corinto, stream, 500 m asl, 07.iii.1996, 4/0/0 mounted, 1/2/0 SEM-mounted, 5/27/0 unmounted; CR 163, Cartago, Río Jicotea, small stream, 800 m asl, 08.iii.1996, 0/1/0 mounted, 0/3/0 unmounted; CR 188, Puntarenas, Peninsula de Osa, above Río Pavón, rheocrene, 140 m asl, 19.iii.1996, 1/0/0 mounted, 1/1/0 unmounted; CR 190, Puntarenas, Peninsula de Osa, Río Pavon, stream, rifle, 110 m asl, 19.iii.1996, 1/0/0 mounted; CR 201, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Los Migueles, rheopsammocrene, 150 m asl, 23.iii.1996, 0/1/0 mounted; CR 202, Puntarenas, Peninsula de Osa, above Los Angeles de Drake, Los

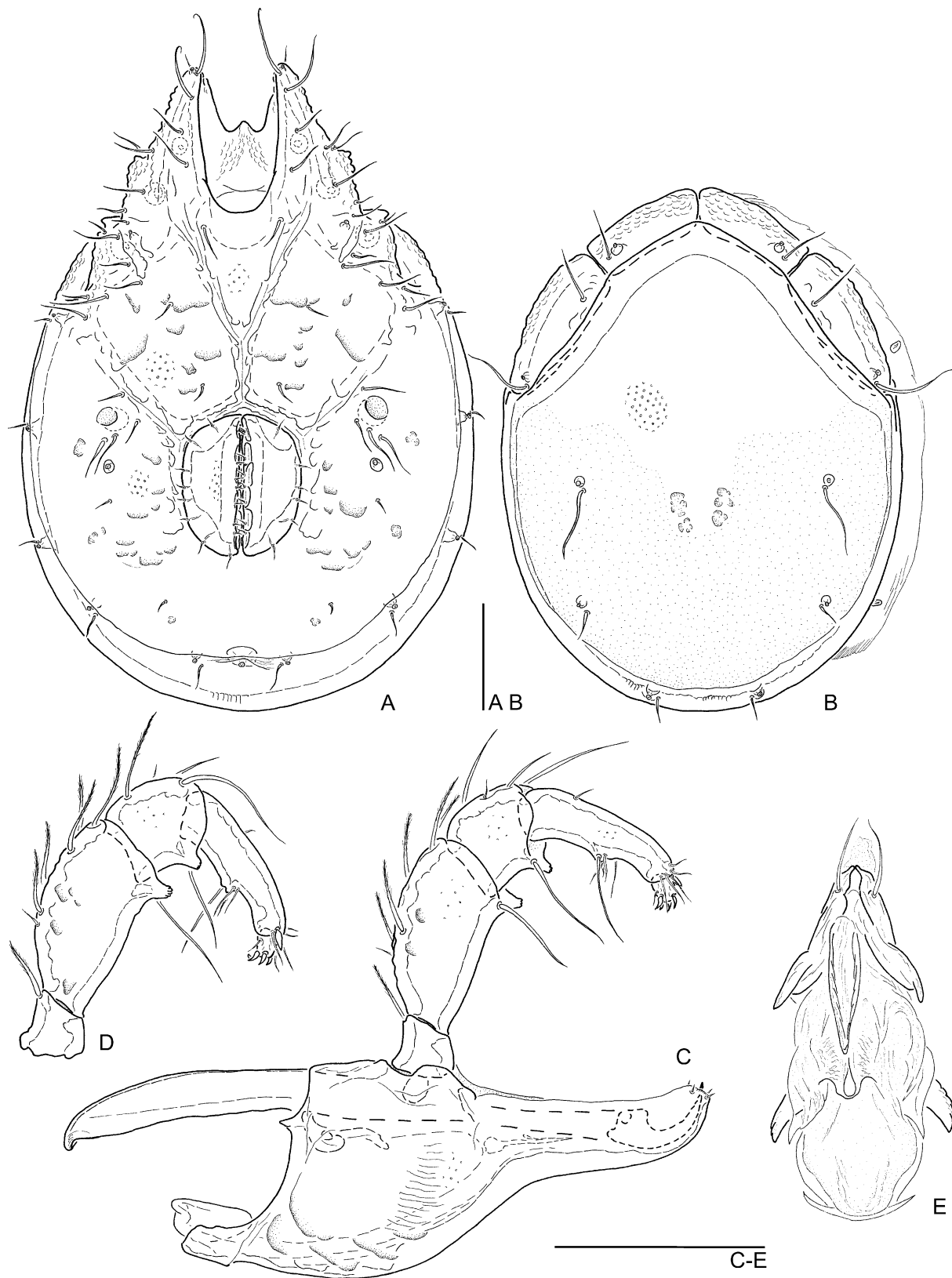


Figure 107. *Torrenticola pervagata*. A–E, holotype male (CR 208). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

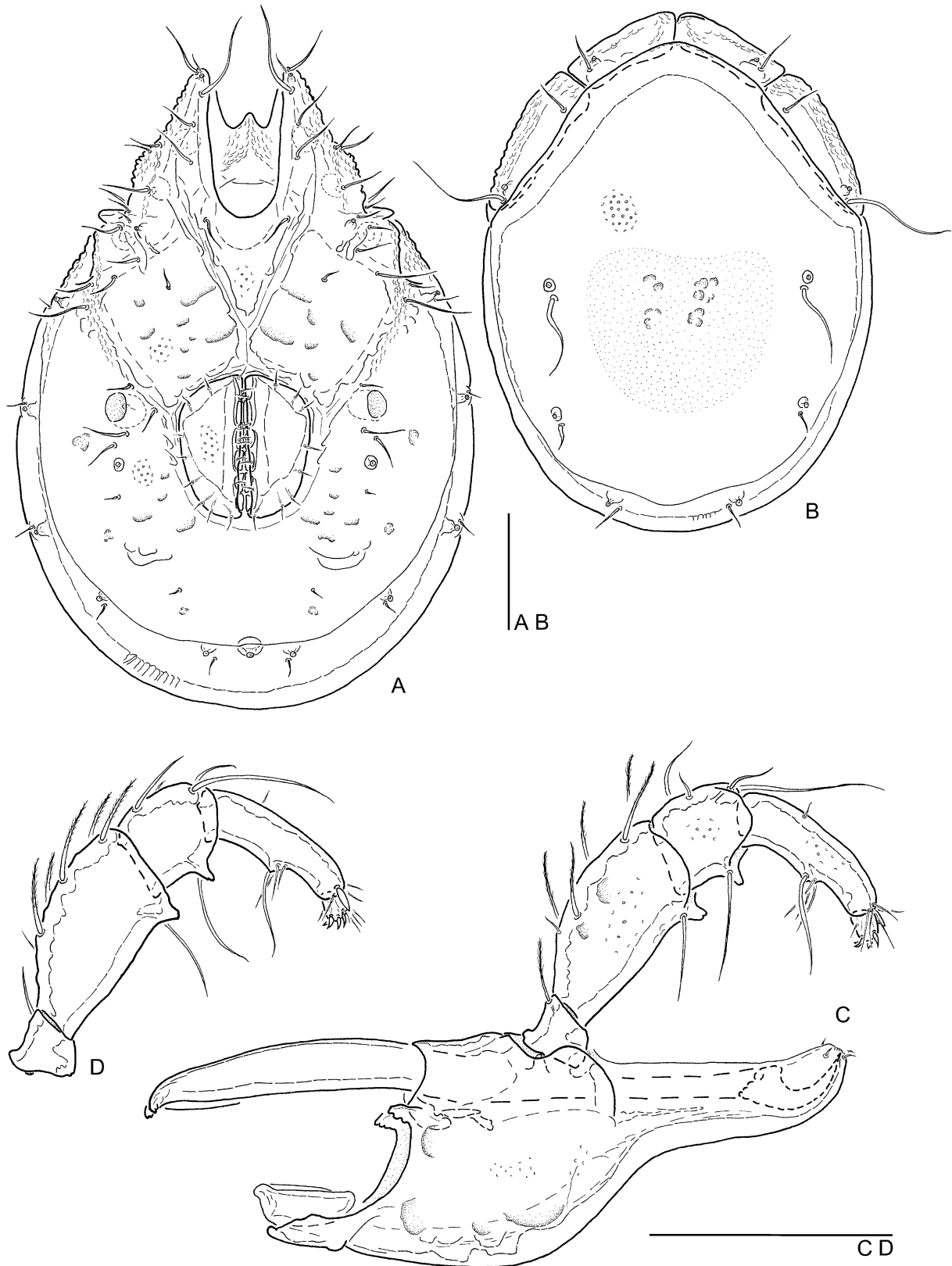


Figure 108. *Torrenticola pervagata*. A–D, female (CR 202). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

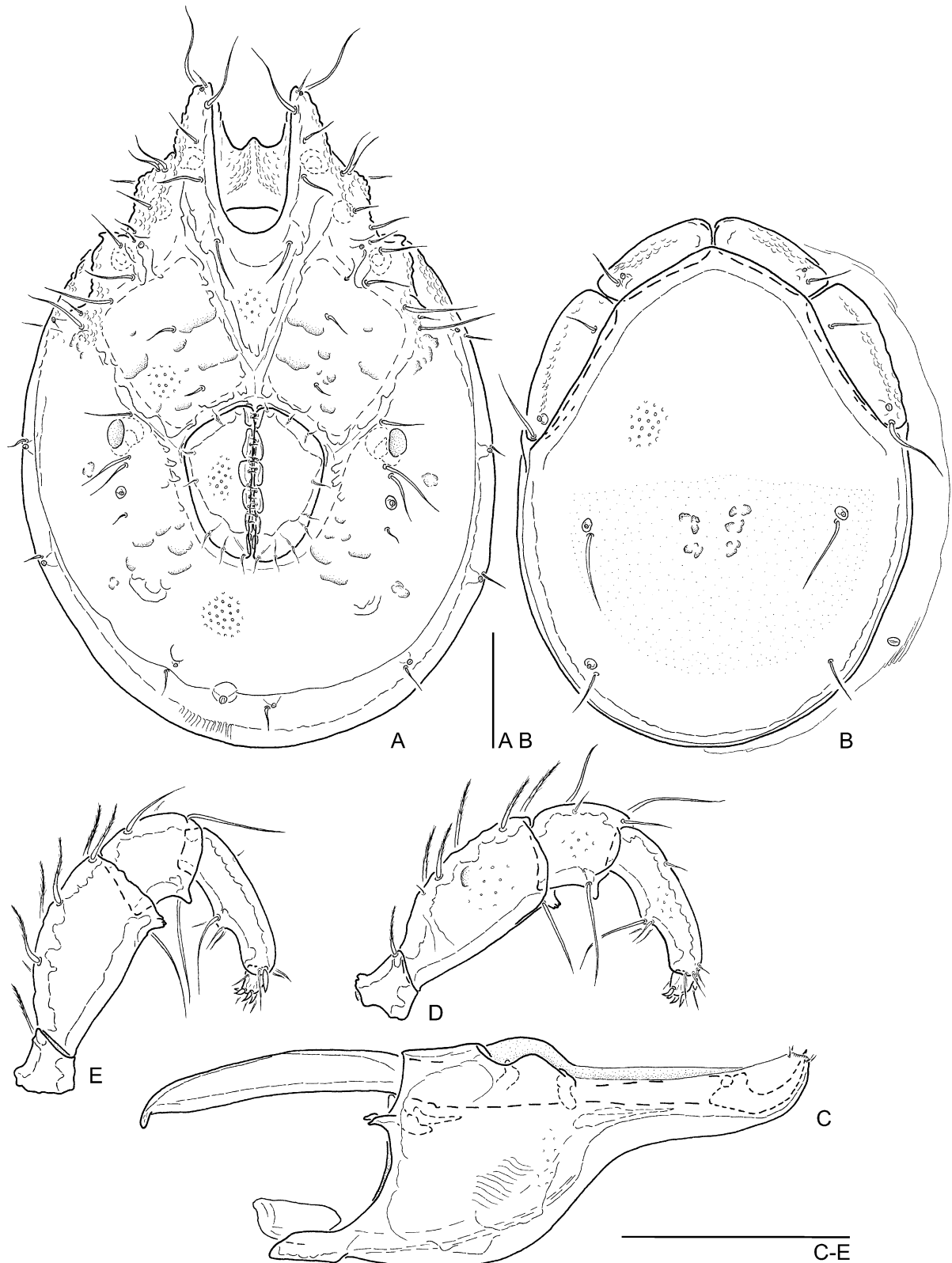


Figure 109. *Torrenticola pervagata*. A–E, female (CR 201). A, idiosoma, ventral view (misshapen, Vgl-2 and expo shifted to the left side); B, idiosoma, dorsal view (misshapen, gland opening of Dgl-5 missing on right side); C, capitulum, lateral view; D, right palp, lateral view; E, left palp, medial view. Scale bars = 100 μ m.

Table 51. Measurements (μm) of *Torrenticola pervagata*; $N = 8$ (male), 4 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	594	567	500	608	36.5	677	549	741	89.7
Idiosoma W	427	419	353	437	33.4	505	392	579	88.7
Idiosoma L/W	1.39	1.39	1.30	1.47	0.1	1.34	1.28	1.40	0.1
Cx-I tL	255	243	216	260	14.6	277	221	309	39.3
Cx-III W	284	289	245	304	23.7	334	265	373	49.1
Cx-I tL/Cx-III W	0.90	0.86	0.79	0.92	0.04	0.83	0.82	0.84	0.01
Ds L	491	464	407	500	34.9	554	441	603	77.5
Dp L	461	439	383	476	33.1	525	422	574	73.5
Ds W	373	351	299	373	29.5	422	324	481	72.5
Ds L/W	1.32	1.34	1.27	1.38	0.04	1.32	1.26	1.36	0.05
Dp L/W	1.24	1.26	1.21	1.31	0.04	1.25	1.19	1.30	0.05
A-m platelet L	118	113	100	118	7.3	127	105	140	16.4
A-m platelet W	42	38	33	42	3.4	45	37	54	8.6
A-l platelet L	147	141	115	152	12.0	162	130	191	27.7
A-l platelet W	54	51	42	54	4.9	55	42	64	10.4
A-m pl L/a-l pl L	0.80	0.79	0.73	0.87	0.05	0.79	0.73	0.81	0.04
Capitular bay L	137	128	113	137	7.9	153	127	169	18.6
Capitular bay W	71	72	51	80	10.1	79	61	86	11.4
Cb L/W	1.93	1.85	1.58	2.29	0.2	1.97	1.91	2.08	0.1
Dist cb – gf	186	186	163	213	15.3	162	137	172	14.8
Cx-I mL	120	118	100	130	9.0	125	100	137	17.4
Cx-II + III mL	59	59	49	67	6.0	31	20	37	7.2
Cx-I tL/Cx-II/III mL	4.34	3.93	3.64	4.40	0.3	8.37	7.07	15.77	4.0
Cx-I/Cx-II + III mL	2.04	1.92	1.80	2.05	0.1	3.82	3.13	7.00	1.77
Genital field L	136	128	110	136	8.5	157	125	174	22.8
Gf L/Cx-II + III mL	2.31	2.08	1.95	2.31	0.1	4.78	3.93	8.88	2.3
Genital field W	113	108	93	114	7.2	143	118	159	18.6
Genital field L/W	1.21	1.19	1.15	1.21	0.02	1.08	1.06	1.11	0.02
Gf L/Id L	0.23	0.23	0.22	0.23	0.01	0.23	0.23	0.23	0.00
Gf L/dist cb – gf	0.73	0.68	0.62	0.73	0.03	0.95	0.90	1.06	0.1
Dist gf – expo	100	88	83	100	6.9	141	119	181	27.6
Dist gf – cauda	140	121	110	140	11.5	204	159	238	37.1
Gs L	172	173	154	194	11.3				
Gs aL	115	115	103	125	7.4				
Gs W	91	85	74	93	8.7				
Gs aL/tL	0.67	0.67	0.62	0.73	0.03				
Gs tL/W	1.89	2.17	1.83	2.47	0.3				
Capitulum vL	262	260	225	278	18.1	300	247	316	31.3
Capitulum dL	194	186	160	201	13.3	215	179	230	23.1
Rostrum L	113	104	92	113	7.8	116	98	130	14.0
Capitulum H	103	99	86	109	7.0	124	98	140	19.4
R L/c dL	0.58	0.57	0.54	0.58	0.02	0.55	0.54	0.56	0.01
R L/c vL	0.43	0.40	0.39	0.43	0.01	0.39	0.38	0.41	0.01
Gn bend depth	15	13	12	17	1.7	22	16	26	5.0
Chelicera L	304	301	255	316	21.7	352	285	380	42.1
Chelicera H	21	21	20	25	1.7	27	22	29	3.1
Chelicera L/H	14.59	13.86	12.90	15.25	0.8	12.93	12.45	13.64	0.5
Chelicera bs L	255	252	218	267	17.7	296	244	321	33.5
Chelicera claw L	49	49	37	49	4.3	54	42	61	9.1
Chel bs/claw L	5.20	5.23	5.06	5.93	0.3	5.65	5.00	5.85	0.4
P1 dorsal L	27	27	25	27	1.3	31	25	37	5.6
P2 dL	86	84	71	87	6.0	98	81	108	12.3

Table 51. Continued

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
P3 dL	45	45	37	49	3.7	53	39	56	7.6
P4 dL	83	79	69	83	5.1	87	71	93	9.9
P5 dL	12	15	12	17	1.6	16	13	17	1.8
Palp total L	254	251	218	258	14.6	283	233	311	34.8
P4 vL	61	59	51	61	4.1	69	53	71	8.7
P4 vL to seta	34	34	27	37	3.3	40	29	42	5.6
P4 vL/L to seta	1.79	1.72	1.67	1.91	0.1	1.77	1.59	1.81	0.1
P1 rel L	0.11	0.11	0.10	0.11	0.00	0.11	0.11	0.12	0.01
P2 rel L	0.34	0.34	0.33	0.34	0.01	0.35	0.34	0.35	0.00
P3 rel L	0.18	0.18	0.17	0.19	0.01	0.18	0.17	0.19	0.01
P4 rel L	0.33	0.32	0.31	0.33	0.01	0.30	0.30	0.31	0.00
P5 rel L	0.05	0.06	0.05	0.08	0.01	0.05	0.05	0.07	0.01
P1 H	29	29	25	32	2.3	34	27	39	5.4
P2 H	47	47	39	51	4.5	53	42	55	6.1
P3 H	40	40	34	44	3.3	44	37	48	4.6
P4 H	25	25	20	27	2.3	28	22	29	3.5
P5 H	10	10	10	11	0.6	11	10	12	1.4
P1 L/H	0.92	0.89	0.83	1.00	0.1	0.90	0.88	1.00	0.1
P2 L/H	1.84	1.83	1.69	1.88	0.1	1.92	1.79	2.00	0.1
P3 L/H	1.12	1.12	1.06	1.18	0.05	1.15	1.07	1.28	0.1
P4 L/H	3.40	3.18	3.00	3.50	0.2	3.13	3.08	3.22	0.1
P5 L/H	1.25	1.35	1.25	1.75	0.2	1.48	1.10	1.75	0.3
P2/P4 L	1.03	1.05	1.03	1.09	0.02	1.14	1.10	1.16	0.02
P3/P4 L	0.54	0.58	0.54	0.61	0.03	0.60	0.55	0.62	0.03

Miguelés, small stream, 150 m asl, 23.iii.1996, 1/1/0 mounted; CR 212, Alajuela, 12 km north San Ramon, Río Balsa, stream, 960 m asl, 27.iii.1996, 1/0/0 mounted, 1/0/0 unmounted; CR 216, Alajuela, Arenal, Río Agua Caliente, stream, 620 m asl, 29.iii.1996, 0/2/0 unmounted; CR 291, Guanacaste, Río Sabalo, small stream, 540 m asl, 06.ii.1997, 0/2/0 unmounted.

Habitat: Mainly fast flowing (one slow, one very fast flowing) small streams at mid elevations; some streams, one slow flowing rheocrene and one slow flowing rheopsammocrene; 110–1420 m asl; mainly mesolihal, akal, lithophyal, also macropelal, macrolithal, psammal, terrestrial vegetation; temperature 15.3–27.6 °C; conductivity 21–178 µS cm⁻¹.

Distribution: Costa Rica (Peninsula de Nicoya, Cordillera de Tilaran, Cordillera Central, Cordillera de Talamanca, Peninsula de Osa).

Derivatio nominis: *pervagatus* (Latin = widespread, overall); referring to the wide distribution and frequency of the species.

Diagnosis: Characters of the *bicolor*-like mites; idiosoma small, oval; dorsal plate with reddish pattern (Fig. 6C-1, C-4), antero-dorsal platelets slender; coxal

field slightly elongated, lateral margins relatively smooth, capitular bay deep U-shaped; genital field broad (female genital field merely tapering to posterior); capitulum basely high, ventral margin bellied, sigmoid curved, rostrum slender (basely relatively high, tapering); ventral projections of P2/3 blunt, distally fine serrate, P2 = P4, setae on ventral margin of P4 slightly distal of centre on flat hump.

Description – Male ($N = 22$): Idiosoma rounded-oval [L 594 µm (500–608 µm), L/W 1.39 (1.30–1.47)]; dorsal plate with reddish pattern on posterior half (Fig. 107B), slightly tapering anterior; antero-dorsal platelets slender, antero-medial platelets medially convex, antero-laterally and posterior straight, antero-lateral platelets anterior straight, posterior tapering; Dgl-4 straight anterior to Dgl-5 (Fig. 107B); coxal field slightly elongated, lateral margins of Cx-I/II relatively smooth, Cx-I apically rounded, Cxgl-4 at the tips of Cx-I; capitular bay U-shaped, lateral margins convex; Cx-II/III medially relatively short [Cx-I/Cx-II/III mL 2.04 (1.80–2.05); gf L/Cx-II/III mL 2.31 (1.95–2.25)]; genital field oval, anterior rounded, lateral margins convex, posterior gradually tapering; excretory pore between Vgl-2, under posterior margin

of primary sclerotization (Fig. 107A); genital skeleton apically mid-sized, cella proximalis small, with pointed, mid-sized processus proximalia [aL/tL 0.67 (0.62–0.73)], brachia distalia and proximalia strong, directed postero-laterally (Fig. 107E); capitulum basely high, ventral margin in basal part bellied, sigmoid curved towards highly attached rostrum, rostrum slightly tapering distally; ventro-distal projections on P2/3 strong, blunt cone-shaped, distally with fine denticles; P2 and P4 of equal length [P2/P4 1.03 (1.03–1.09)], setae on ventral margin of P4 on flat hump, slightly distal of centre [vL P4/L to setae 1.79 (1.67–1.91)] (Fig. 107C, D).

Female ($N = 5$): Idiosoma similar to male, larger (L 549–741 μm); genital field broad, anterior truncated, only slightly tapering to truncated posterior margin (Fig. 108A); gnathosoma similar to male, ventral margin of capitulum slightly stronger bent (Fig. 108C, D).

Discussion: *Torrenticola pervagata* is similar to *T. collina*, *T. levicoxalis* and *T. rubella* in the general features of a rounded-oval idiosoma and basely high rostrum. The species is separated from these others due to its small idiosoma and relatively short genital field, as well as a reddish dorsal pattern (whereas the others bear uniform yellow, reddish or red dorsal plates without a pattern). One male found in a rheocrene (CR 188) and one female in a rheopsammocrene

(CR 201), both on the Peninsula de Osa, differ slightly from the other specimens. The differences are not strong enough to describe a separate species (and the female is slightly misshapen); however, considering also the different habitats (springs, whereas all other populations are found in streams), it seems reasonable to describe the variation. The main differences are found in the female (Fig. 109): lateral margins of coxal field stronger graded; genital field more rhombic (lateral margins heavily tapering posterior) (Fig. 109A); rostrum more slender; chelicera more slender [L/H 15.25 compared with 12.45–13.64 (females from streams)] (Fig. 109C).

***TORRENTICOLA RUBELLA* SP. NOV.**

(FIGS 110A–E, 111A–F, 112A–D; TABLE 52)

Type series: Holotype male, CR 107, Puntarenas, Las Alturas Biological Station, Río Colón, stream, 1340 m asl, 01.viii.1995, mounted; paratypes: same locality and date, 3/0/0 mounted, 12/11/0 unmounted.

Additional specimens: CR 7, Alajuela, Río Sarchí, small stream, 1580 m asl, 18.vi.1995, 0/1/0 mounted; CR 10, Heredia, El Tirol, Río Segundo, stream, 1780 m asl, 19.vi.1995, 3/1/0 mounted; CR 26, Puntarenas, Ecolodge San Luis, Río San Luis, small stream, 1000 m asl, 27.vi.1995, 0/2/0 unmounted; CR 30, Heredia, Río La Paz, stream, 1270 m asl, 29.vi.1995, 2/

Table 52. Measurements (μm) of *Torrenticola rubella*; $N = 12$ (male), 2 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	785	719	643	785	46.4	814	804	824	13.9
Idiosoma W	638	540	476	638	43.2	594	584	603	13.9
Idiosoma L/W	1.23	1.33	1.23	1.37	0.04	1.37	1.37	1.38	0.01
Cx-I tL	334	314	275	334	19.2	316	309	324	10.4
Cx-III W	417	365	324	417	25.1	383	373	392	13.9
Cx-I tL/Cx-III W	0.80	0.86	0.80	0.89	0.03	0.83	0.83	0.83	0.00
Ds L	662	584	520	662	46.2	650	647	652	3.5
Dp L	633	549	491	633	43.4	608	608	608	0.00
Ds W	520	461	407	520	34.7	508	491	525	24.3
Ds L/W	1.27	1.28	1.22	1.31	0.02	1.28	1.24	1.32	0.1
Dp L/W	1.22	1.20	1.17	1.23	0.02	1.20	1.16	1.24	0.1
A-m platelet L	167	141	127	167	11.5	150	137	163	18.2
A-m platelet W	54	51	48	56	3.2	60	59	61	1.7
A-l platelet L	201	176	157	201	13.8	187	180	194	9.6
A-l platelet W	71	64	56	71	4.9	71	69	74	3.5
A-m pl L/a-l pl L	0.83	0.77	0.74	0.84	0.04	0.80	0.76	0.84	0.1
Capitular bay L	180	164	148	180	11.0	171	159	183	16.5
Capitular bay W	110	82	72	110	9.8	88	86	89	2.6
Cb L/W	1.63	2.03	1.63	2.20	0.2	1.95	1.86	2.04	0.1
Dist cb – gf	239	225	201	239	13.5	177	170	184	9.5
Cx-I mL	159	151	132	164	9.0	146	142	149	5.2
Cx-II + III mL	71	62	49	71	6.7	25	12	37	17.3

Table 52. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Cx-I tL/Cx-II/III mL	4.69	5.04	4.31	6.01	0.5	17.02	8.81	25.23	11.6
Cx-I/Cx-II + III mL	2.24	2.42	1.98	2.90	0.3	8.03	3.87	12.20	5.9
Genital field L	196	185	169	198	10.7	179	178	180	1.7
Gf L/Cx-II + III mL	2.76	2.97	2.60	3.48	0.3	9.70	4.90	14.50	6.8
Genital field W	164	145	129	164	11.3	169	167	172	3.5
Genital field L/W	1.19	1.26	1.19	1.35	0.04	1.06	1.04	1.08	0.03
Gf L/Id L	0.25	0.25	0.24	0.27	0.01	0.22	0.22	0.22	0.00
Gf L/dist cb – gf	0.82	0.82	0.75	0.89	0.03	1.01	0.98	1.04	0.04
Dist gf – expo	120	106	88	125	13.2	189	169	208	27.7
Dist gf – cauda	172	164	118	194	21.4	287	274	299	17.3
Gs L	281	262	235	283	16.9				
Gs aL	192	172	148	200	15.2				
Gs W	154	154							
Gs aL/tL	0.69	0.66	0.63	0.73	0.03				
Gs tL/W	1.82	1.82							
Capitulum vL	345	317	281	345	19.2	328	309	347	26.9
Capitulum dL	245	229	203	245	13.7	240	228	252	17.3
Rostrum L	140	126	113	140	8.0	138	135	142	5.2
Capitulum H	154	132	118	154	10.4	147	147	147	0.00
R L/c dL	0.57	0.55	0.54	0.57	0.01	0.58	0.56	0.59	0.02
R L/c vL	0.40	0.40	0.39	0.41	0.01	0.42	0.41	0.44	0.02
Gn bend depth	25	22	17	25	2.1	25	25	26	0.9
Chelicera L	424	380	336	424	25.9	402	375	429	38.1
Chelicera H	31	29	25	32	2.2	29	27	32	3.5
Chelicera L/H	13.84	12.64	11.92	13.84	0.7	13.69	13.46	13.91	0.3
Chelicera bs L	358	319	279	358	22.7	337	314	360	32.9
Chelicera claw L	66	60	54	66	3.5	65	61	69	5.2
Chel bs/claw L	5.41	5.25	4.96	5.46	0.2	5.19	5.12	5.25	0.1
P1 dorsal L	39	34	29	39	2.7	36	34	38	2.6
P2 dL	113	100	94	113	5.8	110	108	113	3.5
P3 dL	60	54	49	60	3.9	60	59	61	1.7
P4 dL	94	89	80	96	5.4	104	97	110	9.5
P5 dL	12	15	12	16	1.1	17	17	17	0.00
Palp total L	319	293	267	319	16.7	327	323	331	5.2
P4 vL	71	66	59	71	4.7	81	71	91	13.9
P4 vL to seta	39	39	34	40	2.4	48	40	55	10.4
P4 vL/L to seta	1.81	1.73	1.66	1.81	0.05	1.70	1.64	1.76	0.1
P1 rel L	0.12	0.12	0.11	0.12	0.00	0.11	0.10	0.12	0.01
P2 rel L	0.35	0.35	0.34	0.35	0.01	0.34	0.33	0.35	0.02
P3 rel L	0.19	0.18	0.18	0.19	0.00	0.18	0.18	0.19	0.00
P4 rel L	0.30	0.30	0.29	0.31	0.00	0.32	0.30	0.33	0.02
P5 rel L	0.04	0.05	0.04	0.06	0.00	0.05	0.05	0.05	0.00
P1 H	42	37	34	42	2.3	39	37	42	3.5
P2 H	61	58	50	61	3.6	59	58	61	2.6
P3 H	51	48	44	53	3.1	51	49	53	2.6
P4 H	32	29	27	32	1.9	31	27	34	5.2
P5 H	12	12	10	12	0.8	12	11	12	0.9
P1 L/H	0.94	0.93	0.80	1.00	0.1	0.92	0.91	0.93	0.02
P2 L/H	1.84	1.79	1.73	1.90	0.1	1.86	1.84	1.87	0.02
P3 L/H	1.17	1.11	1.07	1.17	0.03	1.18	1.12	1.25	0.1
P4 L/H	2.96	2.96	2.75	3.32	0.1	3.46	2.82	4.09	0.9
P5 L/H	1.00	1.30	1.00	1.50	0.1	1.48	1.40	1.56	0.1
P2/P4 L	1.19	1.18	1.10	1.19	0.03	1.07	0.98	1.16	0.1
P3/P4 L	0.64	0.62	0.59	0.64	0.01	0.58	0.56	0.61	0.04

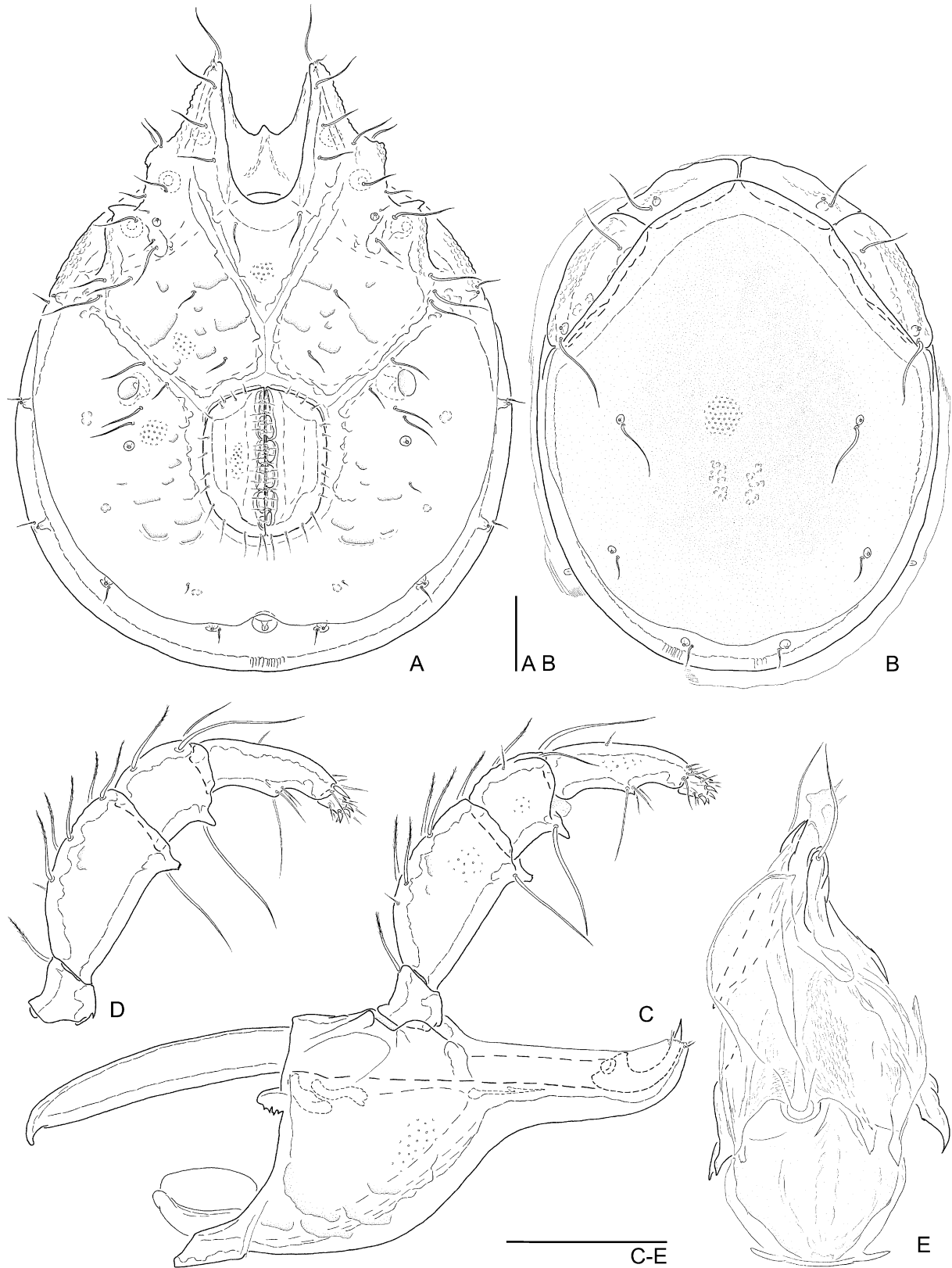


Figure 110. *Torrenticola rubella*. A–E, male (CR 30). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, antero-lateral view. Scale bars = 100 µm.

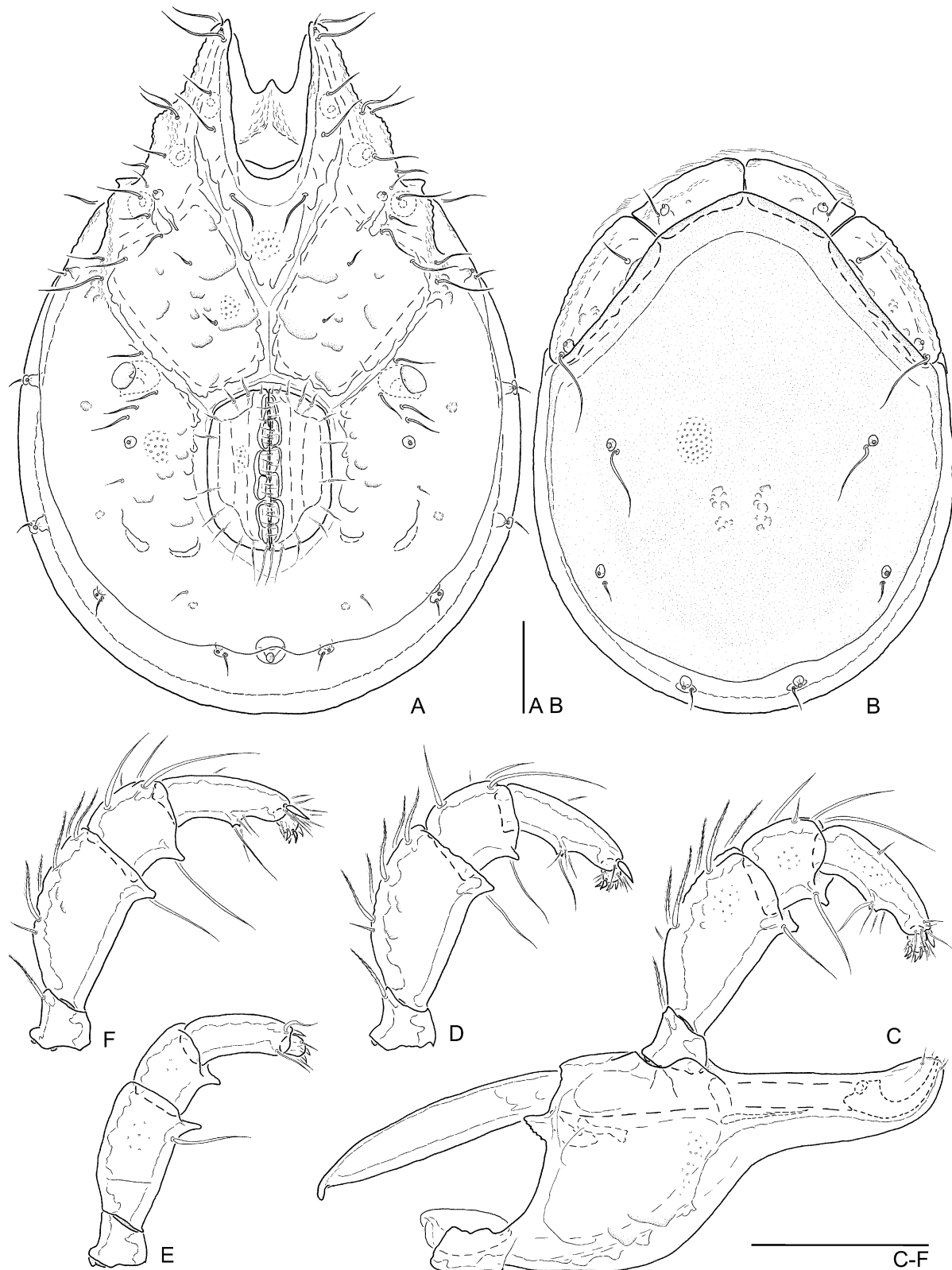


Figure 111. *Torrenticola rubella*. A–D, holotype male (CR 107); E, F, paratype male (CR 107). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, misshapen right palp, lateral view; F, 'normal' left palp (same specimen as E), medial view. Scale bars = 100 µm.

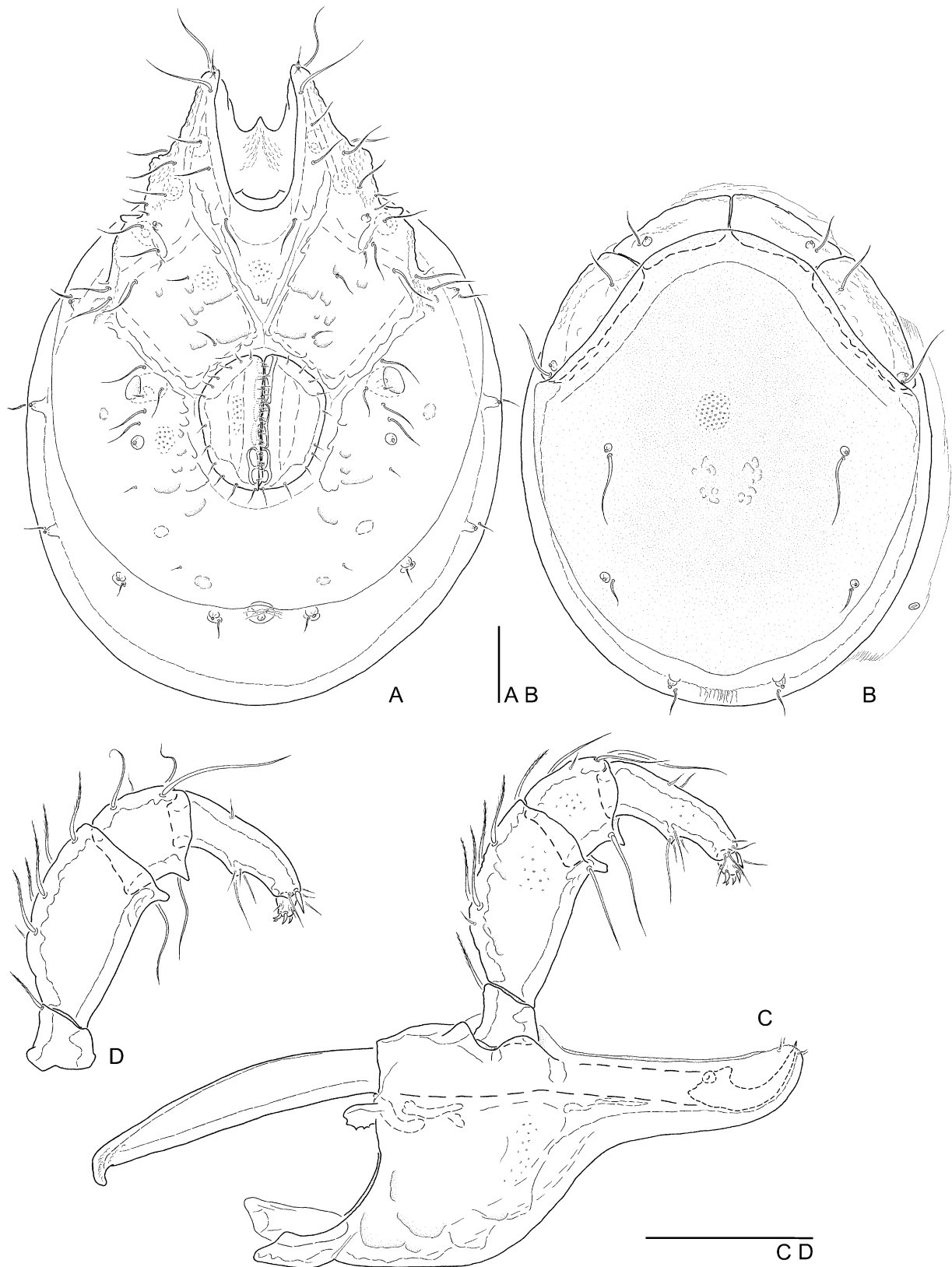


Figure 112. *Torrenticola rubella*. A–D, female (CR 10). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 μ m.

0/0 mounted, 0/2/0 unmounted; CR 32, Alajuela, Río Angel, stream, 800 m asl, 29.vi.1995, 0/1/0 unmounted; CR 39, Alajuela, Río Tapezco, small stream, 1580 m asl, 01.vii.1995, 1/0/0 mounted, 2/1/0 unmounted; CR 65, Puntarenas, Ecolodge San Luis, Río San Luis, small stream, 1240 m asl, 16.v.1995, 1/0/0 unmounted; CR 70, Puntarenas, Monteverde Reserve, Quebrada Quecha, small stream, 1560 m asl, 17.vii.1995, 1/0/0 mounted, 0/3/0 unmounted; CR 72, Puntarenas, Monteverde, Quebrada Máquina, small stream, 1440 m asl, 18.vii.1995, 0/1/0 unmounted; CR 95, San José, Talamaca, small stream, 2340 m asl, 27.vii.1995, 1/1/0 unmounted; CR 96, San José, Talamaca, Río Savegre, stream, 2160 m asl, 28.vii.1995, 0/2/0 unmounted; CR 98, Cartago, Finca Los Lagos, Río Macho, small stream, 2340 m asl, 28.vii.1995, 0/1/0 unmounted; CR 106, Puntarenas, Las Alturas Biological Station, Río Bellavista, stream, 1490 m asl, 01.viii.1995, 1/0/0 mounted, 0/3/0 unmounted; CR 187, Puntarenas, Peninsula de Osa, Quebrada Cerros del Oro, spring brook, 150 m asl, 18.iii.1996, 0/2/0 unmounted; CR 210, Alajuela, San Ramon, Río San Lorenzo, stream, 700 m asl, 27.iii.1996, 1/0/0 unmounted; CR 222, Puntarenas, Monteverde, Río Guacimal, small stream, riffle, 1380 m asl, 31.iii.1996, 1/2/0 unmounted; CR 350, Guanacaste, ACG, Pitilla, Río Coloncito, stream, 640 m asl, 09.iii.1997, 0/2/0 unmounted.

Habitat: Mainly fast flowing, very fast and slow flowing mountain streams and small streams at 640–2340 m asl (one spring brook at 150 m asl); mesolithal, akal, macropelal and lithophytal; temperature 12.8–24.7 °C; conductivity 17–223 $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica (mainly Cordillera Central, southern Cordillera de Talamanca and Cordillera de Tilaran, also single sample sites in the Central Talamanca, Cordillera de Guanacaste and Peninsula de Osa).

Derivatio nominis: *rubellus* (Latin = reddish); referring to the colouration of the dorsal plate.

Diagnosis: Characters of the *bicolor*-like species; idiosoma mid-sized, oval; dorsal plate reddish to red; coxal field laterally slightly graded, relatively slender; genital field relatively large; capitulum smoothly bend to slender rostrum; P4 short.

Description – Male ($N = 12$): Idiosoma oval [L 726 μm (643–785 μm), L/W 1.37 (1.23–1.36)]; dorsal plate red or reddish, paler towards margins; antero-medial dorsal platelets medially straight, laterally straight, oblique, antero-lateral platelets anterior straight, posterior slightly tapering, truncate; Dgl-4 clearly medial to Dgl-5 (Figs 110B, 111B); coxal field laterally slightly to clearly graded (Figs 110A, 111A), Cx-I tips

slender, apically pointed, tips bent to medial, Cxgl-4 posterior to tips of Cx-I, antero-lateral corners of Cx-II rounded; capitular bay relatively narrow U-shaped; Cx-I relatively long [Cx-I tL/Cx-II/III mL 4.36 (4.31–6.01)]; genital field large, rectangular-oval, anterior truncated, lateral slightly convex, posterior rounded (Table 52, Figs 110B, 111B); posterior margin of Cx-IV laterally besides posterior end of genital field; excretory pore between Vgl-2, under indented caudal margin of primary sclerotization (Figs 110B, 111B); genital skeleton apically relatively long, cella proximalis mid-sized, with strong, short processus proximalia [aL/tL 0.66 (0.63–0.73)], brachia distalia and proximalia well developed, carina anterior high (Fig. 110E); ventral margin of capitulum sigmoid, smoothly curved towards relatively straight rostrum; ventral projections of P2/P3 cone-shaped, strong; P4 short [P4 rel L 0.30 (0.29–0.31), L/H 2.96 (2.75–3.32), P2/P4 1.18 (1.10–1.19)], ventral setae on double pointed small projection slightly distally [vL/L to seta 1.74 (1.66–1.81)] (Figs 110C, D, 111C–F).

Female ($N = 2$): Idiosoma similar to male, larger (L 804–824 μm); genital field broad-rhombic, anterior rounded, lateral margins \pm straight, tapering to rounded posterior margin (Fig. 112A); gnathosoma similar to male (Fig. 112C, D).

Discussion: *Torrenticola rubella* is most similar to *T. collina* and *T. levicoxalis* due to its mid-sized, rounded-oval idiosoma with the posterior margin of Cx-IV besides the caudal end of a large genital field. The species is separated from the latter by means of a relatively elongated coxal field (especially Cx-I). Furthermore, *T. rubella* is characterized by a reddish to red dorsal plate and laterally slightly graded coxal field. Males of this species vary over a wide range from mid-sized (Fig. 111A) to large and broad (Fig. 110A).

TORRENTICOLA TILARANENSIS SP. NOV.

(FIGS 113A–E, 114A–D; TABLE 53)

Type series: Holotype male, CR 24, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1010 m asl, 26.vi.1995, mounted; paratypes, same locality and date, 2/0/0 mounted, 6/7/0 unmounted; CR 23 Puntarenas, Ecolodge San Luis, Quebrada Alondra (100 m upstream of CR 24), small stream, 1020 m asl, 26.vi.1995, 4/0/0 mounted, 13/11/1 unmounted; CR 223, Puntarenas, Ecolodge San Luis, Quebrada Alondra, small stream, 1100 m asl, 31.iii.1996, 3/3/0 mounted, 13/32/0 unmounted.

Additional specimens examined: CR 22, Puntarenas, Ecolodge San Luis, Quebrada Puntarenas, small stream, 1040 m asl, 25.vi.1995, 4/0/0 mounted, 10/10/

0 unmounted; CR 26, Puntarenas, Ecological San Luis, Río San Luis, small stream, 1000 m asl, 27.vi.1995, 2/0/0 mounted, 3/3/0 unmounted; CR 27, Puntarenas, Ecological San Luis, affluent of Río San Luis, spring brook, 1000 m asl, 27.vi.1995, 1/0/0 mounted, 3/5/0 unmounted; CR 51, Cartago, 5 km north Capellades, small stream, 1660 m asl, 05.vii.1995, 1/0/0 mounted, 1/0/0 unmounted; CR 67 Puntarenas, Ecological San Luis, left affluent of Río San Luis, spring brook, 1100 m asl, 16.vii.1995, 2/1/0 mounted, 5/9/0 unmounted; CR 71, Puntarenas, Monteverde, Río Guacimal, small stream, 1400 m asl, 18.vii.1995, 1/0/0 unmounted; CR 142, Guanacaste, Maritza, Quebrada Mata Redonda, small stream, 700 m asl, 28.ii.1996, 1/0/0 mounted.

Habitat: Mainly fast flowing small streams, also slow flowing spring brooks at 700–1660 m asl; mesolithal and lithophyal, furthermore akal, terrestrial vegetation, leaf packages and macropelal; temperature 18.0–20.1 °C; conductivity 48–90 (575) $\mu\text{S cm}^{-1}$.

Distribution: Costa Rica, mainly Cordillera de Tilaran, one locality each in the Cordillera de Guanacaste and Cordillera Central.

Derivatio nominis: *tilaranensis*; referring to the fact that the species was mainly found in the Cordillera de Tilaran.

Diagnosis: Characters of the *bicolor*-like species; idiosoma small, rounded drop-shaped; genital field anterior truncated, posterior broadly rounded; capitulum basely high, rostrum very straight and slender; genital skeleton relatively slender.

Description – Male ($N = 21$): Idiosoma rounded drop-shaped [L 559 μm (505–584 μm), L/W 1.34 (1.28–1.39)]; dorsal plate pale reddish or with pale posterior pattern (Figs 6C-1, 6C-4); antero-medial dorsal platelets medially straight, postero-laterally concave, antero-lateral platelets antero-laterally straight to concave, posterior rounded; Dgl-4 only slightly lateral to Dgl-5 (Fig. 113B); coxal field laterally smooth, especially lateral corner of Cx-II rounded, apically elongated, Cx-I tips slender; capitular bay deep U-shaped; genital field very short and broad [L/W 1.11 (1.06–1.17)], anterior truncated, antero- and postero-lateral corners rounded; posterior margin of Cx-IV lateral to posterior margin of genital field, weakly developed; excretory pore between Vgl-2, under posterior margin

Table 53. Measurements (μm) of *Torrenticola tilaranensis*; $N = 11$ (male), 4 (female)

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Idiosoma L	785	569	505	584	21.7	623	598	672	31.1
Idiosoma W	638	422	378	451	22.7	464	441	493	21.4
Idiosoma L/W	1.23	1.34	1.28	1.39	0.04	1.36	1.33	1.36	0.02
Cx-I tL	334	255	235	270	10.4	272	255	280	12.0
Cx-III W	417	284	255	314	15.6	297	280	319	16.2
Cx-I tL/Cx-III W	0.80	0.90	0.84	0.93	0.02	0.91	0.88	0.93	0.02
Ds L	662	451	397	476	21.6	517	476	540	32.2
Dp L	633	422	378	446	19.3	486	446	510	33.1
Ds W	520	358	314	373	17.2	402	373	417	22.1
Ds L/W	1.27	1.27	1.22	1.30	0.03	1.29	1.28	1.29	0.01
Dp L/W	1.22	1.19	1.15	1.23	0.02	1.21	1.19	1.22	0.02
A-m platelet L	167	110	98	120	6.3	120	110	132	9.0
A-m platelet W	54	47	39	49	3.2	50	47	53	2.7
A-l platelet L	201	147	125	153	7.8	150	142	164	10.7
A-l platelet W	71	54	49	56	2.4	60	56	64	3.2
A-m pl L/a-l pl L	0.83	0.77	0.71	0.82	0.03	0.79	0.77	0.84	0.04
Capitular bay L	180	137	123	142	5.5	153	145	162	7.1
Capitular bay W	110	59	54	71	6.1	65	59	72	5.6
Cb L/W	1.63	2.27	1.93	2.47	0.2	2.36	2.24	2.46	0.1
Dist cb – gf	239	197	181	211	9.0	152	142	160	7.8
Cx-I mL	159	123	108	130	6.4	121	108	132	10.5
Cx-II + III mL	71	66	54	74	5.6	23	18	29	5.4
Cx-I tL/Cx-II/III mL	4.69	3.86	3.34	4.91	0.4	12.13	9.01	14.26	2.6
Cx-I/Cx-II + III mL	2.24	1.89	1.53	2.32	0.2	5.52	3.67	6.75	1.5
Genital field L	196	127	118	135	5.1	144	136	148	6.2

Table 53. *Continued*

	male					female			
	ht	mean	min.	max.	SD	mean	min.	max.	SD
Gf L/Cx-II + III mL	2.76	1.96	1.73	2.45	0.2	6.45	4.75	7.56	1.4
Genital field W	164	115	103	120	4.8	136	130	142	5.1
Genital field L/W	1.19	1.14	1.06	1.17	0.04	1.05	1.04	1.08	0.02
Gf L/Id L	0.25	0.23	0.22	0.23	0.00	0.23	0.22	0.24	0.01
Gf L/dist cb – gf	0.82	0.65	0.62	0.71	0.02	0.93	0.92	0.96	0.02
Dist gf – expo	120	74	61	81	5.6	121	99	137	16.4
Dist gf – cauda	172	103	86	115	8.0	181	176	208	15.0
Gs L	281	189	179	196	5.9				
Gs aL	192	123	115	130	4.7				
Gs W	154	83	78	130	21.8				
Gs aL/tL	0.69	0.65	0.62	0.66	0.01				
Gs tL/W	1.82	2.15	1.48	2.41	0.4				
Capitulum vL	345	258	235	267	9.5	285	265	294	12.9
Capitulum dL	245	186	169	196	8.5	208	195	218	11.3
Rostrum L	140	104	96	109	4.2	118	108	120	5.6
Capitulum H	154	99	91	105	4.6	118	108	124	6.6
R L/c dL	0.57	0.55	0.54	0.57	0.01	0.55	0.55	0.59	0.02
R L/c vL	0.40	0.40	0.40	0.42	0.01	0.41	0.41	0.42	0.01
Gn bend depth	25	21	18	25	1.8	26	25	27	1.0
Chelicera L	424	301	273	309	11.0	337	309	355	20.4
Chelicera H	31	21	17	23	2.0	25	25	27	1.2
Chelicera L/H	13.84	14.47	13.05	15.93	1.0	12.97	12.60	14.10	0.7
Chelicera bs L	358	257	234	265	9.3	288	270	304	15.7
Chelicera claw L	66	44	39	45	1.8	49	39	51	5.4
Chel bs/claw L	5.41	5.89	5.67	6.03	0.1	5.98	5.70	6.88	0.5
P1 dorsal L	39	27	27	29	0.8	31	28	34	2.7
P2 dL	113	78	71	83	3.4	88	83	91	3.7
P3 dL	60	42	36	44	2.5	48	44	49	2.3
P4 dL	94	71	64	76	3.3	74	69	80	5.7
P5 dL	12	13	12	15	1.1	15	13	15	0.6
Palp total L	319	233	209	245	9.5	255	240	268	12.2
P4 vL	71	51	47	56	2.7	55	48	59	5.5
P4 vL to seta	39	32	29	37	2.3	33	28	37	4.0
P4 vL/L to seta	1.81	1.59	1.48	1.68	0.1	1.63	1.56	1.83	0.1
P1 rel L	0.12	0.12	0.12	0.13	0.00	0.12	0.11	0.13	0.01
P2 rel L	0.35	0.34	0.34	0.35	0.00	0.35	0.34	0.35	0.00
P3 rel L	0.19	0.18	0.17	0.19	0.01	0.19	0.18	0.19	0.00
P4 rel L	0.30	0.30	0.30	0.31	0.00	0.29	0.28	0.30	0.01
P5 rel L	0.04	0.06	0.05	0.06	0.00	0.06	0.05	0.06	0.00
P1 H	42	29	27	29	1.2	32	29	34	2.0
P2 H	61	40	37	43	1.7	45	42	49	3.2
P3 H	51	37	32	39	1.9	40	34	44	4.2
P4 H	32	22	20	25	1.6	25	23	27	1.5
P5 H	12	10	9	10	0.6	10	9	10	0.6
P1 L/H	0.94	1.00	0.92	1.00	0.04	1.00	0.88	1.00	0.1
P2 L/H	1.84	1.94	1.89	2.00	0.04	1.95	1.85	2.00	0.1
P3 L/H	1.17	1.14	1.10	1.24	0.04	1.20	1.11	1.29	0.1
P4 L/H	2.96	3.06	2.84	3.88	0.3	2.95	2.85	3.20	0.1
P5 L/H	1.00	1.43	1.25	1.71	0.2	1.50	1.38	1.71	0.1
P2/P4 L	1.19	1.12	1.10	1.15	0.02	1.19	1.14	1.23	0.04
P3/P4 L	0.64	0.59	0.55	0.63	0.03	0.63	0.62	0.68	0.03

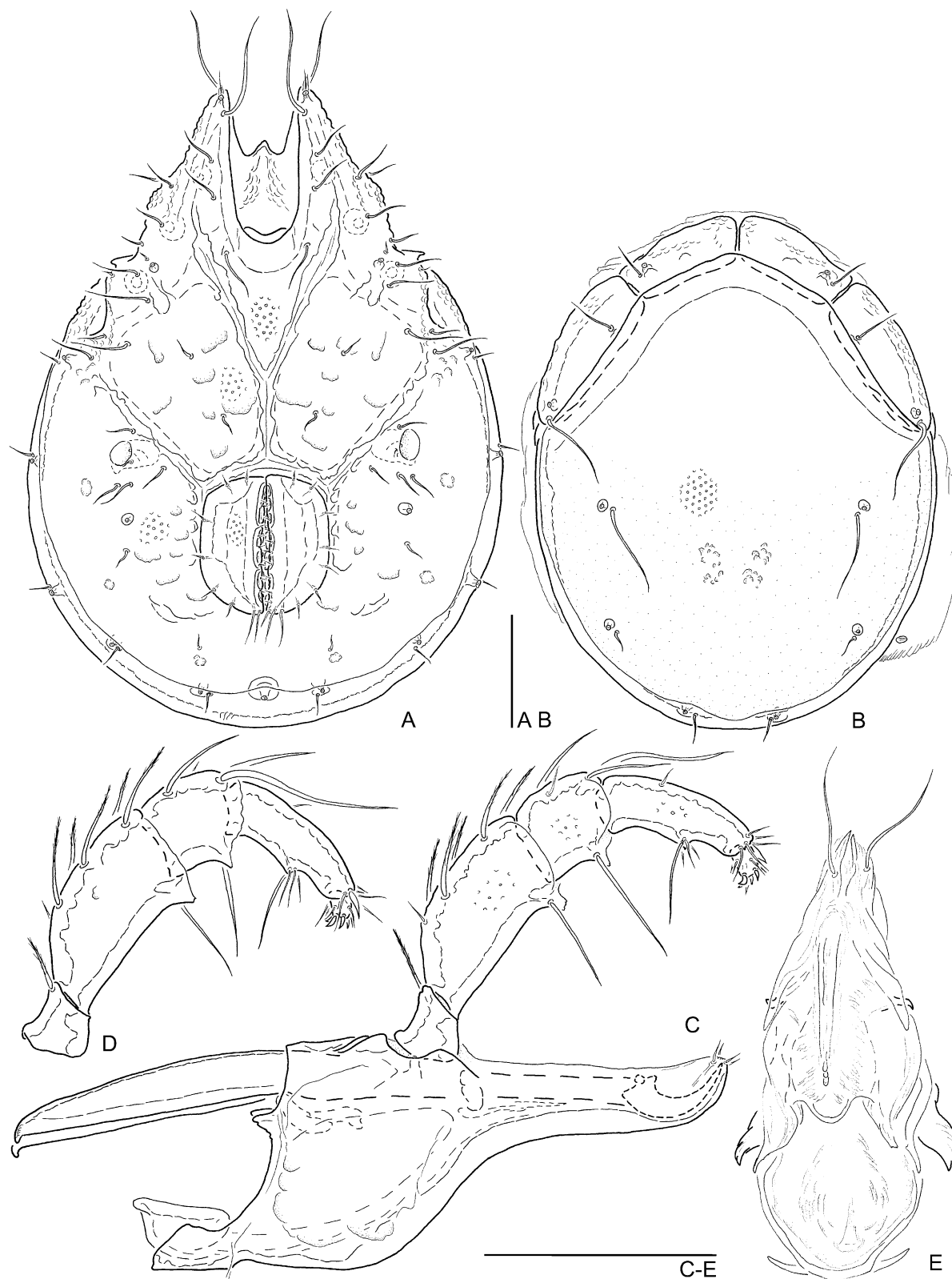


Figure 113. *Torrenticola tilaranensis*. A, B, holotype male (CR 24); C, D, male (CR 27); E, male (CR 26). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view; E, genital skeleton, anterior view. Scale bars = 100 µm.

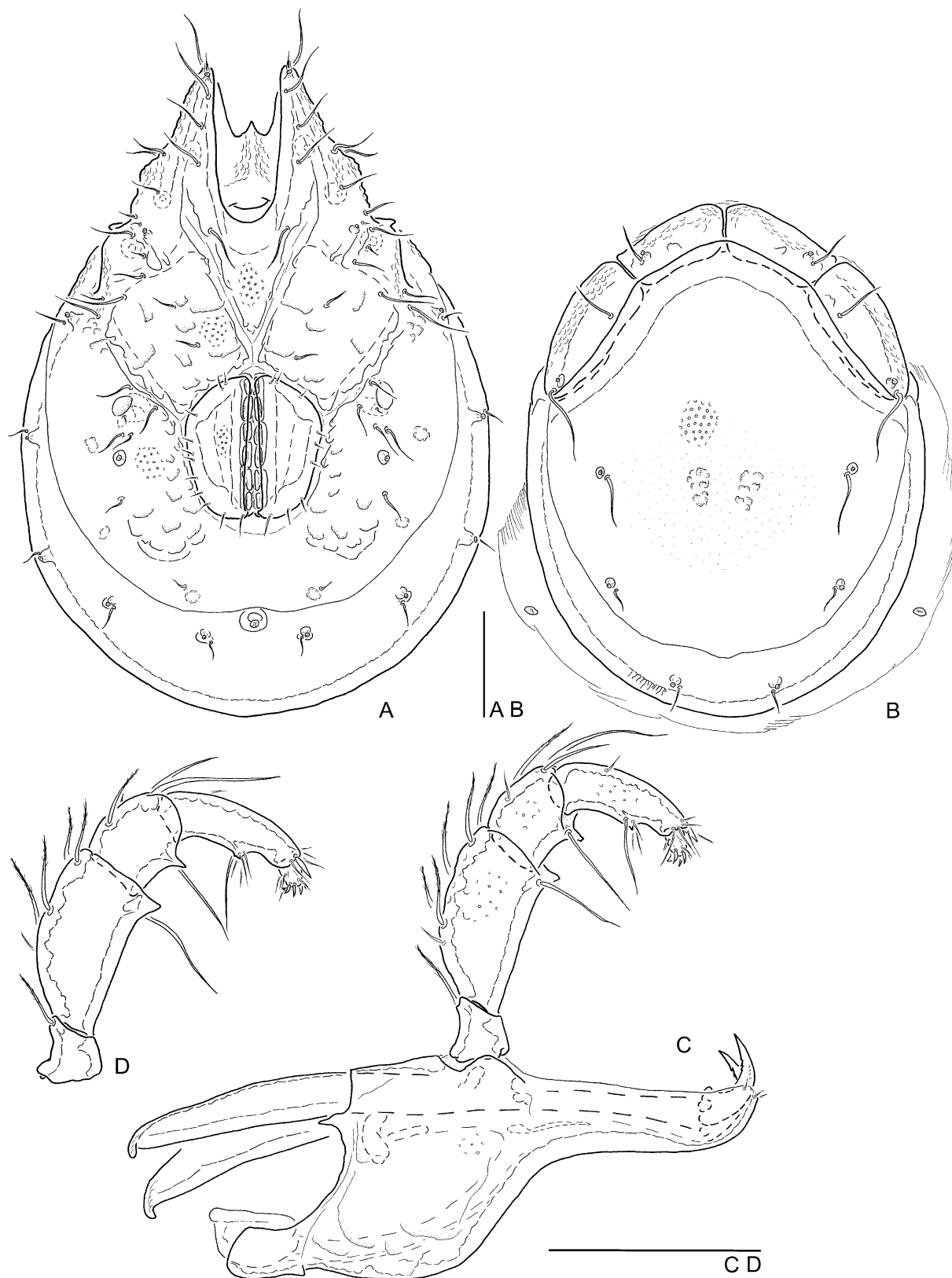


Figure 114. *Torrenticola tilaranensis*. A–D, paratype female (CR 223). A, idiosoma, ventral view; B, idiosoma, dorsal view; C, capitulum with right palp, lateral view; D, left palp, medial view. Scale bars = 100 µm.

of primary sclerotization (Fig. 113A); genital skeleton slender, cella proximalis relatively small, processus proximalia strong, brachia distalia indistinct, brachia proximalia strong, curved, parallel to longitudinal axis, carina anterior very high (Fig. 113E); capitulum basely high, relatively sharp bend towards long, slender and straight rostrum; chelicera slender (Fig. 113C, Table 53); palps typical, P4 relatively compact, distally of ventral setae clearly tapering (Fig. 113C, D, Table 53), P2- and P3-projections thin, fine serrate (Fig. 113C, D).

Female ($N=4$): Idiosoma similar to male; larger (L 598–672 μm); genital field more compact (L/W 1.04–1.05), anterior flatly rounded, antero-lateral and postero-lateral corners very smoothly rounded (Fig. 114A); posterior margin of Cx-IV further posterior than in male, postero-lateral to genital field; excretory pore slightly anterior to Vgl-2, glands clearly posterior to primary sclerotization (Fig. 114A); gnathosoma similar to male (Fig. 114C, D).

Discussion: *Torrenticola tilaranensis*, *T. carlbaderi* and *T. curtialpispis* form a group of very similar species, separated from most others by their very slender rostrum. Within these three species, the main difference lies in the shape of the male genital field, which is very short, compact apically bluntly truncated with more rounded antero-lateral corners in *T. tilaranensis*, apically +/- pointed in *T. carlbaderi* and subrectangular in *T. curtialpispis*.

HABITAT PREFERENCES OF THE COSTA RICAN SPECIES

Whereas in Europe many torrenticolid water mites have preferences for running waters at low and mid elevations (Di Sabatino *et al.*, 1992; Gerecke & Di Sabatino, 1996), the Costa Rican torrenticolid fauna reaches up to the highest mountain regions. Within the samples from Costa Rica, water mites of the genus *Torrenticola* were found at elevations between 10 m and 3500 m asl. While eight – mostly rare species – were bound to sample sites below 800 m asl in various regions, 11 species were only found above 2100 m asl in the Central Cordillera de Talamanca, and four high mountain species (*T. altifontana*, *T. baderi*, *T. chirripoensis* and *T. cumbrensis*) were even restricted to sample sites above 3000 m asl. In general many species show a relatively wide altitudinal range in their distribution, while several mainly high mountain species are restricted to certain elevations (Fig. 115).

The Costa Rican species of *Torrenticola* were found in all types of running waters (spring brooks to rivers and even waterfalls and hygropeletic areas), but with a clear bias towards small streams and streams. Only three species were found in rivers, and only *T. amala*

shows a clear preference for rivers. The species was found in 90% of all samples from this habitat type compared with 55% of all samples from streams, 21% from small streams and 14% from spring brooks. In total, about 70% of all species (27 species) were exclusively found in running waters (Table 54). About 20% of the Costa Rican *Torrenticola* species besides running waters were also found in springs (mainly rheocrenes and rheopsammocrenes, but with single occurrences even in rheohelocrenes and helocrenes). Hence, only a few species appear to be more or less strictly bound to spring habitats: *T. altifontana*, *T. amalgamada* and *T. fontinale* were exclusively found in springs (the first two found only in singletons), and *T. brevicoxalis* and *T. conipalpis* colonized mainly springs – these five species (in total 7% of all species) can be considered as crenobiotic (Table 54).

The preferred choriotope types seem to be mesolithal, lithophytal and akal in riffle zones; in addition, leaf packages and other macropelal in the current, as well as psammal, macrolithal and in some cases even micropelal, terrestrial vegetation or phytal were also colonized (see habitat data in the respective species descriptions).

ZOOGEOGRAPHICAL CONSIDERATIONS

DISTRIBUTION OF THE SPECIES IN COSTA RICA

The two species already known from Costa Rica before this study (*T. gennada* and *T. amala*) were found at many sample sites at low to mid elevations over the entire country. While these and several other Costa Rican species of *Torrenticola* are widespread over different habitats and regions throughout the country, others are restricted to single localities, bound to certain spring habitats or are only found in certain mountain regions (Tables 54, 55).

An analysis of the species distribution in Costa Rica is limited by the fact that of the 42 species found in total, 13 were only discovered at their respective type localities. Nevertheless, most species were found in the various mountain ranges of the country (Fig. 116). In the main, the northern Cordillera de Guanacaste and Cordillera de Tilarán (24 species in total, five exclusively) as well as the Cordillera de Talamanca in southern Costa Rica (28 species in total, 15 exclusively) support the highest diversity. In the Cordillera Central 14 species were found (none exclusively). The majority of the more abundant species were found in several of the Costa Rican mountain regions (Table 55), whereas some species are restricted in their distribution to certain mountain ranges. By far the highest percentage of endemic species (58%) was found in the Cordillera de Talamanca, with the most discrete fauna in the Chirripó National Park. As far as known until now, 11 endemic species are only found

Table 54. Distribution of the 42 Costa Rican species of *Torrenticola* in different habitats, given as specimens/localities (in some species the number of localities differs from the number of sample sites given in the species description, as in this table subsamples are regarded separately). Single findings in a waterfall (four specimens of *T. costaricense*), a lake (two specimens of *T. delgada*), a lake outflow and a dry river bed (one specimen each of the *conirostris/rala*- complex) are not listed. The specimens of the *conirostris/rala*-complex are given as *co/ra*-complex

	running waters					springs			
	spring brooks	small streams	streams	rivers	hygro- petric	rheo- crene	rheo- heloc.	rheo- psammoc.	helo- crene
<i>amala</i>	3/2	183/28	277/27	52/13	2/1				
<i>semicolor</i>	1/1	35/7	54/9		1/1				
<i>gennada</i>	15/2	123/14	55/11						
<i>rubella</i>	2/1	19/9	45/9						
<i>harpagophora</i>	2/2	1/1							
<i>chirriipoensis</i>	22/1	82/5							
<i>rapidensis</i>		34/5	14/3						
<i>delgada</i>		39/2	1/1						
<i>guanacastensis</i>		16/6	13/6	1/1					
<i>collina</i>		9/3	2/1						
<i>fastigata</i>		8/3	2/1						
<i>dispersa</i>		4/4							
<i>australis</i>		7/1							
<i>torpebrazo</i>		6/2							
<i>flexirostris</i>		3/2							
<i>esferica</i>		1/1							
<i>monticola</i>		2/2							
<i>baderi</i>		1/1							
<i>cumbrensis</i>		1/1							
<i>adunca</i>		1/1							
<i>elhachensis</i>		1/1							
<i>chicacoxalis</i>		1/1							
<i>cortobrazo</i>		1/1							
<i>alticola</i>			7/4						
<i>corta</i>			1/1						
<i>levicoxalis</i>			1/1						
<i>esquinada</i>			1/1						
<i>tilaranensis</i>	26/2	132/13				1/1			
<i>obliquipalpis</i>	3/2	6/3	7/4		1/1	1/1			
<i>pervagata</i>	1/1	153/16	46/5		5/3	3/1		1/1	
<i>alargada</i>	20/3	38/11	1/1		2/1	2/1			
<i>alexandra</i>	6/3	15/6				8/3			
<i>menudopalpis</i>	2/1	5/3				4/1			
<i>ratoncitoi</i>	19/1	11/10	1/1			2/2		1/1	
<i>co/ra-complex</i>	10/9	547/74	227/30	4/4	1/1	5/2		11/2	
<i>costaricense</i>	80/10	359/34	12/8		6/1	44/4	23/1	34/7	9/2
<i>ambigua</i>	2/1	12/5					1/1	17/6	
<i>conopalpis</i>		1/1				2/1		2/1	
<i>brevicoxalis</i>	1/1					2/1			
<i>fontinale</i>						1/1		17/2	
<i>altifontana</i>						1/1			
<i>amalgamada</i>								1/1	

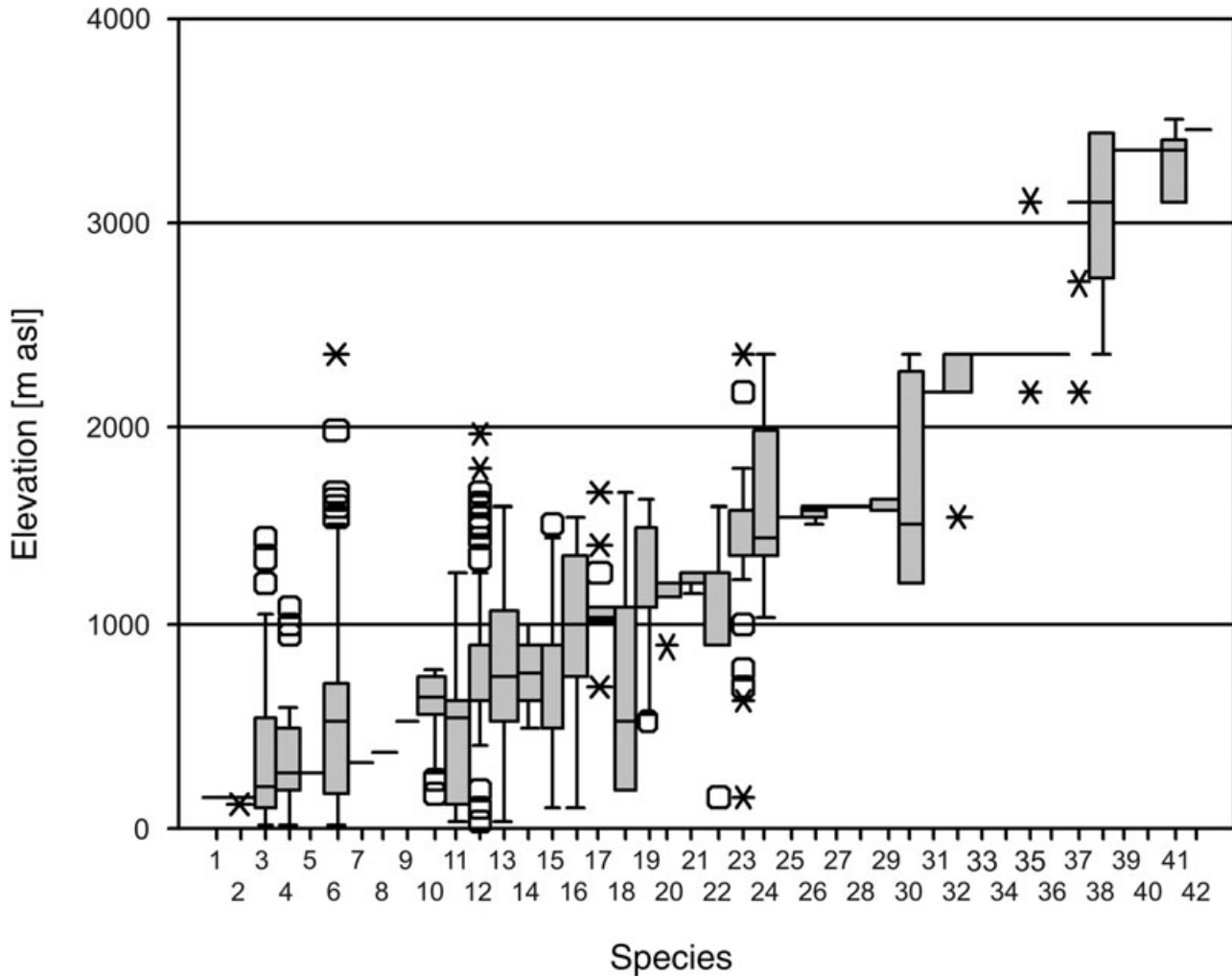


Figure 115. Altitudinal distribution of the sample sites of all Costa Rican species of *Torrenticola*. In the 'box and whisker-plots', the grey 'box' represents the interquartile range, i.e. all values between the 25 and 75 percentiles; the black line marks the median. The vertical lines ('whiskers') connected to the box to the top and the bottom cover values up to 1.5-fold the interquartile range. Values beyond this range (runaways) are represented by circles; values beyond three-fold of the interquartile range (extreme values) are represented by stars. Findings were weighted by the number of specimens prior to the analysis (the median in the boxplots can therefore be shifted to the edge of the interquartile ranges). The numbers represent the species: 1 – *T. amalgamada* (N = 1), 2 – *T. fontinale* (N = 18), 3 – *T. amala* (N = 517), 4 – *T. gennada* (N = 193), 5 – *T. cortobrazo* (N = 1), 6 – *conirostris/rala-complex* (N = 807), 7 – *T. esquinada* (N = 1), 8 – *T. elhachensis* (N = 1), 9 – *T. flexirostris* (N = 3), 10 – *T. guanacastensis* (N = 30), 11 – *T. alexandra* (N = 29), 12 – *T. costaricense* (N = 550), 13 – *T. alargada* (N = 63), 14 – *T. harpagophora* (N = 4), 15 – *T. pervagata* (N = 209), 16 – *T. semicolor* (N = 91), 17 – *T. tilaranensis* (N = 159), 18 – *T. ambigua* (N = 32), 19 – *T. ratoncitoi* (N = 34), 20 – *T. conipalpis* (N = 5), 21 – *T. brevicoxalis* (N = 3), 22 – *T. menudopalpis* (N = 11), 23 – *T. rubella* (N = 66), 24 – *T. obliquipalpis* (N = 18), 25 – *T. levicoxalis* (N = 1), 26 – *T. dispersa* (N = 4), 27 – *T. adunca* (N = 1), 28 – *T. australis* (N = 7), 29 – *T. torpebrazo* (N = 6), 30 – *T. collina* (N = 11), 31 – *T. corta* (N = 1), 32 – *T. rapidensis* (N = 48), 33 – *T. esferica* (N = 1), 34 – *T. chicacoxalis* (N = 1), 35 – *T. fastigata* (N = 9), 36 – *T. monticola* (N = 2), 37 – *T. delgada* (N = 42), 38 – *T. alticola* (N = 7), 39 – *T. baderi* (N = 1), 40 – *T. cumbrensis* (N = 1), 41 – *T. chirripoensis* (N = 104), 42 – *T. altifontana* (N = 1).

in the highest regions of the central Cordillera de Talamanca: *T. alticola*, *T. altifontana*, *T. baderi*, *T. chicacoxalis*, *T. chirripoensis*, *T. corta*, *T. cumbrensis*, *T. delgada*, *T. esferica*, *T. fastigata* and *T. monticola*.

By contrast, the torrenticolid fauna of the Pacific as well as the Caribbean lowland regions is less diverse (Fig. 116) and less independent than the fauna of the mountain regions (Table 55). In streams and springs

Table 55. Distribution of the Costa Rican species of the genus *Torrenticola* in different regions of the country, given as specimens/sample sites. For differences in the number of sample sites referring to the species descriptions and abbreviations, see Table 54

species total	specimens/ sample sites total	Sta. Elena	Nicoya	central Pacific		Osa	Cordillera de Guanacaste	Cordillera de Tilarán	Cordillera Central	Talamanca, northern- central	Talamanca, southern	Talamanca, Caribbean slope	Cordillera Central, Caribbean slope	Caribbean lowland	northern lowland
				lowland	highland										
2	2	4	8	20	19	14	24	12	7	8	3	5			
col-ra-complex	807/124	45/10	15/4	28/4	87/14	469/45	31/15	28/8	23/6	2/2	1/1	42/6	6/3	30/6	
menudopalpis	11/5	2/1				4/1	4/2	1/1							
gennada	193/27		4/1	4/1	61/5	28/8	34/4	11/2		2/1	30/4	21/1	2/1		
amala	517/71		1/1	169/12	104/13	7/4	135/11	51/10	44/5	22/2	8/2	45/11	24/4	33/6	
pervagata	209/27		2/2	9/1					8/3			41/2			
amalgamada	1/1				1/1										
fontinale	18/3				18/3										
elhachensis	1/1					1/1									
flexirostris	3/2					3/2									
brevicoxalis	3/2					3/2									
cortobrazo	1/1					1/1									
guanacastensis	30/13					27/10		1/1				2/2			
esquinada	1/1											1/1			
alexandra	29/12					17/6	1/1	1/1			3/1		7/3		
costaricense	550/68					274/28	183/16	27/11	4/2	4/2	52/8		6/1		
semicolor	91/18				1/1	29/5	12/3	20/6	1/1	26/1	2/1				
harpagophora	4/4					2/2	1/1					1/1			
ratoncito	34/15					6/6	7/6	20/2	1/1						
alargada	63/17					10/7	28/6	9/1		2/1		4/1		10/1	
conopalpis	5/3					2/1	3/2								
tilaranensis	159/16					2/2	155/13	2/1	2/2	2/2	13/4				
ambigua	32/13						14/4	1/1							
levicoxalis	1/1						1/1								
torpebrazo	6/2						2/1		4/1						
dispersa	4/4						1/1		1/1	2/2					
obliquipalpis	18/11					1/1	6/4	2/2	4/2	5/2					
rubella	66/19				2/1	2/1	12/6	14/5	5/3	31/3					
rapidensis	48/8								48/8						
collina	11/4								11/4						
chirripoensis	104/6								104/6						
delgada	42/4								42/4						
fastigata	9/4								9/4						
alticola	7/4								7/4						
monticola	2/2								2/2						
esferica	1/1								1/1						
corta	1/1								1/1						
altifontana	1/1								1/1						
baderi	1/1								1/1						
cumbrensis	1/1								1/1						
chicacoxalis	1/1								1/1						
australis	7/1								7/1						
adunca	1/1								1/1						

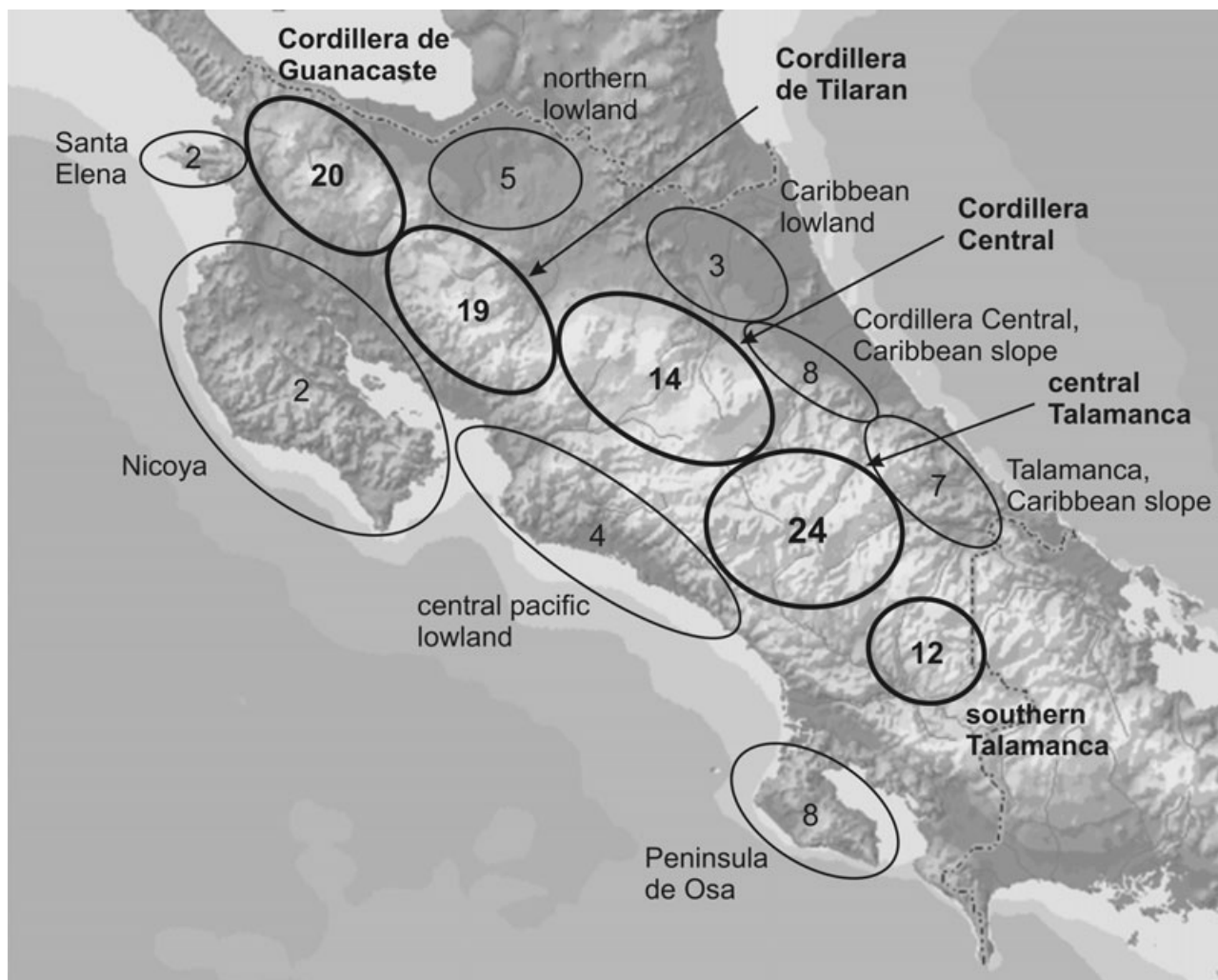


Figure 116. Map of diversity in different regions. The numbers in the circles give the total number of *Torrenticola* species found in the respective region. In the coastal regions at the Pacific as well as the Caribbean coast only relatively few species were found, whereas the central mountain regions show a much higher diversity. The highest diversity (24 species) is found in the central Talamanca.

of the Pacific lowland (Peninsula de Santa Elena, Peninsula de Nicoya, central Pacific coast and Peninsula de Osa), nine species were found in total. Within the species found along the Pacific coast, two endemics – *T. amalgamada* and *T. fontinale* – are restricted to spring habitats in the rainforest on the Peninsula de Osa. These two endemic species possibly are relicts of the fauna of the Nicoya Complex, which is probably the most ancient part of southern Central America (Savage *et al.*, 2005). The other species of the Pacific lowland were also found at mid elevations in several mountain regions and the Caribbean lowland (Table 55). On the Caribbean slope of the Cordillera Central and Cordillera de Talamanca as well as the Central Caribbean and northern lowland, 12 species were found in total – one of these (*T. esquinada*) was

exclusively found in a stream in the Caribbean foothills of the Cordillera Central. The other species of this region were also found in the mountain regions and/or the Pacific lowland (Table 55, Fig. 116).

ZOOGEOGRAPHICAL CHARACTERISTICS OF THE COSTA RICAN TORRENTICOLID FAUNA

At the present state of knowledge, a general zoogeographical analysis of the Central American or even Neotropical torrenticolid fauna is not possible. The poor state of knowledge on the torrenticolid fauna of Central America is best documented by the fact that 88% of the species found in the present study in Costa Rica (36 out of 42 species) are new to science; only two had previously been described from Costa Rica (Cook,

1980). At present the Costa Rican torrenticolid fauna has only three species (7% of the total species number) in common with other neotropical regions – all three with Guatemala (one also with Mexico): *T. brevicoxalis*, described from a stream in Guatemala was found in a rheocene and a spring brook in northern Costa Rica; *T. semicolor*, described from a small stream in Guatemala, and *T. obliquipalpis*, known from streams in Guatemala and Mexico, were found in mountain streams in various regions of Costa Rica. *Torrenticola rala*, described from Mexico and Costa Rica (Cook, 1980), could not be confirmed in the present study, due to uncertainties in the systematic state of the *conirostris/rala*-complex (see respective subsection for discussion). With regard to the complete water mite fauna, Costa Rica has 15% of its species in common with southern Mexico and 5% with Guatemala (Goldschmidt, 2002). These data mainly reflect the very poor knowledge on the water mite fauna of most regions in Central America. Until detailed studies on the water mite fauna of other regions in Central America are available, no statement is possible on the uniqueness of the Costa Rican torrenticolid fauna.

DIVERSITY OF THE GENUS *TORRENTICOLA* IN THE NEOTROPIC

In general the knowledge on the neotropical torrenticolid fauna is very poor – Costa Rica is the only region in Central America studied in detail up to now. Due to the very diverse geography of the country and its central position on the Central American land-bridge a very rich freshwater fauna can be expected in Costa Rica (Umaña, Haberyan & Horn, 1999; Goldschmidt, 2001). However, the position of Costa Rica as ‘the diversity hot spot’ of the genus (with 42 known species) has also to be regarded in relation to the great lack of knowledge on the fauna of other neotropical regions. Apart from Costa Rica, six *Torrenticola* species are known from Mexico (Cook, 1980; Cramer, 1988, 1992) and 12 from Guatemala (Böttger, 1980, 1984; K.O. Viets, 1977/78 Teil I, II). These data (from both countries) are based on the investigation of single streams only. In South America, the genus might really be less diverse, as just three species have been described from Columbia (Lundblad, 1953) – one of these also from Argentina (Cook, 1980; Fernández, 1991, 2003) – and no records are available from the well-documented fauna of Chile (Cook, 1988). However, our still poor knowledge on large parts of the South American water mite fauna severely hampers any large-scale analyses. At present it seems likely that torrenticolid water mites have not reached the Antilles. During intensive sampling on Cuba (T. Goldschmidt, unpubl. data) no torrenticolids have been

found (not even in stream types that in Costa Rica would have carried a rich torrenticolid fauna).

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