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A New Species of *Elpidium* (Crustacea, Ostracoda) from Bromeliad and Non-bromeliad Phytotelmata in the Northeast of Argentina

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A new species of the ostracod genus *Elpidium* (Timiriaseviinae), a group almost exclusively known from Neotropical bromeliad phytotelmata, is here described and illustrated from the northeast of Argentina. *Elpidium chacoense* n. sp. represents the first record of the genus in this country and brings the total of described *Elpidium* species to 19. In view of the recently increased knowledge on the distribution of the species in this Neotropical genus, we discuss potential drivers of speciation that might have led to the high (endemic) diversity of the group: allopatry in bromeliad islands, sexual selection and putative co-evolution between ostracod and bromeliad species. We also point out the biogeographical relevance of the present records, which are amongst the most southern of the genus. Finally, also the fact that species of *Elpidium* can now also be found in non-bromeliad phytotelmata is of relevance.

Key words: Non-marine Ostracoda, New species, Neotropical Cytheridae, Phytotelmata, Argentina

BACKGROUND

Ostracoda are small, bivalved crustaceans which can be found in all types of water bodies, such as marine and non-marine, permanent or temporary, lotic or lentic, surface or groundwater. Some species even occur in (semi-) terrestrial environments such as leaf litter in tropical forests (Martens and Horne 2009). There are presently *ca* 2330 subjective species of non-marine ostracods in 270 genera. (Martens et al. 2008; Meisch et al. 2019). The family Limnocytheridae Sars, 1925 belongs to the superfamily Cytheroidea Baird, 1850 and the Timiriaseviinae Mandelstam, 1960 is one of the most speciose freshwater subfamilies in this superfamily. The genus *Elpidium* F. Müller, 1880 now comprises 19 species, including the species presently described. These occur (almost) exclusively in bromeliad phytotelmata (phyton = plant, thelma = pond) of the Neotropical region (Table 1). *Elpidium bromeliarum* F. Müller, 1880 was the first species described in this genus, thus constituting the type species, and was then found in bromeliad tanks from Southern Brazil (F. Müller 1880 1881).

Bromeliads are amongst the most diverse and most studied phytotelmata in the Americas. Some species are terrestrial and others are epiphytes. Ostracods of the genus *Elpidium* appear largely restricted to the water-filled tanks of bromeliad plants, which occur in the Central and the Eastern part of South America. Some bromeliads have been found in a restricted area of West Africa, but these African species do not have tanks (summarized from Benzing 2000).

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Another type of phytotelmata, far less known, but with a similar morphology to that of the bromeliads, is the Apiaceae (Saniculoideae) of the genus *Eryngium*. While the genus *Eryngium* is represented by more than 250 species and is distributed over all continents (Calviño et al. 2008) except Antarctica, only a few species retain water in their axils (tanks). The geographical distribution of both bromeliads and apiaceous plants overlaps in large parts of the Americas. However, the only records of the fauna living in the axils of *Eryngium* come from a border region of Brazil and Argentina (Campos 2010, Suppl. mater.). The present study describes and illustrates a new species, *Elpidium chacoense* sp. nov. thus also reporting on a new host plant as habitat of an *Elpidium* species, and expanding the geographical distribution of the genus to Argentina.

MATERIALS AND METHODS

Sampling was conducted in three areas in the subtropical region of Argentina: (1) Iguazú National Park (25°38'S, 54°20'W), Misiones province in 2006; (2) Chaco National Park, Chaco province (26°43'S, 59°30'W) and (3) El Toba stream (29°24'S, 60°05'W), Vera Department, Santa Fe province, in 2009 (Fig. 1).

Iguazú National Park is part of the Paranense forest ecoregion (Dinerstein et al. 1995) with a topography and drainage pattern dominated by a basaltic plateau. The annual rainfall varies from 1500 to 2000 mm, the dry season occurs in winter and abundant precipitations are recorded in summer. The mean annual temperature varies between 16 and 22°C. The dominant vegetation is subtropical forest (APN 2009).

Chaco National Park is part of the humid "Chaco" ecoregion (Dinerstein et al. 1995), a very gently sloping area dominated by depressed environments. It has a warm subtropical climate with summer rainfalls from 750 to 1300 mm. The mean annual temperature varies between 11 and 30°C. The forest consists of 15 meters high trees, with the bottom layer covered by bromeliads (APN 2009).

The El Toba stream, finally, is located in the Espinal biogeographic province, characterized by low xeric forest, and grass steppe. The climate is warm and humid, with rainfall ranging from 340 to 1170 mm and mean annual temperatures between 15 and 20°C (Cabrera and Willink1980).

Phytotelmata were sampled by extracting the water in the tanks with a pipette attached to a pump. After first extraction, plants were flushed twice with clean tap water, and the contents extracted with a pipette after each washing.

Ostracods were sorted under a binocular microscope. Selected specimens were dissected with soft parts in glycerine in sealed slides and valves stored dry in micropaleontological slides. Drawings of soft parts were made with a *camera lucida* attached to a compound microscope (Olympus, BX51at RBINS, Brussels). Valves were illustrated and measured using Scanning Electron Microscopy (SEM; Fei Quanta 200 ESEM, - Royal Belgian Institute of Natural Sciences, Brussels, Belgium). The nomenclature of the limb

Table 1. Present known and described species of *Elpidium* in South and Central America, with cited countries

1. *E. bromeliarum* O.F. Müller, 1880: Brazil, ?Jamaica
2. *E. chacoense* sp. nov. (present paper): Argentina
3. *E. herberti* Pereira et al. 2019: Jamaica
4. *E. higutiae* Pereira et al. 2023: Brazil
5. *E. cordiforme* Pereira et al. 2023: Brazil
6. *E. eriocaularum* Pereira et al. 2023 : Brazil
7. *E. inaequivalve* Danielopol, 1980: Cuba (in Colin and Danielopol 1980)
8. *E. laesslei* (Tressler, 1956): Jamaica, Cuba
9. *E. littlei* Pereira et al. 2019: Jamaica
10. *E. litoreum* Pereira et al. 2022: Brazil
11. *E. maricaoensis* (Tressler, 1941): Puerto Rico, ?Florida
12. *E. martensi* Danielopol et al. 2014: Jamaica
13. *E. merendonense* Pinto and Jocqué, 2013: Honduras
14. *E. oxumae* Pereira et al. 2023: Brazil
15. *E. pincinguabaense* Pereira et al. 2023 : Brazil
16. *E. pintoi* Danielopol 1981: Cuba (in Colin and Danielopol 1981)
17. *E. purperae* Danielopol 1981: Cuba (in Colin and Danielopol 1981)
18. *E. quadrata* Pereira et al. 2023 : Brazil
19. *E. wolfi* Pereira et al. 2019: Jamaica

chaetotaxy follows Broodbakker and Danielopol (1982), of the second antenna the revised model proposed by Martens (1987), and of the second and third thoracopods Meisch's nomenclature (Meisch 2000). Higher taxonomy of the Ostracoda follows the synopsis by Horne et al. (2002) and Meisch et al. (2019).

Type material was deposited in the Carcinological Collection of the Museo of La Plata, La Plata (Argentina) (Cr-MLP numbers).

RESULTS

TAXONOMIC

Class Ostracoda Latreille, 1802
Subclass Podocopa Sars, 1866
Order Podocopida Sars, 1866
Suborder Cytherocopina Sars, 1866
Superfamily Cytheroidea Baird, 1850
Family Limnocytheridae Sars, 1925

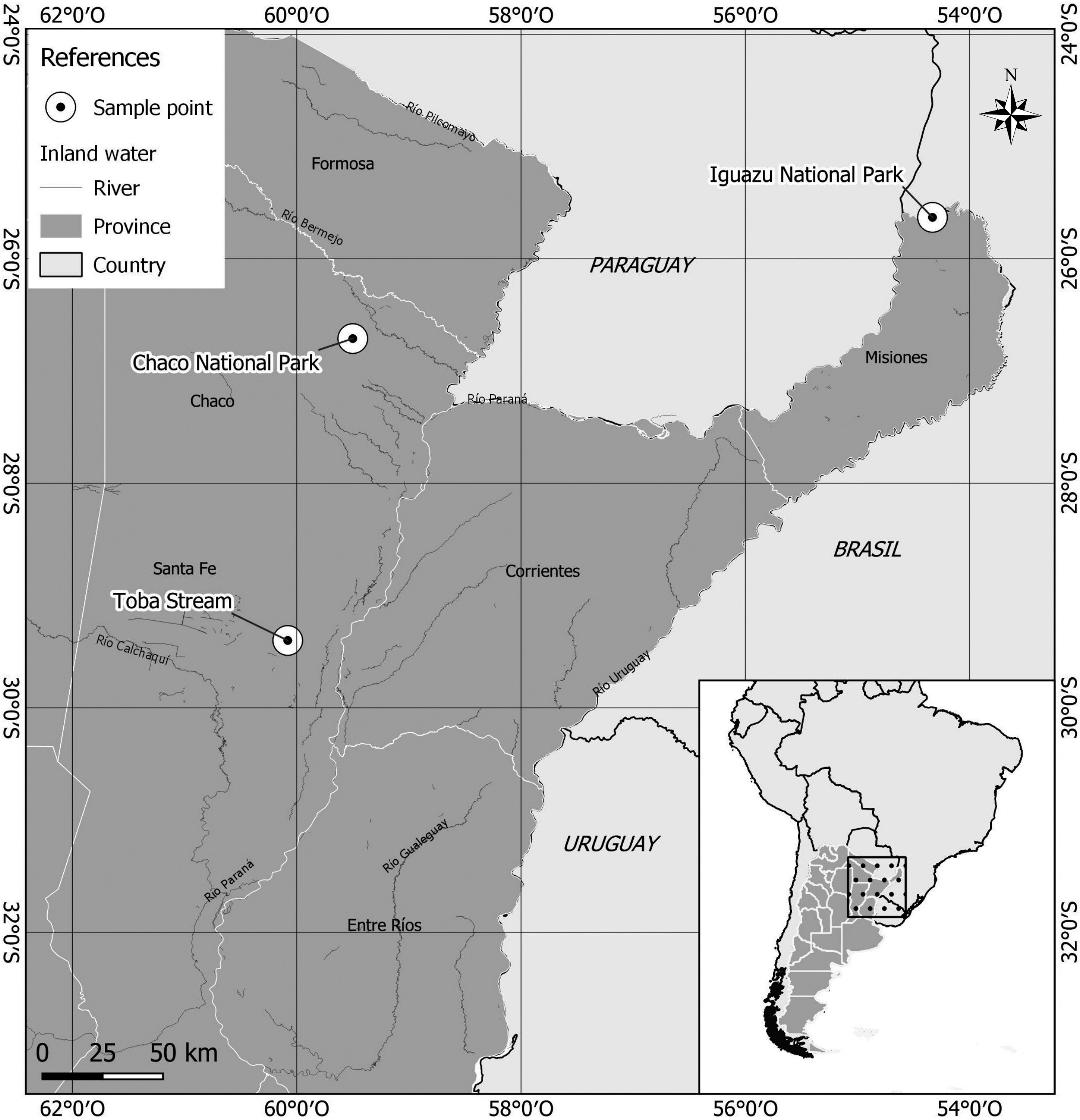

Fig. 1. Map of the type locality of *Elpidium chacoense* sp. nov. in Chaco province, Argentina.

Subfamily Timiriaseviinae Mandelstam, 1960

Genus *Elpidium* F. Müller, 1880

Type species (by original designation): *Elpidium bromeliarum* F. Müller, 1880.

Diagnosis: see Pereira et al. (2022 2023).

Other species: See table 1.

Elpidium chacoense sp. nov. Díaz, Campos and Martens

(Figs. 2–4)
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Diagnosis: medium-sized *Elpidium* (L > 0.7 mm) with slightly dimorphic carapace. Males shorter than females. Females with posterior part expanded into a brood pouch. Surface of carapace smooth, set with few setae, colour light brown covered with dark brown patches. Carapace broad, larger in width than in height, ventral side flat with a subtle ventro-lateral ridge on each valve, at the edge of the flat area (outer lists, arrowed in Fig. 3F). In dorsal and ventral views, carapace relatively elongated with maximum width at mid-length.

In lateral view, carapace elongated with LV overlapping RV along both anterior and posterior margins. Selvage on RV well-developed, especially anterior and posterior margins. Hinge of protodont type; ventral rim well-developed, dorsal rim short.

A1 with 5 segments, the first bearing a small sub-apical tiny seta on the ventral margin. A2 dimorphic, terminal segment of male with one strongly serrated claw and two more weakly serrated claws; female with three smooth claws. Mandibular coxa with 8 strong cuspate teeth. Second and third maxillular endites with two setae and two spatula-like claws each; palp reduced, not segmented, tapering, with two apical setae. Hp with DL triangular, with a pointed tip and with a large, broad and curved finger-like projection at the base of the internal margin, long ds with swollen base present near the basis of the DL. LR present and shaped in a clasping process. Copulatory Process broad, hook-like, distal glans and ejaculatory duct undifferentiated.

Type material: *Holotype*: a male (MLP-Cr 27336) with valves stored dry in micropaleontological slides for scanning electron microscopy and with soft parts dissected in glycerine in a sealed slide. Allotype: a female (MLP-Cr 26337) dissected and stored like the holotype. Paratypes: 10 females and 4 males (MLP-Cr 26338) dissected and stored like the holotype.

Type locality: Tank-bromeliads from (*Aechmea distictchanta* Lem.) from Chaco National Park, Chaco province, Argentina. Geographical coordinates: (26°43'S, 59°30'W). Material collected on 09.10.2009 by Raúl E. Campos.

Derivation of name: The species is named after Chaco province in Northeastern Argentina from where the specimens here described were collected.

Description of the male: CpL (not figured): medium-sized; oval-shaped, dorsal margin rounded with greatest height at mid-length; posterior margin rounded, ventral margin straight, anterior margin bluntly pointed; surface smooth with sparse setae, natural colour light brown with dark spots. pigmented naupliar eye present; carapace less pigmented at the eye region. CpD and CpV (Fig. 2C) with anterior margin slightly more pointed than posterior margin, with maximum width at mid-length, LV overlapping RV along all margins, ventral area flat.

RVe (Fig. 2A) with posterior margin rounded; antero-ventrally with a slightly developed flange, ventral margin slightly concave, not straight.

LVe (Fig. 2B) slightly longer than RVe and of similar shape. Inner morphology of both valves as in the female (see below).

Antennula: as in the female (see below; not illustrated).

Antenna (Fig. 4B): Protopodite two-segmented, endopodite three-segmented. First segment of protopodite (coxa) relatively short and ring-shaped, second one (basis) long, wide and curved. Exoopodite consisting of a long, two-segmented spinneret seta. First segment of endopodite relatively short, bearing a long ventro-apical seta. Second segment long and narrow, dorsally with two sub-apical setae, ventro-medially with a short seta and an aesthetasc (Y), and apically with two sub-equal setae. Third (terminal) segment small, with three claws, ventral one strongly serrated and the other two slender. Hyaline organ absent.

Mandibula and Maxillula: As in the female (see below, not illustrated).

First thoracopod (T1- Fig. 4F): Four-segmented; basis with a pappose dorsal seta, a medium-sized medio-ventral seta and two apical stout setae; second segment quite long, with a strong ventro-apical seta; third segment without setae; terminal segment with an apical claw and a small vestigial seta.

Second thoracopod (T2 - Fig. 4H): Similar to the preceding thoracic limb; basis with a long medio-proximal dorsal seta, a medium-sized medio-ventral seta and a long ventro-apical seta; second segment long, with a strong ventro-apical seta longer than the tip of following segment; third segment devoid of setae; terminal segment with an apical claw and a small vestigial seta.

Third thoracopod (T3 - Fig. 4G): Basis with a

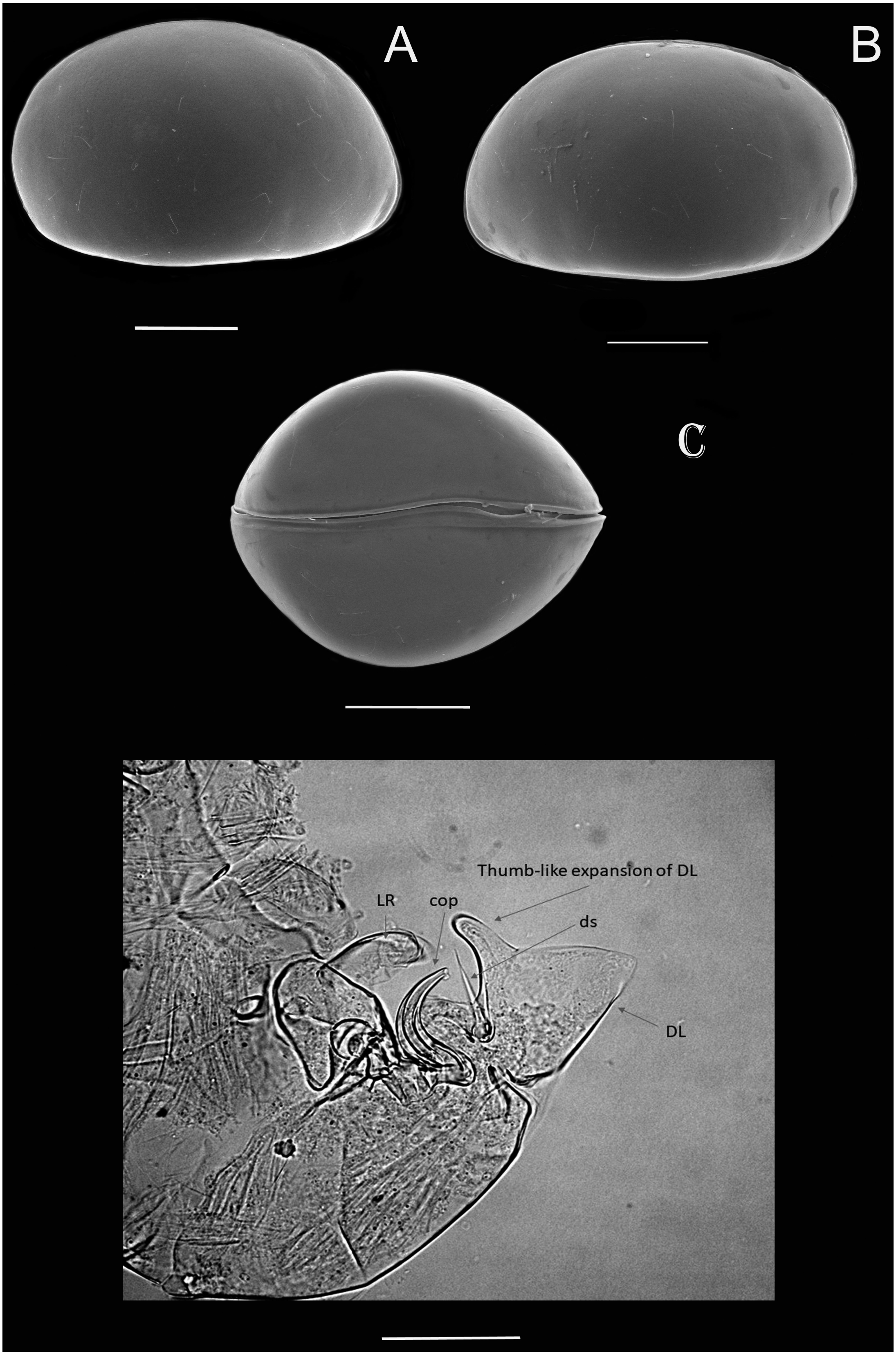

Fig. 2. Valves, Cp and Hp of *Elpidium chacoense* sp. nov. Male (Holotype MLP-Cr 27336): A, RVe; B, LVe; C, CpV; D, Hemipenis. Scale bars: A–C = 250 µm; D = 100 µm.

medio-proximal dorsal seta, a medio-ventral seta and a ventro-apical seta; second segment quite long, with a plumose ventro-apical seta; third segment devoid of setae; terminal segment with a very long and slim apical claw.

Hemipenis (Hp - Figs. 3D, 4I): Consisting of a major muscular body, a triangular distal lobe (DL), with a bluntly pointed tip and with a finger-like projection at the base of the ventral margin, dorsal seta present near the basis of the distal lobe; lower ramus (LR) present and shaped as a clasping process. Copulatory process (cop) broad, hook-like, distal glans and ejaculatory duct undifferentiated.

Description of female: Carapace (CpD Fig. 3E, CpV Fig. 3F): Similar in shape as in the male, but slightly larger and displaying a more pointed ventral margin, expanded in the posterior half forming the brood pouch in which eggs are stored and partially developed.

Right valve (RVe - Fig. 3A, RVi Figs 3D, G, H, I, J): moderately elongated; anteriorand posterior margins rounded, anterior margin produced towards the ventral side; ventral margin nearly straight; dorsal margin arched, with greatest height slightly posterior to the middle; calcified inner lamella narrow; well-developed selvage strongly inwardly displaced along the antero-ventral and to lesser extend also along postero-ventral margin, marginally inwardly displaced along ventral margin, postero-ventral selvage set with a row of (calcified?) setae. A row of four elongated central muscle scars, situated slightly in front of the middle of the valve (creating brood space in the posterior half of the Cp) (Fig. 3G).

Left Valve (LVe - Fig. 3B, LVi - Fig. 3C) with shape similar but slightly longer than RV; marginal valve structures comparable as in the RV but with also postero-ventral selvage marginal.

Antennula (A1 - Fig. 4A) six-segmented. First segment large with an apical expansion, carrying a tuft of tiny pseudochaetae. Second segment with a large and long ventral seta. Third segment smaller, with a short dorso-apical seta. Fourth and fifth segments partly fused. Fourth segment with two dorso-apical setae (one reaching tip of fifth segment, one half that length) and one short ventro-apical seta. Fifth segment with a group of three unequal dorso-apical setae and one ventro-apical seta. Sixth (terminal) segment with two long setae, one short setae and a short aesthetasc (Ya).

Antenna (A2 - Fig. 4C) with general structure as in the male. Second endopodal segment with one sub-apical seta and ventrally with one large claw. Terminal segment with 3 claws, all of them smooth.

Mandibula (Md - Fig. 4D): Coxal endite with eight strong cuspate teeth and two setae on inner edge and one long serrate seta on outer edge (near the articulation with the palp), with three interdental setae. Externally with an exopodite (respiratory plate) with three long rays and two reflexed setae. Palp four-segmented, with basis and three endopodal segments. Basis set with two large, plumose and subequal setae, and a respiratory plate (the exopodite) with three long and broad setae and one much shorter seta, all set with setules. First endopodal segment with two setae, one long, plumose and one short. Second endopodal segment with five setae, three long ones and two thin ones, the latter subequal in length. Third endopodal (terminal) segment very small, sub-quadrate, with three apical setae, two long of similar length and one shorter than the other two.

Maxillula (Mx1 - Fig. 4E): large respiratory plate, an unsegmented palp and three endites. First endite with three setae, the next two endites with three setae each and two claws. Palp tapering, with two apical setae. Respiratory plate well-developed, with 16 long rays.

T1-T3: as in the male (not illustrated, see above).

Abdomen (Fig. 4J): Genital operculum rounded, internally connected by tubes and trabecula; caudal ramus consisting of one smoothly rounded lobe, with 2 serrate seta closely placed together and one larger serrate seta displaced towards the external side.

Measurements: *Holotype*: Male: LV: L = 764 µm, H = 447 µm; RV: L = 760 µm, H = 446 µm.

Allotype Female: LV: L = 780 µm, H = 432 µm; RV: L = 767 µm, H = 400 µm; CpW = 590 µm, CpL = 800 µm, CpH = 423 µm.

Paratypes: Females: RV: L = 721–760 µm (*n* = 8, 742 ± 21.10 µm); H = 447–554 µm (*n* = 8, 493 ± 32.86 µm). LV: L = 730–764 µm (*n* = 8, 747 ± 22.52 µm); H = 500–580 µm (*n* = 8, 521 ± 48.2 µm). Males: RV: L = 680 µm (*n* = 1); H = 388 µm (*n* = 1). LV: L = 710 µm (*n* = 1); H = 400 µm (*n* = 1).

Differential Diagnosis

Elpidium chacoense sp. nov. differs from *E. wolfi*, *E. littlei*, *E. herberti* and *E. laeaesslei* in the absence of a copulatory process with a differentiated ejaculatory duct and distal glans, which is a synapomorphy uniting these four species in one of two main clades in the morphological phylogeny of *Elpidium* proposed by Pereira et al. (2022). All four species in this clade were described from Jamaica. These species also lack the large thump-like expansion on the dorsal lobe of the Hp, which is prominent in *E. chacoense* sp. nov.

Elpidium laesslei, in addition, has a very prominent external ornamentation on the valves which is lacking in any of the other *Elpidium* species, including *E. chacoense* sp. nov.

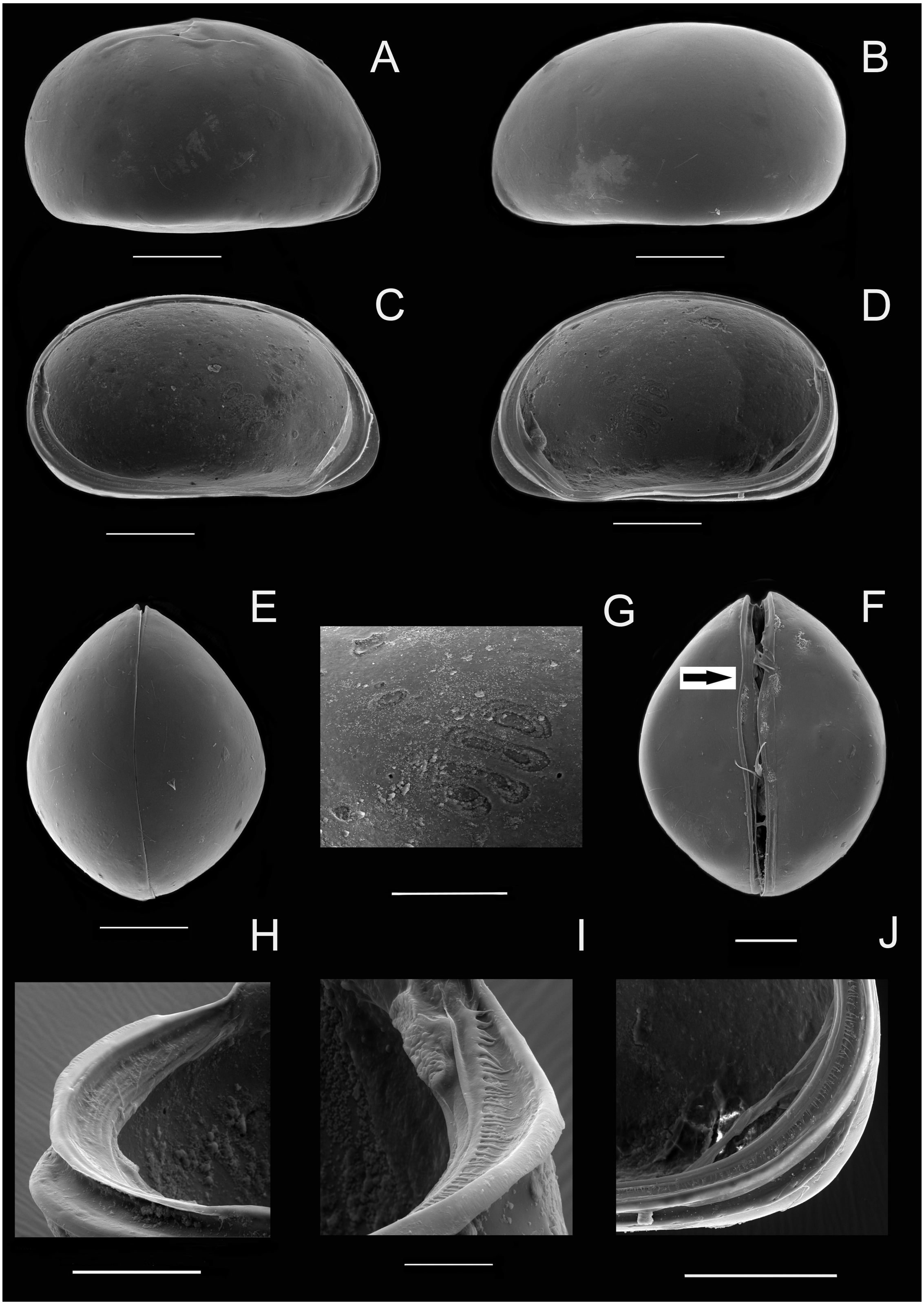

Fig. 3. Valves and Cp of *Elpidium chacoense* sp. nov. Female: A, RVe (Allotype MLP-Cr 27337); B, LVe, (Allotype MLP-Cr 27337); C, LVi (Paratype MLP-Cr 27338); D, RVi (Paratype MLP-Cr 27338); E, CpD (Paratype MLP-Cr 27338); F, CpV (Paratype MLP-Cr 27338); G, RVi, detail of muscle scars (Allotype MLP-Cr 27337); H, RVi, detail of anterior part, tilted (Allotype MLP-Cr 27337); I, RVi, detail of posterior part, tilted (Allotype MLP-Cr 27337); J, RVi, detail of posterior part (Allotype MLP-Cr 27337). Scale bars: A, B, D, E, F = 250 µm; G, H, I, J = 50 µm.

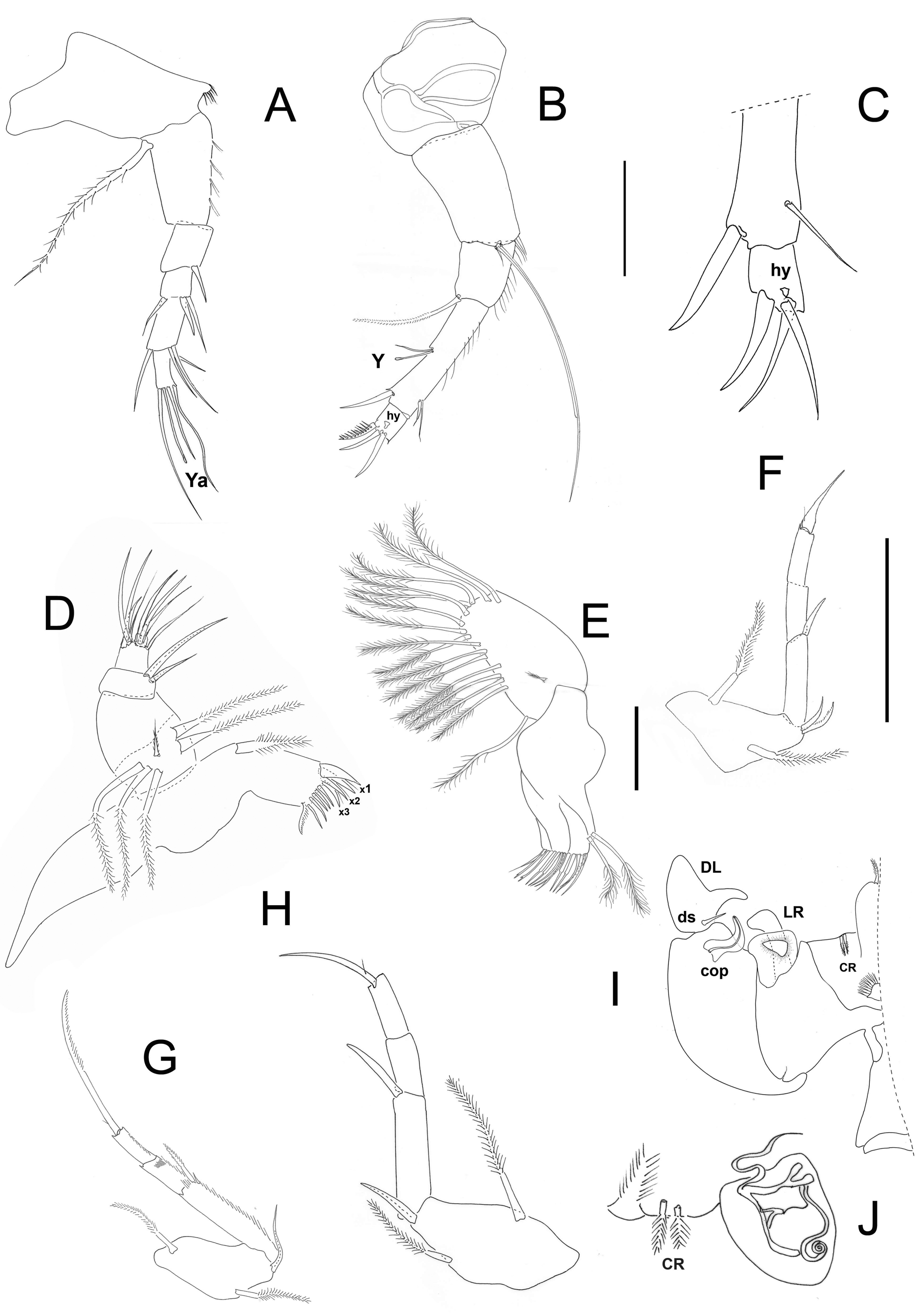

Fig. 4. *Elpidium chacoense* sp. nov. A, A1 female (Allotype MLP-Cr 27337); B, A2 male (Holotype MLP-Cr 27336); C, detail of A2 female (Allotype MLP-Cr 27337); D, Md female (Allotype MLP-Cr 27337); E, Mx1 female (Allotype MLP-Cr 27337); F, T1 male (Holotype MLP-Cr 27336); G, T3 male (Holotype MLP-Cr 27336); H, T2 male (MLP-Cr 27336); I. Hp (Holotype MLP-Cr 27336); J, CR female (Allotype MLP-Cr 27337). Scale bars: A, C–J = 100 µm for; B = 50 µm.

The second clade of Pereira et al. (2022), to which *E. chacoense* sp. nov. belongs, further consists of *E. merendonense* from Honduras, *E. inaequivalve*, *E. purperae* and *E. pintoi* from Cuba, *E. maricaoense* from Puerto Rico and Florida, *E. martensi* from Jamaica and *E. bromeliarum* and *E. litoreum* from Brazil. *Elpidium litoreum* and *E. bromeliarum*, both from Brazil, as well as *E. pintoi*, E. *purperae*, *E. inequivalve* and *E. martensi* from Cuba, also lack the large thumb-like expansion on the DL. The Hp structure of *E. maricaoense* was previously describe by Colin and Danielopol (1981, fig. 12D) from Puerto Rico and Florida but differs mainly in the shape of DL and of the cop.

The six new species described by Pereira et al. (2023) were not included in the phylogenetic analyses of Pereira et al. (2022), but also differ from the new species described here. Of these six species, only *E. higutiae* shows the large thumb-like expansion of the DL of the Hp, but in this species the LR of the Hp is pointed (rounded in *E. chacoense* sp. nov.), while the Cp and valves are much more rounded in lateral view. *Elpidium eriocaularum* has a thumb-like expansion about half the size of that in *E. chacoense* sp. nov., while *Elpidium cordiforme*, *E. picinguabaense*, *E. purium* and *E. oxumae* lack the thumb-like expansion and have very different carapace shapes.

Host plants

The present ostracods were collected from the phytotelmata in the Apiacean species *Eryngium pandanifolium* Cham. and Schltdl., 1826 and in the Bromeliaceaen taxa *Aechmea distichantha* Lemaire, 1853 and *Vriesea friburgensis* Mez., 1894 at Iguazú National, Park (Misiones province); and from *A. distichantha* at Chaco National Park (Chaco province) and at El Toba stream (Santa Fe province). All are native plants in these areas.

Eryngium pandanifolium occurred in moist soil and grew near the edges of streams and in fields prone to flooding. The imbricate arrangement of *Eryngium* leaves delimits axils, which increase in age from the centre to the periphery. The internal axils hold freshwater and debris, the intermediate ones a semi-liquid interface, and the oldest, wet or dry slime and debris. Ostracods collected from these plants were sampled around the Iguazú falls in 2006. *Aechmea distichantha* is a typical bromeliad with imbricate leaves, which delimit axils on the base (Benzing 2000). Adult plants contain a central cavity called tank or cistern which can hold several litres of rain water in a single plant. This bromeliad grows on dry or wet soil or on trees, indistinctly, in or out of the forest. The ostracods collected from this bromeliad come from Iguazú (2006), Chaco (2009) and Santa Fe (2009).

Vriesea friburgensis is a perennial bromeliad, with both epiphyte and terrestrial growth forms, and grows in high humid environments. In Iguazú, it is often found in the forest near the falls. Samples of ostracods were taken from epiphyte plants in 2006.

DISCUSSION

Diversity and speciation in *Elpidium*

With the new species here described, 19 valid species are currently known in the genus *Elpidium* (Table 1). Amongst these species, and although Danielopol (1975) and Danielopol (1981 - in Colin and Danielopol (1981)) provided an illustration of a hemipenis for *E. maricaoense*, both species *E. maricaoense* and *E. laesslei*, were known only from incomplete original descriptions. Pereira et al. (2019) redescribed *E. laesslei* based on new material, including the valves and the soft parts of the male. Given the conspicuous and unique external valve ornamentation in this species, there is little doubt that the material of Pereira et al. (2019) indeed belongs to *E. laesslei*. The identity of *E. maricaoense*, however, remains unclear. The latter species was originally described from Puerto Rico (Tressler 1941) and later reported by the same author from Florida (Tressler 1956). In the same paper, Tressler (loc.cit.) also reports the presence of *E. bromeliarum.* The latter two records are doubtful.

It has meanwhile become quite clear that the genus *Elpidium* has a high incidence of short-range endemics and that the presumed wide-range occurrence of *E. bromeliarum* is an artefact of insufficient taxonomic detail in older identifications (see DISCUSSION in Pereira et al. 2017 2023). Pereira et al. (2017) recorded *E. bromeliarum* from Sao Paulo State, far away from its type locality in Santa Catarina State, but these authors also showed that even in the highly detailed redescription of *E. bromeliarum* by Pinto and Purper (1970), males of two different species were both allocated to *E. bromeliarum*. Therefore, whereas this species might have a relatively wide distribution, certainly not all of its published records are correct. Furthermore, as can be seen from the differential diagnosis above and table 1, all other species thus far described have a much more restricted distribution. For example, only one species was so far recorded with certainty from more than one island in the West Indies (*E. laesslei* in Jamaica and Cuba). Therefore, the expected high diversity in *Elpidium* as predicted by Colin and Danielopol (1981) and confirmed by Little and Hebert (1996), the latter with a study of allozyme diversity in Cuban *Elpidium*, now seems firmly established.

There can be multiple drivers of the origin of this relatively high diversity in the genus. Little and Hebert (1996) postulated that allopatric speciation, with dispersal being restricted and bromeliad tanks acting as virtual islands, would be sufficient to explain the high diversity, even in rather limited geographical ranges (for example, a single island in the West Indies). However, meanwhile different potential pathways of dispersal have been demonstrated. F. Müller (1881) already discussed potential dispersal mechanisms of ostracods inhabiting bromeliad water tanks. Phoretic behaviour (physical transport by other animals) has meanwhile been demonstrated by both field observations (Lopez et al. 1999) and experimental set-ups (Lopez et al. 2005) and show that specimens of *Elpidium* can successfully use snakes and frogs to colonize new plants. This would seem to weaken the "allopatric speciation" hypothesis of Little and Hebert (1996), although the real impact of such phoretic behaviour would need to be estimated using metapopulation models.

A second potential driver of speciation is sexual selection. Male copulatory modules (following Danielopol et al. 1990: including hemipenis, valve shape and ornamentation) in the species of this genus show clear differences, which may have caused relatively rapid speciation by sexual selection. A third possible driver, co-evolution with the host bromeliad plants, has thus far been insufficiently investigated. For such co-evolution to be effective, species of *Elpidium* should have unique, or at least preferential, connections with specific bromeliads (and other phytothel taxa as their host plants. Thus far, such host-inhabitant couplings have not yet been demonstrated. The presence of *E. chacoense* sp. nov. and of *E. eriocaularum* in water tanks of the non-bromeliads *Eryngium pandanifolium* (Apiaceae) (this paper) and *Eriocaulon* spec. (Eriocaulaceae) (Pereira et al. 2023) respectively, already seemsto hint that co-evolution between species of *Elpidium* and of Bromeliaceae, if at all present, might not be exclusive.

Geographical distribution

Thus far, species of *Elpidium* have been reported from bromeliads in Brazil and several islands from the West Indies, *i.e.*, the North-East to Central-East part of the Neotropical Realm. Bromeliad species from West Africa do not have water tanks, and are therefore excluded from the present discussion. The northern border of bromeliad/ *Elpidium* distribution might have been Florida (Tressler 1956; Fish 1976), but these observations need confirmation. In any case, the Central American West Indian Islands as well as the Central American mainland (Hunduras) seem to successfully host *Elpidium* species in phytotelmata, mostly bromeliad water tanks. The southern extend of the distribution of *Elpidium* was thus far Rio Grande do Sul State (Pinto and Purper 1970). The present locality in Argentina more or less corroborates this southern limit, but several hundreds of kilometres more inland, away from the Atlantic forest, where thus far the highest diversity (seven species) was found. Pereira et al. (2023) referred to Benzing (2000), who reported that tank-bromeliads are indeed distributed from Florida (USA) to well into Argentina, and urge for extended sampling in bromeliad tanks at the edge of the known distribution limits of bromeliads and *Elpidium*. The present contribution has done just that and confirms the presence of an *Elpidium* species into Argentina.

CONCLUSIONS

The description of the present new species confirms the presence of the genus in Argentina, confirms the southern border of the distribution of the genus and confirms the fact that species of *Elpidium* can also be found in non-bromeliad phytotelmata. It thus fills in a number of gaps in our knowledge on this enigmatic ostracod genus.

List of abbreviations

Cp, carapace.
CpL, carapace lateral view.
CpD, carapace dorsal view.
CpV, carapace ventral view.
H, height of carapace.
L, length of carapace.
LV, left valve.
LVe, left valve external view.
LVi, left valve internal view.
RV, right valve.
RVe, right valve external view.
RVi, right valve internal view.
A1, antennula.
Ya, aesthetasc on A1.
A2, antenna.
hy, hyaline organ on A2.
Y, aesthetasc on A2.
CR, caudal ramus.
Md, mandibula.
Mx1, maxillula.
T1, first thoracopod.
T2, second thoracopod.
T3, third thoracopod.
Hp, Hemipenis.

DL, Distal Lobe of Hp.
ds, dorsal seta on DL of Hp.
LR, Lower Ramus of Hp.
cop, copulatory process on Hp.

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