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Designation of a neotype for *Orchestoidea tuberculata* Nicolet, 1849 (Amphipoda: Senticaudata: Talitridae), a monotypic sandhopper endemic to the southeastern Pacific coast

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Abstract

The genus *Orchestoidea* Nicolet, 1849 is geographically restricted to sandy beaches of the southeastern Pacific coast of Chile, being found from 23°S (Antofagasta, northern Chile) to 45°S (Guamblin Island, southern Chile), along a latitudinal gradient of ca. 2,400 km. *Orchestoidea tuberculata* Nicolet, 1849, the only known species for the genus, was originally described from Valparaíso Bay, central Chile (33°S). However, the published morphological descriptions are incomplete and a comparison with populations along the entire distributional range is difficult, because the type material is considered lost. In this paper, we selected a male specimen recently obtained from a site close to the type locality, to designate a neotype for *O. tuberculata*. A detailed description and illustrations of this specimen are also provided to establish a basis for further analysis of *Orchestoidea*.

Key words: Amphipoda, Talitridae, *Orchestoidea,* Neotype, Chile

Introduction

Orchestoidea Nicolet, 1849 is a monotypic genus of the family Talitridae, geographically restricted to the upper intertidal zone of sandy beaches of the southeastern Pacific coast of Chile, South America. The only known species, *Orchestoidea tuberculata* Nicolet, 1849, has been recorded from Antofagasta (23°S, northern Chile) to Guamblin Island (45°S, southern Chile), spanning a latitudinal gradient of ca. 2,400 km (González 1991a, 1991b, Pérez-Schultheiss *et al*. 2010, Baessolo *et al*. 2010).

The species *O. tuberculata* was first described by Nicolet (1849) in the third volume of Zoology of Claude Gay's "Historia Física y Política de Chile" (Physical and Political History of Chile), based in specimens obtained in Valparaíso Bay, central Chile. Since then, this conspicuous amphipod has been observed repeatedly on sandy beaches in northern, central and southern Chile, as reported by numerous, principally ecological studies (e.g. Jaramillo 2001, Jaramillo *et al*. 2017, Carrasco *et al*. 2019, Montecinos *et al*. 2020). However, studies on the morphology of this species are limited to the original description (Nicolet 1849) and to past redescriptions (Bousfield 1982, Varela 1983). Thereby, the morphology of this species needs to be revised and updated according to the current standard use in talitrid taxonomy (cf. Lowry & Myers 2019, Myers & Lowry 2020).

It has been suggested that the genus *Orchestoidea* may not be monotypic, including some undescribed species (Baessolo *et al*. 2010, Pérez-Schultheiss *et al*. 2010). Furthermore, morphometric (Pérez-Schultheiss, unpublished) and molecular evidence (Haye *et al*. 2014) has suggested that *O. tuberculata* may represent a species complex. Test-

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ing these hypotheses requires a better definition of the original concept of the species; however, Nicolet (1849) did not designate a holotype, and the original specimens have been reported missing from both the Muséum National d'Histoire Naturelle, Paris (Laure Corbari, personal communication, May 2017) and the Museo Nacional de Historia Natural de Chile (first author, personal observation), where they should have been deposited by Claudio Gay (Ng *et al*. 2019).

In consideration of the above, herein we designate and describe a neotype for *O. tuberculata* Nicolet, 1849, using material collected next to the type locality to adequately establish the identity of this species. This may allow future detailed analyses of the cryptic diversity inside the genus *Orchestoidea*, along its geographical distribution in sandy beaches of the southeastern Pacific coast of Chile, South America.

Material and methods

The specimen selected as a neotype was collected in Cochoa, a small sandy beach located on the northern limit of Valparaíso Bay (32°57'20.58''S, 71°32'50.19''W), central Chile. It was impossible to find any population of *O. tuberculata* in the bay itself, the site from which the original specimens were collected, because the coastline in this zone has been heavily modified and intervened and the local populations must have become extinct. The sample containing the specimen was collected by hand, conserved in 75% ethanol, and deposited in the Amphipod Collection of the Museo Nacional de Historia Natural, Chile (MNHNCL AMP). Contents of labels are transcribed verbatim in type material section.

The neotype was completely dissected and his appendages were mounted temporarily in slides with pure glycerin for microscopic observation. After their study, the dissected appendages were conserved in a vial along with the body. The body length was determined measuring from the frontal zone of the head to the base of the telson, using a digital image displayed in the software Adobe Illustrator. The drawings were made with a digital tablet in Adobe Illustrator, based on stacked digital images, supported by direct microscopic observation for correcting details, following Coleman (2003, 2006). Nomenclature of setae followed the general classification of Garm & Watling (2013) and Zimmer *et al*. (2009).

Figure abbreviations: A1 and A2: antennae 1 and 2, Cx1–Cx7: coxae 1 to 7, G1 and G2: gnathopods 1 and 2, Ll: lower lip, LS: upper lip, MDr and MDl: right and left mandibles, MX1 and MX2: maxilla 1 and maxilla 2, MXP: maxilliped, P3–P7: pereopods 3 to 7, Ep1–Ep3: epimera 1 to 3, Pl1–Pl3: pleonites 1 to 3, Pr1–Pr7: pereonites 1 to 7, T: telson, U1–U3: uropods 1 to 3.

Systematics

Order Amphipoda Latreille, 1816

Suborder Senticaudata Lowry & Myers, 2013

Infraorder Talitrida Rafinesque, 1815

Parvorder Talitridira Rafinesque, 1815

Superfamily Talitroidea Rafinesque, 1815

Epifamily Talitroidae Myers & Lowry, 2020

Family Talitridae Rafinesque, 1815

Subfamily Talitrinae Rafinesque, 1815

Genus *Orchestoidea* Nicolet, 1849

Orchestoidea Nicolet, 1849: 229–231; Stebbing, 1888: 231.
Talitrus Nicolet, 1849: 228–229 (in part); Dana, 1852: 201 (in part).
Talitronus Dana, 1852: 202 (type species *Talitronus insculptus* Dana, 1852, by monotypy. Synonymy established by Dana, 1853-55: 1595).
Type species. *Orchestoidea tuberculata* Nicolet, 1849 (by monotypy).

Orchestoidea tuberculata Nicolet, 1849

(Figs 1–4)

Orchestoidea tuberculata Nicolet, 1849: 231–232; Bate, 1857: 525; 1862: 12, Pl. 2, Fig. 2; Cunningham, 1871: 363; Stebbing, 1888: 231; 1906: 527–528; Schellenberg, 1935: 227; Bousfield, 1957: 119–120; 1982: 44–45, Fig. 20; Varela, 1983: 39–43, Figs. 8–10; De Broyer & Jażdżewski, 1993: 98; Carvacho & Saavedra, 1994: 172. González, 1991a: 63; González, 1991b: 108, Fig. 12; De Broyer *et al.*, 2007: 234; González *et al.*, 2008: 168; Thiel & Hinojosa, 2009: 716, Fig. p. 715; Pérez-Schultheiss *et al.*, 2010: 269; Baessolo *et al.*, 2010: 192–194.
Talitrus chilensis Nicolet, 1849: 229 (female, damaged specimen).
Talitrus ornatus Dana, 1852: 201–202 (female).
Talitronus insculptus Dana, 1852: 202 (male).
Orchestia (*Talitrus*) *insculpta* Dana, 1853-55: 855–857, Pl. 57, Fig. 1a–m (male), 1n–r (female).
Orchestia tuberculata Della Valle, 1893: 496, Pl. 57, Fig. 5 (erroneously cited original Nicolet's description as 1847); Dana, 1853-55: 1595 (addenda).

Type material. Neotype ♂ MNHNCL AMP-15475 (here designated), total length 17.8 mm: Playa Cochoa, Viña del Mar, Región de Valparaíso; 32°57'20.58''S, 71°32'50.19''W, 19-X-2017; Col. J. Pérez-Schultheiss & K. Ayala; enterrados en parte alta de la playa, entre vertientes de agua dulce; JP-274.

Description (Neotype ♂)

Head. Eyes subrounded (Fig. 1A), longitudinal diameter 0.47 times head length, interocular space 1.15 times the ocular height. *Antenna 1* (Fig. 2A1) short, not reaching to half of peduncular article 4 of antenna 2; peduncular article 1 depressed and laterally expanded, nearly as long as wide; article 2 slightly shorter than article 1 and less than half width; article 3 narrower and slightly longer than half of article 2; flagellum 7-articulate. *Antenna 2* (Fig. 2A2) nearly as long as the head-pereon length; peduncular articles little thickened, with scattered short cuspidate setae; article 3 with a low of small blunt proximolateral tubercles, laterodistal angle slightly produced in a rounded lobe covered with a row of 5 short cuspidate setae, distomedial angle produced in a small blunt subtriangular lobe; article 4 with a small low of subtriangular proximal tubercles in the ventrolateral side, and a deep distal lateroventral articular notch, reaching up to 0.42 of the length of the article; article 5 1.6 times longer than article 4; flagellum 21-articulate, proximal articles 1–5 partially fused, distal article cone-shaped.

Upper lip (Fig. 2LS) with apical setular patch; epistome without robust setae, with scattered microtrichia. *Lower lip* (Fig. 2Ll) distomedial setular patch present, without inner lobes. *Mandible* (Fig. 2MDl) with 4-cuspidate left lacinia mobilis, incisor 5-dentate, setal row with 6 pappose setae; right lacinia mobilis (Fig. 2MDr) with two asymmetrically bifid blades, finely denticulates, incisor 6-dentate, setal row with 4 pappose setae. *Maxilla 1* (Fig. 2MX1) with narrow inner plate, width 0.29 times outer plate width, length 0.66 times outer plate length, with two similar pappose setae, 1 distal and 1 subdistal in medial side; outer plate with 9 distal serrate setae and with 1-articulate small palp. *Maxilla 2* (Fig. 2MX2) with inner plate narrower than outer plate, width 0.57 times outer plate width, length 0.88 times outer plate length, with one long pappose setae in medial margin, medial and distal margin with numerous marginal simple setae and a submarginal row of 9 spaced serrate setae, the two lateral ones longest; outer plate width 0.52 times length, apical margin with numerous marginal simple setae, the distolateral ones longest, and then shorter toward lateral margin, few of it serrate. *Maxilliped* (Fig. 2MXP) with palp article 2 bearing well developed distomedial lobe; article 4 vestigial, fused with article 3; inner plate distal margin with 3 thick cuspidate setae and a row of pappose setae, which extend submarginally along the medial margin; outer plate ovate, with a distolateral submarginal row of simple setae, continuing distolaterally with a row of 7 pappose setae.

Pereon. Pereonites 1–6 with lateromarginal interrupted ridges, which from pereonite 4 are fused with continuous transverse ridges that cross transversely by posterior margin and by the transverse midline of the pereonite; pereonite 7 with continuous transverse ridges, but lateromarginal interrupted ridges absent (Fig. 1B, Pr1–Pr7).

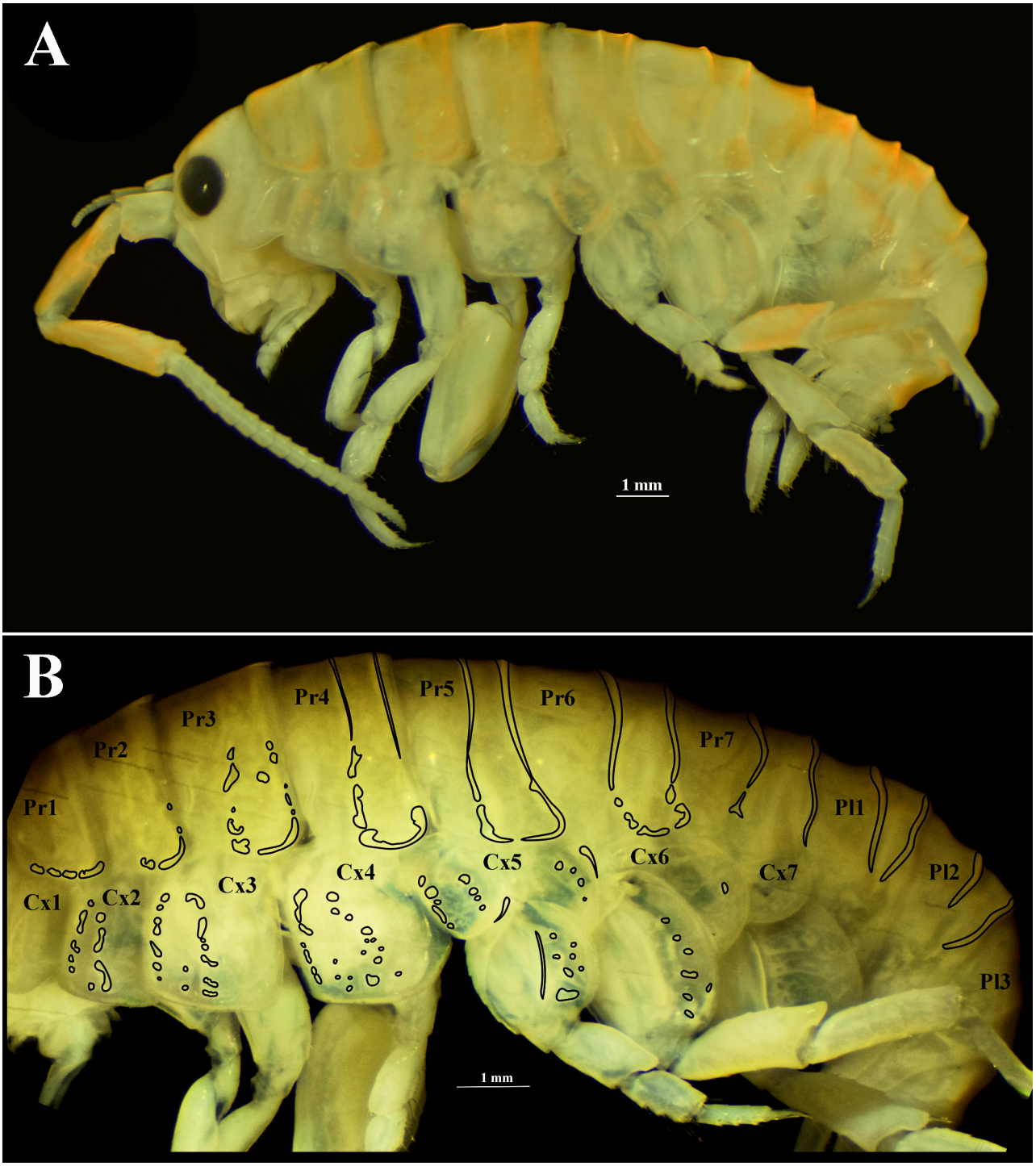

FIGURE 1. *Orchestoidea tuberculata* Nicolet, 1849, male neotype (MNHNCL AMP-15475). A: habitus, lateral view; B: pattern of granules and ridges in pereonites, coxae and bases of pereopods 5–6.

Gnathopod 1 (Fig. 3G1) simple, with vestigial palm, simplidactylate; coxa narrow, subrectangular and distally narrower by posterior margin, anterior margin straight, distal margin straight, lined by 4 small cuspidate setae, surface without defined ridges or tubercles (Fig. 1B, Cx1); basis anterior margin slightly concave, posterior margin convex, covered by scattered slender cuspidate setae; merus slightly longer than ischium, articulation with carpus diagonal, posterior margin covered by scattered slender and short cuspidate setae; carpus longer than ischium and merus together, posterior margin covered by scattered slender cuspidate setae, some longer than half width of the article; propodus anterior margin slightly convex, posterior margin concave, both covered by slender scattered cuspidate setae, with subdistal vestigial tubercle covering 0.33 times of posterior margin; dactylus length 0.5 times the

propodus. *Gnathopod 2* (Fig. 3G2) subchelate; coxa subquadrate, surface with 2 vertical parallel rows of tubercles in anterior half, some partially fused forming short ridges (most evident in the posterior row, whose ventral side appear to be bifid by an isolated tubercle next to the ridge) (Fig. 1B, Cx2); basis anterior margin straight, posterior margin convex, covered by short scattered cuspidate setae and with a transverse posterodistal row of slightly longer slender cuspidate setae; ischium barely longer than width, with small anterodistal lobe; merus posterior margin convex, anterior margin entirely covered by carpus; carpus small, triangular, anterior margin short, posterior margin concealed by merus and propodus; propodus subovate, length 1.4 times the width, palm 1.2 times the posterior margin, divided in two portions separated by a concave pit with a small cuspidate seta at bottom, posterior portion of palm convex, lined by a rows of major intercalated with tiny cuspidate setae, anterior portion of palm is a triangular blunt lobe, lined by tiny cuspidate setae only; dactylus evenly curved and sharpened to apex, barely exceeds the palmar angle, posterior margin with a swelling in the proximal half, which faces the palmar pit while dactylus is closed.

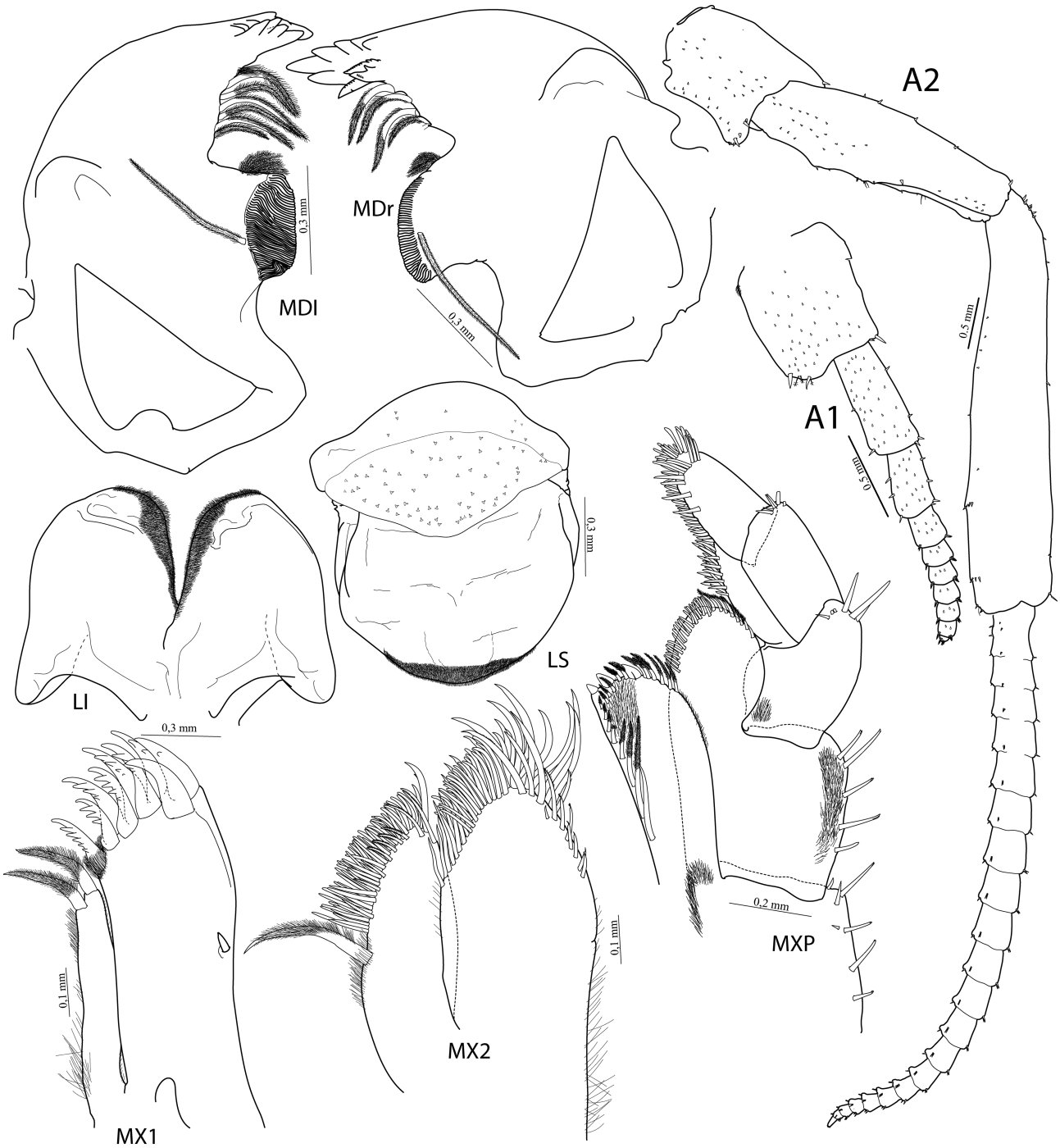

FIGURE 2. *Orchestoidea tuberculata* Nicolet, 1849, male neotype (MNHNCL AMP-15475): A1: antenna 1; A2: antenna 2; MDl: left mandible; MDr: right mandible; LS: upper lip; LI: lower lip; MX1: maxilla 1; MX2: maxilla 2; MXP: maxilliped.

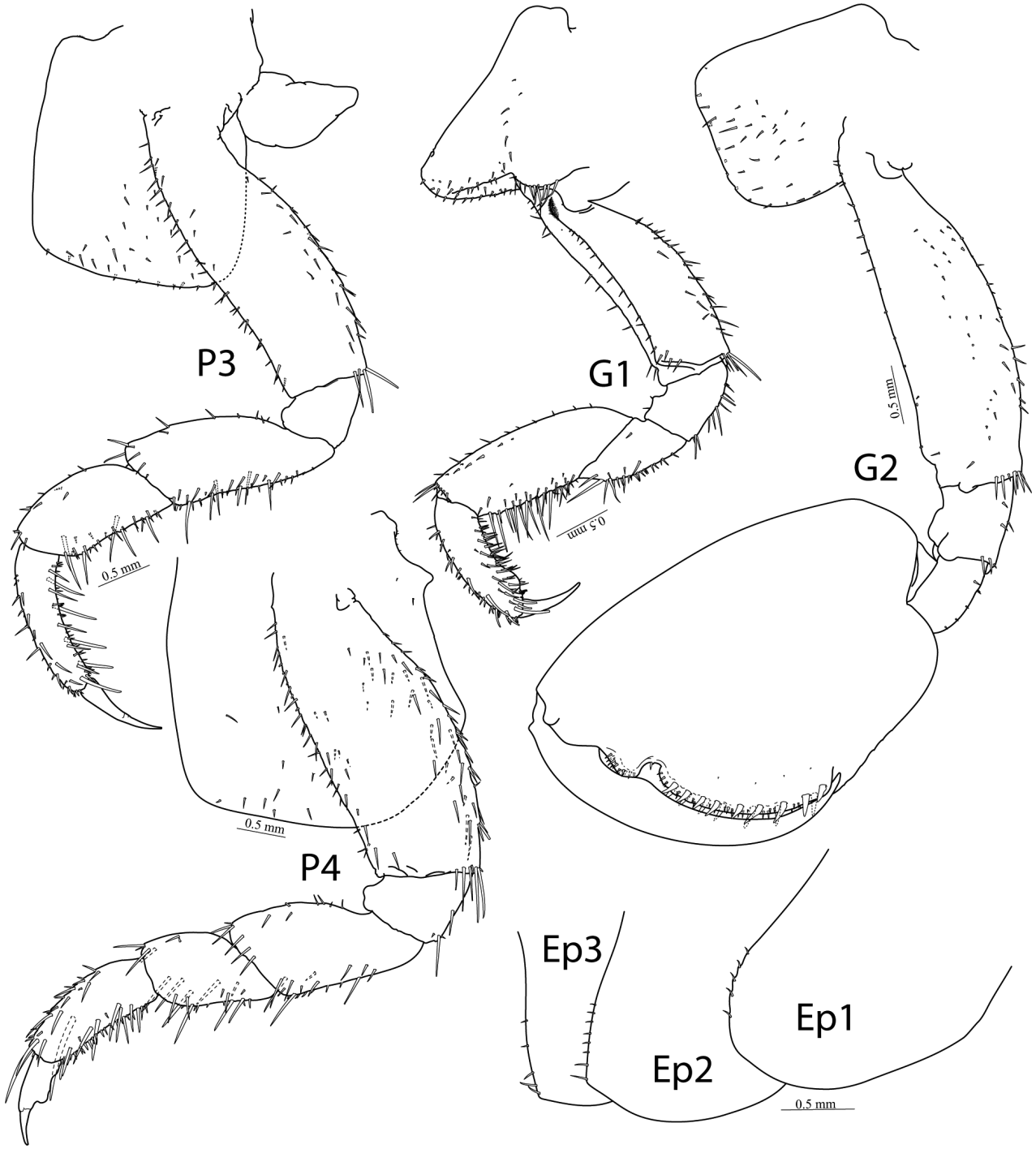

FIGURE 3. *Orchestoidea tuberculata* Nicolet, 1849, male neotype (MNHNCL AMP-15475): G1: gnathopod 1; G2: gnathopod 2; P3: pereopod 3; P4: pereopod 4; Ep1–Ep3: epimera 1 to 3.

Pereopod 3 (Fig. 3P3) coxa subquadrate, with 2 vertical parallel rows of tubercles, the first in the anterior half and the second amid the lateral face, most tubercles fused forming short ridges most evident in the posterior row, whose 3 distal ridges appear slightly diagonal (Fig. 1B, Cx3); basis length 3 times width, anterior margin nearly straight, with short cuspidate setae, posterior margin slightly convex, covered by scattered short slender cuspidate setae and with a transverse posterodistal row of slightly longer slender cuspidate setae; ischium nearly as long as width, devoid setae; merus length 2 times width and 1.2 length of carpus, anterior margin convex, with few slightly grouped cuspidate setae, posterior margin nearly straight, covered with scattered long and short cuspidate setae; carpus length 1.9 times width, anterior margin convex, with few scattered cuspidate setae, posterior margin nearly straight, covered with scattered long and short cuspidate setae; propodus length 3.06 times width, longer than car-

pus, curved, tapering evenly towards the apex, anterior margin covered with long and short cuspidate setae, posterior margin covered with short cuspidate setae and long slender cuspidate setae, nearly as long as article width, and arranged in two submarginal rows; dactylus slender, length 0.5 times the propodus.

Pereopod 4 (Fig. 3P4) length 0.95 times the pereopod 3; coxa subquadrate, distal margin convex, posterior margin with proximal subtriangular tooth, surface with 2 vertical parallel rows of tubercles, the first well defined in the anterior half, with tubercles partially fused, forming small ridges, second row diffuse, sinuous amid the lateral face, with tubercles separated, not forming ridges (Fig. 1B, Cx4); basis length 2.3 times width, anterior margin slightly convex, covered with scattered cuspidate setae, posterior margin convex, covered with scattered cuspidate setae and with a posterodistal transverse row of long slender cuspidate setae; ischium shorter than width, with some long and short cuspidate setae in posterior margin; merus length 1.6 times width and 1.3 length of carpus, anterior margin convex, with few scattered short cuspidate setae and a transverse anterodistal row of slender cuspidate setae, posterior margin straight, covered with scattered long and short cuspidate setae; carpus length 1.5 times width, setal pattern similar to merus, but transverse anterodistal row diffuse; propodus length 2.57 times width, longer than carpus, not curved, scarcely tapering towards the apex, posterior margin straight, anterior margin convex, both covered by scattered short and long cuspidate setae, but long ones tend to be arranged in submarginal rows, anterodistal long setae exceed half of the dactylus; dactylus thickened proximally with notch midway along posterior margin, length 0.6 times the propodus.

Pereopod 5 (Fig. 4P5) coxa bilobed, posterior lobe narrower than anterior lobe, anterior lobe with two well defined rows of tubercles, subparallel to the anterior margin, only the submarginal one forming a diffuse ridge, posterodistal margin of anterior lobe with a diffuse submarginal ridge, posterior lobe with a submarginal ridge in posterior margin and a subparallel curved and diffuse row of four small tubercles (Fig. 1B, Cx5); basis posteriorly lobate, ovate, with curved groove from base to the anterodistal angle, length 1.1 times width, with a median ridge and granules scattered on the surface of posterior lobe, surface of anterior half covered with scattered cuspidate setae; ischium width 1.7 times length, only with short cuspidate setae in anterodistal angle; merus length 1.56 times width, anterior and posterior margin lined with scarce short cuspidate setae, posterodistal lobe with a transverse row of short cuspidate setae; carpus length 1.72 times width, 0.77 times the width of merus, posterior margin covered with small cuspidate setae in two groups, posterodistal angle with three large cuspidate setae, exceeding the 0.3 of propodus, anterior margin with three groups of large cuspidate setae; propodus length 3.61 times width, length 1.05 times carpus, width 0.5 times carpus, posterior margin with two groups of small cuspidate setae, posterodistal angle with a pair of small cuspidate setae and one large cuspidate seta, reaching half dactylus, anterior margin with three groups of large cuspidate setae accompanied by small cuspidate setae; dactylus length 0.68 times propodus, slender.

Pereopod 6 (Fig. 4P6) length 1.06 pereopod 7; coxa posterior lobe subovate, with only one discernible granule on the surface (Fig. 1B, Cx6), length 1.5 times width, exceeding half of basis, marginally covered by small cuspidate setae; basis posteriorly lobate, ovate, length 1.2 times width, with a median slightly curved row of granules on the surface of the posterior lobe, surface of anterior half covered with scattered cuspidate setae; ischium width 1.3 times length, only with short cuspidate setae in anterodistal angle; merus length 1.93 times width, posterodistal angle slightly produced, posterior margin with four groups of small cuspidate setae and a group of longer posterodistal cuspidate seta, anterior margin lined by poorly defined groups of cuspidate setae that increase in size towards the anterodistal angle; carpus length 3.19 times width, 0.68 times width of merus, posterior margin with poorly defined groups of short cuspidate setae, posterodistal angle with three long cuspidate setae, anterior margin with five groups of short cuspidate setae, the subdistal group with a pair of longer setae; propodus length 6.46 times width, length 1.26 times carpus, width 0.62 times carpus, posterior margin lined by a marginal and a submarginal row of small cuspidate setae, that increase in size from about the half of the article to the apex, posterodistal angle with two long cuspidate setae, exceeding half dactylus, anterior margin with four groups of long cuspidate setae; dactylus length 0.39 times propodus, slender.

Pereopod 7 (Fig. 4P7), coxa wider than long, surface smooth (Fig. 1B, Cx7); basis posteriorly lobate, ovate, with straight longitudinal groove, length 1.1 times width, surface of anterior half covered with scattered cuspidate setae, posterior margin lined by small cuspidate setae; ischium width 1.1 times length, only with short cuspidate setae in anterodistal angle; merus length 1.99 times width, anterodistal angle produced, posterior margin lined by four groups of one small and one long setae, posterodistal angle with a transverse row of long setae, anterior margin lined by four diffuse groups of long cuspidate setae, the longest nearly as long as article width; carpus length 2.56 times width, 0.73 times width of merus, posterior margin with three groups of three cuspidate setae, each of a differ-

ent size, posterodistal angle with three long setae, anterior margin with four group of long cuspidate setae; propodus length 4.9 times width, length 0.9 times carpus, width 0.47 times carpus, posterior margin with small cuspidate setae, except the slightly longer distalmost, anterior margin with five group of one short and two long cuspidate setae, as long as article width; dactylus length 0.54 times propodus, slender.

Pleon. Pleonites 1–2 with low and continuous transverse ridges that cross transversely by posterior margin and the transverse midline of the pleonite; pleonite 3 without discernible transverse ridges (Fig. 1B, Pl1–Pl3). *Pleopods* 1–3 well developed, rami segmented, shorter than peduncle. *Epimeral plates* 1–2 posteroventral margin convex. Epimeral plate 3 ventral margin convex, posterior margin straight (Fig. 3Ep1–Ep3).

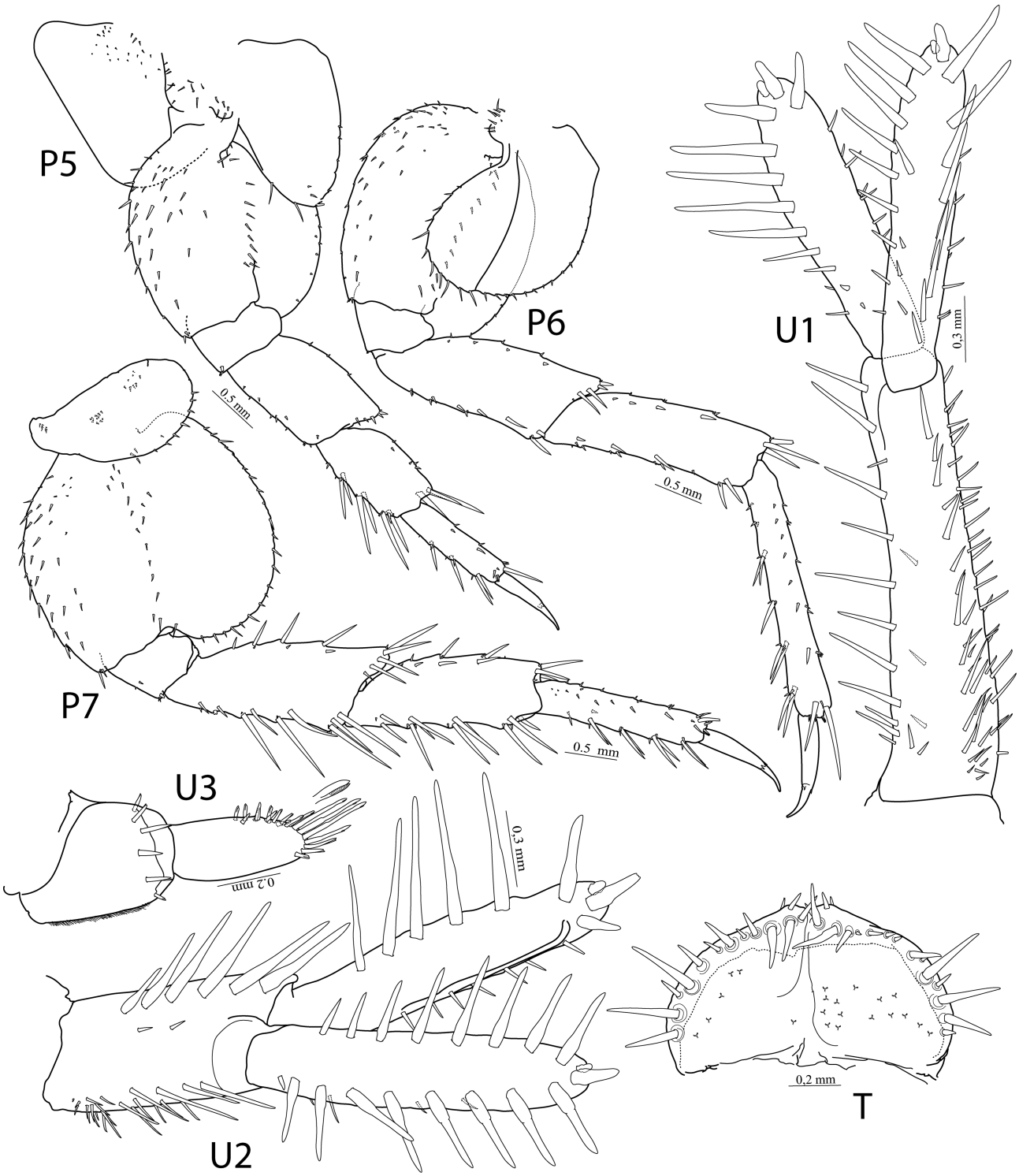

FIGURE 4. *Orchestoidea tuberculata* Nicolet, 1849, male neotype (MNHNCL AMP-15475): P5: pereopod 5; P6: pereopod 6; P7: pereopod 7; U1: uropod 1; U2: uropod 2; U3: uuropod 3, with detail of distal setae of ramus; T: telson.

Uropod 1 (Fig. 4U1) peduncle with numerous scattered cuspidate setae in inner side and a row of 11 dorsolateral cuspidate seta on outer side; rami dorsally flat; inner ramus implanted subdistally, almost on top of outer ramus, with a lateral and medial row of 9 cuspidate setae lengthening towards the apex; outer ramus with lateral row of 7 cuspidate setae, longer in distal half, exceeding the width of the ramus in length, with two cuspidate distal setae and one subdistal cuspidate seta in medial margin. *Uropod 2* (Fig. 4U2) peduncle with numerous scattered cuspidate setae in inner side and a row of 6 dorsolateral cuspidate seta on outer side; rami dorsally flat; inner ramus implanted subdistally, almost on top of outer ramus (but less pronounced than in uropod 1), with a lateral and medial row of 8 long cuspidate setae, most as long as the width of ramus; outer ramus with lateral row of 6 cuspidate setae, exceeding by far the width of the ramus in length, with two cuspidate distal setae, medial margin with a longitudinal ridge ending subdistally in a curved lobe, shortly before one subdistal cuspidate seta. *Uropod 3* (Fig. 4U3) reduced; peduncle slightly longer than width, with 6 subdistal cuspidate setae; ramus oblong, slightly shorter than peduncle, with row of 9 marginal small cuspidate setae plus 8 slightly longer apical cuspidate setae (both rows of setae with accessory seta, cf. Figs. 18–20 in Zimmer *et al*., 2009).

Telson (Fig. 4T) hemispheric, as long to uropod 3, slightly upturned dorsally, broader than long, lateral margins convex, slightly incised apically, dorsal midline rudimentary, with 12–14 various sizes marginal and apical cuspidate setae per lobe, the 3 distalmost setae directed forward; ventrally strongly convex, inferodistal lobes covered with small converging cuspidate setae.

Distribution. The monotypic genus *Orchestoidea* was originally described from Valparaíso Bay, central Chile, and the neotype for *O. tuberculata* was collected in Cochoa beach on the northern limit of the bay. So far these are the only confirmed localities for the species. Additional localities cited in faunistic or taxonomic publications that need confirmation are shown in the Figure 5.

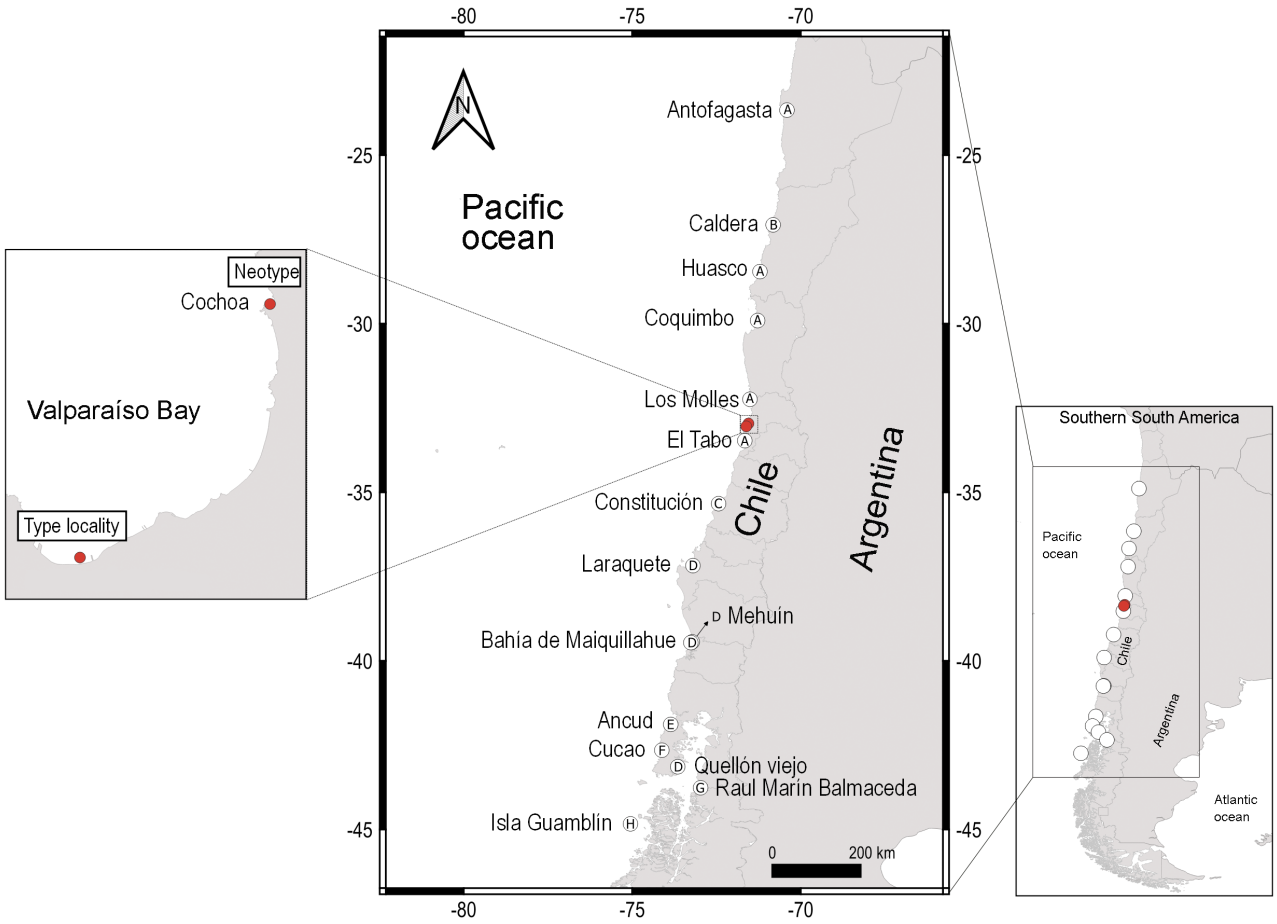

FIGURE 5. Geographic records of *Orchestoidea tuberculata* Nicolet, 1849, ordered from north to south: A, González (1991a). B, Porter (1897). C, Schellenberg (1935). D, Varela (1983). E, Cunningham (1871). F, Carvacho & Saavedra (1994). G, Baessolo *et al*. (2010) and H, Pérez-Schultheiss *et al*. (2010).

Remarks. According to Nicolet (1849), the genus *Orchestoidea* differs from *Talitrus* only by the strongly subchelated gnathopod 2. Due to this simple definition, several North American species were posteriorly ascribed to *Orchestoidea* (Bousfield 1957); however, further refinements confirmed that the genus is monotypic and endemic to South America (Bousfield 1982).

It is interesting to note that the name currently valid for *Orchestoidea tuberculata* could have been *O. chilensis* (Nicolet, 1849), since a page earlier, Nicolet (1849) briefly describes the female of *O. tuberculata* under the name *Talitrus chilensis* based in a damaged specimen. This name was later put in the synonymy of *O. tuberculata* by Stebbing (1906), without considering the principle of priority. However, currently the name *O. tuberculata* is protected by article 23.9 of the Code, which indicates that the predominant use must be maintained when the oldest synonym has not been used as a valid name since 1899 and that the most modern synonym must prevail when it has already been used in at least 25 works or by at least 10 authors in the following 50 years of description, or for a period of no less than 10 years.

The original description of *O. tuberculata* by Nicolet is detailed enough and provides important diagnostic characters to discriminate this taxon from other known talitrids (Nicolet 1849). However, our description of the neotype provides new characters that have not been included in previous studies. These additional characters might represent a significant improvement to evaluate records of this species in other areas of its known geographic range (Baessolo *et al*. 2010, Bousfield 1982, Carvacho & Saavedra 1994, Cunningham 1871, González 1991a, Pérez-Schultheiss *et al*. 2010, Schellenberg 1935, Varela 1983) and could also be included, for example, in a multivariate morphometric analysis to assess the existence of pseudocryptic diversity within *O. tuberculata*, as suggested by preliminary unpublished observations. This could help to answer the yet unresolved question of whether this taxon is in fact a species complex composed of several species with much more restricted geographic distributions along the coast of Chile.

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