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The freshwater amphipods *Hyalella* Smith, 1874 in Chile (Crustacea: Amphipoda)

Los anfípodos de agua dulce del género *Hyalella* Smith, 1874 en Chile (Crustacea: Amphipoda)

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ABSTRACT

The Chilean fauna of amphipods has been poorly studied. Freshwater amphipods in Chile have a single genus in epigean environments. Seven species of the genus *Hyalella* are reported for Chile: *H. simplex*; *H. fossamancinii*, *H. kochi*; *H. chiloensis*; *H. costera*; *H. araucana*, and *H. franciscae*. A short diagnosis, a key and figures are given for each species.

Key words: Neotropical, Amphipoda, *Hyalella*, Chile, freshwater.

RESUMEN

La fauna de anfípodos chilenos ha sido pobremente estudiada. En el caso de los de agua dulce y de ambientes epigeos, el grupo está representado solo por un género. Se reportan siete especies del género *Hyalella* para Chile: *H. simplex*; *H. fossamancinii*, *H. kochi*; *H. chiloensis*; *H. costera*; *H. araucana*, y *H. franciscae*. Se entrega una breve diagnosis, una clave y figuras para cada especie.

Palabras clave: neotropical, Amphipoda, *Hyalella*, Chile, agua dulce.

INTRODUCTION

The species in the genus *Hyalella* Smith, 1874 have been poorly studied and they had a confusing taxonomic state, in Chile and America, as a whole. Eleven species have been recorded for Chile, *H. gracilicornis* (Faxon, 1876) and *H. curvispina* Shoemaker, 1942 (in Barnard & Barnard 1983); *H. azteca* (Saussure, 1858) (in Ruffo 1947, González 1991a); *H. simplex* Schellenberg, 1943; *H. fossamancinii* Cavalieri, 1959 (in González & Watling 2001), *H. dentata inermis* (Faxon, 1876); *H. kochi* González & Watling, 2001; *H. chiloensis* González & Watling, 2001; *H. costera* González & Watling, 2001; *H. araucana* Grosso & Peralta, 1999; and *H. franciscae* González & Watling, 2003a.

The first record of freshwater amphipods in Chile corresponded to *Amphithoe andina* Philippi, 1860 from high elevations in the Atacama desert, Chile. Unfortunately the description is very poor and no drawings were included. This species and *H. dentata inermis* were synonymized under *H. inermis* Smith, 1875 by Stebbing (1906). Later Barnard & Barnard (1983) synonymized *A. andina* under *H. gracilicornis*, indicating that it was different from *H. inermis*; no mention of *H. dentata inermis* was made. This suggested that *H. gracilicornis* was the species described by Philippi (1860) and distributed in northern Chile (González 1991b). However, it is important to stress that the type locality of *H. gracilicornis* is a channel at Campos, Rio de Janeiro, Brazil. Schellenberg (1931) studied freshwater amphipods from Quilpue, Putabla, Puerto Montt and Punta Arenas in Chile, as well as material from Montevideo, Uruguay, Islas Malvinas, Santa Cruz and Usuahia in Argentina. Schellenberg identified these specimens as *H. knickerbockeri* (Bate, 1862). In a later publication, Schellenberg (1943) determined that the material represented a new species which he named *H. simplex*. Barnard & Barnard (1983) synonymized *H. simplex* under *H. curvispina*. Bousfield (1996) considered both as valid species. González & Watling

(2003a) redescribed *H. simplex* and considered the species valid. González (1991a, 1991b) assigned most of the Chilean specimens of *Hyalella* to *H. gracilicornis*, however, in some areas he thought *H. azteca* could also be present. Three new species were described by González & Watling (2001), *H. kochi* for the andean north and central zone of Chile; *H. costera* for lowlands from Paposo (Antofagasta) to Valdivia; and *H. chiloensis* from Concepción to Coihaique.

Hyalella fossamancinii, Cavalieri, 1959, *H. araucana* Grosso & Peralta, 1999, and *H. franciscae* González & Watling, 2003a are part of what has been called the "patagonica complex". This group is named after *H. patagonica* (Cunningham, 1871) the first described species of the complex. Most of the species have a rather restricted distribution in the extreme south of South America. Bousfield (1996) proposed for Chile in this complex, species "A" now *H. araucana*, species "B" now *H. franciscae* and species "C" not described yet (González & Watling 2003a). *Hyalella araucana* was described as *nomen novum* by Grosso & Peralta 1999 in replacement of *H. patagonica.*

Here a short description is given for the seven valid species recorded in Chile. The figures in this work are modified from the original descriptions. A discussion of the species previously recorded for Chile is also included.

TAXONOMY

Hyalella araucana *Grosso & Peralta, 1999 (Fig. 1)*

Hyalella araucana Grosso & Peralta, 1999: 84, 86, 88, figs. 22-45.

Allorchestes patagonicus Cunnigham, 1871: 498, pl. LIX. fig. 14; Stebbing, 1906: 585 (in part).

Hyalella patagonicus Stebbing, 1888: 404.

Hyalella patagonica Ortmann, 1911: 650-

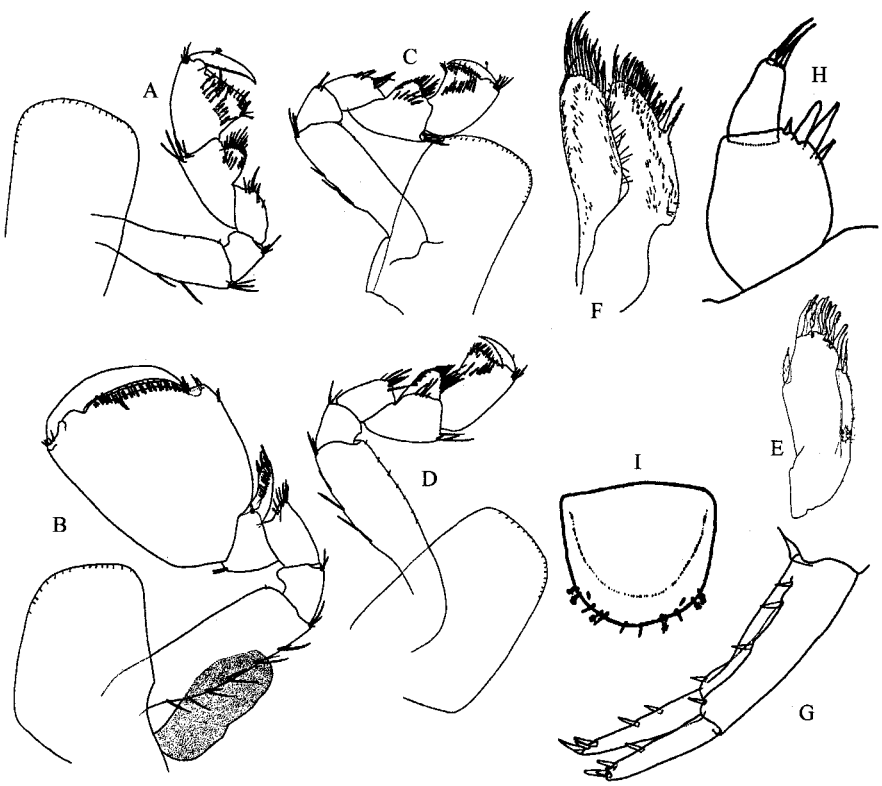

Fig. 1: Hyalella araucana, male length 11.1 mm, female 9.8 mm. Modified from Grosso & Peralta (1999). Symbols of figures are: (A) gnathopod 1 male; (B) gnathopod 2 male; (C) gnathopod 1 female; (D) gnathopod 2 female; (E) maxilla 1; (F) maxilla 2; (G) uropod 1; (H) uropod 3; (I) telson.

Hyalella araucana, macho, largo11,1 mm, hembra 9,8 mm. Modificado de Grosso & Peralta (1999). Símbolos para las figuras son como sigue: (A) gnatópodo 1 macho; (B), gnatópodo 2 macho; (C) gnatópodo 1 hembra; (D) gnatópodo 2 hembra; (E) maxila 1; (F) maxila 2; (G) urópodo 1; (H) urópodo 3; (I) telson.

657, fig. 3a-h (in part); Stebbing, 1914: 368; Schellenberg, 1943: 204.

Hyalella patagonica Schellenberg, 1931: 227, fig. 115 (in part); Barnard & Barnard, 1983: 709; Bousfield, 1996: 188; not *Hyalella neonoma* Stock & Platvoet, 1991: 1486, figs. 12-14.

Type material: Museo Cívico di Storia Naturale di Verona, Italy. Type locality: Río de los Dervos, Chile (probably Río de los Ciervos, Chile). Material Examined. Lago de los Ciervos, Punta Arenas (53°11' S, 70°56' W), Lago Sarmiento, Torres del Paine (51°04' S, 72°45' W).

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Mandible incisor toothed. Maxilla 1 palp longer than wide, reaching more than half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with two apposed strong pappose setae on inner margin (Fig. 1F). Gnathopod 1 propodus length less than two times maximum width (quadrangular), hatched shape, inner face with ten pappose setae, disto-posterior and disto-anterior borders without setose scales. Gnathopod 2 propodus ovate, palm length the same as posterior margin, slope slightly oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with three hind marginal clusters of short setae; propodus posterior margin with two to four groups of setae. Uropod 3 peduncle with four strong distal setae; outer ramus shorter than peduncle, basal width two times or less tip of ramus. Telson as wide as long, apically rounded, with more than two small or minute setae, asymmetrically distributed on the apical margin. Sternal gills in segments 3 to 7.

Characters of female that differ from male. Size, 9.8 mm. Antenna 1 flagellum with seven articles. Antenna 2 weaker than in male, flagellum with eight articles. Gnathopod 1 similar in size, and different in shape to gnathopod 2; similar to male gnathopod 1 in size and shape. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length less than two times maximum width, normally subchelate, palm transverse.

Habitat. Freshwater, epigean, littoral.

Distribution: Río de los Dervos (probably Río de los Ciervos), Chile, South America.

Remarks. This species was erected as a *nomen novum* for *H. patagonica* (Cunningham, 1871), which is not described in the original paper and poorly figured. Grosso & Peralta (1999) gave a long list of characters for distinguishing this species from *H. neonoma*. The species are very close, but differ among other characters, in the length of palp in maxilla 1, setation and palm border in propodus of gnathopod 2 in male, and setation of peduncle in uropod 3. The figures of *H.* sp. A given by Bousfield (1996) correspond well with this species.

Hyalella chiloensis *González & Watling, 2001 (Fig. 2)*

Hyalella chiloensis González & Watling, 2001: 177-183, figs. 1-4.

Type locality: Notuco, Chiloé, Chile. Material Examined: Notuco, Chiloé, Chile.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp minute, reaching less than half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin (Fig. 2F). Gnathopod 1 propodus length less than two times maximum width (quadrangular), hammer shape, inner face with nine pappose setae, setose scales on disto-posterior and disto-anterior border. Gnathopod 2 propodus ovate, palm length the same as posterior margin, slope slightly oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with five to six hind marginal clusters of long setae; propodus posterior margin with five to eight groups of setae. Uropod 3 peduncle with four strong distal setae; outer ramus longer than peduncle, basal width two times or less tip of ramus. Telson longer than wide, apically truncated, with more than two, long and short simple setae symmetrically distributed in two groups, occasionally with shorter setae close to the main setae. Sternal gills in segments 3 to 7.

Characters of females that differ from males: Size, 7.4 mm. Antenna 1 flagellum with six articles. Antenna 2 similar in shape to male, flagellum with nine articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size and shape. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length two to three times maximum width, normally subchelate, palm transverse.

Habitat. Freshwater, epigean, littoral.

Distribution: Laguna Redonda, Concepción, to Río Ñirepan, Cohaique, Chile, South America.

Remarks: This species is close to *H. curvispina* in its general morphology,

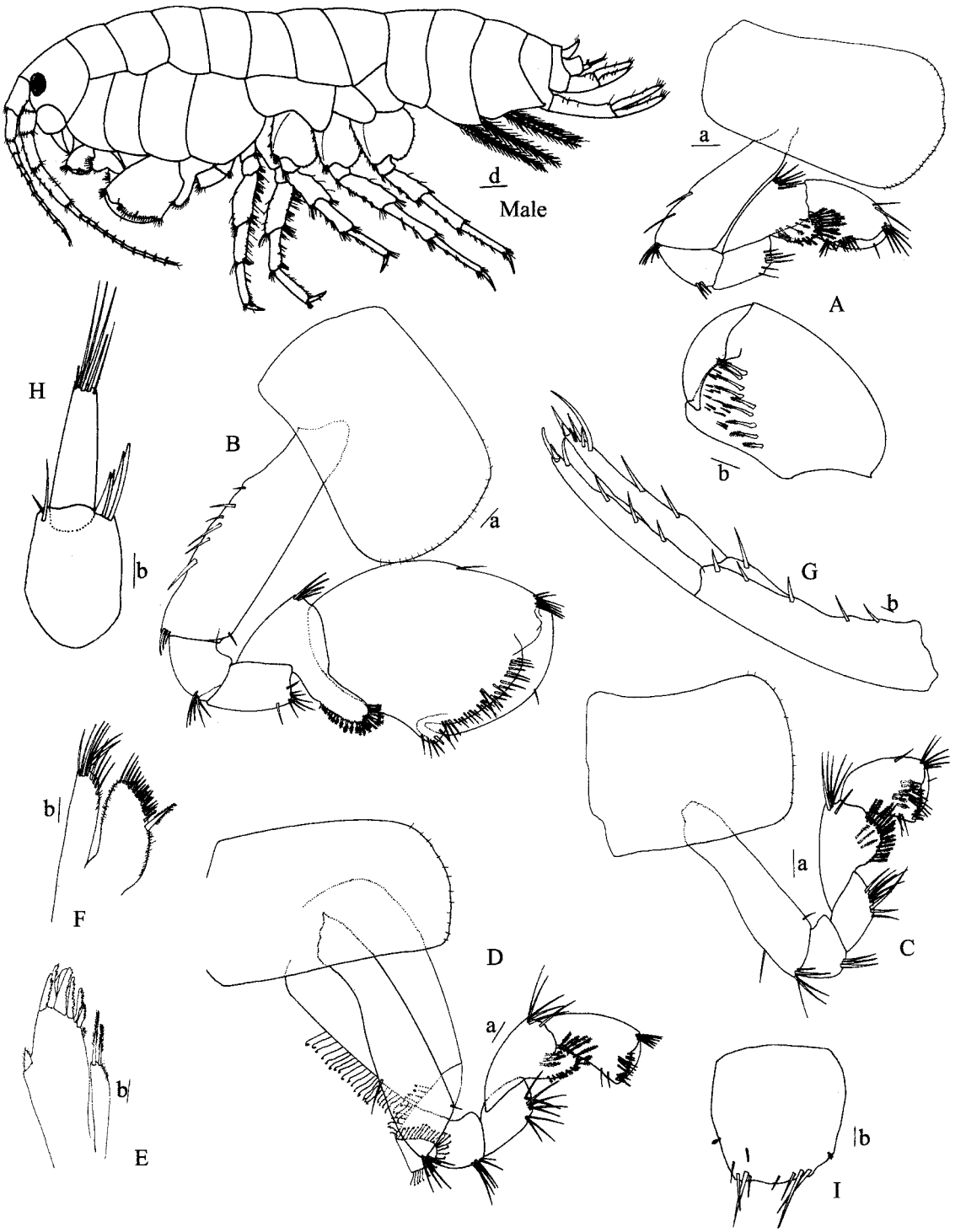

Fig. 2: Hyalella chiloensis male, length 8.1 mm, female 7.4 mm. Modified from González & Watling (2001). Symbols as in Fig. 1. The scale is indicated as a small bar on each appendices: "a" is equivalent to 103 µm; "b" is equivalent to 50 µm; "d" is equivalent to 330 µm.

Hyalella chiloensis macho, largo 8,1 mm, hembra 7,4 mm. Modificado de González & Watling (2001). Símbolos como en Fig. 1. La escala de tamaño esta indicada por una pequeña barra en cada apéndice: "a" es equivalente a 103 µm; "b" es equivalente a 50 µm; "d" es equivalente a 330 µm.

especially uropod 3, and gnathopods, but differs in the type of setae on the telson, (*H. curvispina* has shorter and stronger setae on telson), a shorter article 2 in maxillipedal palp, males bear nine setae on inner side of propodus in gnathopod 1, and longer setae on merus and carpus in peraeopods 3 and 4 (see Shoemaker 1942). The main characteristic that distinguishes these two species is the presence of six pairs (from segment 2 to 7) of sternal gills in *H curvispina*, while *H. chiloensis* has only five pairs (from segment 3 to 7). This feature has been overlooked by or not considered of importance by many authors (Ruffo 1947), or miscounted in several descriptions. The consistency of this character makes it relevant in the evolutionary relationships within the genus.

Hyalella costera *González & Watling, 2001 (Fig. 3)*

Hyalella knicherbockeri Schellenberg, 1931: 228, fig. 116 (in part), not drawings, [not

Allorchestes knicherbockeri Bate 1862: 36, plate VI fig. 1].

? *Hyalella knicherbockeri inermis* Schellenberg, 1935: 229.

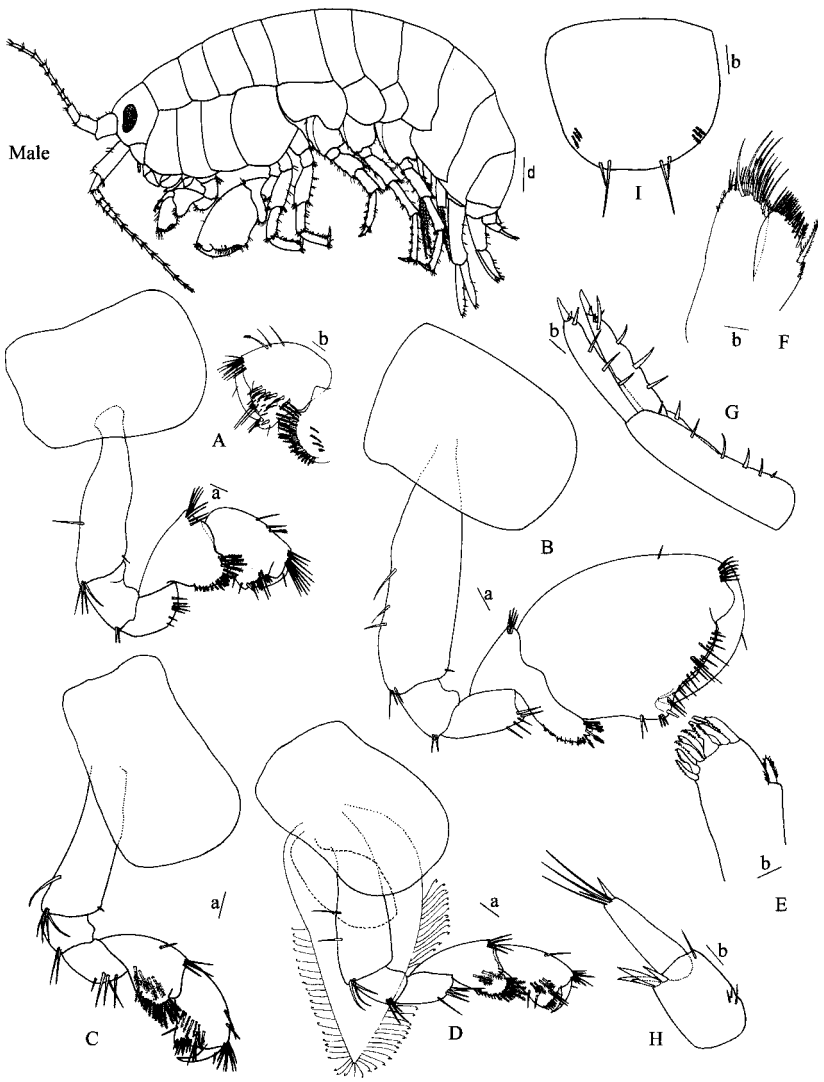

Fig. 3: Hyalella costera male, length 7.1 mm, female 6.1 mm. Modified from González & Watling (2001). Symbols and scale as in Fig. 2.

Hyalella costera macho, largo 7,1 mm, hembra 6,1 mm. Modificado de González & Watling (2001). Símbolos y escala como en Fig. 2.

Hyalella simplex Schellenberg, 1943: 201 (in part). [not *Hyalella simplex* f. *cangallensis* Schellenberg, 1943: 201, fig. 1].

Hyalella azteca Barnard & Barnard, 1983: 708 (in part); González, 1991a: 56 (in part).

Hyalella curvispina Barnard & Barnard, 1983: 708 (in part)

Hyalella costera González & Watling, 2001: 183-191, figs. 5-10.

Type locality: Quebrada Paposo, Antofagasta, Chile. Material examined: Quebrada Paposo, Antofagasta, Limache, El Molle.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp longer than wide, reaching half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin. Gnathopod 1 propodus length less than two times maximum width (quadrangular), hammer shape, inner face with seven pappose setae, setose scales on disto-posterior and disto-anterior border. Gnathopod 2 propodus rectangular elongated, palm shorter than posterior margin, slope oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with three hind marginal clusters of short setae; propodus posterior margin with two to four groups of setae. Uropod 3 peduncle with four strong distal setae; outer ramus longer than peduncle, basal width two times or less tip of ramus. Telson as wide as long, apically rounded, with two widely apart, long simple setae, symmetrically distributed, occasionally with shorter setae close to the main setae. Sternal gills in segments 3 to 7.

Characters of females that differ from males. Size, 6.1 mm. Antenna 1 flagellum with eight articles. Antenna 2 similar in shape to male, flagellum with nine articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size and shape. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length two to three times maximum width, normally subchelate, palm transverse. Additionally, coxa 6, anterior lobe is very small; maxilla 2, inner plate subequal in length to outer plate; maxilliped, article 2 as wide as long; gnathopod 1 propodus with one or two setae on anterior border, inner face without small triangular setae; peraeopod 5 basis posterior lobe deeper than wide and similar to posterior lobe of peraeopod 7, which is wider than deep; uropod 3 with six simple apical slender setae.

Habitat: freshwater, epigean, littoral. Distribution: Quebrada de Paposo, Antofagasta to Isla Teja, Valdivia, Chile, South America.

Remarks: this species was collected in freshwater sources near the coast, along most of the continental Chilean territory. It is the only species present in lowland areas from Paposo in Antofagasta to Concepción. From this point south and down to Valdivia, it is found in the same areas as *H. chiloensis*, but rarely together in the same locality. Most of the specimens collected were females. Only in La Ligua and Limache, males were found in very low densities. *H. costera* differs from *H. chiloensis* in the setation on the inner side of propodus in gnathopod 1, narrower propodus on gnathopod 2, the setation of merus and carpus in peraeopods 3 and 4, setation of telson and the epimeral plate 1. The main difference of *H. costera* with *H. curvispina* is the setation of the telson and like in *H. chiloensis*, it has only five pairs of sternal gills. The morphological characteristics of this species differ considerably from any of the species in the "azteca complex". The latter is mainly distributed in North America, with possible incursions in Central America. The presence of *H. azteca* in Chile is highly improbable.

Hyalella fossamancinii *Cavalieri, 1959 (Fig. 4)*

Hyalella fossamancinii Cavalieri, 1959:278-283, figs. 1-4; Barnard & Barnard, 1983: 708; González & Watling, 2001: 198.

Hyalella (Mesohyalella) fossamancinii Bousfield, 1996: 192.

? *Amphithoe andina* Philippi, 1860: 152.

Type material: Museo de La Plata, Argentina. Type locality: San Juan, Argentina, border with Chile, 3,500 m of altitude. Material examined: La Ola, Copiapó, Chile.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp longer than wide, reaching more than half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin. Gnathopod 1 propodus length less than two times maximum width (quadrangular), hatched shape, inner face with more than ten pappose setae, disto-posterior and disto-anterior borders without setose scales. Gnathopod 2 propodus

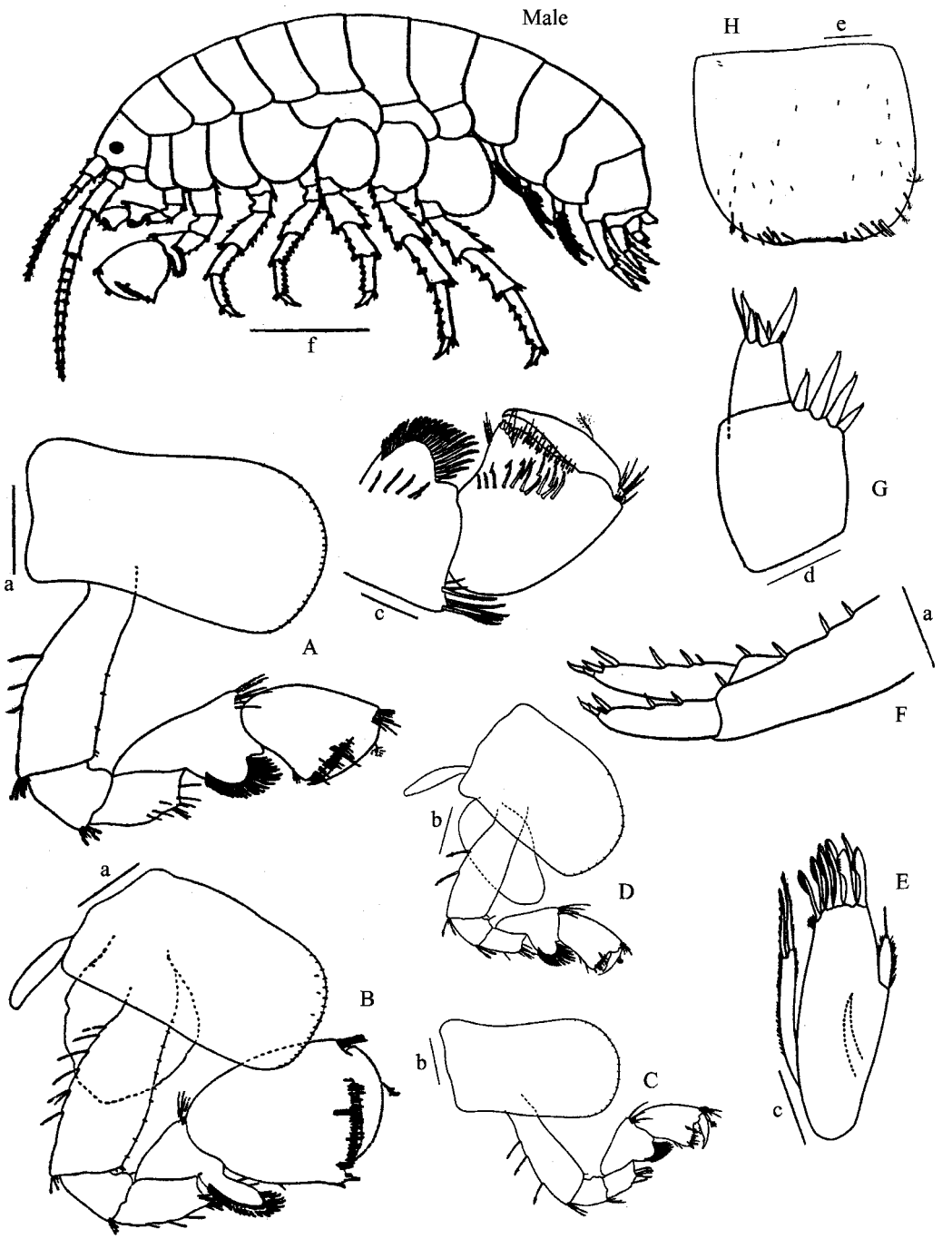

Fig. 4: Hyalella fossamancinii male length 9.4 mm, female 5.6 mm. Modified from Cavalieri (1959). Symbols of figures are: (A), gnathopod 1 male; (B) gnathopod 2 male; (C) gnathopod 1 female; (D) gnathopod 2 female; (E) maxilla 1; (F) uropod 1; (G) uropod 3; (H) telson. The scale is indicated as a small bar on each appendices: "a" is equivalent to 500 µm; "b" is equivalent to 300 µm; "c" is equivalent to 200 µm; "d" is equivalent to 150 µm; "e" is equivalent to 100 µm; and "f" is equivalent to 2 mm.

Hyalella fossamancinii macho, largo 9,4 mm, hembra 5,6 mm. Modificado de Cavalieri (1959). Símbolos para las figuras son como sigue: (A) gnatópodo 1 macho; (B) gnatópodo 2 macho; (C) gnatópodo 1 hembra; (D) gnatópodo 2 hembra; (E) maxila 1; (F) urópodo 1; (G) urópodo 3; (H) telson. La escala de tamaño esta indicada por una pequeña barra en cada apéndice: "a" es equivalente a 500 µm; "b" es equivalente a 300 µm; "c" es equivalente a 200 µm; "d" es equivalente a 150 µm; "e" es equivalente a 100 µm; and "f" es equivalente a 2 mm.

ovate, palm length the same as posterior margin, slope slightly oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with four hind marginal clusters of short setae; propodus posterior margin with five to eight groups of setae. Uropod 3 peduncle with four strong distal setae; outer ramus shorter than peduncle, basal width two times or less tip of ramus. Telson wider than long, apically quadrate, with more than two small or minute setae, asymmetrically distributed on the apical margin. Sternal gills in segments 3 to 7.

Characters of female that differ from male. Size, 5.6 mm. Antenna 1 flagellum with eight articles. Antenna 2 similar in shape to male, flagellum with nine articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length less than two times maximum width, normally subchelate, palm transverse.

Habitat: freshwater, epigean, littoral. Distribution in Chile: Surire in Arica; Putana river, El Tatio to Salar de Punta Negra in Antofagasta and La Ola, Copiapó.

Remarks. The distribution of this species, in Chile and Argentina, is much northern than the distribution of other members of the "patagonica" group. However, the characteristic hatch shape of propodus in gnathopod 1 represents the common feature for the species complex. The record of *H. andina* (Philippi, 1860) a freshwater amphipod for the Atacama desert (Cachinal de la Sierra, Agua de Profetas (locality not longer exist with this name), and Riofrio), is hardly comparable to any of the species present in Chile. The description is very general and no figures are given. However, the mention of small eyes and triangular gnathopod 1 could put this species closest to *H. fossamancinii*. Since the holotype of *H. andina* is not available and the description is poor, it is better to consider *Hyalella andina* a *nomen dubium*. *Hyalella. fossamancinii* has been recorded for San Juan in Argentina, at high altitude, close to the border with Chile, so it is not surprising to find it in the Chilean part of the Andes. This species is close to *H. franciscae*, for details see the remarks section in the latter species.

Hyalella franciscae *González & Watiling, 2003a (Fig. 5)*

Hyalella sp. "B" Bousfield, 1996: 188, fig. 15c.

Hyalella franciscae González & Watiling, 2003a:

Type locality: Laguna El Paso, Torres del Paine, Chile. Material examined: Laguna El Paso, Torres del Paine, Chile.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp longer than wide, reaching base of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin. Gnathopod 1 propodus length less than two times maximum width (quadrangular), hatched shape, inner face with more than ten pappose setae, disto-posterior and disto-anterior borders without setose scales. Gnathopod 2 propodus triangular, palm longer than posterior margin, slope oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with four hind marginal clusters of long setae; propodus posterior margin with five to eight groups of setae. Uropod 3 peduncle with five strong distal setae; outer ramus same length as peduncle, basal width more than two times tip of ramus. Telson wider than long, apically rounded, with more than two, long and short simple setae, asymmetrically distributed on the apical margin. Sternal gills in segments 3 to 7.

Characters of females that differ from males. Size, 11.4 mm. Antenna 1 flagellum with seven articles. Antenna 2 similar in shape to male, flagellum with ten articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length less than two times maximum width, normally subchelate, palm transverse.

Habitat. Freshwater, epigean, littoral.

Distribution: El Paso, Lago Risopatrón, Laguna Melliza, Laguna Redonda, Laguna Larga, Lago Sarmiento, Patagonia, Chile, South America.

Remarks: this species is close to *H. fossamancinii*, but differs in having 16 setae on the inner face of propodus in gnathopod 1; long setae on posterior margin of merus and carpus of peraeopods 3 and 4; long ramus on uropod 3; long setae on posterior margin of telson; several setae on uropod 1, and bigger eyes. The figures given by Bousfield (1996) of *H.* sp. B correspond well with this species.

Hyalella kochi *González & Watling, 2001 (Fig. 6)*

Allorchestes dentata inermis Faxon, 1876: 373, fig. 35 (in part).

Hyalella cf. gracilicornis González, 1991b: 101, fig. 6 (in part).

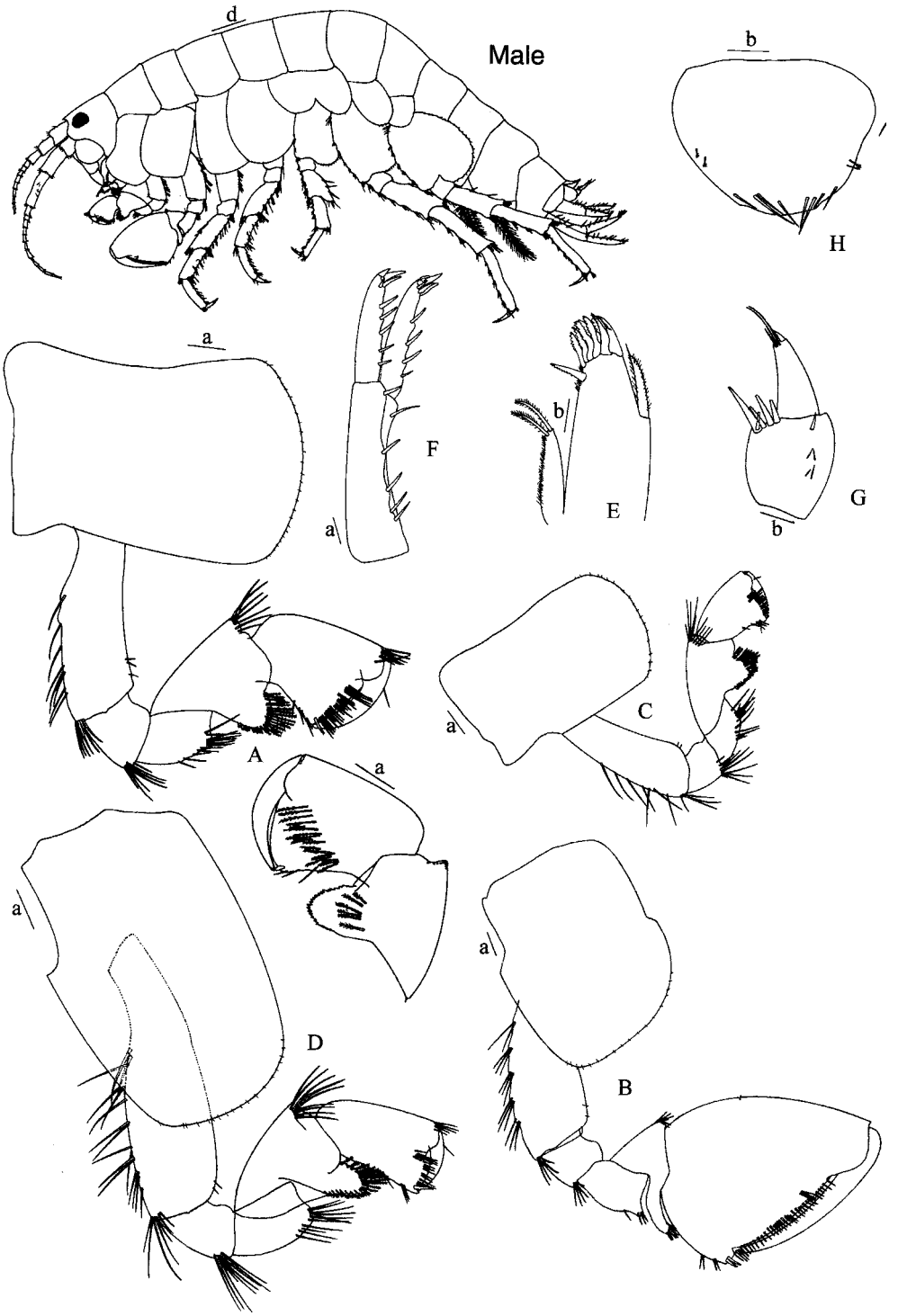

Fig. 5: Hyalella franciscae, male, length 12.8 mm, female 11.4 mm. Modified from González & Watling (2003a). Symbols as in Fig. 4. The scale is indicated as a small bar on each appendices: "a" is equivalent to 192 µm; "b" is equivalent to 94 µm; "d" is equivalent to 481 µm.

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Hyalella franciscae, macho, largo 12,8 mm, hembra 11,4 mm. Modificado de González & Watling (2003a). Símbolos como en Fig. 4. La escala de tamaño esta indicada por una pequeña barra en cada apéndice: "a" es equivalente a 192 µm; "b" es equivalente a 94 µm; "d" es equivalente a 481 µm.

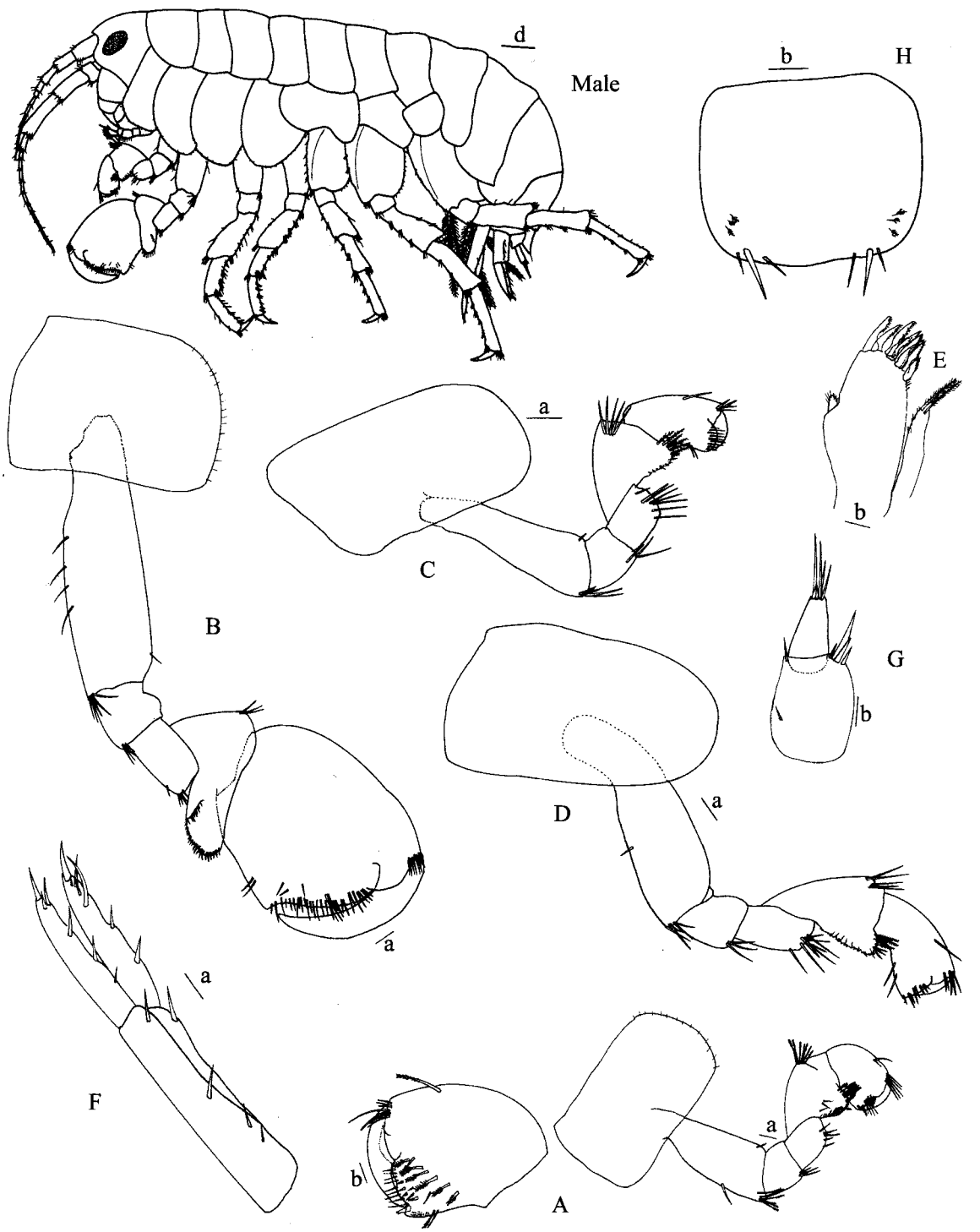

Fig. 6: Hyalella kochi male, length 6.9 mm, female 5.5 mm. Modified from González & Watling (2001). Symbols as in Fig. 4. Scale as in Fig. 2.

Hyalella kochi macho, largo 6,9 mm, hembra 5,5 mm. Modificado de González & Watling (2001). Símbolos como en Fig. 4. Escala de tamaño como en Fig. 2.

Hyalella gracilicornis González, 1991a: 56 (in part).

Type locality: bofedal de Arabilla, Chile. Material Examined: bofedal de Arabilla, Arica; El Tatio, Salar de Punta Negra and Loa river in Antofagasta.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp short, reaching less than half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin. Gnathopod 1 propodus length less than two times maximum width (quadrangular), hammer shape, inner face with seven pappose setae, setose scales on disto-posterior and disto-anterior border. Gnathopod 2 propodus ovate, palm shorter than posterior margin, slope slightly oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with three to four hind marginal clusters of short setae; propodus posterior margin with five to eight groups of setae. Uropod 3 peduncle with four strong distal setae; outer ramus shorter than peduncle, basal width two times or less tip of ramus. Telson as wide as long, apically truncated, with two widely apart, long simple setae, symmetrically distributed, occasionally with shorter setae close to the main setae. Sternal gills in segments 3 to 7.

Characters of females that differ from males. Size, 5.5 mm. Antenna 1 flagellum with six articles. Antenna 2 flagellum with eight articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size and shape. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length two to three times maximum width, normally subchelate, palm transverse.

Habitat: freshwater, epigean, littoral.

Distribution in Chile: Guallatire, Arica to Salar de Punta Negra, Antofagasta.

Remarks: *Hyalella kochi* is common only at high altitude. It is very characteristic for the equal length of ramus and peduncle in uropod 3 and big ovoid eyes. It is found together with *H. fossamancinii*. Both species are common and the male-female ratio is 1:1. The amphipods collected by S. W. Garman on January 19, 1875 in Moro, Lake Titicaca, Perú and San Antonio, Pisagua, northern Chile, (the latter close to the localities examined here) were assigned by Faxon (1876) to *Allorchestes dentata inermis*. The two sets of specimens deposited in the Museum of Comparative Zoology, Harvard University (USA) do not correspond to the same species. The specimens from Chile are closely related to *H. kochi*; however, a more detailed study of the specimens seems necessary. *Hyalella kochi* is a species of wide distribution in the Andes, it has been found in coastal waters of Lake Titicaca, living sympatrically with *H. tiwanaku* González & Watling, 2003c, and in Huancayo, Perú, living sympatrically with *H. pauperocavae* González & Watling, 2002a.

Hyalella simplex *Schellenberg, 1943 (Fig. 7)*

Hyalella simplex Schellenberg, 1943 (in part): 201.

Hyalella knickerbockeri Schellenberg, 1931 (in part): 228-230, fig. 116; not *Allorchestes knickerbockeri* Bate, 1862: 36-37, plate VI, fig. 1; not *Hyalella (Mesohyalella) simplex* Schellenberg, 1943 in Bousfield, 1996: 192.

Hyalella species "S" Bousfield, 1996 (in part): 195-196, fig. 6.

Hyalella curvispina Grosso & Peralta, 1999: 90-94, figs. 46-68.

Hyalella simplex González & Watling, 2003a:

Type material: type unknown or lost. Type locality: Punta Arenas, Chile. Material examined: Punta Delgada, Magallanes, Chile.

Diagnosis: body surface smooth. Coxa 4 excavated posteriorly. Eyes pigmented. Antenna 1 shorter than antenna 2. Antenna 2 less than half body length. Mandible incisor toothed. Maxilla 1 palp longer than wide, reaching half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two strong and pappose apical setae. Maxilla 2 inner plate with one strong pappose seta on inner margin. Gnathopod 1 propodus length less than two times maximum width (quadrangular), hammer shape, inner face with seven pappose setae, setose scales on disto-posterior and disto-anterior border. Gnathopod 2 propodus ovate, palm shorter than posterior margin, slope slightly oblique, anterior edge smooth. Peraeopods 3 and 4 merus and carpus posterior margin with four hind marginal clusters of short setae; propodus posterior margin with two to four groups of setae. Uropod 3 peduncle with three strong distal setae; outer ramus shorter than peduncle, basal width more than two times tip of ramus. Telson as wide as long, apically rounded, with two widely apart, strong setae, symmetrically distributed, no additional apical setae present. Sternal gills in segments 3 to 7.

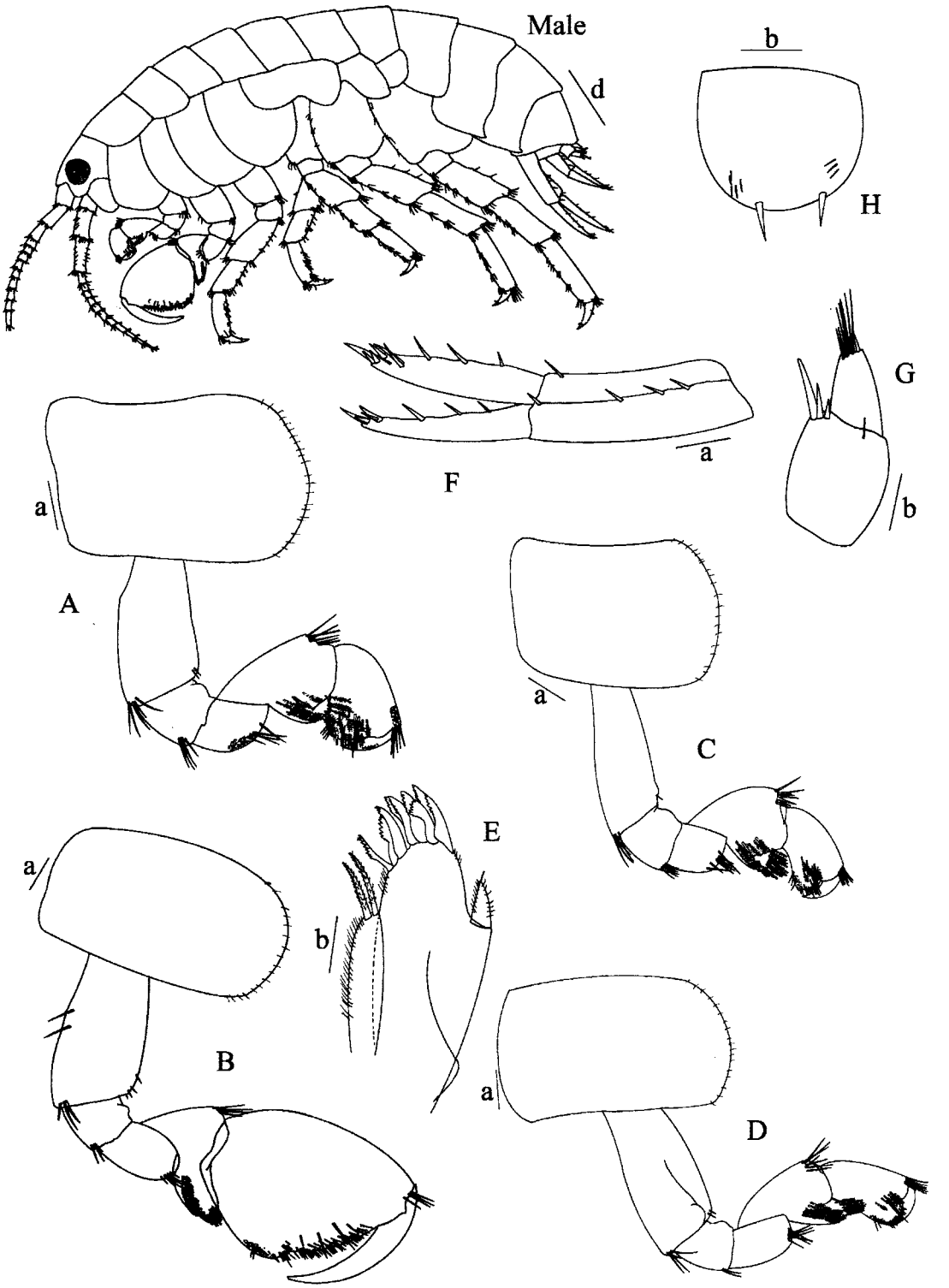

Fig. 7: Hyalella simplex, male 7.8 mm, female 8.1 mm. Modified from González & Watling (2003a). Symbols as in Fig. 4. Scale as in Fig. 5

Hyalella simplex, macho, largo 7,8 mm, female 8,1 mm. Modificada de González & Watling (2003a). Símbolos como en Fig. 4. Escala de tamaño como en Fig. 5.

Characters of females that differ from males. Size, 8.1 mm. Antenna 1 flagellum with nine articles. Antenna 2 flagellum with eleven to fourteen articles. Gnathopod 1 similar in size, and same shape to gnathopod 2; similar to male gnathopod 1 in size and shape. Gnathopod 2 different from male gnathopod 2 in shape and smaller, propodus length less than two times maximum width, normally subchelate, palm transverse.

Habitat: freshwater, epigean. Distribution: Punta Delgada, Lago Queillehue, Magallanes, Chile, South America.

Remarks: the distribution of *H. simplex* is confined to the extreme south of South America, where the "*patagonica* complex" dominates the freshwater habitat. The description by Schellenberg (1931) of *H. knickerbockeri* for Chile was later (Schellenberg 1943) considered a new species, *H. simplex*. The material studied by Schellenberg (1931) included specimens from several localities in Chile, Argentina including Isla Malvinas (Falkland islands), and Uruguay. The species pictured in his work correspond to the material from Punta Arenas (Chile). The material from Putabla and Quilpué (Chile) correspond to *H. costera*. Type material from Schellenberg's original sampling was not available, but material from the same localities was collected and analyzed. *H. simplex* differs from *H. kochi* in the shape and setation of telson, the longer palp in maxilla 1, the several connate setae on inner plate and wider article 2 of palp in maxilliped, and the longer propodus in female gnathopod 2. This species was mistakenly described as *H. curvispina* by Grosso & Peralta (1999). *H. simplex* has sternal gills in segments 3 to 7, *H. curvispina* in segments 2 to 7. These authors in the description of this species include populations as far north as Concepción (Chile). In the samples analyzed in this work from that area, *H. simplex* was not present. Grosso & Peralta (1999) based their identifications on the presence of curved setae on inner ramus of uropod 1. This character is common in several species with very different general morphologies and distribution of sternal gills.

DISCUSSION

The information gathered for this work from new material collected in Chile, and the examination of type material in most cases, indicates that the synonymies proposed by Barnard & Barnard (1983) and the distributions proposed by González (1991a, 1991b) are no longer valid. *H. gracilicornis* is a species from the Amazonian basin and its area of influence. The morphological characteristics of this species (González & Watling 2003b) do not agree with any of the species found in Chile. *Hyalella azteca* has been mention for South America and Chile several times (Ruffo 1947, González 1991a, Villarroel & Graziani 1995). However, the redescription of the species by González & Watling (2002b) makes it clear that the morphology is not present in South America. Unfortunately, some countries have imported specimens of *H. azteca* from U.S.A. to be used in toxicological studies, that may have introduced the species into natural habitats. The *azteca* morphology has not been found for Chile yet. *Hyalella andina* most probably corresponds to *H. fossamancinii*, but it is not possible to validate it. *H. simplex* is not synonym with *H. curvispina*. The material reported by Schellenberg (1931) comprises and array of different species, the drawings and description in his publication correspond to *H. simplex*. Samples of *H. curvispina* from Argentina, Uruguay and Brazil indicates that the morphology, although variable, does not correspond with the ones present in Chile. The samples analyzed of *H. araucana* indicates that its distribution is restricted to areas near Punta Arenas (Chile) and probably toward the east into Argentina, this distribution agrees with the type locality of *H. patagonica*. *Hyalella franciscae* has a distribution northwest of Punta Arenas toward Torres del Paine National Park. The former *H. patagonica* (Cunningham, 1871) could be any of the species in the complex.

To summarize, we recognize seven species of *Hyalella* present in Chile (*H. simplex* Schellenberg, 1943; *H. fossamancinii*, Cavalieri, 1959; *H. kochi* González & Watling, 2001; *H. chiloensis* González & Watling, 2001; *H. costera* González & Watling, 2001; *H. araucana* Grosso & Peralta, 1999; and *H. franciscae* González & Watling, 2003a). The other four species previously mentioned for Chile are either not present or they are in the synonymy of one the above species. Further sampling of the Andean region, especially in northern Chile could find the species *H. tiwanaku* González and Watling, 2003c and *H. pauperocavae* González and Watling, 2002a now only known for Bolivia and Perú, respectively.

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APPENDIX 1

Key to the species of *Hyalella* in Chile

Clave para la identificación de *Hyalella* en Chile

(Also included *Hyalella pauperocavae, Hyalella tiwanaku* and *Hyalella curvispina*)

1(0) Gnathopod 1 hatched shape (Fig. 1A) 2
Gnathopod 1 hammer shape (Fig. 2A) 4

2(1) Telson with several long apical setae (Fig. 5H) ..... *H. franciscae*
Telson with minute apical setae (Fig. 1I) 3

3(2) Palm of propodus in male gnathopod 1 shorter than posterior margin (Fig. 4A) ..... *H. fossamancinii*
Palm of propodus in male gnathopod 1 longer than posterior margin (Fig. 1A) ..... *H. araucana*

4(1) Sternal gills present in segments 2 to 7 5
Sternal gills present in segments 3 to 7 6

5(4) Uropod 3 peduncle slender (rectangular) ..... *H. curvispina*
Uropod 3 peduncle quadrate ..... *H. tiwanaku*

6(4) Telson wider than long, with several strong apical setae ..... *H. pauperocavae*
Telson longer than wide, with several long slender apical setae (Fig. 2I) ..... *H. chiloensis*
Telson as wide as long, with two main apical setae (Fig. 7H) 7

7(6) Ramus of uropod 3 shorter than peduncle (Fig. 7G) 8
Ramus of uropod 3 longer than peduncle (Fig. 3H) ..... *H. costera*

8(7) Telson quadrate, with two main slender apical setae and four small accessory setae (Fig. 6H) ..... *H. kochi*
Telson ovoid, with two strong apical setae (Fig. 7H) ..... *H. simplex*