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AMPHIPODA (CRUSTACEA, PERACARIDA) OF GUAMBLÍN ISLAND NATIONAL PARK, CHILEAN ARCHIPELAGOES

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Abstract: The composition of the amphipod fauna of the Guamblín Island National Park, Aysén Patagonia, Chile, is analyzed. A total of 15 species are studied, all of them new records for this area. Two species (*Parapherusa crassipes* and *Aora cf. maculata*) are reported for first time from Chile, one (*Orchestoidea* sp.) corresponds to an undescribed species and six (*Phoxocephalopsis mehuinensis*, *Melita* sp., *Protohyale rubra*, *Parhyalella penai*, *Orchestoidea tuberculata* and *Tryphosella paramoi*) extend their known distributional range to Guamblín Island. This is the first information about the amphipod fauna of a remote and little known area of the Chilean Patagonia.
Key words: Crustacea, Amphipoda, new records, distribution range, taxonomic comments, Aysén, Chile.

Amphipoda (Crustacea, Peracarida) del Parque Nacional Isla Guamblín, archipiélagos chilenos
Resumen: Se analiza la composición de la fauna de anfípodos del Parque Nacional Isla Guamblín, Patagonia de Aysén. Se estudiaron un total de 15 especies, todas ellas nuevos registros para esta zona. Dos especies (*Parapherusa crassipes* y *Aora cf. maculata*) son citadas por primera vez en Chile, una (*Orchestoidea* sp.) corresponde a una especie no descrita y seis (*Phoxocephalopsis mehuinensis*, *Melita* sp., *Protohyale rubra*, *Parhyalella penai*, *Orchestoidea tuberculata* y *Tryphosella paramoi*) expanden su rango distribucional conocido hasta Isla Guamblín. Esta es la primera información acerca de la fauna de anfípodos de un área remota y poco conocida de la Patagonia chilena.
Palabras clave: Crustacea, Amphipoda, nuevos registros, rangos de distribución, comentarios taxonómicos, Aysén, Chile.

Introduction

In Chile, the marine area between Chiloe and Cape Horn (40º to 56º S) is one of the least studied from the viewpoint of its biodiversity (Arntz, 1999; Escribano *et al.,* 2003) due to restricted access to study sites and difficult climatic conditions. This area, comprising a broad insular system with profusion of bays, fjords and channels (Camus, 2001), shows a remarkable habitat diversity (Ward *et al.,* 1999) and high number of invertebrate species in relation to other areas of the country (Fernandez *et al.,* 2000; Lancellotti & Vásquez, 2000).

Guamblín Island is the most oceanic component of the Chonos Archipelago, in the Aysén Region, located approximately 30 km to southwest of Ipún. This island was declared National Park in 1976, but the knowledge of its biodiversity is still scarce and limited to publications on the flora (Ramirez *et al.,* 2004), nudibranch mollusks (Schrödl & Grau, 2006), decapod crustaceans (Xu *et al.,* 2009), mammals (Valenzuela & Grau, 2005), birds (Castro *et al.,* 2009), and coleopteran insects (Pérez-Schultheiss *et al.,* 2009). In addition, there are some unpublished reports by the National Forestry Corporation (CONAF) and the Scientific Expedition to the Chonos Archipielago conducted by the Universidad Austral de Chile. These reports give general information about flora and fauna, the latter restricted to some species of annelid worms, mollusks, arthropods and vertebrates. Currently there is few published information regarding the composition of the crustacean fauna, but some data recorded by Grau (unpublished report) indicate the presence of six decapod species. Nothing is currently known about the Amphipoda species present on Guamblín Island.

The Magellan Amphipoda has been studied on several occasions (Schellenberg, 1931; Lowry & Bullock, 1976; González, 1991b; De Broyer & Jazdzewski, 1993; De Broyer & Rauschert, 1999), but the northern area of this biogeographic sub-region, where Guamblín Island National Park is located, has been considerably less studied (Chieza *et al.,* 2007). Herewith, in this paper, we study for the first time the amphipod crustaceans present on Guamblín Island National Park, providing new distributional records, some information of species not previously cited in Chile and the presence of an undescribed species.

Material and methods

During January 2008, the Universidad de Los Lagos and the Centro de Investigación en Ecosistemas de la Patagonia (CIEP) conducted a scientific expedition to Isla Guamblín, Aysén District, Chile. Samples of amphipod crustaceans were obtained from the East coast of the island, between Punta Piedra and Punta Arenas (Figure 1), from 11 stations representing diverse intertidal and freshwater adjacent aquatic habitats (Table I). The specimens were collect with hand nets and were immediately fixed and preserved in alcohol 70%.

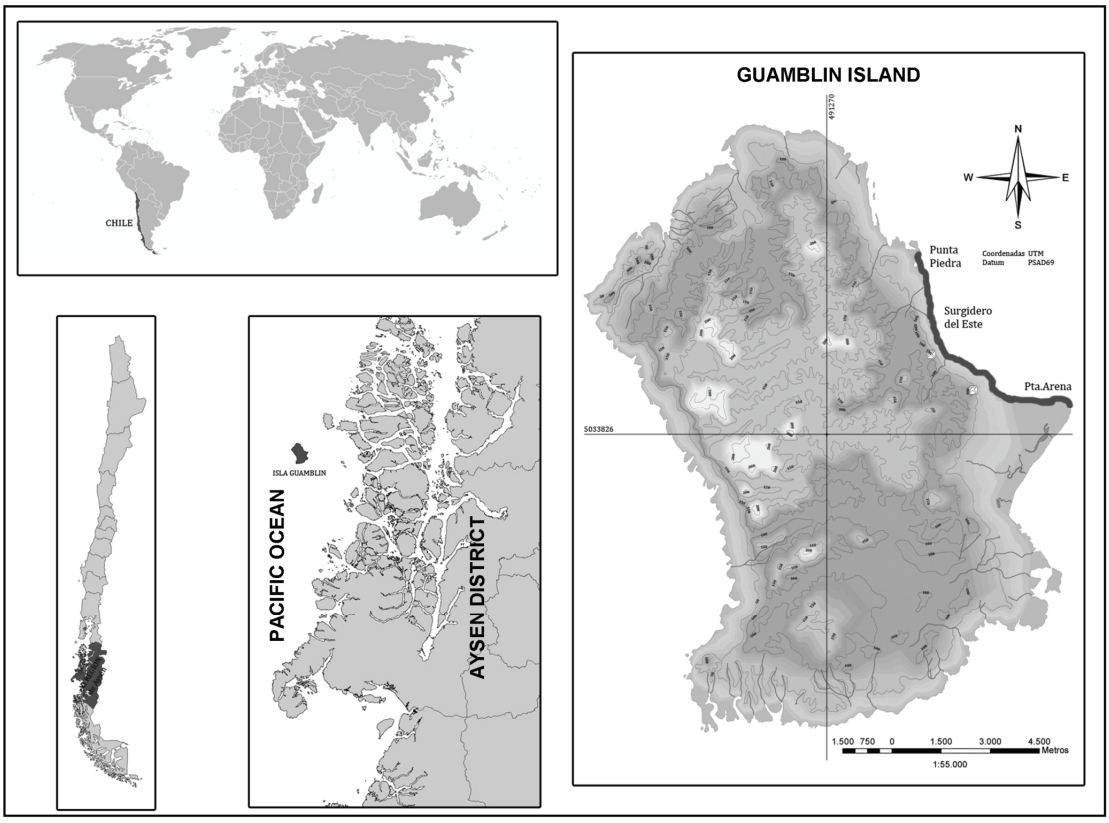

Fig 1. Geographic location of the Isla Guamblín National Park, indicating in red the area under study.

The material was classified at family level and subsequently, some specimens were dissected in alcohol and mounted in glycerine for detailed observation in microscope. All material is deposited in the Biological Collections of the Centro de Estudios en Biodiversidad (CEBCh), Osorno, Chile.

Results

The material includes a total of 10 families and 15 species, 14 of them belonging to the suborder Gammaridea and only one to the suborder Corophiidea (Table II). The superfamily Talitroidea was represented by six species, including some semiterrestrial (Talitridae) and freshwater (*Hyalella* sp.) forms.

Taxonomic part

***Melita* sp.**

The material studied could correspond to *Melita gayi* (Nicolet, 1849), the only species of the genus previously cited in Chile from Herradura Bay and Coquimbo (González, 1991b), but this melitid was poorly described and cannot be recognized with precision. The only character that can be useful in the recognition of the species is the large lobe on coxa 6 (Stebbing, 1906), although this is a feature present also on females of several species of the genus.

The specimens studied are very close to *M. inaequistylis* (Dana, 1852), especially in dorsal urosomite armaments, coxa 1 and male gnathopods; but differs in the shape of lateral cephalic lobes and prebuccal mass, the 4-articulate accesory flagellum, non-serrate dactyls of pereiopods, posterior margin of epimeron 3 slightly concave, article 2 of uropod 3 longer and distal margin of inner ramus obtusely pointed. The condition of female coxa 6 is unknown because there are not adult females among the Guamblín island material. A complete study of numerous samples from more Chilean localities is needed in order to confirm the validity of and rediagnose *M. gayi*.

***Parapherusa* sp.**

The melitids of the genus *Parapherusa* are defined by the accesory multiarticulate flagellum (7-9 articles), coxa 4 not excavated, uropod 1 with developed interramal spine, rami of uropod 3 shorter than peduncle, with ornamented spines at apex, and telson entire. The only known species of the genus, *Parapherusa crassipes* (Haswell), is known from Australia, New Zealand and Tristan da Cunha (Barnard, 1972b; Chilton, 1920; Lowry & Fenwick, 1983; Stephensen, 1949), where it is a common inhabitant of the lower intertidal zone to about 20 m depth, mostly among seaweed (Lowry & Fenwick, 1983). This is the first record of the genus in South American waters. The single specimen collected in Guamblín Island has a gnathopod 2 similar to that reported by Chilton (1916) and Stephensen (1949) in males of *P. crassipes*, but our specimen does not display male genital papillae nor oostegites. Additionally we have at hand other single specimen found in a sample from Pucatrihue (Región de Los Lagos), but this is an ovigerous female, strangely with a large gnathopod 2, as a male and longer spines on the telson. It is needed a more numerous collection of this genus to know the specific status of the Chilean material.

Table I. Collecting stations of Amphipoda on Isla Guamblín National Park.

Station	Date	Description
1	22-JAN-2008	Supratidal: filtration area in brackish water from nearby wetland. Under rocks
2	23-JAN-2008	Rocky intertidal: floating algae debris
3	23-JAN-2008	Sandy intertidal: infauna
4	23-JAN-2008	Rocky intertidal: gravel accumulated in tidal pool
5	23-JAN-2008	Rocky intertidal: between coralline algae in tidal pools
6	23-JAN-2008	Rocky intertidal: infauna of sand accumulated in rockeries
7	25-JAN-2008	Wetland with about 10 cm of freshwater between reeds
8	26-JAN-2008	Sand supratidal: 30 cm deep hole dug out in the sand
9	26-JAN-2008	Sandy intertidal mid-inferior infauna
10	26-JAN-2008	Posterior dunes on sandy beach: buried in a mound surrounded by grasses
11	28-JAN-2008	Stream: Sandy sediment sample including plant debris

Table II. Species, number of specimens and collection stations of amphipods in Isla Guamblín Nacional Park.

Species		Stations										
		1	2	3	4	5	6	7	8	9	10	11
Order Amphipoda												
Suborder Gammaridea												
Melitidae	*Melita* sp.	–	–	–	2	3	–	–	–	–	–	–
	Parapherusa sp.	–	–	–	–	1	–	–	–	–	–	–
Pontogeneiidae	*Paramoera cf. fissicauda*	–	–	–	32	–	–	–	–	–	–	–
	Paramoera sp.	–	–	–	–	2	–	–	–	–	–	–
Atylidae	*Nototropis cf. dentatus*	–	30	–	–	–	–	–	–	–	–	–
Phoxocephalopsidae	*Phoxocephalopsis mehuinensis*	–	–	109	–	–	7	–	–	14	–	–
Cheidae	*Cheus annae*	–	–	4	1	–	5	–	–	–	–	–
Lysianassidae	*Tryphosella paramoi*	–	–	2	–	–	–	–	–	–	–	–
Hyalidae	*Protohyale rubra*	–	–	–	–	12	–	–	–	–	–	–
Dogielinotidae	*Parhyalella penai*	–	80	–	–	–	–	–	–	–	–	–
	Hyalella chiloensis	–	–	–	–	–	–	30	–	–	–	2
Talitridae	*Transorchestia chiliensis*	17	–	–	–	–	–	–	–	–	–	–
	Orchestoidea tuberculata	–	–	–	–	–	–	–	82	–	–	–
	Orchestoidea sp.	–	–	–	–	–	–	–	2	–	3	–
Suborder Corophiidea												
Aoridae	*Aora cf. maculata*	–	–	–	–	4	–	–	–	–	–	–

Paramoera cf. fissicauda

Currently the genus *Paramoera* Miers, 1875 includes more than 40 species (Staude, 1995), but the inadequate description of the first taxa known (e.g. *austrina* (Bate), *fissicauda* (Dana), *capensis* (Dana), *australis* Miers and *gregaria* (Pfeffer)) has resulted in a great confusion and profusion of synonyms (Schellenberg, 1931), that difficult the recognition of some taxa (Thurston, 1974; De Broyer & Jazdzewski, 1993). In Chile there are reports of *P. brachyurus* Schellenberg, 1931, *P. fissicauda* (Dana, 1852), *P. pfefferi* Schellenberg, 1931 (González, 1991b), *P. gregaria* (Pfeffer), *P. hermitensis* KH Barnard, *P. obliquimana* KH Barnard and *P. parva* Ruffo (cited from Magellanic Sub-region in Chile by De Broyer and Rauschert, 1999).

Bellan-Santini and Ledoyer (1974) redefined *P. fissicauda* based on material from the Kerguelen and Crozet Islands, but these specimens have been recognized as an undescribed new species (Barnard & Karaman, 1991; De Broyer & Jazdzewski, 1993). Because of this, currently it is not possible to identify *P. fissicauda* and, accordingly, it is suggested to review new material eventually collected near the type locality, nine miles north of Valparaiso (Dana 1852).

***Paramoera* sp.**

It was not possible to determine this material. However, some taxonomic characters are in agreement with the genus *Paramoera*, such as an oblique row of setae on the inner plate of the maxilla 2, the medial margin of the inner plate of maxilla 1 with setae on the most part, and the cleft telson, with only one strong seta at the apex of each lobe. It will be necessary to collect new material, because the specimens studied are two small damaged juveniles.

***Nototropis cf. dentatus* (Schellenberg, 1931)**

The specimens are very similar to *N. dentatus* (Schellenberg, 1931), especially in the rounded anteroventral corner of the head, second segment of peduncle of antenna 1, shape of coxa 1, setae arrangement on epimeron and dorsal structure of pleosomite 3 and urosomite 2-3. However, there are some remarkable differences such as the slightly more marked upper portion of the lateral cephalic lobe, the absence of posterodorsal teeth in the seventh pereionite and pleosomites, and the absence of a concavity in the dorsal carina of the urosomite 3. As noticed by Barnard (1932) in *A. villosus* (Bate), it is possible that our specimens represent an indentate form of *A. dentatus* although several character are unknown for this species. The slight differences with the original description of the species reported herewith makes compulsory a detailed study and comparation with the type material of Schellenberg.

***Phoxocephalopsis mehuinensis* Varela, 1983**

Phoxocephalopsis mehuinensis Varela, 1983: 27-32, Figs. 2-4; Thurston, 1989: 309 (key); González, 1991b: 62.

P. mehuinensis can be recognized by the convex-rounded posterior margin of the epimeron 3, peduncle of uropod 2 setose, and article 2 of outer ramus of uropod 3 short (attaining 20% length of article 1) (Thurston 1989). The species is a common inhabitant of some sandy beaches of the

Región de Los Lagos (~41° S). This is a new record that marks the southern limit of its distribution.

***Cheus annae* Thurston, 1982**

Cheus annae Thurston, 1982: 414-419, Figs. 1-3; De Broyer and Jazdzewski, 1993: 26; De Broyer and Rauschert, 1999: 283 (cited in table); De Broyer *et al.,* 2007: 180.

This species, originally described from sandy beaches of the Falkland Islands (Thurston, 1982), has been cited several times in estuaries of the Chilean coast from the Biobío River to Guamblín Island (Turner, 1984; Bravo, 1984; Bertran *et al.,* 2001). The species has also been reported from the Magellan Sub-region in Chile by De Broyer and Rauschert (1999), however these authors do not indicate precise localities.

The species is rare in Chilean marine environments. Seemingly, Thurston (1982) points out that this species is "not very common" in the type locality, a marine beach. Probably, the prospection of estuaries in the Falklands could confirm their status as predominantly estuarine, as observed in Chile.

***Tryphosella? paramoi* (Schellenberg, 1931)**

Tmetonyx paramoi Schellenberg, 1931: 41-43, Fig. 20-21; Barnard, 1958: 100.

Tryphosa paramoi Barnard, 1962: 30 (in key).

Tryphosella paramoi Lowry & Bullock, 1976: 108; González, 1991b: 59; Barnard & Karaman, 1991: 537 (quest. gen).

Tryphosella? paramoi De Broyer and Rauschert, 1999: 285; De Broyer *et al.,* 2007: 154.

Tryphosella is distinguished from other genera in the Tryphosine group principally by the display of a reduced and tapering first coxa, and the proximally setose and distally triturative molar (Lowry & Stoddart, 1995). Our specimens have a non-reduced coxa and consequently their generic assignment remains unresolved (Barnard & Karaman, 1991). The specimens have the posterior margin of epimeron 3 with fewer and more rectangular denticles than Schellenberg (1931) illustration, thus approaching to *Tryphosella castellata* (K. H. Barnard, 1932) but differing from this species in the not distally widened epimeron 1, the deep dorsal notch present on urosomite 1 and the sharper lateral cephalic lobe. The species has been cited previously only from the Magellan Strait (González, 1991b), although De Broyer and Rauschert (1999) reported it from the Chilean part of the Magellan sub-region, but without indication of precise localities. The two specimens found in Guamblín Island extends the northern limit of the distribution of the species.

***Protohyale (Boreohyale) rubra* (Thompson, 1879)**

Nicea rubra Thompson, 1879: 236, Pl. 10b, Fig. 3; Thompson and Chilton, 1886: 144.

Hyale rubra Stebbing, 1888: 500; Stebbing, 1906: 572; Barnard, 1974: 67-72, Figs. 43-45; Barnard, 1979: 101-102, Figs. 56hG1o-hP3; González, 1991a: 126-128, Figs. 1-2.

Protohyale (Boreohyale) rubra Bousfield and Hendricks, 2002: 61 (cited).

This widely distributed species is known from Australia, New Zealand, Japan, Hawaii, and Juan Fernandez Islands, continental Chile, and Perú (Barnard, 1979; González, 1991a, 1991b). It can be recognized based on the strong distolateral spine displayed on the first uropod, the small or absent inner marginal dactyl setae, the coxa 1 without posterior cusp, the subrectangular propodus of the first gnathopod provided with an oblique palm, the maxillipedal dactyl with long distal setae surpassing the distal nail, and the slightly crenulate posterior margin of pereiopod 7. In Chile, *P. rubra* has been recorded only in the north, from Iquique to Coquimbo (González, 1991b). The specimens of Guamblín Island represent a significant expansion of the range for the species to the south of the country.

***Parhyalella penai* Pérez-Schultheiss and Crespo, 2008**

Parhyalella sp. Andres, 1975: 85-86; González, 1991b: p. 56; González, 1991c: 102-103, fig. 7 (not *Parhyalella ruffoi* Lazo-Wasem and Gable, 2001).

Parhyalella penai Pérez-Schultheiss & Crespo, 2008: 62-66, Figs. 1-5.

The males of this species can be characterized by the following features: eyes medium-sized, oval, dark; antenna 2 peduncle very strong, flagellum article 1 4-conjointed; anterior margin of gnathopod 1 segment 5 with or without single medial seta, palm transverse, gently concave, dactyl bifurcate; gnathopod 2 segment 6 with rounded posterior margin; margin of inner ramus of uropod 2 with a single row of spines.

This species is common among subtidal floating macroalgae that temporarily reach the intertidal fringe (e.g. Rodriguez, 2000). The material studied allows to extend the known distribution for the species, which had previously been recorded from Coquimbo to Maicolpué in continental Chile (Perez-Schultheiss & Crespo, 2008).

***Hyalella chiloensis* González & Watling, 2001**

Hyalella chiloensis González and Watling, 2001: 177-183, Figs. 1-4; González, 2003: 625-627, Fig. 2; Jara *et al.* 2006: 42, 43, 44 (cited).

The species can be recognized by the following combination of characters: medium, ovoid eyes. Propodus of male gnathopod 1 not subtriangular, inner side with nine pappose setae and 10-16 small triangular setae. Palm margin of male gnathopod 2 convex, as long as posterior margin of propodus. Telson longer than wide, apically truncated, with more than two long and short simple setae (there may be additional smaller ones). Uropod 3 rami not shorter than peduncle. Sternal gills present on segments 3-7 (González & Watling, 2001).

This species is distributed from Laguna Redonda in Concepción, to Ñirepan River, Coyhaique (González, 2003). Its range overlaps with *Hyalella costera* González and Watling, 2001 from Valdivia to the north, but can be differentiated from this species by the foregoing diagnosis.

***Transorchestia chiliensis* (Milne Edwards, 1840)**

Orchestia chiliensis Milne Edwards, 1840: 18; Stebbing, 1906: 537; Schellenberg, 1931: 224; Ruffo, 1949: 53, Fig. 18; Varela, 1983: 43-47, Figs. 11-13 (not *Orchestia chiliensis* Hurley, 1957).

Transorchestia chiliensis Bousfield, 1982: 20-21, Fig. 9; González, 1991b: 64; González, 1991c: 103, Fig. 8; Carvacho and Saavedra, 1994: 173.

This species can be differentiated from other Chilean talitrids by the 4-dentate left lacinia mobilis, maxillipedal palp obscurely 4-segmented, antenna 2 and pereiopods 6-7 sexually dimorphic, dactyl 1 of the female barely or not exceeding palm, anterior margin of posterior lobe of coxa 6 vertical, telson elongated and distally narrow, with rows of

dorsolateral spines, and marginal setae on oostegites hook tipped.

Transorchestia chiliensis has been cited from Chile and New Zealand (Varela, 1983), but Bousfield (1982) suggested that specimens of New Zealand redescribed by Hurley (1957) might be *Transorchestia serrulata* (Dana, 1852). In Chile, this species has a wide distribution, ranging from Antofagasta to Cape Horn (González, 1991b), where it is found under rocks on the upper parts of beaches (González, 1991c; Varela, 1983) and occasionally under algae stranded in the supratidal zone.

***Orchestoidea tuberculata* Nicolet, 1849**

Orchestoidea tuberculata Nicolet, 1849: 527-528; Stebbing, 1906: 231-232; Bousfield, 1982: 45, Fig. 20; Varela, 1983: 39-43, Figs. 8-10; Carvacho and Saavedra, 1994: 172. González, 1991b: 63; González, 1991c: 108, Fig. 12.

O. tuberculata is the only sandhopper species found so far in Chile, since the presence of *Talorchestia quoyana* (Milne Edwards) has not been confirmed (González, 1991c). This species is distributed from Antofagasta to Quellón Viejo (González, 1991b, 1991c). However, it seems necessary to conduct more collections to confirm this information, considering that Bousfield (1982) cited specimens from Mejia, Perú, and the recent discovery of specimens in another locality of the Aysén Region (Baessolo *et al.,* 2010).

***Orchestoidea* sp.**

This is an undescribed species currently under study, which will be formally described in a separate paper along with a redescription of *O. tuberculata*. Preliminary observations indicate that it differs from *O. tuberculata* in the more slender appendages (e.g. pereiopods, pleopods, uropods), the smaller but more prominent distal tubercle of propodus of first gnathopod, posterior lobe of coxa 5 not reaching half of basis, antero-ventral margin of coxa 6 evenly rounded, second uropod with fewer setae on the margins of rami, lack of marginal ridge on the inner margin of uropod 2 inner ramus and telson lengthened, less curved dorsally. The preserved specimens are easily recognizable from *O. tuberculata* by their slender habitus and tendency to fix with the pleon extended.

Orchestoidea sp. has been found recently in three localities in the inland sea of Aysén and Chiloé, sharing with *O. tuberculata* sandy beaches and appearing generally mixed in collections, but at station 10 some specimens were found separate, buried in dunes and away from the influence of waves.

***Aora cf. maculata* (Thomson, 1879)**

The genus *Aora* Krøyer, can be recognised principally on the basis of a gnathopod 1 merochelate, simple and larger than gnathopod 2. Our specimens key out to *A. maculata* in the key to world *Aora* by Myers & Moore (1983), and differ from all additional species described until now (*A. pseudotypica* Hyrayama, 1984, *inermis* Apadoo & Myers, 2004 and *karibu* Vader & Krapp, 2005). There is only one hyperadult male in our samples, whose gnathopod 1 is very similar to the figure of *A. maculata* provided by Barnard (1972: fig. 10h). However, our specimens can be differentiated from *A. maculata* principally by their smaller size (no more than 5 mm), the slightly less setose antennae, specially antenna 1, and the reduction of the spine on the posteroventral margin of epimera. Other characters probably significant are the presense of transversal rows of small outgrowths in the hyperadult dorsal surface of pereionites 5-7 and pleosomites 1-2. This character needs confirmation because has not been observed in female or subadult specimens, including additional material from Bahia Metri and Carelmapu in Lakes Region (that do not include hyperadults), where this species has been found also.

Conclusions

This report is a first approximation to the amphipod fauna of a poorly studied geographic area in terms of its biodiversity. The material allowed to expand the known distribution on Chile for several species. *Phoxocephalopsis mehuinensis*, *Melita* sp., *Protohyale rubra*, *Parhyalella penai* and *Orchestoidea tuberculata*, extend their range to the south, and *Tryphosella paramoi* expands its range to the north. Besides, we confirm the presence of *Paramoera cf. fissicauda*, *Cheus annae*, *Hyalella chiloensis* and *Transorchestia chiliensis*, species whose occurrence was expected by their known longitudinal geographic range in Chile.

Some taxonomic problems have arisen during this study. It is necessary to get more material to undertake a detailed analysis of *Nototropis cf. dentatus*, *Aora cf. maculata* and *Melita* sp. in order to determine their specific identity (they are probable new species). It is necessary also to confirm the possible validity of *M. gayi* and the generic position of *Tryphosella paramoi*. New collections should be made in the study area to determine the specific identity of *Parapherusa sp.*, *Paramoera sp.* and to complete the amphipod inventory of Guamblín Island.

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