Diversity of Chilean peracarids (Crustacea: Malacostraca)

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ABSTRACT - A database containing all available published records of peracarid crustaceans from the Pacific coast of Chile was created and evaluated in order to provide a general overview of the peracarid diversity from this region. There are a total of 404 peracarid species recorded from Chile with the orders Amphipoda (44.3% of all species) and Isopoda (41.8%) dominating. A total of 112 (27.7%) reported peracarid species are at present recognized as endemic in Chile. Terrestrial peracarids all belong to the Isopoda (32 species). The majority of aquatic Chilean peracarids are marine with the only freshwater representatives belonging to the amphipod families Hyalellidae and Ingolfiellidae. Most marine species inhabit benthic habitats, primarily soft-bottoms, but macroalgae from hard bottoms also harbor many different species. Feeding modes represented among marine peracarids from Chile comprise predators/scavengers, deposit-feeders, grazers and suspension-feeders in decreasing order of reported species. The majority of peracarid species is recorded from water depths < 100m, and the number of species known from waters > 500m is small; this trend is valid for amphipods and isopods, but cumaceans show an opposite trend with more species reported from deeper waters. Many peracarid species have a limited geographical distribution, having been reported from locations separated by <5 degrees of latitude. There is, however, also a substantial number of species with a wide geographic distribution (30% of species with information extending over >10 degrees of latitude). In general, the peracarid fauna from the Chilean Pacific coast is diverse and species from all major taxonomic and ecological groups are represented. Two opposing trends are most remarkable: while there is a high degree of endemism, there is also a relatively high degree of species that are widespread. It is suggested that these opposing trends are due to the reproductive biology of peracarids (direct development favoring endemism) and to the oceanographic conditions along the Pacific coast of Chile (strong latitudinal currents favoring latitudinal dispersal). Research lines for future studies necessary to improve knowledge about Chilean peracarids are suggested.

Key words: Peracarida, Chile, diversity.
Palabras clave: Peracarida, Chile, diversidad.

Introduction

Peracarids occur in marine, freshwater and in terrestrial environments. In aquatic environments they represent some of the most important consumer groups involved in conversion of organic matter on various levels (Buschmann 1990, Glazier et al. 1992, Aljetlawi et al. 2000). Many species feed on living and dead plant material both in aquatic and terrestrial environments, and peracarids are an important food resource for other organisms (Muñoz & Ojeda 1998). Besides being of great interest from the ecological point of view, peracarids also serve as indicators of biodiversity and of environmental change (Thomas 1993, 1996). They have been used as bioindicators for environmental pollution (see refs. in Thomas 1993), and also in studies of biogeography (Barnard 1972, Brandt et al. 1999).

The aquatic and terrestrial environments of Chile are inhabited by many different peracarid crustaceans (Menzies 1962, González 1991a, Leistikow 1998, 2001). Despite their ecological importance and high abundances in intertidal and shallow subtidal habitats (Buschmann 1990, Brazeiro 1999, Sepúlveda et al. 2003), peracarids have received relatively little research attention in the past. Most studies on Chilean peracarids represent species descriptions or species listings from highly localized samples. Present knowledge of taxonomy and geographic distribution of Chilean peracarids is still based primarily on collections from some of the major expeditions conducted during the 20th century (e.g., amphipods - Swedish Antarctic Expedition 1901-1903; intertidal and shallow-water marine Isopoda - LUND expedition 1948/49; deep-sea cumaceans - VEMA-expedition 1958-61). Some species have been exclusively collected during these expeditions, despite the fact that the taxonomists studying the expedition material remarked on their local ubiquity. During the past two decades, at least for some groups or some habitats the geographic coverage has been extended. Some peracarid taxa have received particular research attention during the past two decades, e.g., the amphipod families Hyalidae (Buschmann 1990, González 1991b, Lancellotti & Trucco 1993) or more recently the Caprellidae (Guerra-Garcia 2002, 2003; Thiel et al. 2003) and the freshwater family Hyalellidae (González & Watling 2001, in press). The peracarid fauna associated with the large tunicates *Pyura praeputialis* and *P. chilensis* has been identified (Cerda & Castilla 2001, Sepúlveda et al. 2003). Studies by Jaramillo and coworkers have focused on the beach fauna (including peracarids) between approx. 20°S and 42°S (Jaramillo et al. 1993, 1998). The peracarid fauna associated with intertidal macroalgae has been examined over a similar geographic range (Thiel 2002). In the Magellan region, several more recent expeditions and research programs have contributed to a better knowledge of the peracarid fauna (Lorenti & Mariani 1997, Brandt et al. 1999, Schmidt & Brandt 2001).

We therefore consider it a timely enterprise to provide an updated summary of the actual knowledge of peracarid crustaceans from Chile. Herein we report the major patterns and we identify some important voids in our present knowledge. Based on these results we propose research topics that can be addressed even by scholars without taxonomic experience in this group.

Material and Methods

An extensive database was created with published records containing references to peracarid crustaceans from aquatic and terrestrial environments of Chile. The references utilized to construct the database are published elsewhere (González & Thiel, in press; the list of all peracarid species from Chile is published at http://herradura.ucn.cl/peracarida, and the complete database is available from the corresponding author upon request). Following the arguments by Hessler & Watling (1999), herein we do not consider the Mysidacea, which most likely will be removed from the Superorder Peracarida in the future. We examined records comprising both taxonomic and ecological studies. Whenever available we included information on endemism, environments, latitudinal and bathymetric distribution, feeding mode, abundance and body size. This information was not available for all species, and very few species had entries in all of these fields. Herein we use entirely descriptive statistics to provide a general overview of the peracarid fauna from Chile. The geographical area considered ranges from the Chile-Peru border to Cape Horn (4200 km) and only records north of 56°S and west of 66°W (Beagle Channel) are included in the database (Fig. 1). Records from the oceanic Islands are included in the database but were excluded for some of the analyses (see below), because their fauna is distinctly different from that of the mainland coast of Chile (Di Salvo et al. 1988).

For the evaluation of endemism we considered all species with type locality in Chile and not recorded outside from Chile as endemic. In order to characterize the environment inhabited by a species we considered species from brackish waters (mainly estuarine species) as marine and semi-terrestrial species (mainly from the supratidal zone on sandy beaches) as terrestrial. For the remaining analyses we focused on marine species. Records from the oceanic islands were excluded from the analyses of bathymetric and latitudinal distribution. For the bathymetric distribution we distinguished several depth categories (intertidal: 0 m; shallow subtidal: 1-50 m; deeper subtidal: 51-100 m; continental shelf: 101-200 m; shelf break: 201-500 m; continental slope: 501-2000 m; deep sea: >2000 m). The distributional range of some species extended over several of these categories – since we were interested in learning how many species have been reported from each of these depth categories, a species with a wide bathymetric distribution (e.g., *Apseudes heroae*: 13-903m) received an entry for each depth category within its bathymetric range. For the latitudinal distribution we examined the range extension of the respective peracarid species, and we determined over how many latitudes each species had been reported.

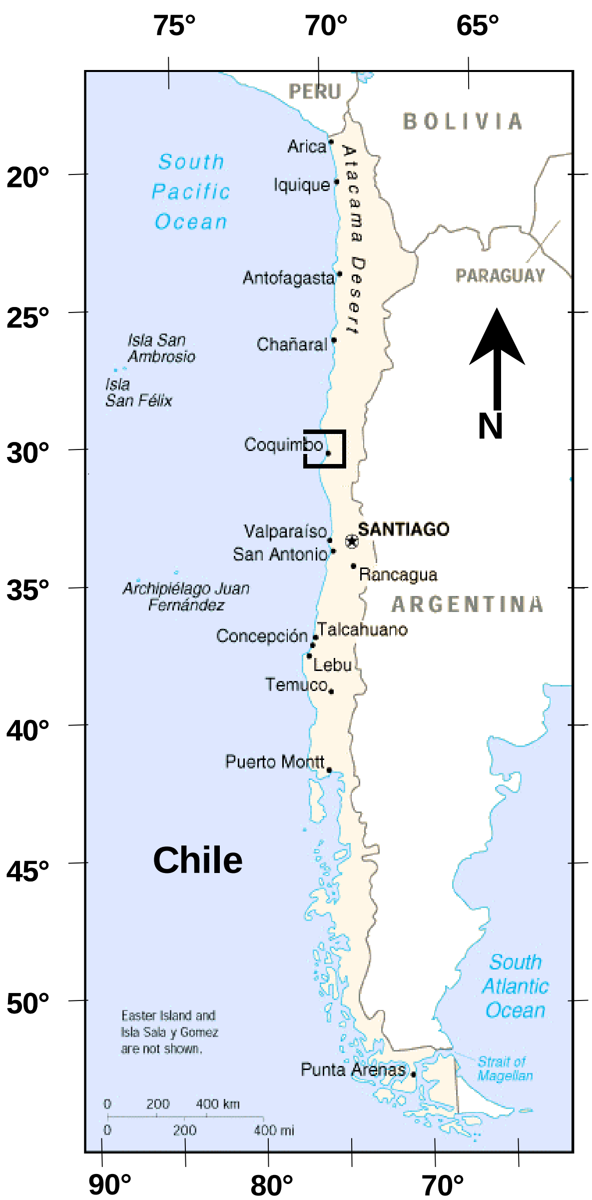

Fig. 1. Map of Chile showing the main locations named in the text.

Results and Discussion

Present state of taxonomy.- There are a total of 404 peracarid species from 96 families and four orders recorded from Chile (Table 1). The majority of species (n = 179; 44.3%) belong to the Amphipoda, 169 species (41.8%) to the Isopoda, 34 (8.4%) to the Cumacea and 22 (5.4%) to the Tanaidacea. To our knowledge no species from other peracarid orders (Thermosbaenacea, Spelaeogriphacea, Mictacea) have been found in Chile. Among the amphipods, the Lysianassidae (24 species) and Corophiidae (16 species) are the families with most species representatives. Among the isopods the family Sphaeromatidae dominates with 20 species, and among the cumaceans the family Leuconidae (11 species) is most commonly reported from Chile.

Table 1. Families and species reported for the four peracarid orders known from Chile.

	Families	Species
Amphipoda	47	179
Isopoda	36	169
Cumacea	5	34
Tanaidacea	8	22
TOTAL	96	404

Peracarid crustaceans are one of the most diverse marine taxa from Chile. The most recent synthesis of marine macroinvertebrates from Chile revealed a total of 1601 species from <100 m water depths (Lancellotti & Vásquez 2000). In that study the authors cited 146 shallow-water amphipods, which coincides well with the 150 records of marine benthic amphipods in our database. These values for the amphipods are also similar to an estimate given by Báez (1995), which most likely is due to the fact that all these estimates are based on the same source, the compilation by González (1991a). While Lancellotti & Vásquez (2000) cite 87 and Báez (1995) gives an estimate of 90 isopod species for Chile, the present database contains 133 marine isopod species (including parasites). The fact that the present number of marine isopods species is considerably higher than the values given by Báez (1995) and Lancellotti & Vásquez (2000) most likely is due to the fact that their information was largely based on the monograph by Menzies (1962) and additional papers on specific groups or locations (e.g., Carvacho 1982, Jaramillo 1982). Our database also contains many of the original reports from Menzies (1962), but besides the records from Carvacho and coworkers we have added a substantial amount of recent information, particularly from the Magellan region (Winkler 1992, 1993, 1994; Lorenti & Mariani 1997, Brandt 1998, Brandt et al. 1999), and from water depth > 100 m (Aydogan et al. 2000). The values for tanaids and cumaceans provided herein are among the first estimates of species richness for these groups in Chile (see also Heard 2002).

Degree of endemism.- For 347 (85.9%) of the 404 peracarid species reported from Chile, sufficient information was available to determine whether they were endemic or not (Table 2). A total of 112 (27.7%) peracarid species are at present recognized as endemic in Chile. The majority of these (64 species) are isopods (Table 2). When considering only the species for which information is available, only 10.5% of the tanaids, 19.4% of the amphipods, but 50.8% of the isopods and 42.6% of the cumaceans are endemic in Chile.

Table 2. Peracarid species identified as endemic, non-endemic or for which no information is available.

	Endemic	Not endemic	No information
Amphipoda	34	140	5
Isopoda	64	62	43
Cumacea	12	16	6
Tanaidacea	2	17	3
TOTAL	112	235	57

A relatively high number of peracarid species appear to be endemic to Chile. In general, marine peracarids may reach high levels of endemicity in some regions of the world (Myers 1993), particularly in coral reefs (Thomas 1996). The values given herein for marine peracarids from Chile could represent overestimates of endemism since some of the reported species may also occur in adjacent areas where peracarids have received even less research attention than in Chile. To our knowledge very few studies have been conducted on the marine peracarid fauna from Peru or Ecuador. Many of the species reported from northern Chile may also occur on the coasts of these countries. Some peracarid species have been sampled repeatedly along the central Pacific coast of Chile, but never outside of Chile. This is the case of the caprellid amphipod *Deutella venenosa* (Fig. 2), which had been described in 1890 based on specimen from Coquimbo, Chile (Mayer 1890). Since then *D. venenosa* had never been reported again until Guerra-Garcia & Thiel (2001) found it abundantly in nearshore habitats from Coquimbo. A recent study indeed revealed that *D. venenosa* is abundant in Coquimbo but absent or very rare in other regions along the Pacific coast of Chile (Thiel et al. 2003). In light of this background, the present estimates of endemicity in Chilean peracarids could potentially be underestimates because some rare or locally restricted species may never have been sampled or been identified.

Fig. 2. Male specimen of the caprellid *Deutella venenosa* sampled from aquaculture installations near Coquimbo, Chile

Various authors have pointed out the strong affinity of the Chilean peracarid fauna with the subantarctic region (Menzies 1962, Barnard 1972, Andres 1975, Schmidt & Brandt 2001). The estimates of endemicity for Chilean marine amphipods correspond to values provided by De Broyer & Jazdzewski (1996) for some subantarctic subregions. While on the one hand there are strong connections between southern Chile and other subantarctic regions, there also is good indication that some peracarid species from the central Chilean coast (between approx. 27°S and 37°S) are restricted in their distribution to this region (Thiel 2002). Similar patterns have also been observed for other faunal groups (Camus 2001 and citations therein). Marine peracarids endemic to Chile should thus primarily be expected along the central Chilean Coast. Knowledge of the peracarid fauna from the Fiord region between 40°S and 50°S presently is too limited to infer the degree of endemism in this region.

Some of the terrestrial peracarids are endemic to Chile (Leistikow 1998), but to our knowledge no systematic investigations on this group has been conducted in Chile. The situation of the freshwater peracarids from Chile is considerably better due to the research efforts by Noodt (1965) on hypogean amphipods and more recently González (2001) on epigean amphipods. Several species from the family Hyalellidae are endemic to Chile, and some of these species are relatively common in epigean waters (González & Watling 2001).

Table 3. Peracarid species summarized by the major environments in which they occur.

	Marine	Fresh-water	Terres-trial	No infor-mation
Amphipoda	162	9	7	1
Isopoda	133	-	32	4
Cumacea	34	-	-	-
Tanaidacea	22	-	-	-
TOTAL	351	9	39	5

Environments and habitats.- Peracarid crustaceans have been reported from all major environments in Chile. The majority of species are marine (Table 3). The only freshwater peracarids presently known from Chile are amphipods from the families Hyalellidae and Ingolfiellidae. In contrast, the majority of terrestrial species belong to the Isopoda (32 species) but there are also seven terrestrial amphipod species (Table 3). The latter occur in the supralittoral zone of sandy beaches. The Cumacea and Tanaidacea are exclusively marine.

For 306 marine peracarid species information on their habitat is available (Table 4). The majority of these species inhabit benthic habitats. At present, only 12 eupelagic peracarids have been recorded for Chilean waters, all of which are amphipods from the suborder Hyperida. The majority of peracarids (130 species) are from soft-bottom habitats (mud and sand). Many species have also been reported from gravel/shell hash (45 species) and from macroalgae (73 species). There are also 14 symbiont species reported from Chile, the majority of which are parasites from the order Isopoda (e.g., bopyrids).

Marine peracarids inhabit all major habitat types along the Chilean coast, ranging from soft-bottom to hard-bottom benthic communities, biogenic habitats such as tunicate beds (Cerda & Castilla 2001, Sepúlveda et al. 2003), algal (Thiel & Vásquez 2000) and mussel beds (Thiel & Ullrich 2002) to the pelagic environment (Meruane 1980, 1982). The high number of peracarid species from soft-bottoms may be attributed to the fact that the vast majority of benthic habitats are soft-bottoms. Given the ubiquity, diversity and abundance of macroalgae along the Chilean coast (Hoffmann & Santelices 1997), it is not surprising that this habitat-type also harbors many peracarid species. In general, macroalgae harbor a diverse peracarid fauna (Barnard 1972, Duffy 1990, Wakabara et al. 1991). Sponge beds and coral beds that are common in the fiord region (Häussermann & Forsterra, pers. comm.) are not represented as habitats of peracarids from Chile, but since these habitats usually harbor a large diversity of peracarids (Jensen & Frederiksen 1992, Thomas 1996), it is likely that additional taxa remain to be discovered.

Feeding modes.- Feeding mode for 210 species (52.0 % of the total) is summarized in Table 5. All major feeding modes are represented among the peracarids from Chile. Predators were most abundant (44 species), and included the hyperiid and lysianassid amphipods. Fifteen species were classified as scavengers, comprising mostly amphipods. These are followed by deposit-feeders (42 species) and suspension-feeders (30 species)

Table 4. Marine peracarid species summarized by major habitats.

	Plankton	Soft bottom	Gravel/ shell	Hard bottom	Macroalgae	Barnacles/ mussels	Symbiont	No info
Amphipoda	12	54	5	20	50	-	3	19
Isopoda	-	35	33	7	15	5	11	31
Cumacea	-	33	-	-	1	-	-	-
Tanaidacea	-	8	7	7	-	-	-	-
TOTAL	12	130	45	27	73	5	14	50

The other major group of feeding modes were the grazers (33 species) and omnivores (30 species). A parasitic feeding habit, at least during some stage of their life cycle, has been reported for 16 species, most of which are isopods (Table 5).

Given that all major marine habitats are inhabited by peracarids, it is not surprising that all feeding types are represented. The fact that primary productivity along the Chilean Pacific coast is comparatively high might contribute to the ubiquity of predators and suspension-feeders among the marine peracarids from Chile. These species may feed on micrograzers (predators) or on microalgae or algal detritus (suspension-feeders). While there are many peracarids inhabiting macroalgae, there are comparatively few grazers. Possibly many of the species for which the feeding mode presently is unknown, will in the future turn out to be grazers.

Bathymetric distribution.- For 370 species, information about their bathymetric distribution was available. The majority of species is recorded from water depths < 100 m (Table 6). Substantially more species (n = 194) have been reported from shallow subtidal waters than from the intertidal zone (118 species). In general, the number of peracarid species reported for Chile decreases with increasing depth. Amphipods and isopods follow this trend, whereas cumaceans show an opposite trend with more species reported from deeper waters (Table 6). The highest number of cumacean species has even been reported from the deep sea (> 2000 m). The bathymetric distribution of tanaidaceans shows no distinct trend.

The general trend of bathymetric distribution of marine peracarids from Chile coincides with patterns reported from other parts of the world: with increasing depths the number of reported species decreases (Wakabara et al. 1991). In contrast to other areas, where peracarids exhibit a high degree of eurybathy (e.g., amphipods in polar waters - Brey et al. 1996) most species recorded in our database occur at only one or two bathymetric levels. There are two noticeable patterns revealed by the bathymetric analysis: (i) there are substantially more species reported from the shallow subtidal than from the intertidal zone, and (ii) species richness of cumaceans increases with depth. As a consequence of easy access, the intertidal zone commonly receives intensive research attention. It could thus have been expected that this zone would feature the highest species richness, similar as has been reported in other studies (Wakabara et al. 1991). Nevertheless, considerably more species were reported from shallow subtidal waters than from the

Table 5: Marine peracarid species summarized by feeding mode (f=feeder).

	Suspension f.	Deposit f.	Grazer	Predator	Scavenger	Parasite	Omnivore	No info
Amphipoda	25	11	11	37	14	1	18	46
Isopoda	5	-	22	4	1	15	12	76
Cumacea	-	31	-	3	-	-	-	-
Tanaidacea	-	-	-	-	-	-	-	22
TOTAL	30	42	33	44	15	16	30	146

intertidal zone. In consideration of the above argument (higher sampling effort in intertidal zone) and the magnitude of the difference (194 species in shallow subtidal vs. 118 in intertidal zone), we consider it unlikely that this difference is a sampling artifact. Rather we believe that ecological reasons may be responsible for the observed pattern. Most parts of the Chilean Pacific coast (north of 40°S) are exposed to the open ocean and therefore impacted by substantial wave action. The exposure time at a certain height in the intertidal zone may vary substantially and unpredictably between tides (Venegas et al. 2002), and along wide expanses of the Chilean coast there may exist a wide transitional zone rather than a distinct limit between the intertidal and subtidal zone. Instead of having well defined zonation patterns, species may occur over a wide range of heights in the intertidal zone. It is likely that many species with a broad distribution pattern in the intertidal zone will also frequently occur in shallow subtidal habitats. In fact, several of the peracarid species reported from intertidal macroalgae (Thiel 2002) have also been found in tunicate beds (Sepúlveda et al. 2003) and among kelp holdfasts (Thiel & Vásquez 2000) in shallow subtidal waters.

The number of cumacean species increases with depth to the edge of the shelf, a trend that has been observed elsewhere (Jones, 1969). For Chilean cumaceans the strong increase of species richness with depth may represent a skewed pattern, since the cumacean material from the deep-sea expeditions has been intensively studied (Petrescu 1995, 2001), while cumaceans from coastal waters of the Chilean Pacific coast have only very recently been studied (Gerken & Watling 1999). Knowledge of cumaceans and tanaids at intermediate water depths (200 – 2000 m) also is limited, and given that large numbers of species have been recorded from these water depths in other regions (Jones 1969, Gardiner 1975, Watling & McCann 1997), a similar trend can be expected off the Chilean coast. The number of amphipod species recorded drops off dramatically below 200 m as do isopod species below 500 m. We attribute this to the limited research efforts devoted to the amphipod and isopod fauna from the shelf break and from the continental slope. In this context it should be noted that the few deep-sea expeditions conducted in Chilean waters have revealed a large number of new species in those groups that have been studied (Menzies & George 1972, Gardiner 1975, Petrescu 1995, 2001, Aydogan et al. 2000). The continental slope between 500 and 2000 m water depth along the Chilean Pacific coast is one of the least studied environments and probably harbors a wide diversity of additional, unknown, peracarid species.

Latitudinal distribution.- Information of the latitudinal distribution was available for 299 marine peracarids. The majority of these were only reported from one location, and consequently their geographic distribution only extends over one degree of latitude. It is interesting to note that few peracarid species have a geographical distribution extending over 6-10 degrees of latitude, while quite a few have a relatively large geographical range (Table 7). Thirty percent of all marine peracarids for which information is available have a geographic range extending over >10 degrees of latitude (Table 7). The geographical range of tanaids and cumaceans appears to be much more restricted than that of amphipods and isopods. This result may be due to the little previous attention both of these groups have received. Tanaids have only been studied in the Magellan region (Schmidt & Brandt 2001), while cumaceans have only recently received some research attention (Petrescu 1995, 2001, Gerken & Watling 1999).

Table 6. Marine peracarid species summarized by water depth from which they were collected.

	0m	1-50m	51-100m	101-200m	201-500m	501-2000m	>2000m
Amphipoda	60	104	50	25	8	5	5
Isopoda	51	78	53	39	31	10	5
Cumacea	1	2	2	9	7	7	13
Tanaidacea	6	10	9	10	8	5	6
TOTAL	118	194	114	83	54	27	28

Table 7. Number of marine peracarid species from Chile and their latitudinal distribution range (degrees of latitude)

	1 degree	2-5 degrees	6-10 degrees	11-20 degrees	>20 degrees
Amphipoda	59	35	5	25	21
Isopoda	46	14	8	27	17
Cumacea	22	5	3	1	-
Tanaidacea	11	-	-	-	-
TOTAL	138	54	16	53	38

Some of the peracarid species have a very restricted geographic range. We consider this an artifact due to the lack of records, which most likely is due to the limited taxonomic expertise on peracarids among ecologists working in Chile. This underscores the urgency for taxonomic expertise among local scientists. While the large number of species with a limited geographical range most likely is an artifact, the comparatively high proportion of species with a wide latitudinal distribution may represent a more realistic pattern. There are only 16 peracarid species with a latitudinal range of 6-10 degrees of latitude, compared to 53 with a range extending over 11-20 degrees. This large number of species with a wide latitudinal range probably reflects the importance of oceanographic currents in latitudinal distribution. Littoral peracarids may be transported within the Humboldt Current or within the Peru-Chile Counter Current if rafting substrata are available (Thiel et al. 2003). Such a transport mechanism had also been suggested by Myers (1993) in order to explain the wide geographic distribution of some littoral amphipods from the North Pacific.

Outlook.- The overview presented herein suggests some interesting patterns but leaves many open questions. Very limited knowledge is available about the biology of peracarids from Chile, which not only is essential to understand their ecological role, but also their zoogeography. Buschmann & Bravo (1990) suggest how grazing amphipods may contribute to spore release in some marine algae, while other authors have demonstrated that in soft-bottom habitats amphipods can suppress the recruitment success of small bivalve settlers (Ejdung & Elmgren 1998). Peracarids from hard-bottom environments may play similar roles and thereby contribute to variations in recruitment success of commercially important species (macroalgae, sea urchins, bivalves, gastropods). We propose rigorous studies of the natural history and particularly the feeding ecology of common benthic peracarids from the Chilean Pacific coast. Many of the most common species can be relatively easily identified and even taxonomically inexperienced marine biologists could examine the hypothesis that peracarids influence the recruitment success of important mega-fauna and flora.

All peracarids have direct development, which may have important consequences for offspring survival and dispersal, and consequently affect their population dynamics. Peracarids may have a competitive advantage over other species with pelagic larvae and therefore be capable of rapidly colonizing patches after a disturbance event. Their population dynamics may be much less variable and therefore much more predictable than that of benthic invertebrates with pelagic larvae. Possibly the stability and predictability of peracarid populations in intertidal and shallow subtidal habitats contributes to their importance as food resources for many juvenile fishes (Palma & Ojeda 2002). While direct development and local recruitment (sensu Thiel 2003) may have a stabilizing influence on the population dynamics of peracarids, it does nevertheless impose restrictions on their dispersal potential. This may have consequences on the genetic population structure, as has been seen in other organisms (Sponer & Roy 2002). Brooding species, however, often have a wide geographic distribution. Rafting on floating substrata has been suggested as the process permitting far-distance dispersal of brooding marine invertebrates (Castilla & Guiñez 2000). At least for algal-dwelling peracarids, which may frequently disperse on floating algae via rafting (Myers 1993), a similar genetic pattern as for other brooding organisms, e.g., the brittle star *Amphipholis squamata* (Sponer & Roy 2002), can be expected. Thus, molecular studies may also contribute to a better understanding of the zoogeography of marine peracarids.

While zoogeographic analyses have been conducted using marine peracarids (Menzies 1962, Andres 1975, De Broyer & Jazdzewski 1993), to our knowledge no such efforts have been directed towards the terrestrial peracarid fauna. Terrestrial zoogeography is principally determined by precipitation and vegetation cover, and it should be expected that terrestrial isopods follow this trend. However, in contrast to most other terrestrial invertebrates, isopods give birth to live young and thereby may gain a competitive advantage in extreme environments. Given the limited number of known species (32 terrestrial isopod species), even taxonomically inexperienced biologists could relatively quickly gain an overview of the Chilean terrestrial isopod fauna and put the above hypothesis to a test.

There are also relatively few peracarid species reported from the continental shelf off the Chilean Pacific coast, but as previously discussed this is most likely an artifact since very few studies have been conducted on the (peracarid) fauna from these water depths. Deep-water corals and diverse and large sponges, as reported from the continental shelf in other regions of the world are also known from the continental shelf off Chile (Di Salvo, pers. comm.). Given the high faunal diversity in these habitats, and the intense fishing pressure on the continental shelf, we consider that there is an urgent need for the study of the fauna associated with these habitats. A better knowledge of the peracarid fauna from the continental shelf and slope will also contribute to a better understanding of their bathymetric and geographic diversity.

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Resumen

Con el objeto de proveer una visión general de la diversidad de peracáridos de la costa Pacífico de Chile se ha creado y evaluado una base de datos que contiene todos los registros disponibles publicados de crustáceos peracáridos de esta región. Se encontró un total de 404 especies de peracáridos registrados para Chile, donde los órdenes Amphipoda (44.3% de todas las especies) e Isopoda (41.8%) fueron dominantes. Un total de 112 (27.7%) especies de peracáridos reportadas son reconocidas como endémicas para Chile. Todos los peracáridos terrestres pertenecen al órden Isopoda (32 especies). La mayoría de los peracáridos acuáticos chilenos son marinos y los únicos representantes de agua dulce pertenecen a las familias de anfípodos Hyalellidae e Ingolfiellidae. La mayoría de las especies marinas viven en hábitat bentónicos, principalmente de fondos blandos, pero las macroalgas de fondos duros también contienen muchas especies diferentes. Las modalidades de alimentación representadas entre los peracáridos marinos de Chile comprenden a predadores/carroñeros, alimentadores de depósito, ramoneadores y alimentadores por suspensión, en orden decreciente de las especies reportadas. La mayoría de las especies de peracáridos son registradas en profundidades menores a 100m, el número de especies conocidas en aguas mayores de 500m es pequeño; esta tendencia es válida para anfípodos e isópodos, pero en el caso de cumáceos se muestra una tendencia opuesta, con más especies reportadas para aguas más profundas. Muchas especies de peracáridos tienen una limitada distribución geográfica, siendo reportados para localidades que están separadas por menos de 5 grados de latitud. Hay, sin embargo, un número substancial de especies con intervalos de distribución geográfica más amplia (30% de las especies se extienden en intervalos sobre 10 grados de latitud). En general, la fauna de peracáridos del Pacífico chileno es diversa y especies de los principales grupos taxonómicos y ecológicos están representadas. Es importante destacar dos tendencias opuestas: mientras hay un alto grado de endemismo, hay también un relativamente alto grado de especies de amplia distribución. Se sugiere que estas tendencias

opuestas se deben a la biología reproductiva de los peracáridos (desarrollo directo, que favorece el endemismo) y a las condiciones oceanográficas a lo largo de la costa pacífica de Chile (fuertes corrientes latitudinales que favorecen la dispersión latitudinal). Se sugieren líneas de investigación futuras que permitirán mejorar el conocimiento sobre los peracáridos chilenos.

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