

New records and distribution ranges of shrimps (Crustacea: Decapoda: Penaeoidea and Caridea) in Chilean waters

Ingo S. Wehrtmann and Alberto Carvacho

(ISW) Instituto de Zoología "Ernst F. Kilian," Universidad Austral de Chile, Casilla 567, Valdivia, Chile; present address: Alfred-Wegener-Institut für Polar- und Meeresforschung, Am Handelshafen 12, D-27570 Bremerhaven, Germany;

(AC) SINERGOS, Santa Luisa de Marillac 1081, La Reina, Santiago, Chile; present address: Museo Nacional de Historia Natural, Casilla 787, Santiago, Chile

Abstract.—Extensions of the geographical distribution are provided for eight species of shrimps. Ranges were mostly extended toward the south (*Haliporoides diomedea*, *Pasiphaea magna*, *Betaeus emarginatus*, *Alpheus inca*, *Hippolyte williamsi* and *Lysmata intermedia*), while the boundary of the distribution of *Eualus dozei* was shifted to the north. Two species (*Pasiphaea magna* and *Lysmata intermedia*) are reported for the first time from Chilean waters. An additional species, *Ogyrides* sp., was collected from a stomach content of the fish *Eleginops maclovinus* in central-southern Chile, representing the first record of a representative of the family Ogyrididae from Chilean waters. This record is remarkable since species of *Ogyrides* are considered to inhabit warm-temperate and tropical waters.

Chile has an extraordinary long, diversified coastline that lies in two distinct zoogeographic regions (cold-/and warm-temperate region) connected by a transitional zone (Brattström & Johanssen 1983). Several national and international expeditions (see Retamal 1981, Brattström & Johanssen 1983, Arntz et al. 1996, Wehrtmann & Lardies 1996) have carried out intensive collections along the Chilean coast, such as The Lund University Chile Expedition 1948–49 (LUCÉ), of special importance to the knowledge of the Chilean decapod fauna. Holthuis (1952), in his account of the "macruran" decapods collected during LUCÉ, noted the relative small number of Decapoda Macrura known from Chile, which included a total of 37 species, 5 of which inhabit freshwater, 13 live in the deep sea or are pelagic, and 19 littoral. Subsequently, Retamal (1981) reported a total of 44 penaeoid and caridean shrimp species from Chilean waters, but excluded *Hippolyte williamsi* Schmitt, 1924, previously re-

ported by Zuñiga et al. (1978). Recently, Retamal (1993), and Retamal & Soto (1995), examined samples collected from deep waters off northern Chile, and reported four additional species from Chile: *Benthescymus tanneri* (Faxon, 1893), *Sergia phorca* (Faxon, 1893), *Psathyrocaris fragilis* Wood-Mason, 1893 and *Plesionika santaecatalinae* Wicksten, 1983a.

This study updates and summarizes available information concerning species composition and distribution of the penaeoid and caridean shrimp fauna of Chile. We include results from our samplings carried out during the last years as well as from examination of collections of Museo Nacional de Historia Natural (MNHNC), Santiago, Pontificia Universidad Católica de Chile ("Sala de Sistemática": SS-UC), Santiago, and National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). The specimens that we collected are deposited in the collections of "Sinergos" (SIN), and the Institute of Zo-

ology (IZUA), Universidad Austral de Chile, Valdivia. Carapace length (CL) was measured from the posterior edge of the orbital arch to the mid-dorsal margin of the carapace. Total length (TL) refers to the distance between the posterior margin of the orbital arch and the distal margin of the telson, excluding setae.

Infraorder Penaeidea Rafinesque, 1815
Family Solenoceridae Wood-Mason, 1891
Haliporoides diomedae (Faxon, 1893)

Previous known distribution.—Panama (06°30'N) to central Chile (37°40'S); from 240 to 1886 m (Faxon 1895, Del Solar & Mistakidis 1971, Del Solar & Flores 1972, Noziglia & Arana 1976, Pérez-Farfante 1977, Holthuis 1980, Méndez 1981, Retamal R 1993).

Material examined.—1 female (CL 41.0 mm), Gulf of Corcovado, off Morro Yeli (43°32'S), bottom trawl, 50–95 m, May 1996, MNHNC 660025.

Remarks.—The specimen collected extends considerably (approximately 660 km) to the south the known geographical distribution of this species. The depth at which the specimen was collected is the shallowest recorded for this species.

Infraorder Caridea Dana, 1852
Family Pasiphaeidae Dana, 1852
Pasiphaea magna Faxon, 1893

Previous known distribution.—California, U.S.A. (off Point Arena to off Point Loma) to Perú (17°05'S); from 509 to 1019 m (Faxon 1893, Schmitt 1921, Méndez 1981).

Material examined.—1 ovig. female (CL 47.9 mm, TL 113.0 mm), off northern Chile (22°13'S, 70°23'W), 815 m, Feb 1981, MNHNC 81085.

Remarks.—This is the first record of this species from Chile, and extends its distribution to the south by approximately 560 km.

Family Oplophoridae Dana, 1852
Acanthephyra pelagica (Risso, 1816)

Previous known distribution.—Mediterranean, North and South Atlantic, Indo Pacific, and, perhaps Panantarctic (Zariquiey 1968, Chace 1986, Tiefenbacher 1994), Argentina between 38°S and 54°S (Boschi et al. 1992), South Africa (without indication of latitude) (Kensley 1981), New Zealand (without indication of latitude) (Richardson & Yaldwyn 1958).

Material examined.—1 male (CL 15 mm), Valle de La Mocha (38°04'S, 73°52'W), 400–548 m, Jun 1965, MNHNC 660011.

Remarks.—The systematic position of the species seems to be unclear (Chace 1986). The specimen studied by us coincides perfectly with Boschi et al.'s (1992: 25) description and illustration of *A. pelagica* from southern Argentina. To our knowledge, this is the first report of this species from central-southern Chile and, therefore, the most northern record for the Pacific Ocean. Vinuesa (1977:14, table 1) reported *A. pelagica* occurring between Magellan Strait and Chiloé Island (approximately 42°S), but he did not indicate where he obtained information on the distribution of this species.

Superfamily Alpheoidea Rafinesque, 1815
Family Alpheidae Rafinesque, 1815
Betaeus emarginatus (H. Milne Edwards, 1837)

Previous known distribution.—Perú (between 06°55'40"S and 14°14'S) and Chile (between 20°16'S and 41°51'S) (Holthuis 1952, Wicksten & Méndez 1983).

Material examined.—2 males (CL 9.84, 15.96 mm; TL 29.26, 47.61 mm) and 1 female (CL 10.10 mm; TL 30.05 mm), west coast of Chiloé Island, Quiutil (42°30'S), Apr 1993, SIN CR(97)023.

Remarks.—This record extends the range of this species slightly to the south by approximately 90 km, and now includes Chiloé Island.

Alpheus inca Wicksten & Méndez, 1981

Previous known distribution.—Galápagos Islands (Wicksten 1991), Perú (between 06°55'S and 13°50'S) and Chile (22°08'S) (Wicksten & Méndez 1981).

Material examined.—1 female (CL 4.66 mm; TL 14.35 mm), Tocopilla (22°S), Jan 1965, SS-UC 2822; 1 male (CL 5.89 mm; TL 17.48 mm) and 1 female (CL 5.32 mm; TL 18.34 mm), Peninsula of Mejillones (23°S), Jan 1965, SS-UC 2759; 2 females (CL 4.73, 6.46 mm; TL 15.66, 21.00 mm), Mejillones Bay (23°S), Jan 1965, SS-UC 2823 and 2802; 4 males (CL 8.97–17.02 mm; TL 25.84–42.28 mm) and 3 females (CL 6.23–8.97 mm; TL 19.61–24.93 mm), Totoralillo-Panul (30°05'S), Jan 1963, SS-UC 764; 1 male (CL 10.64 mm; TL 34.35 mm) and 2 ovig. females (CL 14.29 and 16.26 mm; TL 44.23 and 49.25 mm), Los Molles (32°14'S), Jan 1963, SS-UC 451; 1 ovig. female (CL 16.72 mm; TL 50.77 mm), Los Molles (32°14'S), Jan 1963, SS-UC 452; 1 male (CL 9.42 mm; TL 34.05 mm), El Tabo (33°28'S), Feb 1960, SS-UC 33; 1 female (CL 5.99 mm; TL 17.67 mm), Las Cruces (33°35'S), Oct 1966, SS-UC 3769; 1 male (CL 4.94 mm; TL 17.58 mm), Duao (35°S), Jan 1963, SS-UC 615.

Remarks.—The present report extends the southern limit of this species from Mejillones (22°08'S) to Duao (35°S), a distance of approximately 1430 km.

Family Hippolytidae Dana, 1852

Hippolyte williamsi Schmitt, 1924

Previous known distribution.—México, Gulf of California to Chile (between 20°14'30"S, 70°10'50"W to Isla Santa María (23°24'30"S, 70°36'10"W) (Zuñiga et al. 1978, Wicksten & Hendrickx 1992).

Material examined.—7 females (CL 3.7, 3.4, 2.5, 3.2, 3.7, 3.6 and 2.7 mm; TL 22.2, 17.2, 12.3, 16.3, 20.0, 19.3 and 13.9 mm, respectively) and 9 males (CL 2.0, 2.1, 2.1, 2.4, 2.9, 3.5, 3.2, 3.0 and 3.1 mm; TL 10.2, 10.9, 10.6, 13.3, 14.7, 17.1, 15.9, 14.9 and

14.4 mm, respectively) associated with *Ulva* sp., Bahía de Coquimbo (29°50'S, 71°15'W), 2 m, 15 Mar 1995, IZUA 540; 1 female (CL 4.3 mm; TL 24.0 mm) and 3 males (CL 2.8, 2.4 and 2.8 mm; TL 16.3, 13.7 and 15.6 mm, respectively) associated with *Ulva* sp., Calbuco (51°50'S, 73°05'W), 2 m, 5 Nov 1994, IZUA 541; 3 females (CL 6.23, 6.00 and 5.62 mm; TL 36.01, 35.11 and 32.83 mm, respectively) and 2 males (CL 4.56 and 4.03 mm; TL 25.80 and 21.81 mm, respectively), Lechagua, near Ancud, Chiloé Island (41°52'S, 73°52'W), 6 Feb 1958, MNHNC 940002; 3 females (CL 6.23, 4.15 and 6.08 mm; TL 34.50, 35.12 and 34.35 mm, respectively), Lechagua, near Ancud, Chiloé Island (41°52'S, 73°52'W), 6 Feb 1958, MNHNC 940005; 4 males (CL 4.26, 4.56 and 4.86 mm; TL 25.84, 24.48 and 26.76 mm, respectively; 1 individual incomplete), Lechagua, near Ancud, Chiloé Island (41°52'S, 73°52'W), 6 Feb 1958, MNHNC 940008; 1 ovig. female (CL 7.3 mm; TL 38.0 mm) associated with mussel raft culture, Putemún, Chiloé Island (42°25'S, 73°43'W), approximately 5 m, 12 May 1994, IZUA 542.

Remarks.—The present material extends considerably the southern limit of this species from northern (Isla Santa María, 23°S) to southern Chile (Isla Chiloé, 42°S), a distance of approximately 2030 km. Thus, the range of this species now covers the area between the Gulf of California and southern Chile (see Wicksten 1990). *Hippolyte williamsi* has been confused with *H. californiensis* in the Gulf of California, but the two can be separated by the number of spines on the distal end of the first antennular segment (Wicksten 1983b). *H. californiensis* has one or rarely two spines, whereas *H. williamsi* has three. Zuñiga et al. (1978) pointed out some differences between the original description (Schmitt 1924) and the specimens collected in northern Chile. Additionally, we have observed the following variations: (1) The first segment of antennular peduncle bears 3–4 and (2) the merus of the fourth pereopod has 2

or 3 spines. Our measurements indicate a latitudinal cline in adult size (TL, CL), with considerably larger individuals in Chiloé Island (largest female from Putemún: 38.0 mm) compared to specimens from northern Chile (Coquimbo: mean female TL of 17.3 mm). A similar tendency has been reported by Boschi et al. (1969) for the brachyuran crab *Halicarcinus planatus* (Fabricius) from the Argentinean coast.

Eualus dozei (A. Milne-Edwards, 1891)

Previous known distribution.—Southern Chile (between 55°36'S, 67°40'W and 42°20'S, 72°22'W), from 8 to 300 m (A. Milne-Edwards 1891, Holthuis 1952, Aracena & López 1973).

Material examined.—1 ovig. female collected from sand and shell, Galápagos Islands (Tagus Cove, Isla Isabela), 15 Jan 1934, 18–33 m, *Velero III* station 157-34; collection of the USNM 276061; 4 females (CL 2.2, 2.2, 2.4 and 2.0 mm; TL 12.3, 12.1, 12.1 and 12.9 mm, respectively) associated with suspended scallop culture, Bahía de Guanaqueros (30°08'S, 71°25'W), approximately 5 m, 13 Nov 1993, IZUA 538; 2 females (CL 2.8 and 2.6 mm; TL 12.9 and 12.4 mm, respectively) associated with suspended scallop culture, Bahía de Tongoy (30°13'S, 71°32'W), approximately 5 m, 27 Jul 1992, IZUA 539.

Remarks.—Our material represents the northernmost record of this species, and the first from Galápagos Islands. So far, the species has not been reported from Perú (see Méndez 1981) or Argentina (Boschi et al. 1992). Zarenkov (1970) reported a single specimen from 53°S 52'S-64°10'E, but was unable to determine it with certainty due to the poor condition. It is of interest to note that our material as well as those of *E. dozei* collected during the LUCE (see Holthuis 1952) and the Soviet Antarctic Expedition (see Zarenkov 1970), are all females. As indicated by our material, this species occurs in relatively deep and shallow waters (approximately 5 to 300 m).

Lysmata intermedia (Kingsley, 1878)

Previous known distribution.—Florida Keys to Tobago and Curaçao; Azores; Galápagos Islands (Wicksten 1990); eastern Pacific: from México to Perú (03°30'S–03°44'S) (Méndez 1981, Wicksten & Méndez 1983, Hendrickx & Wicksten 1987); up to 36 m (Méndez 1981).

Material examined.—1 male collected from suspended scallop cultures (CL 8.2 mm, TL 33.8 mm), Bahía de Guanaqueros (30°08'S; 71°25'W), approximately 8 m, 31 Jul 1993, IZUA 537.

Remarks.—This is the first report of a species of *Lysmata* from Chile. The specimen collected extends the known geographical distribution of the species by almost 27° of latitude (approximately 2960 km) to the south. Monthly sampling in the Bahía de Guanaqueros did not produce additional specimens of this species.

Genus *Ogyrides* Stebbing, 1914

Ogyrides sp.

Material examined.—1 female (CL 5.8 mm, TL 21.1 mm) obtained from a stomach content of *Eleginops maclovinus* (Pisces, Nototheniidae), Mehuín, estuary of river Lingue (39°25'S, 73°13'W), Feb 1991, IZUA 543.

Remarks.—Species of *Ogyrides* are known from warm-temperate and tropical waters (Wicksten & Méndez 1988); however, our sampling site (Mehuín) lies in the cold-temperature region (see Brattström & Johanssen 1983). The specimen collected is a noteworthy record, representing the first account of a representative of the family Ogyrididae from Chile. Two species of *Ogyrides* have been reported from the eastern Pacific Ocean (Carvacho & Olson 1984, Wicksten & Méndez 1988): *O. alphaeros-tris* (Kingsley 1880) and *O. tarazonai* Wicksten & Méndez, 1988. Due to the incomplete condition of our specimen, we were unable to identify it to the species level. Our specimen clearly has more than one spine on the dorsal midline of the carapace

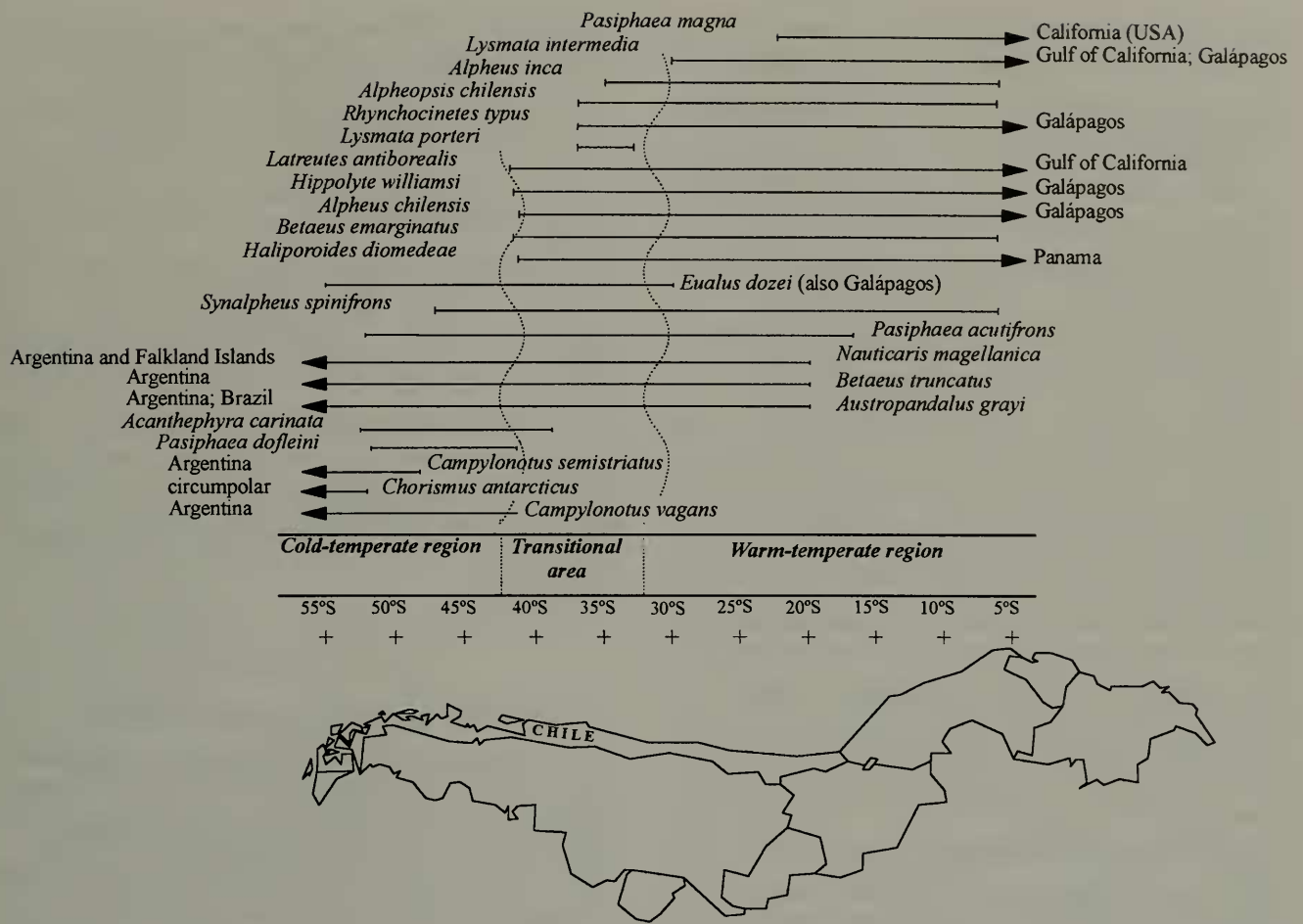


Fig. 1. Eastern Pacific distribution of 22 shrimps inhabiting the continental shelf along the Chilean coast. Ranges extending to the Atlantic coast of South America are also indicated.

(at least 4–5 spines). Our individual is not *O. tarazonai*, known from Nicaragua and Perú, or *O. hayi*, from Puerto Rico and eastern United States (North Carolina to Florida and Mississippi), both of which have a single dorsal spine on the carapace (see Williams 1981).

Zoogeographic Affinities

According to Brattström & Johansen (1983), who reviewed the ecological and regional zoogeography of the marine benthic fauna of Chile, three zoogeographic zones can be distinguished on this coast: cold-temperate and warm-temperate region zones, separated by a transitional zone (see also Dahl 1960). The following remarks are based on shrimp species known from the continental shelf (0–200 m) of Chile. Deep-water (>200 m) species are excluded. The

distributions of the species considered are summarized in Fig. 1.

Of the species reported from Chile, a relatively small group occur in the subantarctic or cold-temperate regions; these are *Acantheephyra carinata* Bate 1888, *Pasiphaea dofleini* Schmitt 1932, *Campylonotus semistriatus* Bate 1888, *C. vagans* Bate 1888 and *Chorismus antarcticus* (Pfeffer 1887). Members of this group generally inhabit waters around 50°S and 55°S of latitude, although the range of one species (*A. carinata*) extends its northernmost distribution up to Chiloé Island (42°S).

Another group of species, *Pasiphaea acutifrons* Bate 1888, *Nauticaris magellanica* (A. Milne Edwards 1891), *Betaeus truncatus* Dana 1852 and *Austropandalus grayi* (Cunningham 1871), seems to be fairly eurythermic with distributions that include warm-temperate as well as cold-temperate

regions. The most distinctive feature of this group is the capacity of its members to cross the Chiloé boundary (see Brattström & Johanssen 1983).

The majority of the species considered show clear boreal affinities, with their northern distribution limit [except *Lysmata porteri* (Rathbun 1907)] extending to the Peruvian Province. Chiloé Island is the southern limit of the distribution of five species, which confirms that the area around 42°S serves as a separation zone between the cold-/and warm-temperate regions described by Brattström & Johanssen (1983) for the Chilean coast. The southern distribution limit of the remaining species of this group is between 30° (Coquimbo) and 42°S (Chiloé Island), which according to Brattström & Johanssen (1983) corresponds to a transitional area between the Magellanic and Peruvian Provinces. As is typical for transitional zones, this area does not contain an endemic fauna, although one species (*Lysmata porteri*) is found exclusively in this area. The boundary between this transitional area and the Peruvian Province is not clear, but probably is located around Coquimbo (30°S). Additional information on the shrimp fauna of northern Chile is needed to properly evaluate the various zoogeographic boundaries.

The influence of the Peruvian Province on the caridean fauna of Chile becomes apparent from Coquimbo (30°S) on northward. A distributional boundary apparently is located around Iquique (20°S), where the northern limit of four eurythermic species (*Pasiphaea acutifrons*, *Nauticaris magellanica*, *Betaeus truncatus* and *Austropandalus grayi*) is located. However, this observation could be attributed to the much more intense sampling programs in this area (Holthuis 1952, Retamal & Soto 1993). The northern limit of carideans from the Peruvian Province seems to be located around the equator.

The several distribution patterns of carideans from Chile are influenced by the prevailing current system (see Brattström &

Johanssen 1983, and references cited therein). The Chiloé boundary corresponds to the area where the Westwind Drift reaches the continent and splits into the Perú Coastal Current (northward) and the Cape Horn Current (southward). The Perú Coastal Current gradually joins the South Equatorial Current, which may explain, in part, the presence of some species [*Alpheus chilensis* Coutière (in Lenz 1902), *Hippolyte williamsi*, *Eualus dozei*, *Lysmata intermedia* and *Glyphocrangon loricata* Faxon 1895] that occur both in Chile and the Galápagos Islands (see Chávez & Brusca 1991, Wicksten 1991).

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