

Pycnogonids on cnidarians at fjord Comau, Southern Chile: A report on 2005 SCUBA collections*

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Using SCUBA sampling on inner Comau fjord's cnidarian communities we found 65 specimens of subtidal pycnogonids belonging to four species of four different families: *Anoplodactylus californicus* Hall (Phoxichilidiidae), *Achelia assimilis* (Haswell) (Ammonotheidae), *Callipallene margarita* (Gordon) (Callipallenidae) and *Austrodecus curtipes* Stock (Austrodecidae). Biogeography and ecology of these species are discussed with respect to the fjord's specific conditions.

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Introduction

In Southern Chilean fjords, like the nearly pristine Comau and Quintupeu fjord at 42.1-42.5°N and 72.4-72.6°W (fig. 1), one finds highly specific abiotic factors as well as impressive and unique benthos communities (Försterra & Häussermann 2003, Försterra et al. 2005). These fjords are strongly influenced by high precipitation, i.e. fresh water running down the mountains by numerous rivers, brooks and streams forming a low salinity layer that may attain a thickness of up to 7 m. Tides of an amplitude between 4 and 6 m expand the freshwater influenced upper benthos zone to a depth of more than 10 m. Hence, the phytal zone is not well developed. Below the halocline, however, one finds various types of flourishing benthos communities obviously dominated by sessile filtering organisms: large amounts of Actiniaria, Scleractinia and other cnidarians mixed with brachiopods cover the rocky slopes falling from shallow waters steeply into the depths of the fjord ("cold water reefs"; see, e.g., Försterra & Häussermann 2003). Among these coelenterate communities,

hydrozoan and octocoral colonies form large meadows in moderate, SCUBA-accessible depths.

As a part of the studies on Comau fjord coordinated by the Huinay Scientific Field Station focussing on an inventory of the fjord's invertebrate fauna (Försterra & Häussermann 2003, Schrödl et al. 2005) we have used SCUBA sampling techniques to study the sublittoral Pycnogonida on cnidarian colonies at the steep rocky slopes, and give a survey of the collected species and further observations. The classical study on Southern Chilean pycnogonids is that of Hedgpeth (1961) using material collected by the Lund University Chile Expedition. In the latter study most of the material was sampled at the outer coast and within semi-protected "channels" of Chile rather than in the inner fjords, i.e. areas much less influenced by fresh water (see Brattström & Johansen 1983 for a general survey of the communities studied by Lund's excursion). Thus far, Southern Chilean pycnogonids were mainly trawled from considerable depths, shallower subtidal areas have not been sampled systematically. Hence the report given here is intended to supplement previous

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Fig. 1. Map of the Comau fjord showing the locations from which the material for this study was collected: 1 Playa Lonco, 2 Cross Huinay Nord, 3 Punta Gruesa, 4 Lilihuapi, 5 Quintupeu, 6 Punta Huinay.

knowledge on the pycnogonid fauna by investigating unstudied areas with special environmental conditions, and, for the first time, to enlighten the shallow subtidal down to 40m depth. A synopsis of Chilean pycnogonids and bibliography is given in Sielfeld (2003). Infralittoral pycnogonids are known to be either found in the phytal zone or on cnidarians, some of them are known to feed on these

Fig. 2. Pycnogonids collected from hydrozoans at Comau fjord. A. *Callipallene margarita*. B. *Anoplodactylus californicus*. C. *Callipallene margarita*. D. *Callipallene margarita*. E. *Achelia assimilis*. F. *Anoplodactylus californicus*. G. *Anoplodactylus californicus*. H. *Austrodecus curtipes*. On A and B, plumulariid, on D, F and G sertulariid and on E and H campanulariid hydrozoans are seen on which the pycnogonids were found. A-G show vital animals, H is a specimen fixed in ethanol. A and B are underwater photographs shot at the actual habitat of the species, C is a macrophotograph taken from aquarium, and D-H are stereomicroscopic pictures.

(Staples & Watson 1987, Arango, 2001, Genzano 2002, Heß & Melzer 2003).

Collecting stations and methods

During SCUBA dives between 0 and 40 m at the locations given below and on fig. 1, pycnogonids were either collected by hand or samples of coelenterate colonies were removed from the ground and examined in the laboratory. All the samples were taken from the benthos communities at the steep rocky slopes described above. For photographic documentation, a Canon Ixus 400 underwater camera, an Olympus 8080 and an Olympus stereomicroscope were used. The sample sites were: (1) Playa Lonco, 10-30 m, 18.2.05; (2) Cross Huinay Nord, 10-39,5 m, 21.2.05; (3) Punta Gruesa, 20-33 m, 22.2.05; (4) Lilihuapi West, 20 m, 6.1.05, and 10-36 m, 24.2.05; (5) Quintupeu, 15-25 m, 25.2.05; (6) Punta Huinay, 18 m, 4.5.05. The collected material is deposited at the Bavarian State Collection of Zoology in Munich.

The collected Pycnogonida

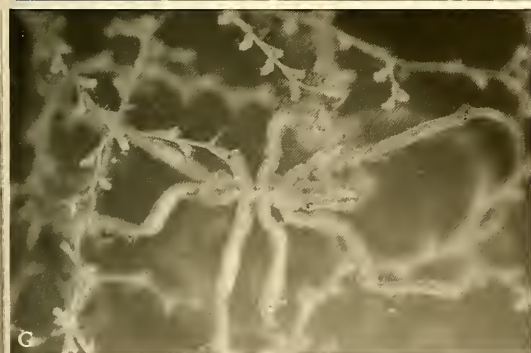
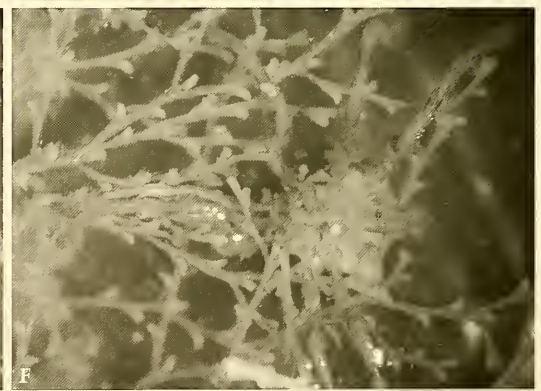
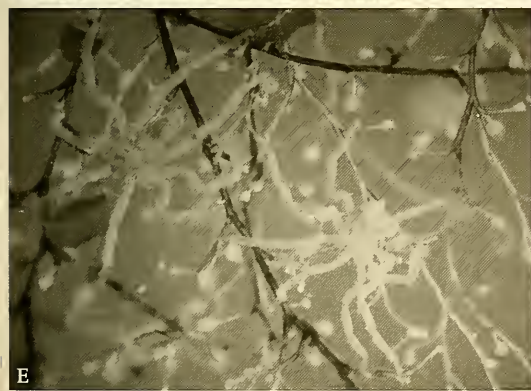
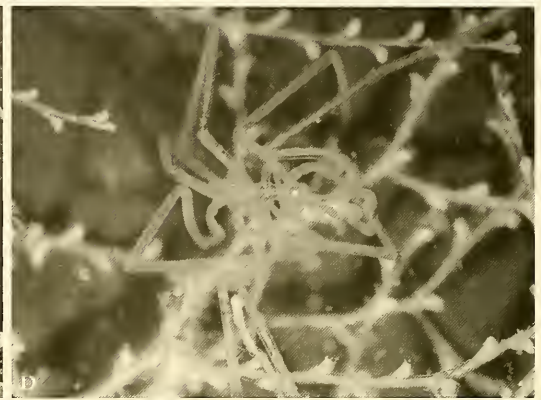
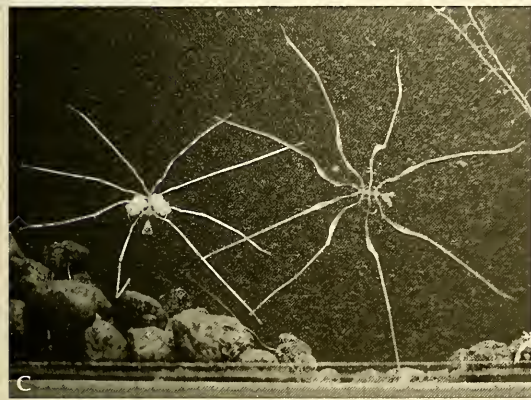
Pycnogonids were absent in the upper brackish water zone. A total of 65 specimens belonging to 4 species, were found at the six subtidal sampling sites given above. They represent various locations from the outer sections of Comau fjord to the innermost part being more than 30 km away from the Corcovado Gulf (Fig. 1). All the collected pycnogonids were found on hydrozoans belonging to the Plumulariidae, Sertulariidae and Campanulariidae.

Phoxichilidiidae

Anoplodactylus californicus Hall, 1912

Material. Lilihuapi West: 1♀; 6.1.05; A20051960 (Bavarian State Collection's storage number). Quintupeu: 1♀, 4♂♂; 25.2.05; A20051915-A20051919.

Remarks. At Hedgepeth's times, individuals from Chile were named *Anoplodactylus portus* Calman, 1927, and he described from the Lund specimens var. *chilensis* (see synonymy in Müller 1993). All the



Lund material comes from between 41°44'-41°50'S and 73°06'-73°31'W, i.e. from the outer coast North and West of Comau. The Huinay material (6 specimens) corresponds well with Hedgpeth's description (Figs 2B,F,G). The females possess the alate processes on the proboscis characteristic for this species. *A. californicus* was originally seen as an intertidal form restricted to California. Later reports, however, indicated at least a circumtropical distribution, and in the meantime, this species has been found even in the Mediterranean Sea (van der Land & Krapp 2001). Our report from Comau fjord is among the southernmost locations at which this species is found (see also Child 1992). The two individuals of *A. californicus* depicted here represent two extremes of coloring. Most animals in the Comau area are uncolored as shown in fig. 2G. Occasionally, however, animals with reddish stripes are found, possibly depending on food (Fig. 2F).

Ammotheidae

Achelia assimilis (Haswell, 1875)

Material. Cross Huinay Nord: 2♂♂, 14 juv.; 21.2.05; A20051928-A20051930, A 20051946-A20051957, A10051968.

Punta Gruesa: 1♂, 4 juv.; 22.2.05; A20051921, A20051922, A20051931-A20051933.

Lilihuapi West: 2♀, 4 juv.; 24.2.05; A20051923-A20051927, A10051970.

Quintupeu: 1♀, 1♂ with larvae on ovigera, 2♂♂, 16 juv., 1 3-limbed larva attached on hydrozoan colony; 19 individuals of the sample were found on a single hydrozoan "tree"; 25.2.05; A20051934-A20051945, A10051961-1966, A10051968, A10051971.

Punta Huinay: 1 juv.; 4.5.05; A20051920.

Remarks. *A. assimilis* (Fig. 2E) is a widely distributed form in tropical and temperate waters of the southwest Pacific which also occurs along the Pacific coast of South America. The Lund excursion found numerous individuals of this highly variable species from the tidal area to a depth of more than 250 m between 41-53° S and 70-73° W (Hedgpeth 1961). González & Edding (1990) found *A. assimilis* in the Coquimbo region, i.e. far in the north, at 30° S. Our samples (49 individuals, more than 2/3 of the whole sample) indicate that *A. assimilis* might be the most common pycnogonid at fjord Comau, were it is found regularly on coelenterate colonies. 40 individuals are juveniles of various size, 3 are females and 6 males (one of these carrying larvae). Hence, about 1/4 of the population are in a fertile stage in February, i.e. Southern Chilean summer. Müller (1993) reports stones, dead corals and red algae as *A. assimilis*'s main habitat. In our Quintupeu sample

19 individuals of various stages from a single hydrozoan "tree" are found showing the high density in which *A. assimilis* may occur. Pycnogonid-hydrozoan associations for the coast of Argentina are described in Genzano (2002).

Callipallenidae

Callipallene margarita (Gordon, 1932)

Material. Playa Llonco: 1♂; 18.2.05; A20051912.

Cross Huinay Nord: 1♀ with developed eggs in legs, 2♂♂; 21.2.05; A20051910, A20051911, A20051913.

Punta Huinay: 5♂♂; 4.5.05; A20051914, A20051909.

Remarks. Most reports of *Callipallene margarita* are from the shelf and slope of the Atlantic coast of South America, mainly Argentina, but also Brazil and the South Georgia area (Müller 1993). Hedgpeth's (1961) report from the Chilean coast was the first from the Pacific Ocean; only a single female was found at a depth of 70 m at 42°20'50"S, 73°22'00"W. Our 9 specimens correspond well with the description of the Lund material and indicate that *C. margarita* is not as rare as Hedgpeth's (1963) report might suggest (fig. 2A,C,D). Contrary to earlier collections, in which this species was generally found between 100 and more than 2000 m of depth (Müller 1993), we found *C. margarita* in the upper sublittoral between 10 and 40 m.

Austrodecidae

Austrodecus curtipes Stock, 1957

Material. Punta Gruesa: 1♀; 22.2.05; A20051959.

Lilihuapi West: 1♀; 24.2.05; A20051958.

Remarks. Hedgpeth (1961) had some individuals from 53°11'S 70°55'W, i.e. the Strait of Magellan south of Punta Arenas, found "between the tides". In his original description Stock (1957) studied material from the Falklands, Kerguelen and Tierra del Fuego. Hence, the Huinay material at present is the northernmost record of this pycnogonid and the first one truly in the Pacific Ocean. Our specimens show the *A. curtipes* features as described in Stock (1957) except for the armature of coxa 1 of leg 1: here our specimens have 2 dorsal spurs (see discussion on variability and distinctive features to *A. longispinum* in Stock (1957)). In fjord Comau, we found *A. curtipes* together with *Achelia assimilis* on hydrozoan colonies (fig. 2H) on rocks. In contrast, Müller (1993) mentions *Macrocystis pyrifera* as the main habitat of this pycnogonid.

Conclusions

The pycnogonid fauna presently known from the inner part of Comau fjord is composed of some of the species also found at the outer coast and channels that were studied by the Lund excursion southwards to the Magellan Strait (Hedgpeth 1961). Obviously the observed species are able to tolerate the specific fjord conditions. Our collection sites are at lower depth than those of most previous studies on the respective species (see above). It is not clear at the moment if our new findings are due to the newly applied sampling technique (SCUBA) in a so far unstudied area and depth range, respectively, or if the occurrence of otherwise deep-water pycnogonids in low depths is limited to the inner fjords. The latter may support a more general observation that in the inner fjords deep water forms occur already at moderate depths, as shown in Försterra & Häussermann (2003) for scleractinians.

Three of the species deserve peculiar attention: First we show that *Callipallene margarita* is far from being a rare fjord pycnogonid. Second, is the occurrence of *Anoplodactylus californicus* deep in the South, far away from its circumtropical and/or subtropical main area, and third, our *Austrodecus curtipes* individuals found in Comau fjord extend the known distributional range of this species from the subantarctic Atlantic and Magellan Strait (Stock 1957, Hedgpeth 1961) considerably north into the Pacific Ocean. Thus, *A. curtipes* might be a "pycnogonid example" for a wideranged Magellanic species extending north by virtue of similar environmental conditions created by the Humboldt current, as has been described for several marine invertebrate taxa, e.g. in Brattström & Johanssen (1983) and in Schrödl (2003).

The cnidarian "meadows" at a depth of between 10 and 40 m are the main pycnogonid habitat found in Comau fjord so far. As various pycnogonids are known to feed on cnidarians these meadows mainly made of hydrozoans are similar to pycnogonid habitats found in other seas, and correspond well to pycnogonid-hydrozoan associations described for the Atlantic coast of Argentina by Genzano (2002; see also Staples & Watson 1987, Arango 2001). However, the upper phytal layer, generally providing a second main pycnogonid habitat, seems to be less inhabited by them at Comau fjord. This might be related to the brackish water layer allowing only a relatively poor macroalgal zone composed of some *Macrocystis* spots.

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