

The feasibility of using *Udonella* sp. (Platyhelminthes: Udonellidae) as a biological control for the sea louse *Caligus rogercresseyi*, Boxshall and Bravo 2000, (Copepoda: Caligidae) in southern Chile

Sandra L. Marín^{a,*}, Fabiola Sepúlveda^b, Juan Carvajal^b,
Mario George-Nascimento^c

^aInstituto de Acuicultura, Universidad Austral de Chile, Casilla 1327, Puerto Montt, Chile

^bUniversidad de Los Lagos, Casilla 557, Puerto Montt, Chile

^cFacultad de Ciencias, Universidad Católica de la Sra. Concepción, Casilla 297, Concepción, Chile

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Abstract

Caligus rogercresseyi is a sea louse of native and farmed fish in southern Chile. Due to the impact that this copepod has on the Chilean salmonid production, it is necessary to search for control mechanisms that can effectively reduce its population. This study focuses on determining the feasibility of using *Udonella* sp., a common flatworm found on copepod ectoparasites of the Chilean rock cod, *Eleginops maclovinus*, as a biological control for sea lice. The following aspects were studied: distribution and preference of *Udonella* sp. regarding both host sex and body location on copepods collected from both the Chilean rock cod and cultured salmonids; the effect of *Udonella* on both fecundity and survival of the free-living stages; and seasonal variations of population of both *Udonella* and the copepod. Results indicated that *Udonella* sp. is frequently found on copepods collected from the Chilean rock cod, but is absent on those from cultured salmonids. The flatworm showed a marked preference for female copepods and the main body locations used by *Udonella* are the genital complex and egg sacs. The three life stages of *Udonella* are distributed across the copepod body in different ways since different body locations represent feeding and nursery areas. *Udonella* has no significant effect either on fecundity or survival of free-living stages. *Udonella* may maintain its population relatively independent of the *Caligus* infra-population all year round. Seasonal patterns of variation were not evident for the population parameters of either *Caligus* or

* Corresponding author. Tel.: +56-65-277119; fax: +56-65-255583.
E-mail address: smarin@uach.d (S.L. Marín).

Udonella, probably due to the exceptional environmental conditions that occurred during 1997 that allowed *Caligus* populations to remain high during fall and winter, instead of decreasing as it has been reported previously. Results suggest that *Udonella* cannot be used as a biological control for sea lice since it is not found naturally on salmonid species and because the presence of *Udonella* did not reduce either fecundity or survival of free-living stages of copepods. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

Caligus rogercresseyi is a copepod ectoparasite common on native and farmed fish in southern Chile. It was first recorded as *C. flexispina* in 1994 by González and Carvajal (1999), but recently identified as a new species, *C. rogercresseyi* (Boxshall and Bravo, 2000). This ectoparasite has had an impact on the economy of the salmonid industry in Chile since it affects different aspects of the production process. For example, infection increases processing costs, diminishes fish quality, decreases growth rate, increases mortality due to appetite loss when fish are infected, and increases susceptibility to viral and bacterial infections (Pike and Wadsworth, 2000). Due to this great impact, the search for control mechanisms of this sea louse must include different approaches in order to finally find one or a combination of several mechanisms that can help solve the problem.

Currently, Chilean salmon farmers have been applying chemical bath treatments (Nuvan and experimentally cypermethrin). Unfortunately, this type of treatment is applied without any concern for possible damage to both marine and human health (Halley et al., 1989; Gillibrand and Turrell, 1997; Rose et al., 1998; Grave et al., 1991; Burka et al., 1997). It has been proven that these chemicals also act against other crustaceans present in the plankton (Davis et al., 1997; Burridge and Haya, 1997; Collier and Pinn, 1998). Given these difficulties, the use of biological control could be a more efficient and safer strategy in the management of sea lice infections. In the Northern Hemisphere, biological control using wrasses (Family: Labridae) has been tried; however, these fish have not been reported to occur in Chile (Pequeño and Lamilla, 1995).

Udonella sp. is a common flatworm that lives on copepods of the genera *Caligus* (Causey, 1961) and *Lepeophtheirus* (Villalba and Durán, 1985; Carvajal et al., 1998a), ectoparasites of the Chilean rock cod, *Eleginops maclovinus*. This native fish can be found around net-pen systems feeding on food given to cultured salmonids. Sproston (1946) and Ivanov (1952) indicated that *Udonella* would be an epizootic fluke that feeds on fish tissue. Preliminary information suggests that *Udonella* could negatively affect copepod eggs by mechanical damage, which in turn could affect some copepod population attributes (fecundity, survival) (Carvajal et al., 1998b). If these effects can be proven to occur in *Caligus* present on both salmonid species and the Chilean rock cod, then *Udonella* could be considered a potential biological control mechanism. Thus, the general objective of this study was to evaluate the feasibility of using *Udonella* sp. as a biological control for the copepod *C. rogercresseyi*. The distribution and preference of *Udonella* sp. regarding both host sex and body location were evaluated for sea lice collected from the Chilean rock cod