

Toxicity Response of *Emerita analoga* (Stimpson, 1857) Collected from Beaches of South Central Chile

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Received: 3 April 2000/Accepted: 25 July 2000

Studies on organisms that populate the sandy beaches of Chile are limited, although this habitat is extensive, extending throughout the 4600 km of Chilean coastline (Hernández et al. 1998). Currently, there is a growing interest in developing new methods and programs to assess the ecotoxicological impact of industrial and municipal effluents onto the Chilean coast. In this context it is relevant to carry out studies to identify indicator species, to ensure that the assimilative capacity of the marine coast is not exceeded by human activity.

Species selected as bioindicators should meet certain minimum requirements (Phillips 1980, 1990). Additionally, Chapman (1995) suggested working with native species, emphasizing the need to select groups of individuals which demonstrate a similar response, independent of collection site, this is termed positive control.

Emerita analoga is an abundant decapod crustacean frequently encountered along the Pacific coastal zone (Tam et al. 1996; Jaramillo 1987, 1994; Hernández et al. 1998). It extends from Alaska (58°N) to Falsa Bay in Argentina (55°S) (Wenner 1988). *Emerita* sp. is increasingly becoming a standard species for pollution biomonitoring (Mohan et al. 1984; Wenner 1988; Suresh et al. 1995).

The southern central coast of Chile, where this study was conducted, is composed of a group of temperate embayments with different physical characteristics, e.g. Concepción Bay, San Vicente Bay, and the Gulf of Arauco (Ahumada et al. 1989; Rudolph and Rudolph 1993; Rudolph 1995). In these sites there are detectable levels of cadmium resulting from human activity (Salamanca et al. 1988; Carrera et al. 1993; Ahumada 1994), which could be influencing the local biota. Cadmium is the second most important toxic trace metal in sea water after mercury. Its toxicity is due to alterations in cellular permeability (Viarengo 1989).

We conducted this study to determine if individuals of *E. Analoga*, coming from beaches in Southern Central Chile with differing degrees of human alteration, exhibit different responses to the toxic effect exerted by cadmium sulfate, and to evaluate whether *E. analoga* could be used as a bioindicator for South Pacific coasts.

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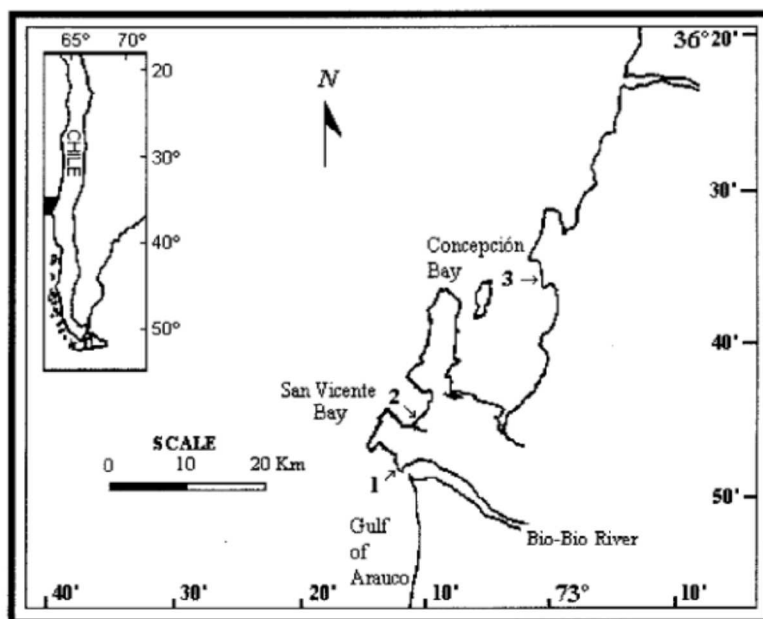


Figure 1. Sampling sites (arrows) in Gulf of Arauco (1), San Vicente Bay (2) and Concepción Bay (3).

MATERIALS AND METHODS

During the austral summers of 1995 and 1996, *E. analoga* and sediment samples were manually obtained from two beaches: (1) North Gulf of Arauco and (2) Southwest of San Vicente Bay. During the austral summer of 1996 *E. analoga* and sediment samples were obtained from (3) Northeast of Concepción Bay beach (Fig. 1). The salinities of the collection sites were 31.0; 34.2; 34.6 UPS respectively.

The individuals were acclimated in the laboratory during days with filtered sea water (1.92 μm) at same original site salinity and a pH of 8.2 ± 0.05 . The water was changed every 48 hr, obtained at the same sampling. During acclimation and the experiment the water was constantly aerated to maintain the concentration of oxygen at saturation. The individuals were fed until 24 hr before the beginning of the experiment. Survival of *E. analoga* in the tanks was 100% prior to the experiment.

A static bioassay was made in triplicate for each study site (Reisch and Oshida 1987) using juveniles between 1 and 1.5 cm in cephalothorax length. The individuals were randomly divided into groups of 6 individuals each, and placed into tanks 700 mL of filtered seawater (with the same characteristics as the water used in acclimation) and 210 g of wet sand. The sand came from each of the