RANGE EXTENSION AND ESTABLISHMENT OF A BREEDING POPULATION OF THE ASIATIC COPEPOD, *PSEUDODIAPTOMUS MARINUS* SATO, 1913 (CALANOIDA, PSEUDODIAPTOMIDAE) IN TODOS SANTOS BAY, BAJA CALIFORNIA, MEXICO

BY

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ABSTRACT

The Asiatic calanoid copepod, *Pseudodiaptomus marinus* is recorded for the first time in Todos Santos Bay, Baja California. The first specimens were collected near a newly constructed marina in October 1998, and by February 1999 the *P. marinus* population colonized the harbours in the bay. Sampling continued until October 2002 and ovigerous females were present in the samples, indicating that *P. marinus* has adapted to the semi-enclosed environmental conditions of the Todos Santos Bay harbours and had established breeding colonies in the area.

RESUMEN

Se reporta por primera vez la presencia del copépodo asiático *Pseudodiaptomus marinus* dentro de la Bahía de Todos Santos Baja California. Los primeros especímenes se capturaron cerca de una marina de reciente construcción en Octubre de 1998 y para Febrero de 1999 la población de *P. marinus* ya había colonizado los puertos de la bahía. Los muestreos se continuaron hasta Octubre de 2002 y se capturaron hembras ovígeras en la mayoría de las muestras indicando que *P. marinus* se ha adaptado a las condiciones semi-encerradas de los puertos de la Bahía de Todos Santos y ha establecido colonias reproductoras en el área.

The Asiatic calanoid copepod, *Pseudodiaptomus marinus* Sato, 1913, was first described from samples collected from embayments near Takashima and Oshoro

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on the west coast of Hokkaido, Japan. Since then its presence has been reported in Peter the Great Bay, Amur, and Poseta, in the former U.S.S.R. (Brodsky, 1948, 1950); Oshoro Bay (Anraku, 1953); Tokyo Bay, the Seto Inland Sea, and Kyushu, Japan (Chiba, 1956; Hirota, 1962, 1964; Tanaka, 1966; Tanaka & Hue, 1966; Uye et al., 1982, Walter, 1986). It was also found in river estuaries of the northern Liuzhou Peninsula, China (Shen & Lee, 1963) and in coastal waters off Xiamen, China (Chen & Zhang, 1965).

A systematic survey of coastal embayments between northern Baja California and Oregon made in 1938, established the presence of only one species of *Pseudodiaptomus*, i.e., *P. euryhalinus* Johnson, 1939, which was found between Punta Banda and Point Conception (Johnson, 1939). Sporadic observations on the Mission Bay plankton populations between 1960 and the mid-1970s showed no change. However, during the mid-1980s, Fleminger & Kramer (1988) reported the introduction of *P. marinus* into southern California. Recently, Walter (1989) reported the presence of nine species of *Pseudodiaptomus* indigenous to east Pacific coastal waters bordering North, Central, and South America: *Pseudodiaptomus euryhalinus* Johnson, 1939; *P. wrighti* Johnson, 1964; *P. culebrensis* Marsh, 1913; *P. sp. cf. Walter*, 1989; *P. galapagensis* Grice, 1964; *P. panamensis* Walter, 1989; *P. cristobalensis* Marsh, 1913; *P. longispinosus* Walter, 1989; and *P. marinus* Sato, 1913.

Studies on the zooplankton communities in Todos Santos Bay, a shallow temperate ecosystem located about 70 miles south of San Diego, California, indicate that the copepod population is composed mainly of *Acartia tonsa* Dana, 1848, *Paracalanus parvus* Claus, 1863, *Labidocera trispinosa* Esterly, 1905, and *Corycaeus anglicus* Lubbock, 1857, and until the summer of 1996 there were no *Pseudodiaptomus marinus* populations inhabiting the area (Jiménez-Pérez, 1989). In this study, we report for the first time the recent introduction and establishment of a breeding population of *P. marinus* in the coastal zone of Todos Santos Bay along with the evidence that this species is extending rapidly towards the southern area.

Todos Santos Bay, Baja California, is located between 31°43′ and 31°54′N and between 116°36′ and 116°49′W (fig. 1), and has a surface area of approximately 116 km²; surface temperatures vary from 14 to 23°C and surface salinities range from 33 to 34 PSU. As a part of an ongoing survey conducted in Todos Santos Bay, zooplankton samples were collected monthly during 1998-2000 at 9 sampling stations (fig. 1). Tows were carried out vertically with a 300 μm mesh standard zooplankton net. Samples were concentrated in 250 ml glass beakers, preserved with 4% neutralized formalin, and transported to the laboratory, where taxonomic studies were conducted. The number of sampling stations was increased to 30 during January and October 2002 (fig. 1) in order to know if *P. marinus* began displacing towards the southern part of the bay.