On the near-surface plankton of the eastern South Pacific Ocean

A. K. Heinrich

P.P. Shirshov Institute of Oceanology of the Academy of Sciences of the USSR; Moscow, USSR

Abstract

A study has been made of the plankton of the near-surface water layer (0 to 30 cm) of the eastern South Pacific Ocean in the region lying to the east of the meridian 90°W, between latitudes 5° N and 35° S. This region is influenced by the Peru Current; the current brings water from high latitudes, which results in a decrease in the number of species of the local fauna of copepods of the family Pontellidae, typical of tropical near-surface plankton. Some of the widely tropical and one bicentral species are absent or rare. Least affected by the Peru Current are the waters of equatorial structure in the northern part of the region. Here, 7 species of pontellids were recorded; the widely tropical Labidocera detruncata, Pontella tenuiremis, Pontellopsis regalis, the distant-neritic Pontella danae and Labidocera acuta, the bicentral Labidocera acutifrons, and the neritic Pontellopsis lubbocki. The dominant species among these are L. detruncata and L. acuta. To the west of the convergence, in the southern part of the region, live the southern central species Pontella valida and P. whiteleggi, with Pontellopsis regalis occurring occasionally. In these regions the copepod fauna is frequently dominated by pontellids. To the south of the boundary of the waters of equatorial structure, between the coast of South America and the line of convergence, lies a region most subjected to the effect of waters from high latitudes and of upwellings. It is inhabited by 2 pontellids only: Pontellopsis regalis and Labidocera acutifrons, but they too disappear close to the coast. In this particular region the copepods Calanus australis and Centropages brachiatuas are common; they are found in a thicker water layer (0 to 200 m), and are often more abundant than the pontellids.

Introduction

The near-surface plankton of the eastern South Pacific Ocean has scarcely been studied. There are only isolated references to occurrence of some species (Giesbrecht, 1889) typical of the near-surface layer.

Material and methods

The object of this study was to investigate the species composition and distribution of animals in the near-surface plankton collected during cruise IV of the R.V. "Academician Kurchatov" between August 27, and November 9, 1968. The material was collected by the late A. I. Savilov, Senior Naturalist at the Institute of Oceanology, USSR Academy of Sciences, with a pleuston trawl of his own design. This trawl consisted of a frame measuring 100 x 60 cm and a net 1.5 m long made of bolting cloth No. 140 with 14 meshes per cm, and was towed horizontally through the upper 25 to 30 cm water layer.

Altogether, 87 samples from 66 stations were examined. The positions of the stations are shown in Fig. 1.

Results

The region investigated is hydrologically heterogeneous; it is influenced by waters which enter from high latitudes and spread northwards with the Peru Current. On the coast of South America, intense upwelling occurs. During our investigation, to the north of latitude 3° to 8° S (depending upon the meridian), waters of equatorial structure were found to be least affected by the Peru Current (Fig. 1); south of this position, however, were waters of south-eastern subtropical structure and, southward of 13° S, waters of Peru-Chile structure (Burkov et al., 1971).

Copepods of the family Pontellidae, typical representatives of the tropical near-surface plankton, occurred frequently throughout the region; they disappeared, like many other pleuston animals (Savilov, 1971), only at the most inshore stations, which may be due to upwelling.

The following 9 species of pontellids were recorded: Labidocera acuta (DANA), Labidocera acutifrons (DANA), Labidocera detruncata (DANA), Pontella danae GIESBRECHT, Pontella tenuiremis GIESBRECHT, Pontella valida DANA, Pontella whiteleggi Krämér, Pontellopsis lubbocki (GIESBRECHT), Pontellopsis regalis (DANA).

The specific features of their ranges have been investigated earlier in most areas of the Pacific Ocean (HEINRICH, 1969). During the cruise of the R.V. "Academician Kurchatov", their distribution in the south-eastern part of the ocean was found to be as follows:

Pontellopsis lubbocki is a neritic species, endemic to the eastern equatorial area (Fleminger, 1965). In our material all its findings, with a single exception, were restricted to coastal waters of equatorial structure (Fig. 1).
Fig. 1. Distribution of pontellids in the eastern South Pacific Ocean showing species recorded, and boundaries of ranges. Hydrological limits according to Burkov et al. (1971): I southern limit of waters of equatorial structure; II southern limit of waters of southern east-subtropical structure and northern limit of waters of Peru-Chile structure; III convergence. Stations

**Labidocera detruncata** is a widely tropical oceanic species. Within the region investigated it was confined to waters of equatorial structure. Coastwards, its distribution is limited by almost the same line which marks the seaward boundary of Pontellopsis lubbockii.

**Pontella tenuiremis** is also widely distributed throughout tropical waters, but is strictly oceanic. This species was found at one station only, in the most northern part of the region investigated. The rarity of *P. tenuiremis*, and the absence of another widely tropical species, *Pontella princeps*, results from the changes caused by the advection of the Peru Current and of upwelling (Burkov et al., 1971). These species also avoid other distant-neritic regions.

**Pontella danae** and **Labidocera acuta** are eastern distant-neritic species. In our material, the boundaries of their ranges coincided exactly, and slightly extended beyond the waters of equatorial structure in a southern direction. Here, a deep counter-current, flowing towards the south, ascended to the surface (Burkov et al., 1971) and carried these pontellids southwards.

**Pontellopsis regalis** is, morphologically, highly variable. In this region, only one of its forms was encountered, which form had already been reported by Giesbrecht (1892, Table 50, Fig. 66). These copepods, under the provisional name "form B", were found by the author along latitudes 20° and 23° N between the coast of America and 120° W (Heinrich, 1964). N. M. Voronina (quoted after Heinrich, 1964) encountered them at 3° and 10° N along 140° W, but, further west, they did not occur (Heinrich, 1964). In the region investigated during cruise IV of the "Academician Kurchatov", this pontellid was of widespread occurrence: it was observed in waters of...