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THE DISTRIBUTION OF SPECIES OF SUBGENUS *UROCORYCAEUS* (GENUS *CORYCAEUS*, CORYCAEIDAE, COPEPODA) IN THE INDIAN OCEAN

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ABSTRACT

This paper deals with the distribution of three species of *Urocorycaeus* in the Indian Ocean based on 330 samples from the IIOE collections. The species *Corycaeus* (*Urocorycaeus*) *furcifer* is widely distributed with higher densities in the Gulf of Aden, central equatorial zone and in the west Australian Sea south of Java. *Corycaeus* (*Urocorycaeus*) *longistylis* occurs predominently in the Bay of Bengal and the Somali Sea. *Corycaeus* (*Urocorycaeus*) *lautus* is represented in small numbers, mostly along the equatorial region. The former two species are more abundant during the north-east monsoon, while *C.* (*U.*) *lautus* commonly occurs during the south-west monsoon.

INTRODUCTION

INFORMATION regarding the family Corycaeidae of the Indian Ocean is found in Thompson and Scott (1903), Wolfenden (1905), Scott (1909), Farran (1911), Dahl (1912), Sewell (1947), Chiba *et al.*, (1957) and Tsalkania (1970). All these reports on distribution are based on materials from restricted areas of the Indian Ocean. In this paper the extensive collection from the entire Indian Ocean region was utilised for studying the species belonging to the subgenus, *Urocorycaeus*.

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MATERIAL AND METHODS

The present report is based on the examination of zooplankton collections of the International Indian Ocean Expedition (IIOE). According to the procedure given by Hansen (1966) the copepods were at first sorted out from a fraction of 3-5 ml in every sample. As copepods were the most abundant taxa numerically they were subsorted into various genera and families and Corycaeidae was one among them. Selected samples were subsorted from every 5° Square so as to cover the entire Indian Ocean. The subsorting for the copepod fraction of 330 representative samples were completed and out of which Corycaeidae were present in 322 samples. Out of the 6 subgenera of the genus *Corycaeus* subgenus *Urocorycaeus* is selected for the present study.

Based on the data available distribution chart for each species was prepared showing the relative abundance in four ranges of numbers (1-24, 25-49, 50-99 and > 99). The seasonal and diurnal variation in mean abundance was calculated.

For calculating the seasonal difference in the species composition only the stations north of 10°S latitude is considered, as the monsoon is prevalent only in the northern part of the Indian Ocean.

Distribution of Species

In 322 samples, *Urocorycaeus* is represented in 275 stations. Three species encountered in the samples are *C.* (*U.*) *furcifer* Claus, *C.* (*U.*) *longistylis* Dana and *C.* (*U.*) *lautus* Dana, in the order of their numerical abundance.

Corycaeus (Urocorycaeus) furcifer Claus (Fig. 1)

This species has been previously recorded from the Gulf of Mannar (Thompson and Scott, 1903), Malay Archipelago (Scott, 1909), Indo-Pacific region (Dahl, 1912) and the northern Indian Ocean (Tsalkania, 1970). *C.* (*U.*) *furcifer* is the dominant species in the collections, being represented in 64% of the samples and the number per haul averaging 12.5 in day and 10 in night. It is distributed all over the Indian Ocean, and more common in the equatorial zone. The species is sparsely represented

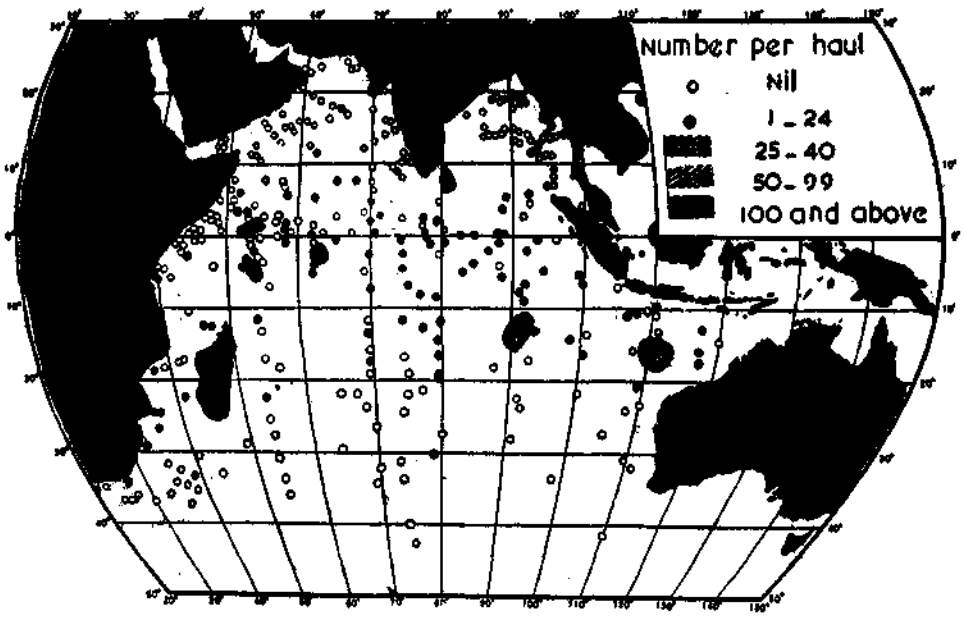

Fig. 1. Distribution of *Corycaeus* (*Urocorycaeus*) *furcifer*.

in the Bay of Bengal, the northern Arabian Sea and the central part of the sub-tropical gyre. Groups of stations in the head of Bay of Bengal, around Andaman Islands, Gulf of Kutch, off Karachi and central Arabian Sea are devoid of this species. From the overall distribution it is significant to note that the species is more widespread in the central equatorial zone and in the west Australian Sea whereas stations with high population densities are noticed in the Gulf of Aden, off Arabian Coast and

south of Java. High values are observed at a few stations in the southern part of Indian Ocean along 30°S. The average number per haul during north-east monsoon period is 2.6 times more than that of the south-west monsoon period.

Corycaeus (Urocorycaeus) longistylis Dana (Fig. 2)

This species is widely distributed in the Indian Ocean (Dahl, 1912). Earlier records are from the Gulf of Mannar (Thompson and Scott 1903), Maldive and Laccadive Archipelagoes (Wolfenden, 1905), Christmas Island (Farran, 1911), Arabian Sea (Sewell, 1947), middle part of northern Indian Ocean (Chiba *et al.*, 1957), eastern part of the Indian Ocean (Tsuruta *et al.*, 1957), south-east of Madagascar (Tanaka, 1960), south-western Indian Ocean (Decker and Mombeck, 1961), Madagascar (Gaudy, 1967) and around Kavaratti atoll (Goswami, 1973).

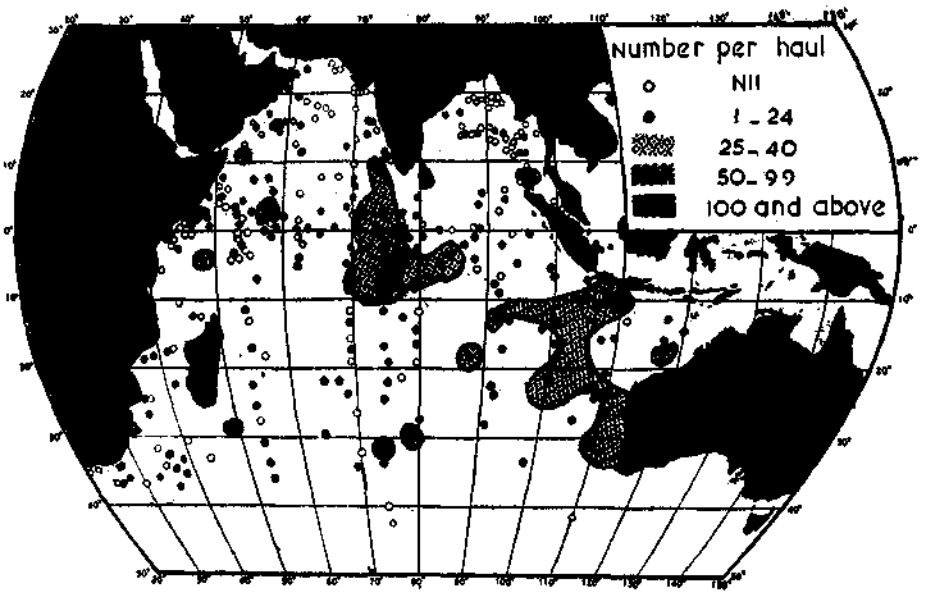

Fig. 2. Distribution of *Corycaeus (Urocorycaeus) longistylis.*

The species is represented in 50% of the samples and the average number per standard haul is 13. It is more common in the equatorial zone (10°N-10°S) and the Bay of Bengal, the areas of high density mainly occurring in the Bay of Bengal and the Somali Sea. It is interesting to note that while this species is common in the Bay of Bengal it is almost absent in the northern part of the Arabian Sea where high salinity (> 36‰) prevails. The average number per standard haul for the two monsoon periods are almost the same. The maximum number (288/Std. haul) was obtained during north-east monsoon (01°02'N, 57°59'E) in a night sample. The average number per haul is 11 during day and 8.7 during night.

Corycaeus (Urocorycaeus) lautus Dana (Fig. 3)

This has widespread distribution in the tropical and sub-tropical parts of the Atlantic, Pacific and Indian Oceans. It is reported from Christmas Island (Farran, 1911), in middle eastern part of the northern Indian Ocean (Chiba *et al.*, 1957).

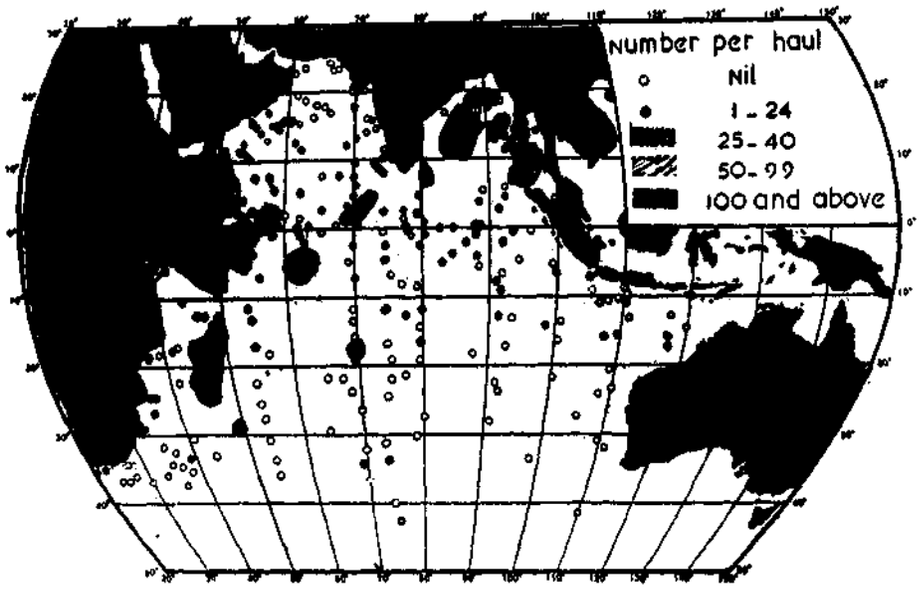

Fig. 3. Distribution of *Corycaeus (Urocorycaeus) lautus.*

The species is represented in 11% of the samples. The average number per standard haul is 3. This species occurs in small numbers predominantly in the equatorial zone (5°N-5°S) and is very rare north of 10°N and south of 20°S. Its occurrence in the equatorial zone shows that this is a stenothermic species. Average number per haul in day is 1.3 and in night 2.9. The maximum value was obtained (75/Std. haul at 03°00'S, 53°00'E) in a night sample during south-west monsoon.

Discussion

It is interesting to note that the three species of the subgenus *Urocorycaeus* reveal three distinct patterns of distribution in the Indian Ocean. While *C. (U.) furcifer* is noticed to have a wider distribution, both *C. (U.) longistylis* and *C. (U.) lautus* show restricted distribution in these waters. Consequently the population centres of the three species indicate clear differences. While *C. (U.) furcifer* has higher densities in the Gulf of Aden and in the western Australian Sea south of Java, *C. (U.) longistylis* shows higher densities in the equatorial region of the Somali Sea and in the Bay of Bengal. *C. (U.) lautus* is restricted to the equatorial region. In general the northern Arabian Sea and the southern sub-tropical gyre of the Indian Ocean are either sparsely populated or rarely represented by *Urocorycaeus* species.

It appears that the equatorial currents play an important role in the exchange of population between the centres of higher abundance and in the general distribution especially in the case of *C. (U.) furcifer*. Thus it is quite probable that the dense patch in the area south of Madagascar might be due to mixing of equatorial and sub-tropical water as given by Orren (1963). The high density in the Central equatorial zone might possibly be due to divergence which is reported by Hidaka and Ogawa (1959) in between 70°E and 80°E.

In comparison with *C. (U.) furcifer*, *C. (U.) longistylis* is less tolerant to high salinities (> 36‰). The two areas of high population densities of *C. (U.) longistylis* are Bay of Bengal and Somali Sea. It is absent from the northern and central Arabian Sea and Gulf of Aden ; perhaps due to its lesser tolerance to high salinities.

In the case of *C. (U.) lautus* in comparison with the other two species, it is quite significant that the distribution is restricted to the equatorial region, although in smaller numbers. It is probable that the optimum condition for the species is provided by the warm water of this region.

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