

STUDIES ON SCOLECITHRICIDAE (COPEPODA: CALANOIDA)
OF THE INDIAN OCEAN

1. TAXONOMIC FEATURES, ECOLOGY AND DISTRIBUTION
OF *SCOLECITHRIX DANAE* (LUBBOCK)

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ABSTRACT

This paper deals with the taxonomic features, ecology and zoogeography of *Scolecithrix danae*, the most abundant species of the family Scolecithricidae in the Indian Ocean based on the zooplankton samples collected during the International Indian Ocean Expedition. This species was present at 82% of the total stations and constituted 60% of the total counts of Scolecithricidae. *S. danae* was present throughout the epipelagic zone of the Indian Ocean (north of 40°S latitude) with maximum abundance in the equatorial waters especially along the African coast. Seasonal and diurnal variations were not pronounced.

Key-words : Copepoda, Scolecithricidae, Indian Ocean.

Copepods, though small in size, are the most abundant of all crustaceans, forming the bulk of the zooplankton of the sea. Among the copepods, calanoids rank first in abundance and scolecithricid copepods are found in all oceans with peak abundance in the tropics. Eventhough substantial information on the taxonomy of scolecithricid copepods has been available, a comprehensive study dealing chiefly with their zoogeography in the Indian Ocean has not been done so far. The present paper deals with the distributional features of *Scolecithrix danae*, the most abundant species of the family Scolecithricidae in the Indian Ocean in relation to the various environmental parameters, in addition to the general treatment of its taxonomy.

The samples collected during the International Indian Ocean Expedition and deposited at the Indian Ocean Biological Centre (Hansen, 1966) form the basis of this study. Since copepods were the major components of the sorted groups and were present in all samples, they were subsorted into family or genus level according to the requirements. For this, from each sample, after its volume was made up to 100 ml, two 10 ml aliquots were removed using a Stempel Pipette. The remaining 80% of the sample was subsorted. Representative samples from each 5 degree Marsden Square, totalling 385 were picked up for subsorting. While doing this, particular attention was given in covering important areas in relation to upwelling, primary production and zooplankton biomass. The identification was done based on the existing descriptions available on Scolecithricidae from the world oceans. Total number of the species was computed to 100% of each sample for preparing the distribution

map. While presenting the data for distribution and abundance studies, samples were compared on the basis of catch per unit standard haul (IOBC, 1969). Numerical abundance was used to indicate the main centre of distribution. Seasonal and diurnal variations in occurrence and abundance were also studied for northeast and southwest monsoon periods (IOBC, 1969).

Taxonomic features :

Scolecithrix danae (Lubbock)

Undina danae, Lubbock, 1856.

Female: (Fig. 1a). Length 2.00 mm. This species can be easily identified by its characteristic robust nature. Head fused with the 1st thoracic segment. Fourth and 5th thoracic segments separate. Posterolateral corners of the last thoracic segment produced into rounded lappets. Abdomen 4-segmented. Genital segment with a shovel-like process on the ventral side. First antenna 19-

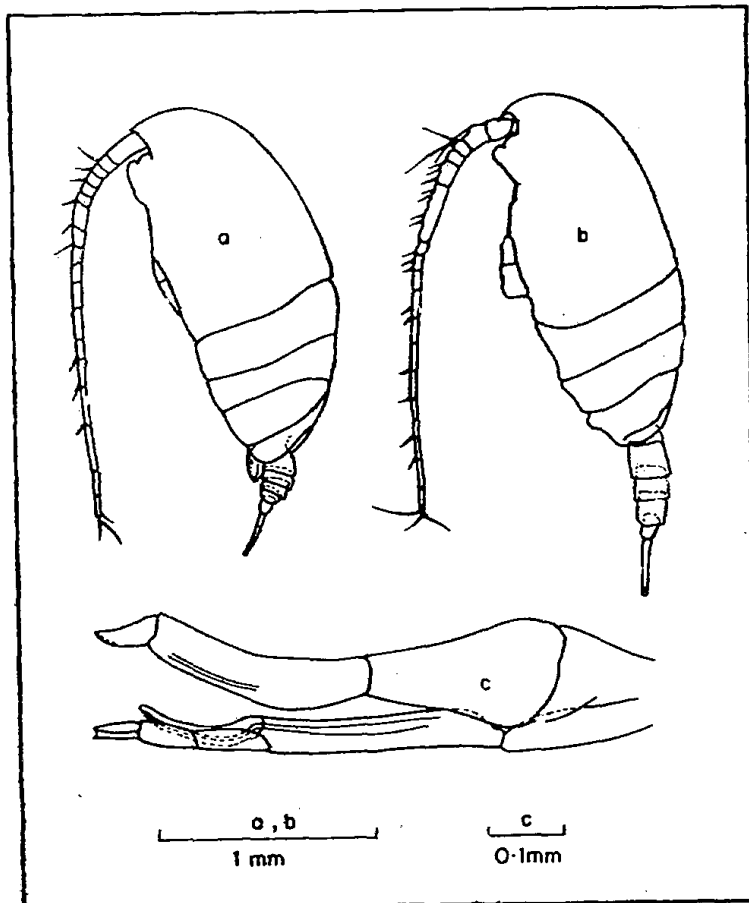


Fig. 1. (a) *Scolecithrix danae* : Female — Lateral view, (b) Male — Lateral view and (c) Male — 5th pair of legs.

segmented, reaches up to the posterior end of the last thoracic segment. Fifth pair of legs totally absent.

Male : (Fig. 1 b). Length 2.2 mm. In general appearance like the female. Fifth leg has got its peculiar shape with very stout and massive joint (Fig. 1 c).

Occurrence : This species was present in almost all samples examined. There were a total of 10,485 males, 15,727 females and 17,475 juveniles. It was present in 82% of the total stations and constituted 60% of the total Scolecithricidae.

Distribution ; This was the most abundant species of this family occurring in the surface waters of the Indian Ocean with a frequency of 82%. A total of 43,687 specimens were identified from 325 stations out of 385 examined. The numerical counts varied from 0-2078 giving an average of 126/st. for southwest monsoon and 104/st. northeast monsoon, 110/st. for night stations and 117/st. for day stations. Day and night variations were not prominent as it was present in 156 day and 169 night stations. It is likely that the species is present in the euphotic zone throughout the Indian Ocean. Latitudinally, it was abundant in the equatorial waters from 15° N to 15° S. A gradual increase in the population was noticed from east to west and from the northern and southern waters to the equator. The species was widely distributed from 25° N to 40° S (Fig. 2). The highest densities (> 450/haul) occurred in patches only, confined to areas west of 80° E longitude especially along the African coasts. Starting from Mozambique coast the species was abundant along the

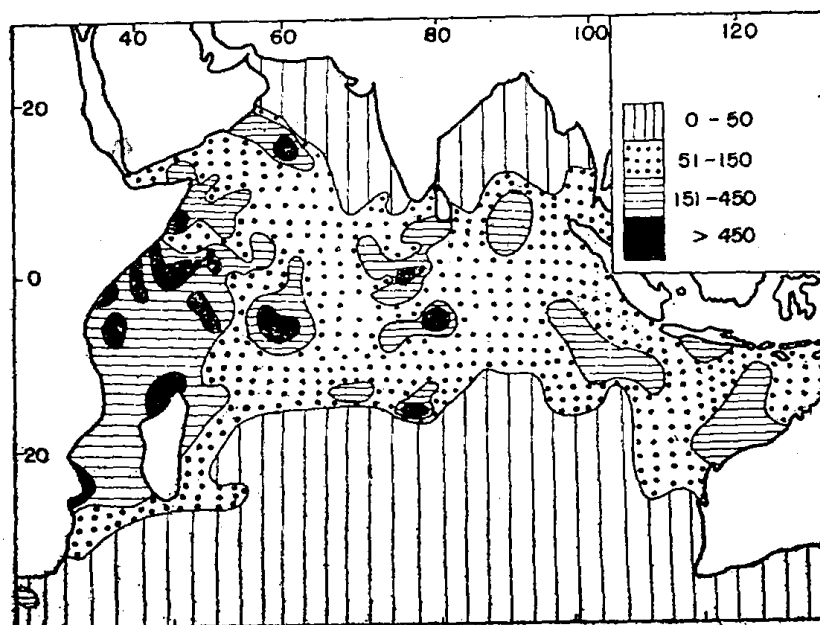


Fig. 2. Distribution of *Scolecithrix danae* in the Indian Ocean. (Density distribution in nos. per standard haul).

northern coast of Madagascar, Kenya coast, Somali coast, off Arabia in the central Arabian Sea and as three patches along 78° to 80° E longitudes south of equator. The next range (151–450/haul) was wide spread all along the African coast up to 55° E longitude. Relatively higher density was also observed along the north Arabian coast, 78° to 80° E longitudes, southern Bay of Bengal, Timor Sea and off Indonesia. Areas with low densities (51–150/haul) were the eastern and central Indian Ocean up to 20° S latitude. The northern and central Bay of Bengal, north-east Arabian Sea and the areas south of 20° S latitude represented lowest densities of 0–50/haul. But for the lowest densities in the Arabian Sea and Bay of Bengal the pattern was similar to the general distribution of copepoda given by Kasturirangan, Saraswathy and Gopalakrishnan (1973).

Eventhough *S. danae* was wide-spread in the seasonally changing monsoon gyre and the subtropical anticyclonic gyre, areas of high density was confined to tropical waters characterised by the presence of comparatively stable salinity waters (35–35.5‰). The decrease in population towards the northern part of Arabian Sea and the Bay of Bengal can be attributed to higher salinity in the former and lower in the latter region. This indicates its avoidance of waters of very high and very low salinities. The highest surface salinities of the waters in the subtropical anticyclonic gyre are found in a belt between 25° and 35° S, up to 500 m depth. This seems to restrict the abundance of *S. danae* population south of 25° S. Similarly the reduction south of 35° S latitude may be due to the low salinity waters of the southern Indian Ocean. The high density areas have a production rate of 50 to 120 mg C/m³/day (Prasad, 1966). The hydrochemical front at 10° S (Wyrki, 1971), more pronounced in the subsurface, may act as a factor limiting the abundance of this species south of it.

In the Indian Ocean this species has been previously recorded from Gulf of Aden (Scott, 1902); Ceylon Pearl Banks (Thompson and Scott, 1903; Sewell, 1914); Arabian Sea (Cleve, 1904); Maldiva and Laccadive archipelago (Wolfenden, 1906); Malay archipelago (Scott, 1909); south of Madagascar (Wolfenden, 1911); Bay of Bengal and central portion of the Indian Ocean (Scott, 1912); coast of southern Burma (Sewell, 1912); Durban Bay (Brady, 1914–1915); several "Investigator" collections in the Indian Ocean (Sewell, 1929); inshore waters off Trivandrum coast (Saraswathy, 1961); Durban to Cape Town area (De Decker and Mombeck, 1964) and western Indian Ocean (Grice and Hulsemann, 1967).

Geographically this species is widely distributed, occurring in the tropical and subtropical areas of all oceans including the Mediterranean Sea. It extends from about 35° N to 35° S (Vervoort, 1965). This species has been recorded as far north as 41.5° N in the Atlantic carried by the Gulf Stream (Lysholm, Nordgaard and Wiborg, 1945). It is an inhabitant of surface and subsurface water layers.

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