

**PRELIMINARY NOTES ON THE DISTRIBUTION OF SOME
ZOOPLANKTON GROUPS IN THE SEA SOUTH OF JAVA
ISLAND***

S. MOTODA**, K. AZECHI, T. NARUMI, T. SAWADA AND C. SEKI
Faculty of Fisheries, Hokkaido University, Hakodate, Japan

ABSTRACT

Two species of Cladocera, 9 species of Ostracoda, 13 species of Chaetognatha, 20 species of Pteropoda, 10 species of Heteropoda and 4 species of Thaliacea were collected from the upper 200 metres of the sea area from Java Island to the north-western Australia (ca 10°S-30°S, 105°E-120°E) in two successive winters (of the northern hemisphere) in 1962-1963. The area can be divided into two regions by water masses, *i.e.*, the area north of about 17°S under influence of westward current (A), and the area of northward flowing West Australian Current (B). Most of the zooplankton species are widely distributed in both regions, but some of them are confined in either region A or B.

INTRODUCTION

DURING the International Indian Ocean Expedition (IIOE), the *Oshoro Maru* training ship of Hokkaido University, completed the cruises for exploratory tuna fishing in the eastern Indian Ocean during the period from 12 December 1962 to 19 January 1963 (Cruise 1) and from 13 to 25 December 1963 (Cruise 2) (Anonymous, 1964, 1965). The first series of the cruises (Cruise 1) covered a considerably wide area between Sunda Islands and the North-west coast of Australia, occupying 51 stations of plankton sampling, and the second series of the cruises (Cruise 2) was limited to the south of Java occupying 13 stations for plankton sampling (Figs. 1 and 2). At every station duplicate vertical hauls with an Indian Ocean Standard Net (113 cm in mouth diameter, 0.33 mm mesh cloth) (Currie, 1963; Motoda *et al.*, 1963) were made usually at night through the upper 200 metres (IIOE standard method). One series of duplicate samples has been sent to the Indian Ocean Biological Centre (IOBC) to be studied with the IIOE standard samples taken by other participating ships. The remaining one series has been processed at our laboratory. It is felt useful to present notes on the results of our work here since the precise and detailed studies by selected specialists on all the standard samples sorted and distributed from IOBC will take long time.

Taxonomic identification reported in this paper was made by K. Azechi on Cladocera and Ostracoda, by T. Sawada on Chaetognatha, by T. Narumi on Pteropoda and Heteropoda, and by C. Seki on Thaliacea. The authors greatly appreciate the sampling work aboard conducted by Messrs. A. Kawamura and K. Osawa on Cruise 1, and Dr. T. Kawamura and Mr. K. Osawa on Cruise 2.

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** Present address: College of Marine Science and Theology, Tokai University, Shimizu, Japan, 424.

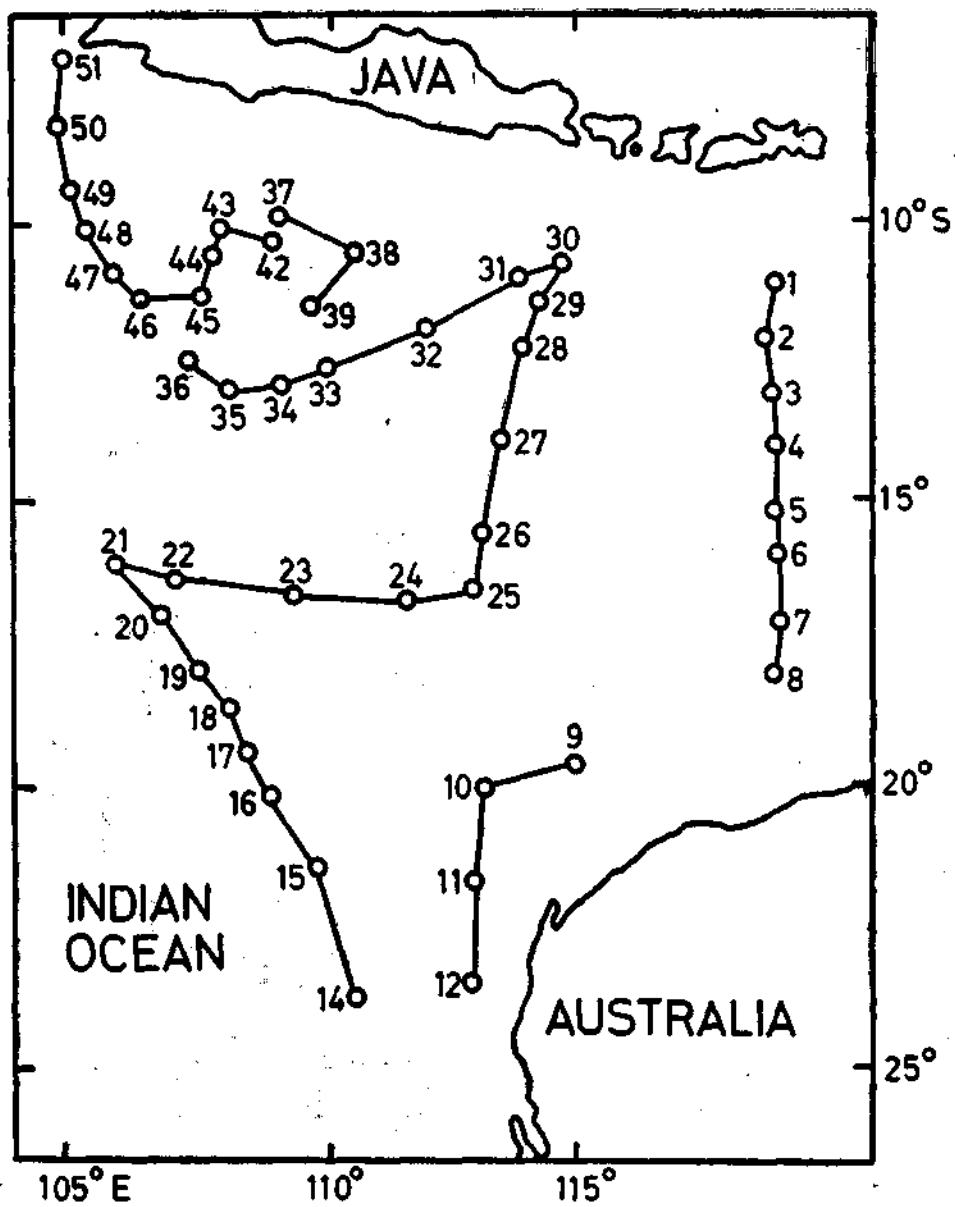


Fig. 1. Zooplankton stations on Cruise 1 of the T. S. *Oshoro Maru*, December 12, 1962-January 19, 1963.

SPECIES COLLECTED

From the samples the following 6 groups of zooplankton were sorted out and identified :

Cladocera

Evadne spinifera P. E. Müller and *Evadne tergestina* Claus.

Ostracoda

Euconchoecia chierchae G. W. Müller ; *E. aculeata* var. *elongata* G. W. Müller ; *Conchoecia oblonga* Claus ; *C. magna* Claus ; *C. acuminata* Claus ; *C. daphnoides* (Claus) ; *C. agassizii* G. W. Müller ; *C. imbricata* (Brady) ; and *Pyrocypris lepidophora* G. W. Müller.

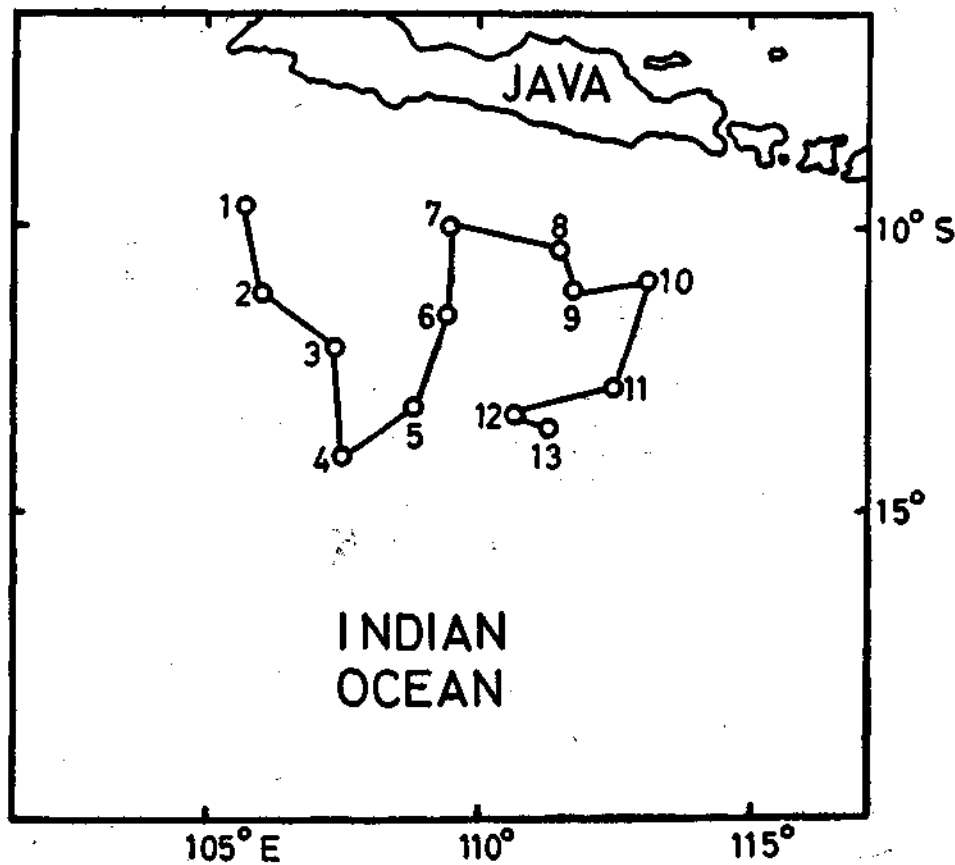


Fig. 2. Zooplankton stations on Cruise 2 of the T. S. *Oshoro Maru*, December 13-25, 1963.

■ Besides them, 28 or more species of Ostracoda have been reported in the Indian Ocean (Brady, 1880 ; G. W. Müller, 1906 ; Cannon, 1940 ; Dakin and Colefax, 1940).

Chaetognatha

Sagitta hexaptera d'Orbigny; *S. lyra* Krohn; *S. enflata* Grassi; *S. robusta* Doncaster; *S. bedoti* Beraneck; *S. pulchra* Doncaster; *S. serratodentata* Krohn; *S. neglecta* Aida; *S. decipiens* Fowler; *S. minima* (Grassi); *S. sp. (?hispidata* Aida); *Pterosagitta draco* (Krohn); and *Krohnitta subtilis* (Grassi).

About one-third of the specimens of chaetognaths in the samples had been damaged which resulted in difficulty in identification. Ten more species previously reported in this region were missed in the present samples (cf. Tokioka, 1962).

Pteropoda

Limacina trochiformis (d'Orbigny); *L. inflata* (d'Orbigny); *L. lesueurii* (d'Orbigny); *L. bulimoides* (d'Orbigny); *Clio pyramidata* Linnaeus; *C. recurva* (Children); *C. chaptalii* (ms. Eydoux & Souleyet); *Creseis virgula* (Rang); *C. spicula* Rang; *Styliola subula* (Quoy & Gaimard); *Hyalocylis striata* (Rang); *Cavierina columnella* (Rang); *Diacria quadridentata* (ms. Lesueur) (Blainville); *D. trispinosa* (ms. Lesueur) (Blainville); *Cavolinia longirostris* (ms. Lesueur) (Blainville); *C. gibbosa* (ms. Rang) (d'Orbigny); *C. uncinata* (Rang); *C. globulosa* (ms. Rang) (Gray); *Peraclis bispinosa* Pelseneer; and *P. triacantha* (Fescher).

Heteropoda

Oxygyrus karaudreni (Lesueur); *Atlanta peroni* Lesueur; *A. gaudichaudi* Souleyet; *A. lesueurii* Souleyet; *Atlanta inclinata* Souleyet; *A. helicoides* Souleyet; *A. fusca* Souleyet; *A. turriculata* d'Orbigny; *Pterotrachea coronata* Forskål; and *P. minuta* Bonnevie.

Fourteen species of pteropods and 12 species of heteropods previously known in the Indian Ocean were not obtained (Pelseneer, 1887; Smith, 1888; Tesch, 1904, 1906, 1948, 1949; Massy, 1932; Stubbing, 1938). Shells of many specimens in pteropods in the samples had been broken and were impossible for identification. Sometimes shells of *Cymbulia* remained in the samples.

Thaliacea

Doliolum denticulatum Quoy and Gaimard; *Thalia democratica* (Forskål); *Iasis zonaria* Pallas; and *Salpa fusiformis* Cuvier.

Identification was difficult on the present specimens due to inadequate fixation of samples. Only 4 species are reported here.

DISTRIBUTION OF SPECIES

The survey during Cruise 1 covered the area approximately from 10°S to 30°S, and from 105°E to 120°E, i.e., from the Java Island of the Sunda Islands to the north-west corner of Australia. The stations of Cruise 2 were confined to the south coast of Java Island, and all included in the abovementioned area. Because the cruise track was selected primarily for the purpose of exploratory tuna fishing, it was impossible to have the plankton stations in any other desirable course.

There are two major water masses in the shallow layer of the eastern Indian Ocean during December (Rochford, 1964). The west Australian Current flowing along the west coast of Australia which is comparably low in salinity forms mixing boundary at about 17°S with the comparatively high salinity waters from the east.

Based on such a hydrography, the distribution of plankton can be discussed by separating the areas into two regions; A region (Sts. 1-4, 18-51 on Cruise 1, and Sts. 1-13 on Cruise 2) and B region (Sts. 5-17 on Cruise 1), placing the boundary at about 17°S, though the boundary may shift to the north in the eastern part.

A Cladocera, *Evadne spinifera* is present only in B region and on the contrary *E. tergestina* is distributed in A region. This means that *E. tergestina* is more tropical than *E. spinifera*. In Ostracoda, *Conchoecia magna*, *C. oblonga*, *C. acuminata*, *C. daphnoides*, *C. agassizii*, *Euconchoecia chierchae* and *E. aculeata* var. *elongata* are widely distributed in both A and B regions. *Pyrocypis lepidophora* is mainly confined to B region on Cruise 1, but it appears also in A region during the next winter (Cruise 2).

Almost all species of Chaetognatha are ubiquitously distributed in the area of survey. However, it is noticed that *Sagitta lyra* is absent in the eastern area (Sts. 1-8) and *S. bedoti* also decreases in number in these stations. *S. decipiens* is nearly confined in A region.

In Pteropoda *Limacina enflata* and *Creseis acicula* predominantly occur, followed by *C. virgula*, *Cavolinia longirostris* and *C. quadridentata* found mostly in A region, though a small number is found along the north-west coast of Australia. Other species of Pteropoda and Heteropoda are widely distributed in the area of survey.

Doliolum denticulatum, both sexual and asexual stages, commonly occur in both A and B regions, while the distribution of *Salpa fusiformis* is limited to south of Java. *Iasis zonaria* occurs in small numbers in A region and in the boundary zone.

CONCLUSION

Distribution of 6 groups of zooplankton in the upper 200 metres in the eastern Indian Ocean was studied. In some species there is a variation in distribution between north and south of about 17°S which is approximately located at the boundary of two different water masses.

Evadne tergestina, *Cavolinia longirostris*, *C. quadridentata* and *Iasis zonaria* are mainly distributed in the region north of 17°S while *Evadne spinifera* and *Pyrocypis lepidophora* are nearly confined to the region south of 17°S.

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