

A STUDY OF THE HYPERIID AMPHIPODA IN THE WATERS OFF THE
EAST AND SOUTH COASTS OF THE REPUBLIC OF SOUTH AFRICA IN
RELATION TO PREVAILING HYDROLOGICAL CONDITIONS.

ROY IAN DICK. B. Sc. Hons.

Thesis submitted for the Degree of Master of Science (Zoology),
University of Cape Town, 1967.

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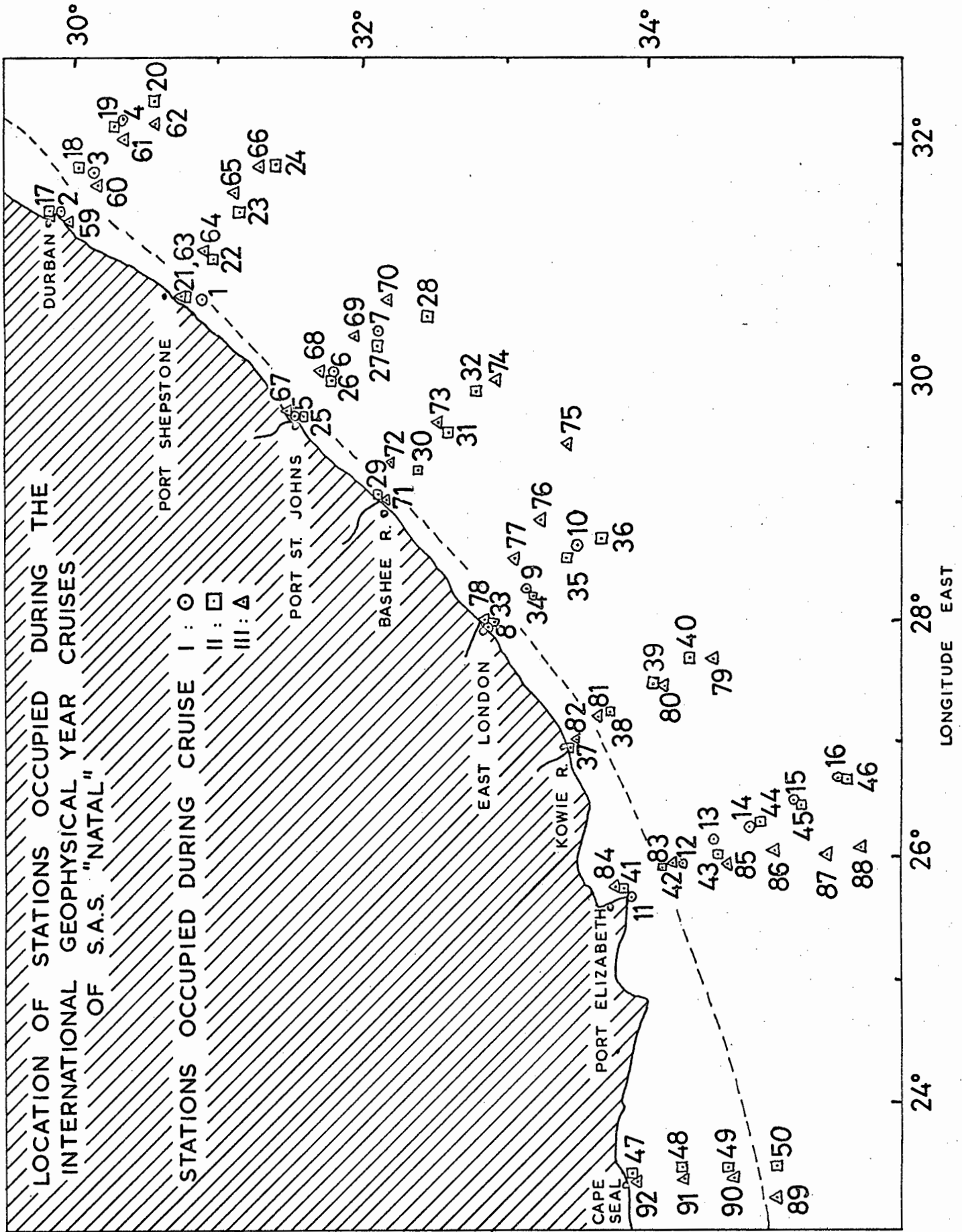
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L A T I T U D E S O U T H



INTRODUCTION.

During the International Geophysical Year, 1957 - 1958, it was decided that the hydrographic frigate, S.A.S. "Natal", as part of the South African contribution, should undertake a number of oceanographic cruises off the east and south coasts of the Republic of South Africa. Thus during 1958 three cruises were carried out in February and March, May, and August, during which a total of eighty-four oceanographic stations were occupied. Sixteen were occupied in the first cruise and thirty-four each in the second and third cruises. The stations were located on "lines" normal to the coast at Durban^{*}, Port Shepstone, Port St. Johns^{*}, Bashee River, East London^{*}, Kowie River, Port Elizabeth^{*}, and Cape Seal (see map opposite). In the first cruise only four^{*} lines were worked and of these, the first three contained three stations each while the fourth (Port Elizabeth line) contained six stations. The first station (NGY 1) was not located on any line and was used for gear testing. In the second and third cruises the minimum number of stations per line was increased to four while the number on the Port Elizabeth line remained at six.

At each station both biological and hydrological sampling was carried out. The zooplankton samples were sorted into major taxonomic groups (e.g. Hyperiid amphipods) in the laboratory, after determination of the settled- and displacement volumes in the case of samples collected with N 70 nets. It is this material that formed the basis of this study.

The investigation was undertaken with the following aims in mind:

- (i) To further the knowledge of the Hyperiid Amphipoda present in the waters off the east and south coasts of the Republic.
- (ii) To extend the knowledge of the world geographic distribution of hyperiids and clarify the position regarding the alleged cosmopolitan status and wide tolerances of many species.
- (iii) To define more precisely the hydrological tolerances of hyperiid amphipods and assess their value as "indicator species", either alone or in association with other hyperiids or members of other taxonomic groups in the zooplankton.
- (iv) To determine the extent to which similar hydrological tolerances govern interspecific association in the hyperiids.

METHODS.

Zooplankton was sampled using two types of net, both of the "Discovery" pattern (Kemp, Hardy and Mackintosh 1929). The first had an intake of 70 cm. diameter (referred to hereafter as the N 70 net) and the second had an intake of

NGY STATIONS THAT YIELDED SAMPLES WITH HYPERIID AMPHIPODS.

<u>Station</u>	<u>N 100H</u> <u>Sample</u>	<u>N 100B</u> <u>Sample</u>	<u>Station</u>	<u>N 100H</u> <u>Sample</u>	<u>N 100B</u> <u>Sample</u>
1	NT	NT	69	--	x
2	--	NT	70	x	x
3	--	x	71	x	NT
4	x	x	72	--	x
5	x	NT	73	x	x
6	x	x	74	x	x
7	x	x	75	x	x
8	x	NT	76	x	x
9	x	NT	77	--	x
10	--	NT	78	x	NT
11	x	NT	79	x	x
12	x	x	80	x	x
13	x	x	81	x	x
14	x	x	82	--	NT
15	x	x	83	--	x
16	x	x	84	--	NT
17	x	NT	85	x	x
18	x	x	86	x	x
19	x	x	87	--	x
20	x	x	88	--	x
21	x	NT	89	x	x
22	x	--	90	--	NT
23	x	x	91	--	NT
24	--	x	92	NT	NT
25	x	NT			
26	--	x			
27	x	x			
28	x	x			
29	x	NT			
30	--	x			
31	x	x			
32	x	x			
33	x	NT			
34	x	x			
35	x	x			
36	x	x			
37	--	NT			
38	--	x			
39	--	x			
40	--	x			
41	--	NT			
42	x	NT			
43	--	x			
44	x	x			
45	x	x			
46	x	x			
47	x	NT			
48	x	x			
49	x	x			
50	x	x			
59	x	NT			
60	--	x			
61	x	x			
62	x	x			
63	x	NT			
64	x	x			
65	x	x			
66	x	x			
67	x	NT			
68	--	x			

ABBREVIATIONS.

NT: Not taken ; --: Absent ; x: Present.

MISCELLANEOUS DATA.

	<u>N 100H</u> <u>HAUL</u>	<u>N 100B</u> <u>HAUL</u>
Haul period range	10 to 15	8 to 14 mins.
Mean haul period	10 minutes	12 minutes
Haul time range (Local time)	0650 to 1725 hours	0650 to 1742 hours
Total number of hauls	82	58
Total number of hauls that yielded samples with amphi- pods	58	57
Total numbers of amphipods: Cruise I	199	297
Cruise II	263	315
Cruise III	131	291
Mean numbers of amphipods per sample (N 100B corrected for time difference)	13	
Cruise I	13	28
Cruise II	8	11
Cruise III	4	10

100 cm. diameter (hereafter referred to as the N 100 net). The N 70 net was hauled vertically and embodied facilities for terminating sampling by throttling the net. By this means it was possible to sample discrete sections of the water column - i.e. from four hundred to two hundred meters, from two hundred to one hundred meters, and from one hundred meters to the surface. The N 100 net was used in horizontal surface- and oblique (from one hundred and fifty meters to the surface) hauls. The former were ideally of ten minutes duration and the latter ideally of fifteen minutes duration. In practice neither of these ideals were realized.

A preliminary examination of the amphipod material demonstrated the superiority of the N 100 net as a sampling device for this group. It was found that the majority appeared to escape capture by the N 70 net and those that were captured were mainly juveniles. For these reasons, further analysis was restricted to material collected with the N 100 net which amounted to eighty-two samples from horizontal (N 100H) hauls and fifty-eight samples from oblique (N 100OB) hauls (see table opposite).

Hyperiidids with the exception of the genus, Hyperia, were identified to species, sexed and the state of maturity assessed. The genus, Hyperia, was excepted from the study because of the confused state existing in the species synonymy, which in the absence of reference material it is impossible to clarify.

Assessment of the world geographic range of the species was achieved by plotting the accumulated records of previous authors on maps using a separate map for each species. In addition to the International Geophysical Year (NGY) records, the previous authors' records for South African waters (defined as those south of latitude 20°S. and up to two hundred miles from the coast) were listed. This enabled detection of new records and comparison with the fauna of west coast waters to be made.

Intercorrelation analysis between hyperiid species, between hyperiids and chaetognaths, and between both these groups and hydrological factors (temperature and salinity) was accomplished using an ICT 1301 computer. Only data from N 100OB samples was used since the occurrence of hyperiids in these was close to one hundred percent. Prior to analysis, all species data was transformed according to the relation, $Y = \log (X + 1)$, following the recommendation of Cassie (1963). The hydrological data was transformed into a series of frequencies of occurrence in the 150-meter stratum at each station of temperature classes (in 0.5°C. increments) and salinity classes (in 0.05‰ increments). Twenty-eight

such classes were used in the present analysis and were selected so that the minimum frequency of occurrence in fifty-seven samples was four.

The computer output took the form of a matrix of product-moment correlation coefficients which formed the basis for further correlation analysis involving the construction of species groups and the delimitation of ranges of hydrological tolerance.

RESULTS.

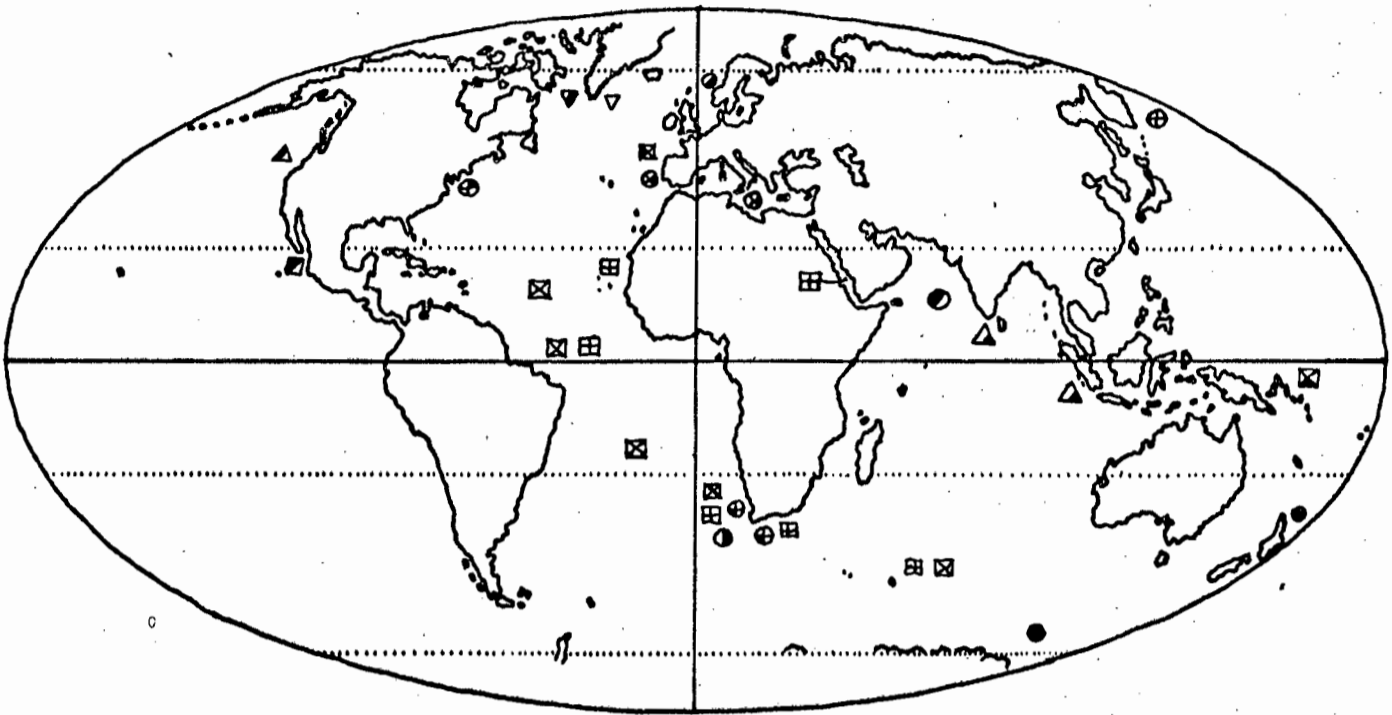
The Hyperiid amphipod species present in the area investigated during the IGY Cruises of S.A.S. "Natal" and their World Distributions on the basis of Previous Records

The amphipod material from samples collected with N 100 nets yielded sixty-one species (excluding species of Hyperia) of hyperiid amphipods. Of these, eighteen are new records for South African waters and forty-eight are new to waters off the east coast of the Republic. Virtually every family and species of the epiplanktonic members of the Hyperiidea is represented. The absentees are among the rarer and/or more tropical species, and typically cold-water species.

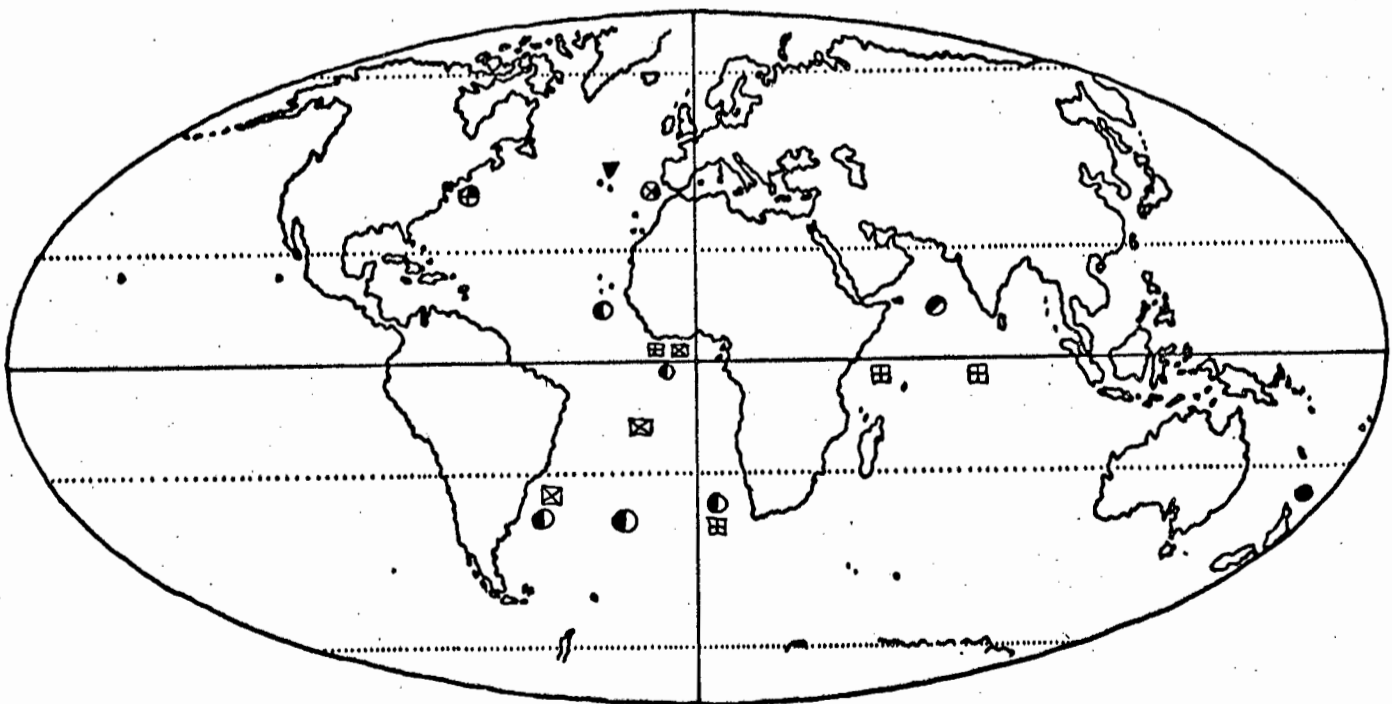
As regards the world distributions that emerge from previous records, it must be remembered wide distributions are not always indicative of eurythermal and euryhaline tolerances. It should also be noted that it is only within the last thirty-nine years that closing nets have been used extensively to sample discrete sections of the water column in the oceans. In spite of this it is possible to state that the majority of species recorded in the NGY area have been recorded in previous records based on samples from the upper 150-meter stratum of the oceans. The only significant exception to this involves the Scinidae which are mainly recorded from samples covering depth ranges of one thousand meters and more.

A further limitation to the interpretation of world geographic distributions based on previous records is imposed by the fact that the early investigations of the World Oceans were decidedly biased in favour of certain areas. It is only since the International Geophysical Year that this position has been rectified. As a result of this, one is forced to use previous records only to establish general trends in the distribution and ecology of species. More precise inferences are only possible when sampling is intensively carried out after systematic planning in relatively restricted oceanic areas.

WORLD DISTRIBUTION OF
SCINA BOREALIS



WORLD DISTRIBUTION OF
SCINA CURVIDACTYLA



FAMILY SCINIDAE STEBBINGGENUS SCINA PRESTANDREAScina borealis (Sars) 1882Clydonia borealis Sars 1882Tyro borealis Bovallius 1887

Scina borealis Sars 1891. (⊙), Stebbing 1904 (⊕), Tattersall 1906 (▲),
Walker 1909 (▣), K. Stephensen 1918 (⊕), K. Stephensen 1923 (▽),
Wagler 1926 (⊞), Wagler 1927 (⊞), Pirlot 1929 (⊞),
K.H. Barnard 1930 (●), Pirlot 1930 (⊞), K.H. Barnard 1932 (●),
K. Stephensen 1933 (▽), K.H. Barnard 1937 (●), Thorsteinson 1941
(▲), Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (■),
Vinogradov 1956 (⊕), Siegfried 1963 (⊕), Tsuruta 1963 (▲)

South African Records additional to those of the NGY:

Wagler 1926, 1927, K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Sta. 21

N 100B Samples: Nil.

Cruise III - nil.

World Distribution: See map opposite.

Remarks: This species is distributed on a world-wide basis from the equator to the poles. It is alleged to have euthermal and euryhaline tolerances which tends to be supported by its presence in areas as diverse as the Red Sea and the Antarctic. The sole NGY record is of no ecological significance.

Scina curvidactyla Chevreux 1914

Scina curvidactyla Chevreux 1914 (▼), K. Stephensen 1918 (⊕), Wagler 1926 (⊞),
Wagler 1927 (⊞), K.H. Barnard 1930 (●), K.H. Barnard 1937 (●),
Shoemaker 1945 (⊕)

South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - nil.

Cruise II - nil.

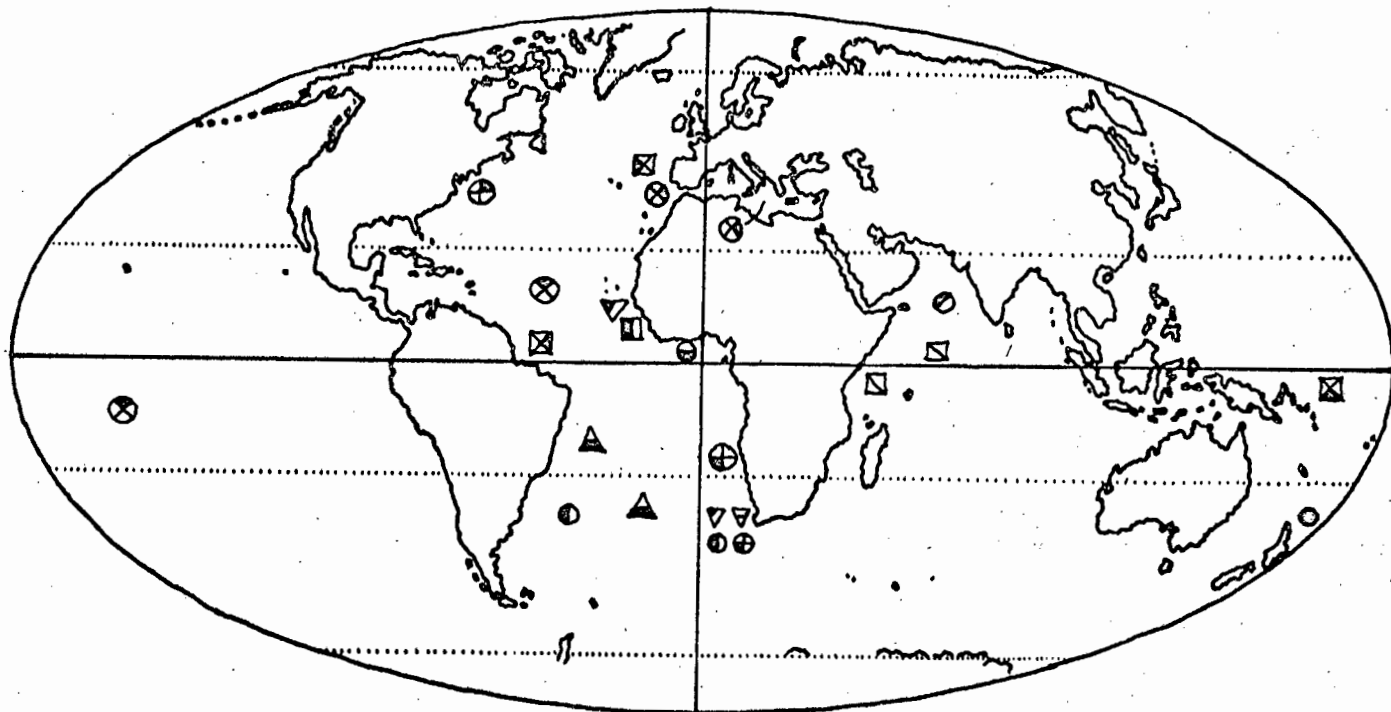
Cruise III - N 100H Samples: Sta. 67

N 100B Samples: Nil.

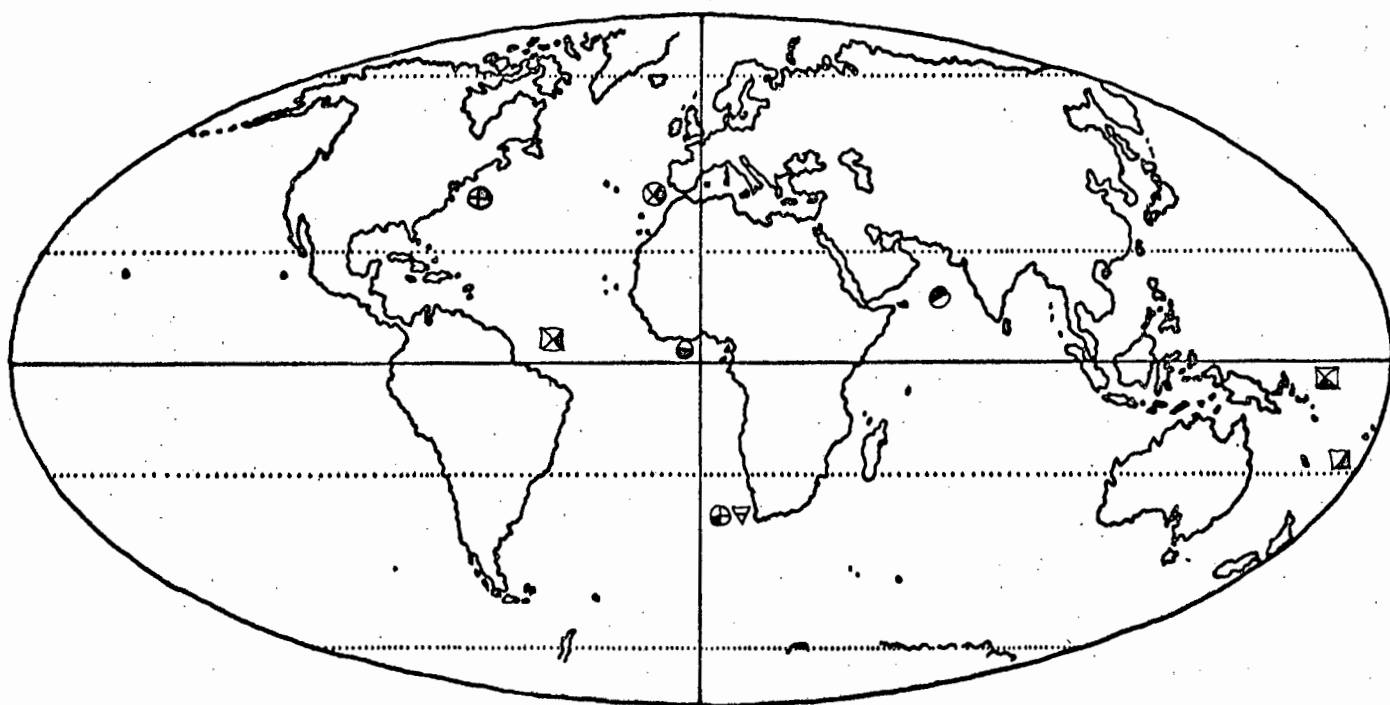
World Distribution: See map opposite.

Remarks: This species, distributed mainly in the Atlantic and Indian Oceans, is probably a warm water species since the majority of the records are likely to have come from regions with this type of water. The sole NGY record can only be used to extend its range to the Southwest Indian Ocean.

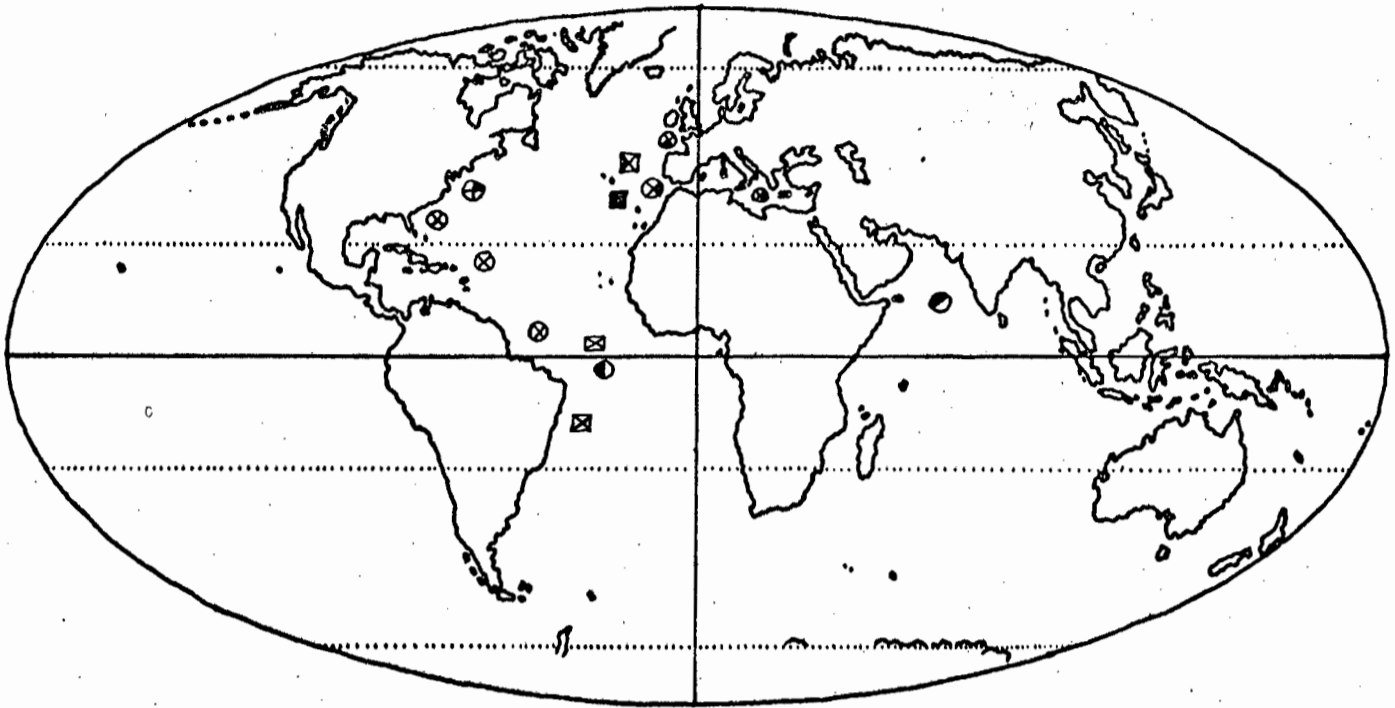
WORLD DISTRIBUTION OF
HEMITYPHIS RAPAX



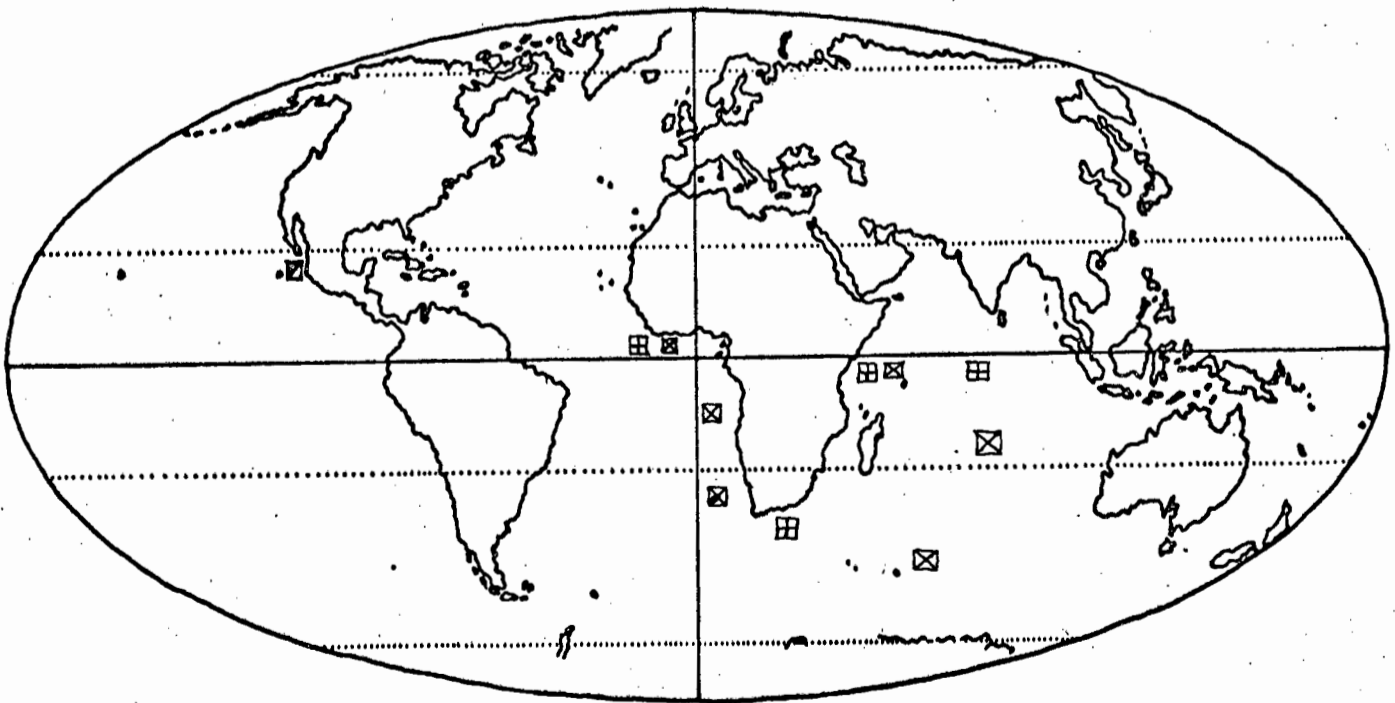
WORLD DISTRIBUTION OF
PARATYPHIS MACULATUS



WORLD DISTRIBUTION OF
SCINA MARGINATA



WORLD DISTRIBUTION OF
SCINA NANA



Scina marginata (Bovallius) 1885

Tyro marginata Bovallius 1885

Scina marginata Chevreux 1900 (■), Vosseler 1901 (⊗), Stebbing 1904 (⊗),

K. Stephensen 1918 (⊗), Wagler 1927 (⊗), Pirlot 1929 (⊗),

K.H. Barnard 1932 (●), K.H. Barnard 1937 (●), Shoemaker 1945 (⊕)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - nil.

Cruise III - nil.

World Distribution: See map opposite.

Remarks: This species occurs mainly in the Atlantic in the temperate and tropical regions. It is probably a warm water species since a number of records are from near the equator. The sole NGY record extends its range of distribution to the Southwest Indian Ocean.

Scina nana Wagler 1926

Scina nana Wagler 1926 (⊕), Wagler 1927 (⊗), Hurley 1956 (■)

South African Records additional to those of the NGY:

Wagler 1926, 1927

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

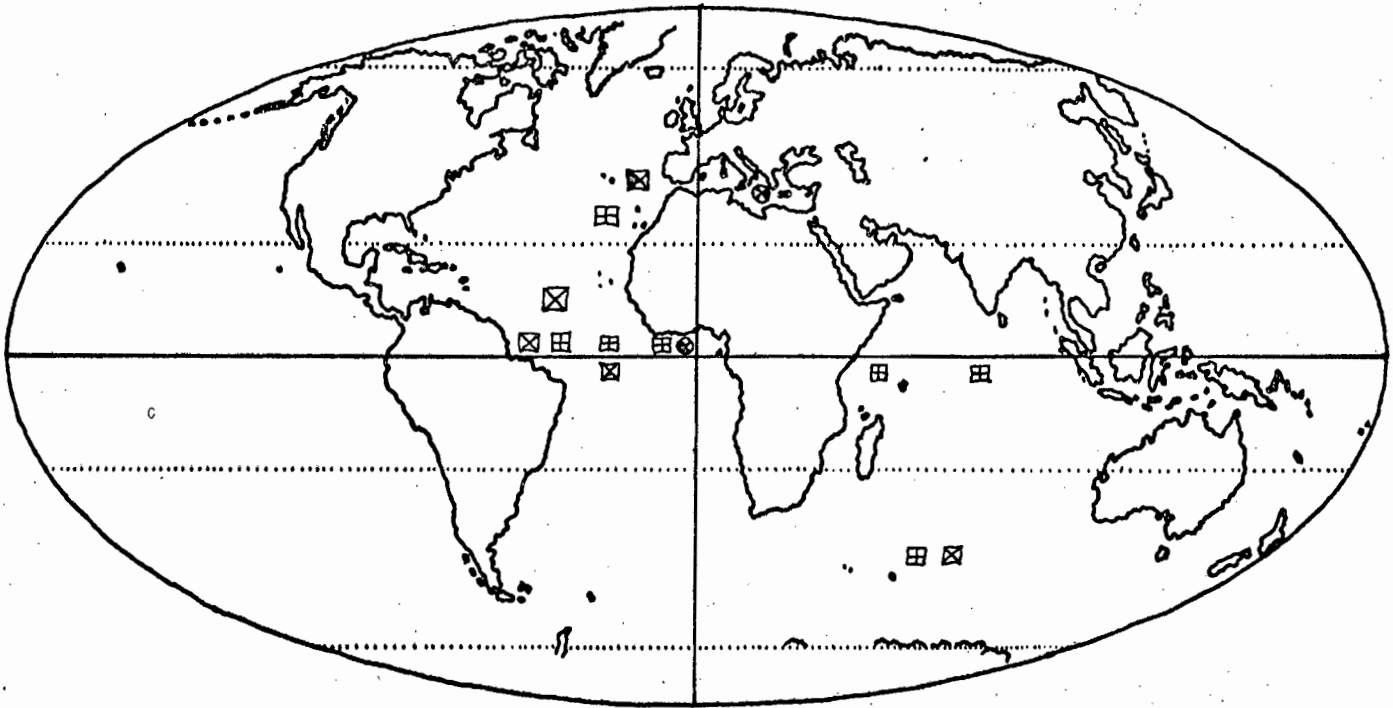
N 100B Samples: Sta. 45

Cruise III - nil.

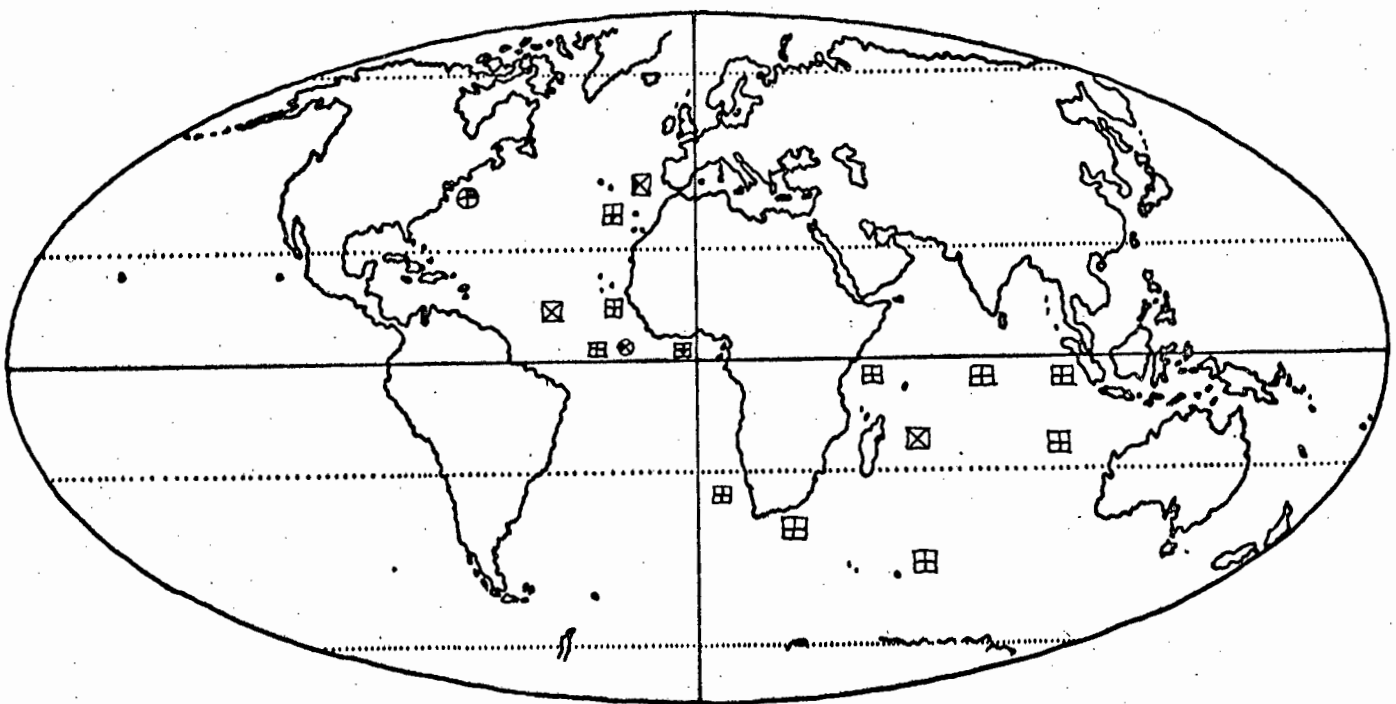
World Distribution: See map opposite.

Remarks: All previous records of this species in the Atlantic and Indian Oceans are based on specimens collected by the Deutsche Tiefsee- and Deutsche Südpolar Expeditions. This being the case, it may be assumed that all samples covered depth ranges of 1000 meters and more which is of no value for ecological inferences. Unfortunately the record by Hurley (1956) is also based on a sample covering a depth range of more than 1000 meters. The sole NGY record merely adds another record to the previous one by Wagler (1926) for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
SCINA SIMILIS



WORLD DISTRIBUTION OF
SCINA STENOPUS



Scina similis Stebbing 1895

Scina similis Stebbing 1895 (⊗), K. Stephensen 1918 (⊗), Wagler 1926 (⊕),
Wagler 1927 (⊗), Pirlot 1929 (⊗)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 20, 36

Cruise III - nil.

World Distribution: See map opposite

Remarks: The majority of previous records for this species are from within the Tropics which suggests a preference for warmer waters. The minimum temperature in the depth ranges covered by the two NGY samples is 18.45°C. which tends to support this.

Scina stenopus Stebbing 1895

Scina stenopus Stebbing 1895 (⊗), Wagler 1926 (⊕), Wagler 1927 (⊗),
Pirlot 1929 (⊗)

Scina stenops Shoemaker 1945 (⊕)

South African Records additional to those of the NGY:

Wagler 1926

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 15

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 18, 23

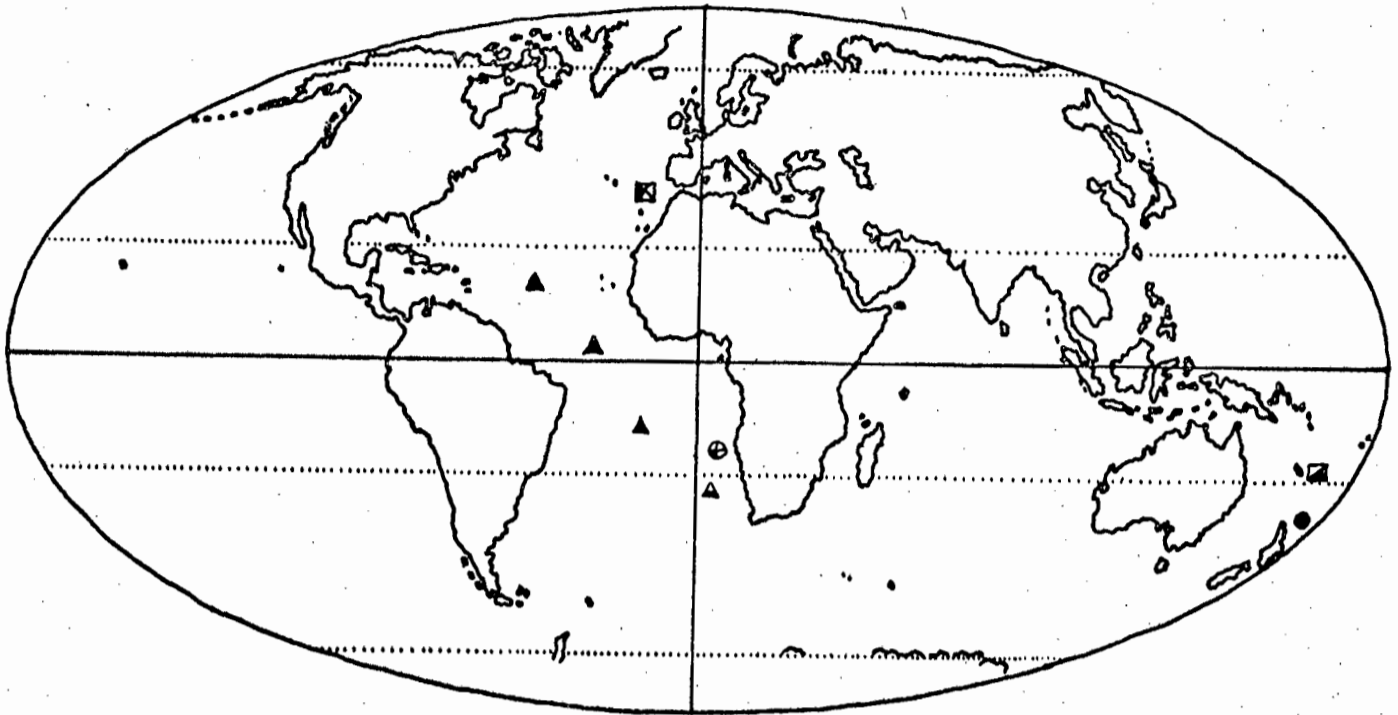
Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 68, 79, 83

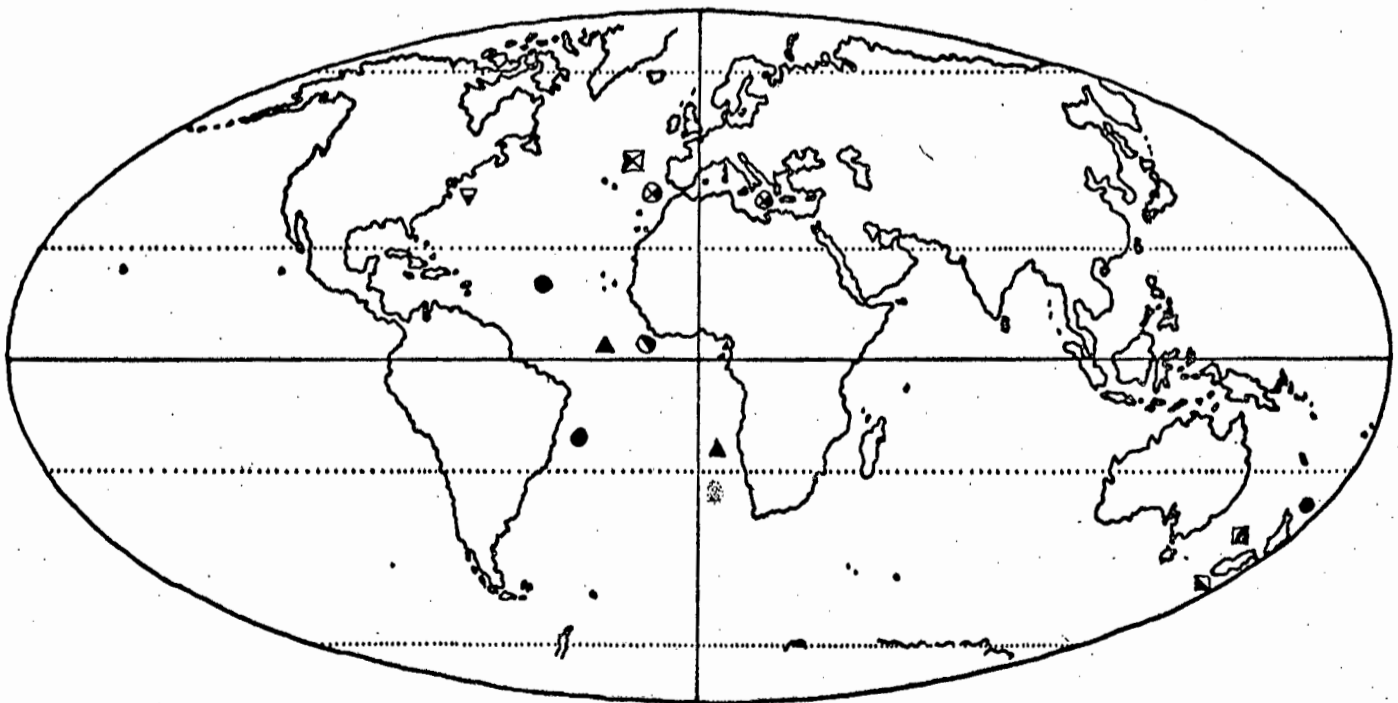
World Distribution: See map opposite.

Remarks: The majority of previous records of this species are from regions within the Tropics in the Atlantic and Indian Oceans. This was the most frequently occurring species of Scina in NGY Samples which suggests warm water preferences. This could not be positively inferred from previous records since the majority of these are based on samples collected by the Deutsche Tiefsee- and Deutsche Südpolar Expeditions and as previously stated cover depth ranges greater than 1000 meters.

WORLD DISTRIBUTION OF
VIBILIA CHUNI



WORLD DISTRIBUTION OF
VIBILIA STEBBINGI



FAMILY VIBILIIDAE CLAUSGENUS VIBILIA MILNE-EDWARDSVibilia chuni Behning & Woltereck 1912Vibilia chuni Behning 1927 (▲), Pirlot 1929 (☒), K.H. Barnard 1930 (●),
K.H. Barnard 1940 (▼), Hurley 1960a (☒), Siegfried 1963 (⊕)Vibilia hodgsoni Stewart 1913 (▲)South African Records additional to those of the NGY:

K.H. Barnard 1940, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - nil.

Cruise III - nil.

World Distribution: See map opposite.Remarks: This species has previously been recorded from a few scattered areas of the Atlantic and Pacific Oceans - mainly from regions within the Tropics. The sole NGY record is the first for the Southwest Indian Ocean (K.H. Barnard 1940 does not give a locality for his record).Vibilia stebbingi Behning & Woltereck 1912Vibilia stebbingi K. Stephensen 1918 (⊕), Behning 1925 (⊕), Behning 1927 (▲),
Pirlot 1929 (☒), K.H. Barnard 1930 (●), Hurley 1955 (☒),
Hurley 1960a (☒), Grice & Hart 1962 (▼)South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - N 100H Samples: Nil.

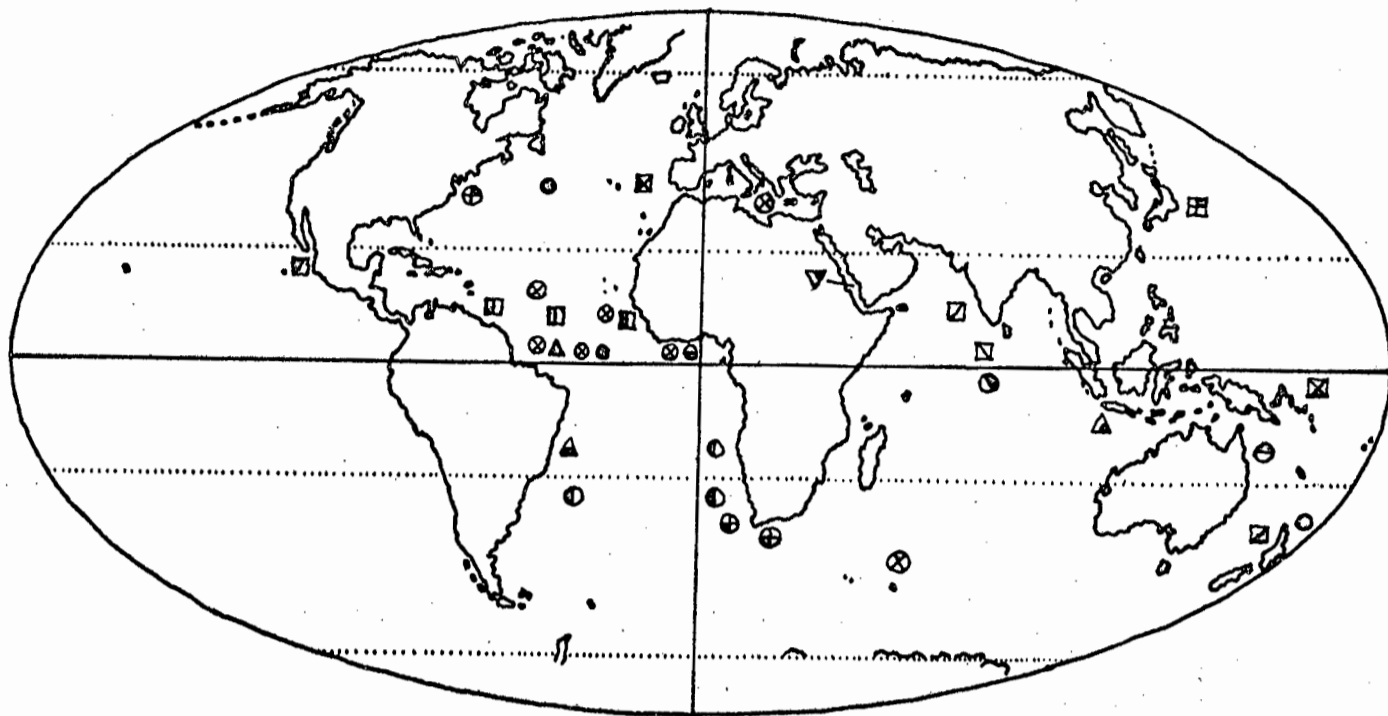
N 100B Samples: Sta. 12

Cruise II - nil.

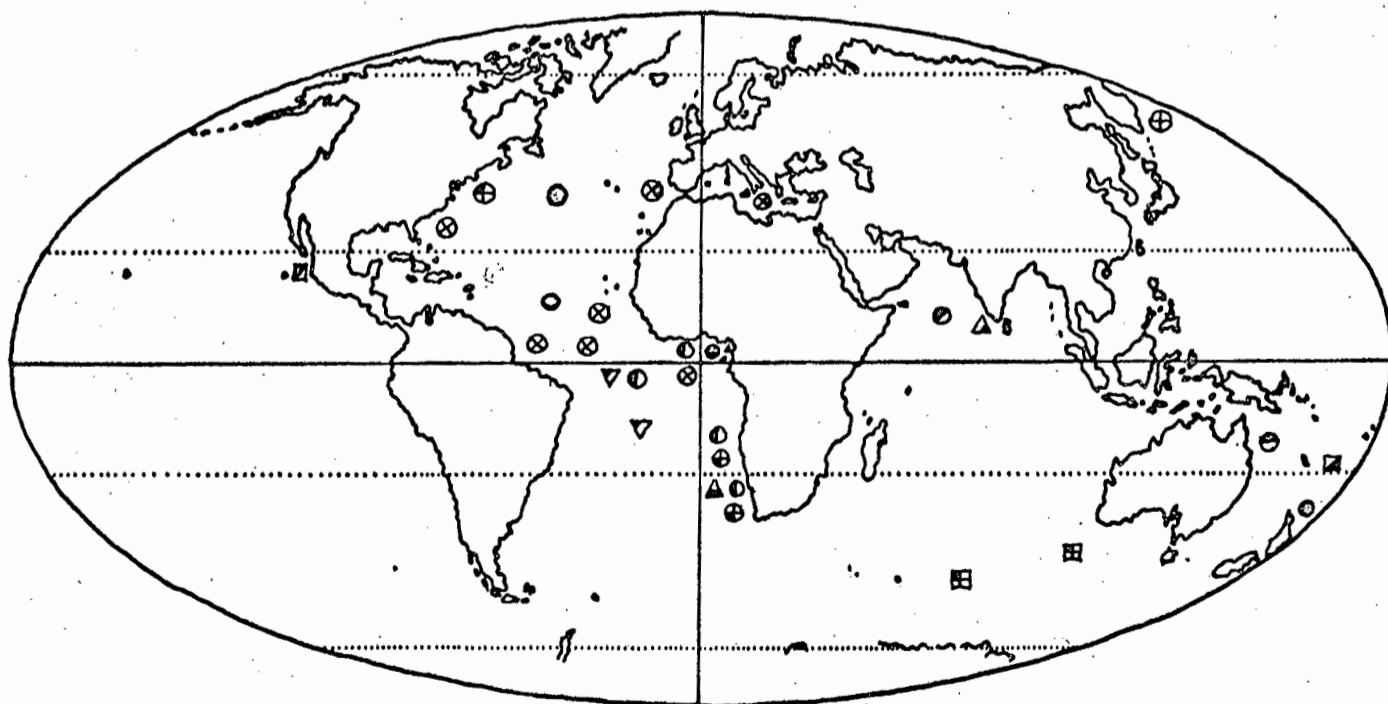
Cruise III - nil.

World Distribution: See map opposite.Remarks: This species has previously been recorded from widely scattered regions (temperate and tropical) of the Atlantic and Pacific Oceans. The sole NGY record is the first for the Southwest Indian Ocean and merely extends the geographic range of the species.

WORLD DISTRIBUTION OF
VIBILIA VIATRIX



WORLD DISTRIBUTION OF
PARAPHRONIMA CRASSIPES



Vibilia viatrix Bovallius 1887

Vibilia viatrix Vosseler 1901 (⊗), Walker 1904 (⊠), Walker 1909 (⊡),
 Stewart 1913 (▲), K. Stephensen 1918 (⊕), Spandl 1924 (▽),
 Behning 1925 (●), Behning 1927 (▲), Pirlot 1929 (⊠),
 K.H. Barnard 1930 (●), Pirlot 1930 (⊠), K.H. Barnard 1931 (●),
 K.H. Barnard 1932 (●), Shoemaker 1945 (⊕), Reid 1955 (●),
 Hurley 1956 (⊠), Irie 1959 (⊠), Hurley 1960a (⊠), Evans 1961 (⊠),
 Siegfried 1963 (⊕)

Vibilia viator Stebbing 1888 (⊗), Tsuruta 1963 (▲)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 18

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 68

World Distribution: See map opposite.

Remarks: Previous records for this species show a wide geographic distribution in the Atlantic, Indian and Pacific Oceans, the majority of records being from regions within the Tropics suggesting warm water preferences.

FAMILY PARAPHRONIMIDAE BOVALLIUS

GENUS PARAPHRONIMA CLAUS

Paraphronima crassipes Claus 1879

Paraphronima crassipes Vosseler 1901 (⊗), Stewart 1913 (▲), K. Stephensen 1924 (⊕), Spandl 1927 (▽), K.H. Barnard 1930 (●), K.H. Barnard 1931 (●), K.H. Barnard 1932 (●), K.H. Barnard 1937 (●), Shoemaker 1945 (⊕), Reid 1955 (●), Hurley 1956 (⊠), Vinogradov 1956 (⊕), Hurley 1960a (⊠), Hurley 1960b (⊠), Siegfried 1963 (⊕), Tsuruta 1963 (▲)

Paraphronima clypeata Bovallius 1889

South African Records additional to those of the NGY: K.H. Barnard 1932,

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Nil.

Cruise II - N 100H Samples: Staa. 22, 23

N 100B Samples: Sta. 18

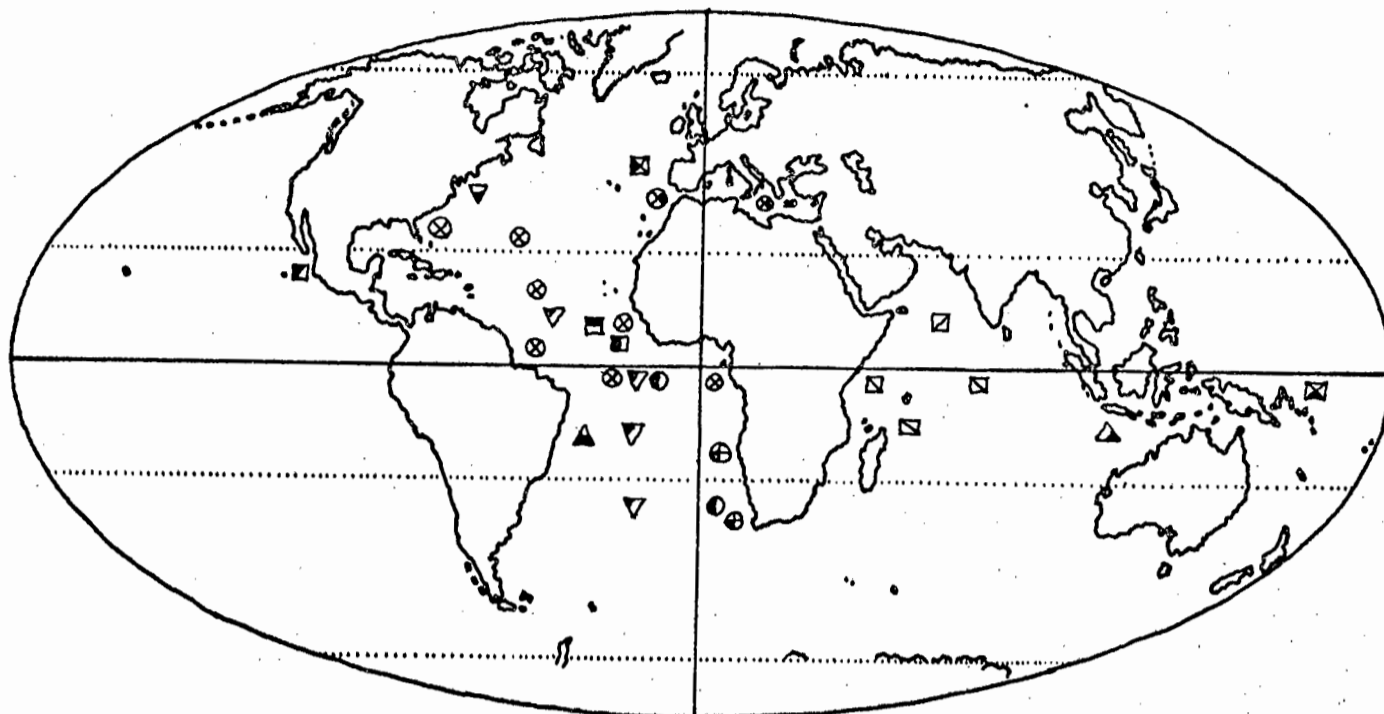
Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 87

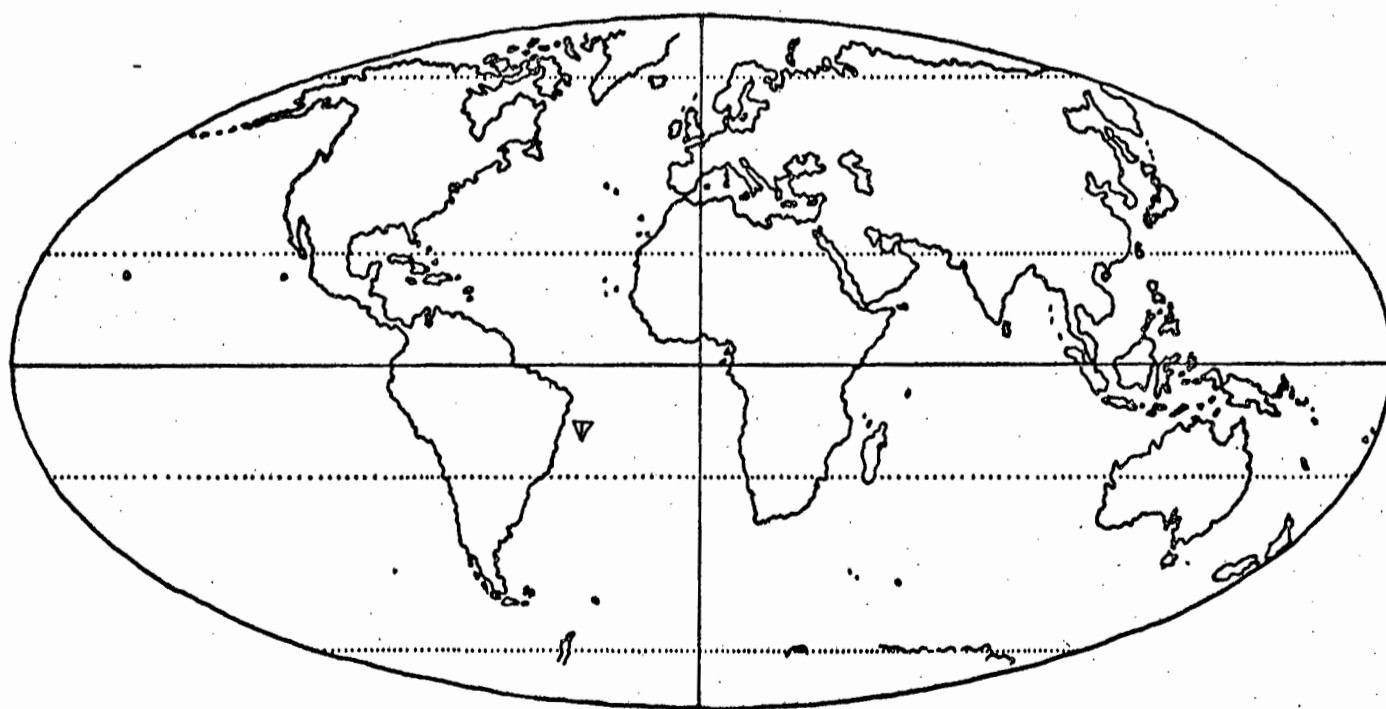
World Distribution: See map opposite.

Remarks: Previous records of this species show it to be widely distributed in the temperate and tropical regions of the World Oceans, with a slight preference for regions within the Tropics. The occurrence in NGY samples tends to suggest and support a preference for warm water.

WORLD DISTRIBUTION OF
PARAPHRONIMA GRACILIS



WORLD DISTRIBUTION OF
HYPEROCHE MARTINEZII



Paraphronima gracilis Claus 1879

Paraphronima gracilis Vosseler 1901 (⊗), Walker 1904 (⊠), Walker 1909 (⊡),
 Chilton 1912 (⊞), Stewart 1913 (△), K. Stephensen 1924 (⊗),
 Spandl 1927 (▽), Pirlot 1929 (⊠), Pirlot 1930 (⊠),
 K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙), Hurley 1956 (⊠),
 Evans 1961 (⊠), Grice & Hart 1962 (▽), Siegfried 1963 (⊕),
 Tsuruta 1963 (△)

South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Staa. 4, 12

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 36

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 60, 69, 70, 80, 86

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be mainly distributed in regions within the Tropics in the World Oceans. The suggested preference for warm water is supported by the occurrence in NGY Samples.

FAMILY HYPERIIDAE DANA

GENUS HYPEROCHE BOVALLIUS

Hyperoche martinezii (Fr. Müller) 1864

Hyperia martinezii Fr. Müller 1864

Hyperoche martinezii Bovallius 1889 (▽)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - nil.

Cruise III - N 100H Samples: Nil.

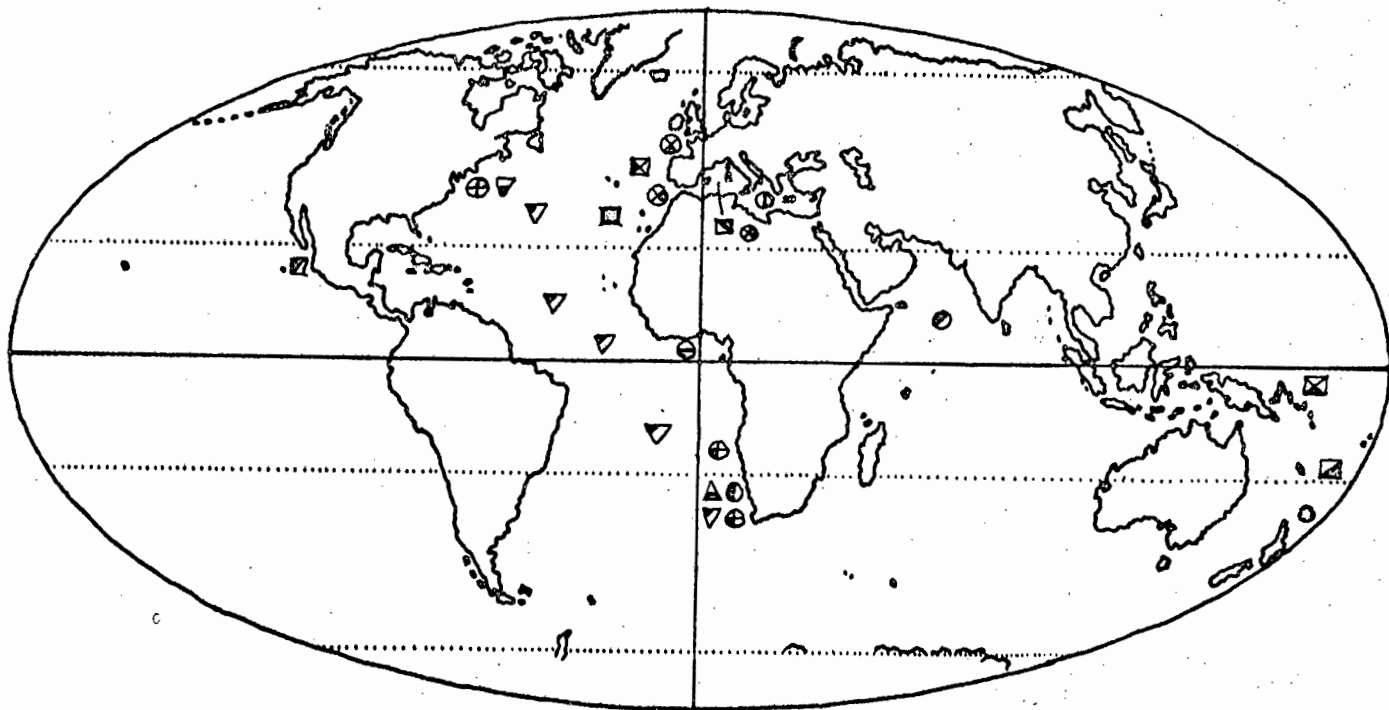
N 100B Samples: Sta. 81

World Distribution: See map opposite.

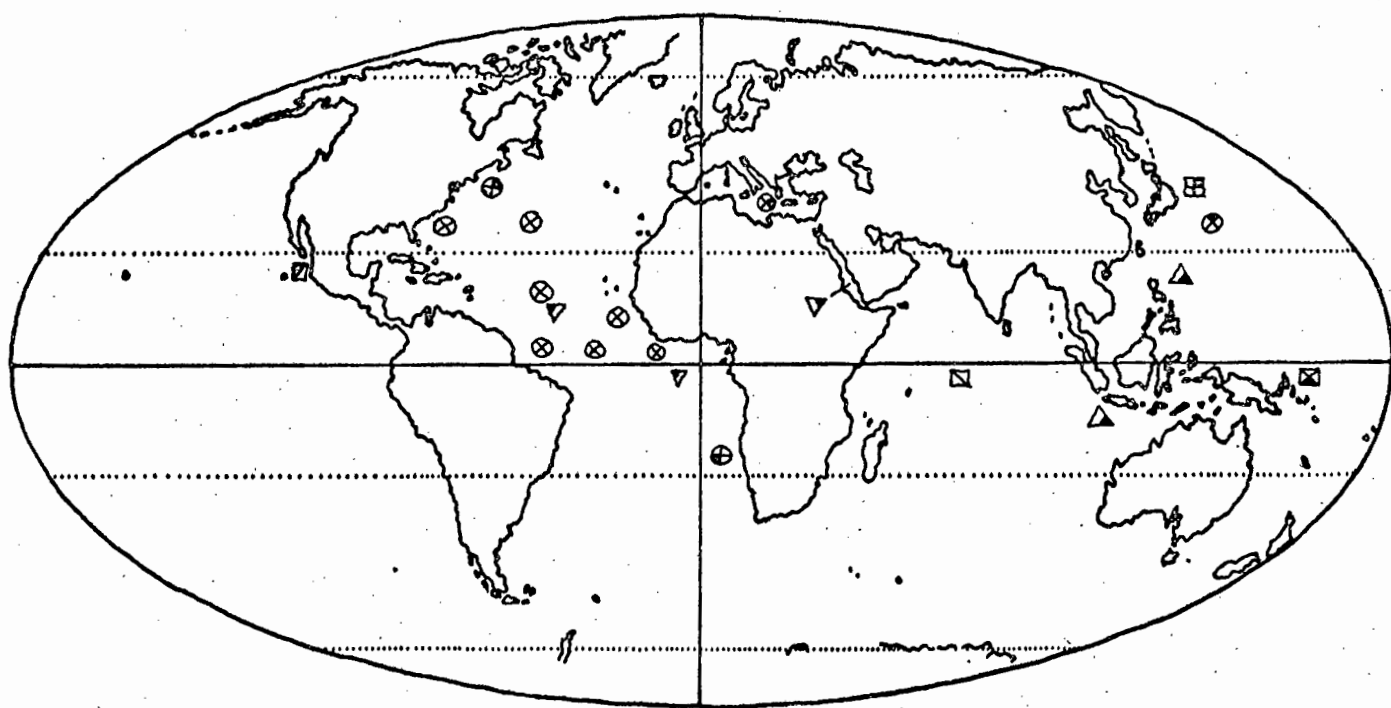
Remarks: Although there is only one previous record of this species it can be inferred from the distribution of other species of the genus, Hyperoche, that the species has a preference for cold water. This is supported by the fact that at the two stations from which it is recorded the minimum temperatures in the depth range covered by the samples were 12.00 and 13.57 °C. respectively.

The NGY records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
HYPERIOIDES LONGIPES



WORLD DISTRIBUTION OF
PHRONIMOPSIS SPINIFERA



GENUS HYPERIOIDES CHEVREUXHyperioides longipes Chevreux 1900 (■)

Hyperioides longipes Stebbing 1904 (⊗), Stewart 1913 (▲), K. Stephensen 1924 (⊗), Spandl 1927 (▽), Pirlot 1929 (⊗), K.H. Barnard 1930 (⊗), Pirlot 1930 (⊗), K.H. Barnard 1932 (⊗), K.H. Barnard 1937 (⊗), Ruffo 1939 (⊗), Shoemaker 1945 (⊕), Hurley 1956 (■), Irie 1959 (■), Furnestin 1960 (■), Hurley 1960a (■), Grice & Hart 1962 (▽), Siegfried 1963 (⊕)

Hyperia longipes Reid 1955 (⊖)South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 16

N 100B Samples: Staa. 12, 16

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 20, 35, 36, 39, 40, 44, 45, 46

Cruise III - N 100H Samples: Sta. 78

N 100B Samples: Staa. 60, 68, 69, 70, 72, 74, 75, 76, 79, 85, 88, 89

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be widely distributed in the World Oceans with a slight preference for the temperate regions. The NGY records suggest a preference for warm temperate conditions.

GENUS PHRONIMOPSIS CLAUSPhronimopsis spinifera Claus 1879

Phronimopsis spinifera Vosseler 1901 (⊗), Walker 1909 (■), Spandl 1924 (▽), K. Stephensen 1924 (⊗), Spandl 1927 (▽), Pirlot 1930 (⊗), Shoemaker 1945 (⊕), Hurley 1956 (■), Irie 1959 (■), Siegfried 1963 (⊕), Tsuruta 1963 (▲)

Phronimopsis sarsi Bovallius 1889Phronimopsis tenella Stebbing 1888 (⊗), Bovallius 1889South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 7, 12, 13, 15, 16

Cruise II - N 100H Samples: Staa. 22, 23

N 100B Samples: Staa. 18, 19, 38, 43, 50

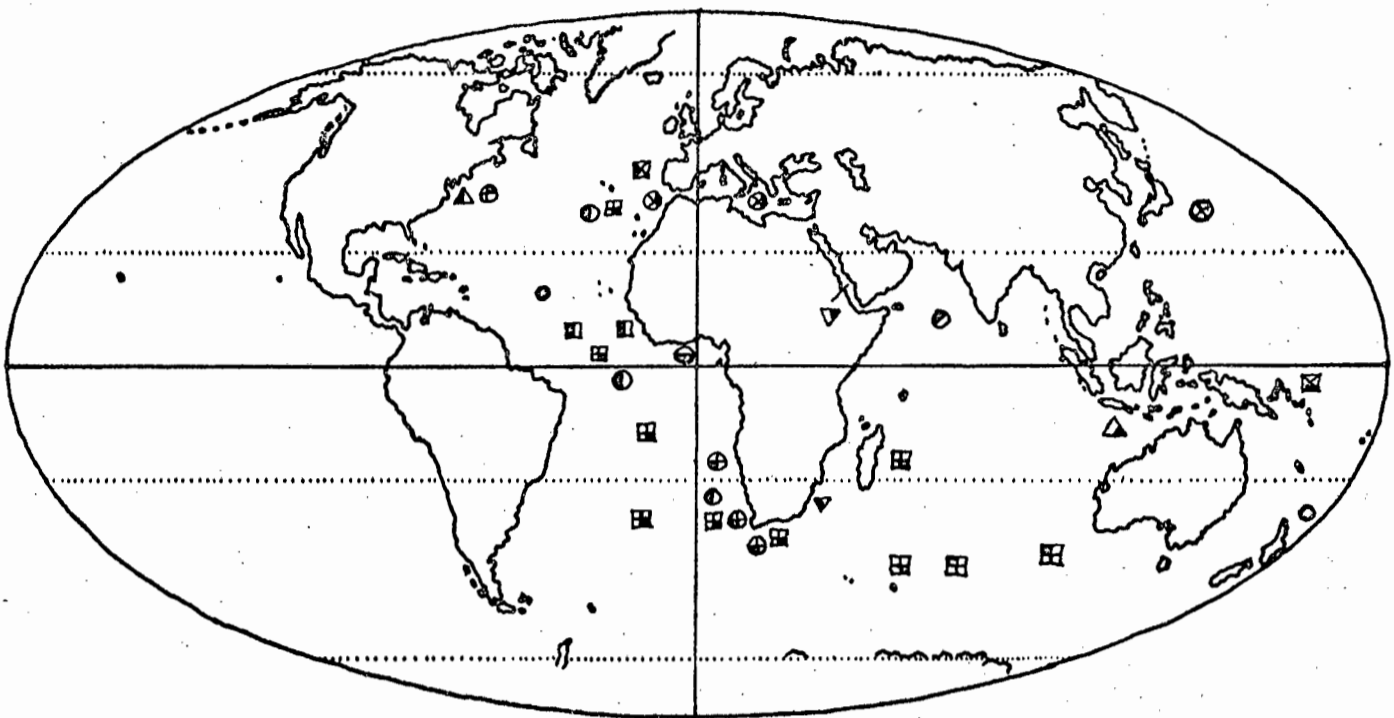
Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 60, 72, 77

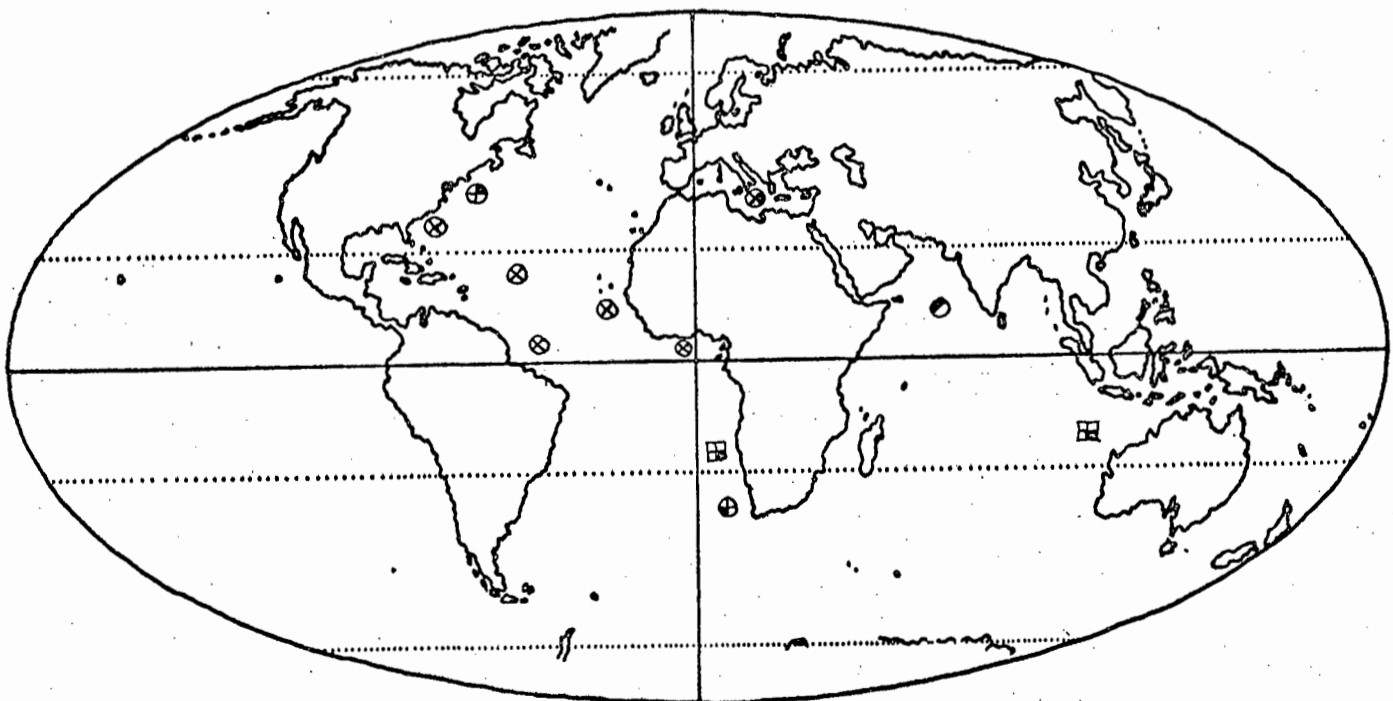
World Distribution: See map opposite.

Remarks: Previous records of this species are from widely scattered areas of the oceans of the World, mainly from within the Tropics. The suggested preference for warm conditions is supported by the occurrence in NGY samples mainly from the first and second cruises.

WORLD DISTRIBUTION OF
PHRONIMA ATLANTICA



WORLD DISTRIBUTION OF
PHRONIMA ATLANTICA VAR. SOLITARIA



FAMILY PHRONIMIDAE DANA
GENUS PHRONIMA LATREILLE

Phronima atlantica Guérin Méneville 1836

Phronima atlantica Stebbing 1888 (⊗), Bigelow 1915 (▲), Spandl 1924 (▼),
K. Stephensen 1924 (⊕), Mogk 1927 (⊞), Pirlot 1929 (⊠),
K.H. Barnard 1930 (⊙), Pirlot 1930 (⊡), K.H. Barnard 1932 (⊛),
K.H. Barnard 1937 (⊚), K.H. Barnard 1940 (▽), Shoemaker 1945 (⊕),
Reid 1955 (⊕), Hurley 1960b (⊞), Evans 1961 (⊠),
Siegfried 1963 (⊕), Tsuruta 1963 (▲)

South African Records additional to those of the NGY:

Mogk 1927, K.H. Barnard 1932, 1940, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - N 100H Samples: Sta. 23

N 100B Samples: Staa. 20, 46

Cruise III - nil.

World Distribution: See map opposite.

Remarks: Previous records of this species are from the temperate and tropical regions of the World Oceans, the majority being from warm temperate regions. The NGY records are not very numerous but they do not oppose this inference.

Phronima atlantica var. solitaria (Guérin Méneville) 1836

Phronima solitaria Guérin Méneville 1836, Bovallius 1889

Phronima atlantica var. solitaria Vosseler 1901 (⊗), K. Stephensen 1924 (⊕),
Mogk 1927 (⊞), K.H. Barnard 1930 (⊙), K.H. Barnard 1937 (⊚),
Shoemaker 1945 (⊕), Siegfried 1963 (⊕)

South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

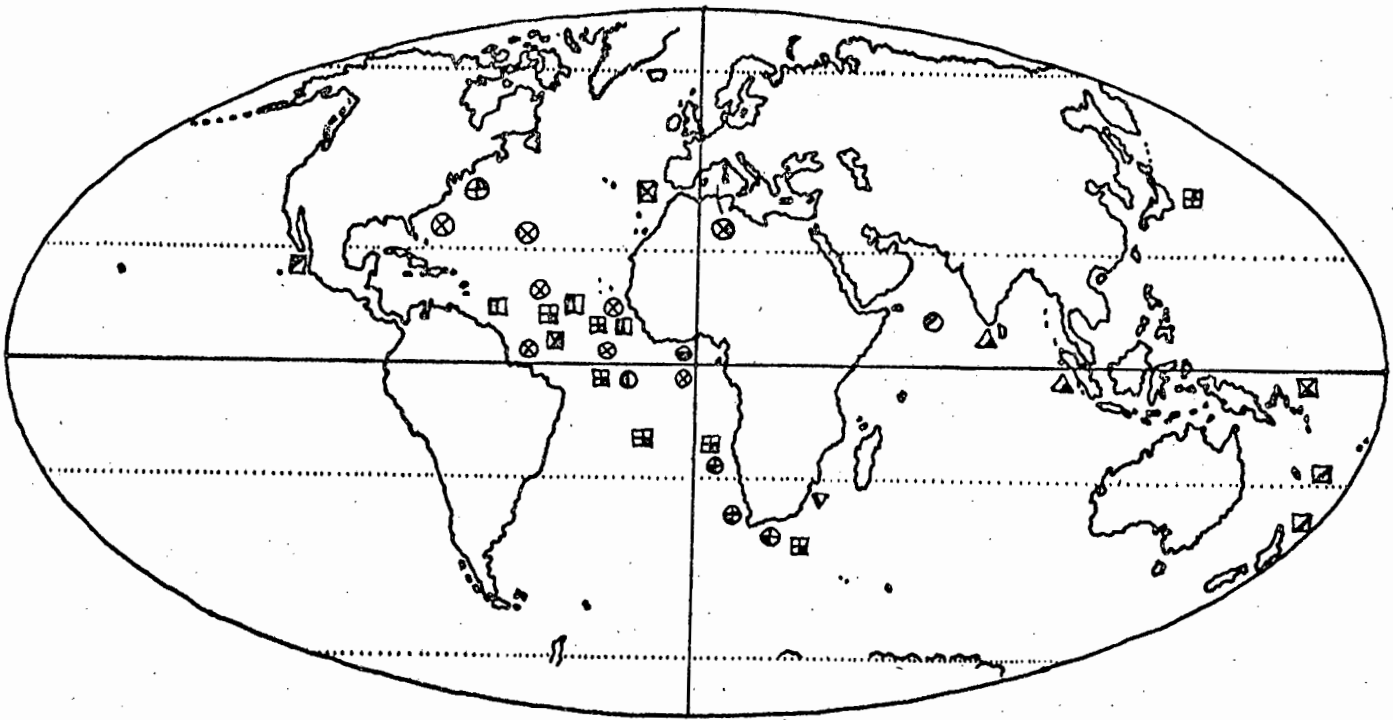
N 100B Samples: Sta. 20

Cruise III - nil.

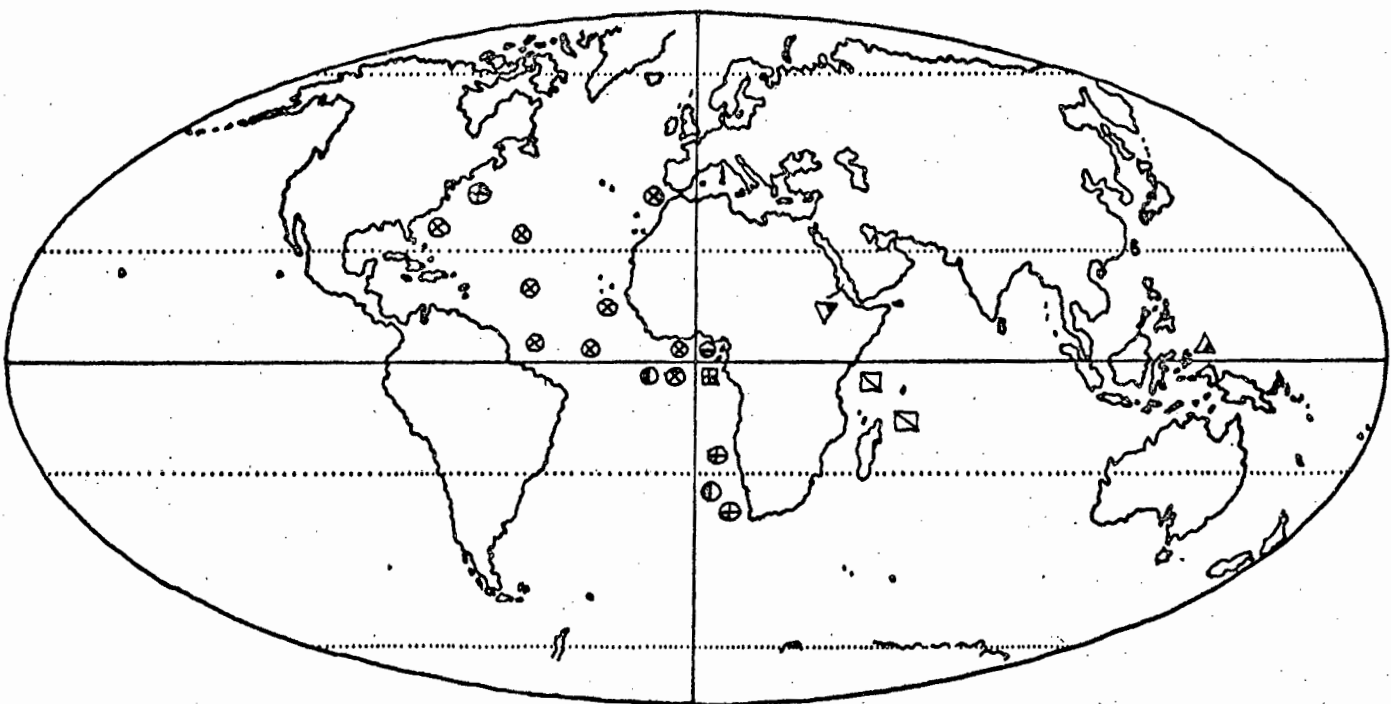
World Distribution: See map opposite.

Remarks: Previous records of this species are from a few scattered regions of the Atlantic and Indian Oceans, mainly within the Tropics. The sole NGY record merely extends the range of distribution to the Southwest Indian Ocean and cannot be used for ecological inferences.

WORLD DISTRIBUTION OF
PHRONIMA COLLETTI



WORLD DISTRIBUTION OF
PHRONIMA PACIFICA



Phronima colletti Bovallius 1887

Phronima colletti Vosseler 1901 (⊗), K. Stephensen 1924 (⊗), Mogk 1927 (⊞),
 Pirlot 1929 (⊞), Pirlot 1930 (⊞), K.H. Barnard 1932 (⊙),
 K.H. Barnard 1937 (⊙), Pirlot 1939 (⊞), K.H. Barnard 1940 (▽),
 Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (⊞), Irie 1959 (⊞),
 Hurley 1960a (⊞), Evans 1961 (⊞), Siegfried 1963 (⊕),
 Tsuruta 1963 (△)

South African Records additional to those of the NGY:

Mogk 1927, K.H. Barnard 1940, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Sta. 4

Cruise II - N 100H Samples: Staa. 20, 21

N 100B Samples: Staa. 19, 20, 26, 38, 44

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 88

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be widely distributed in the temperate and tropical regions of the World Oceans with a preference for regions within the Tropics. The inferred preference for warm conditions is supported by the occurrence in NGY samples mainly from the second and third cruises.

Phronima pacifica Streets 1887

Phronima pacifica Stebbing 1888 (⊗), Vosseler 1901 (⊗), Walker 1909 (⊞),
 Spandl 1924 (▽), K. Stephensen 1924 (⊗), Mogk 1927 (⊞),
 K.H. Barnard 1932 (⊙), Shoemaker 1945 (⊕), Reid 1955 (⊖),
 Siegfried 1963^(⊕), Tsuruta 1963 (△)

South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 13

N 100B Samples: Sta. 16

Cruise II - N 100H Samples: Sta. 20

N 100B Samples: Staa. 20, 26, 39, 40, 49

Cruise III - N 100H Samples: Nil.

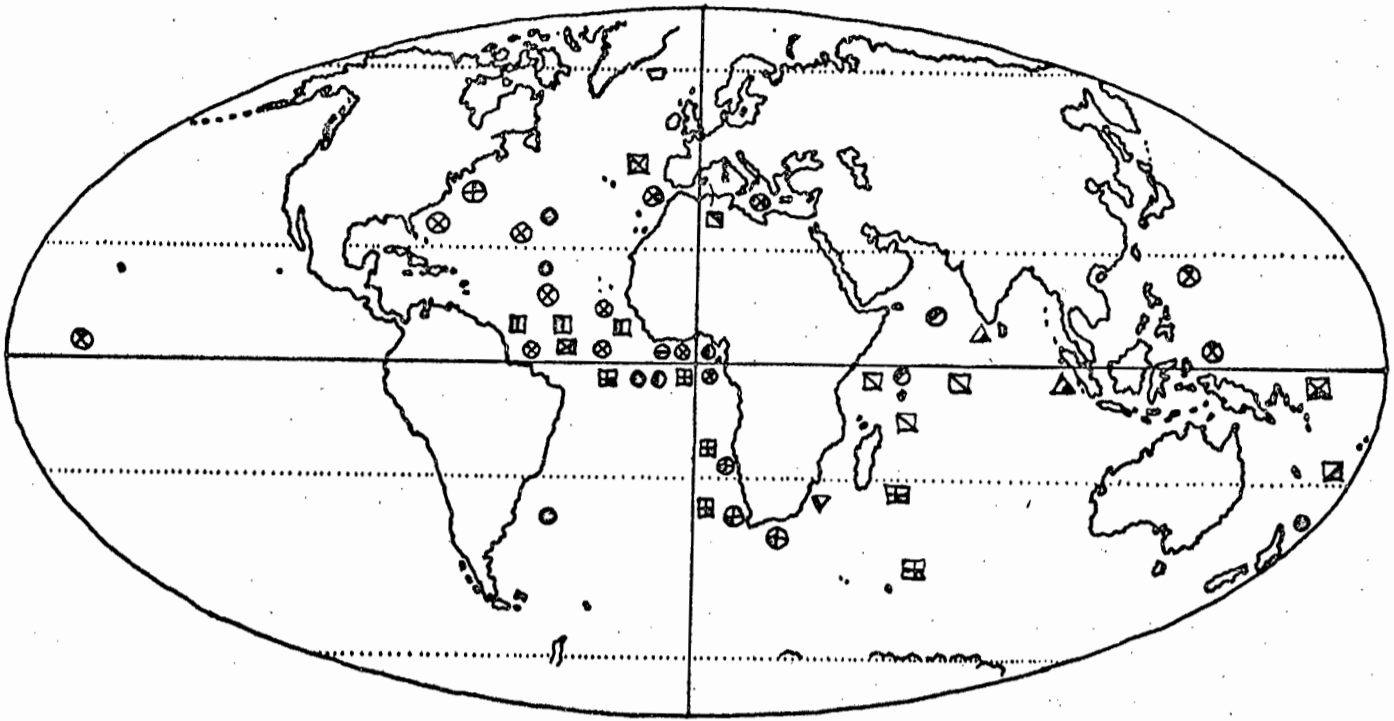
N 100B Samples: Staa. 69, 75, 88

World Distribution: See map opposite.

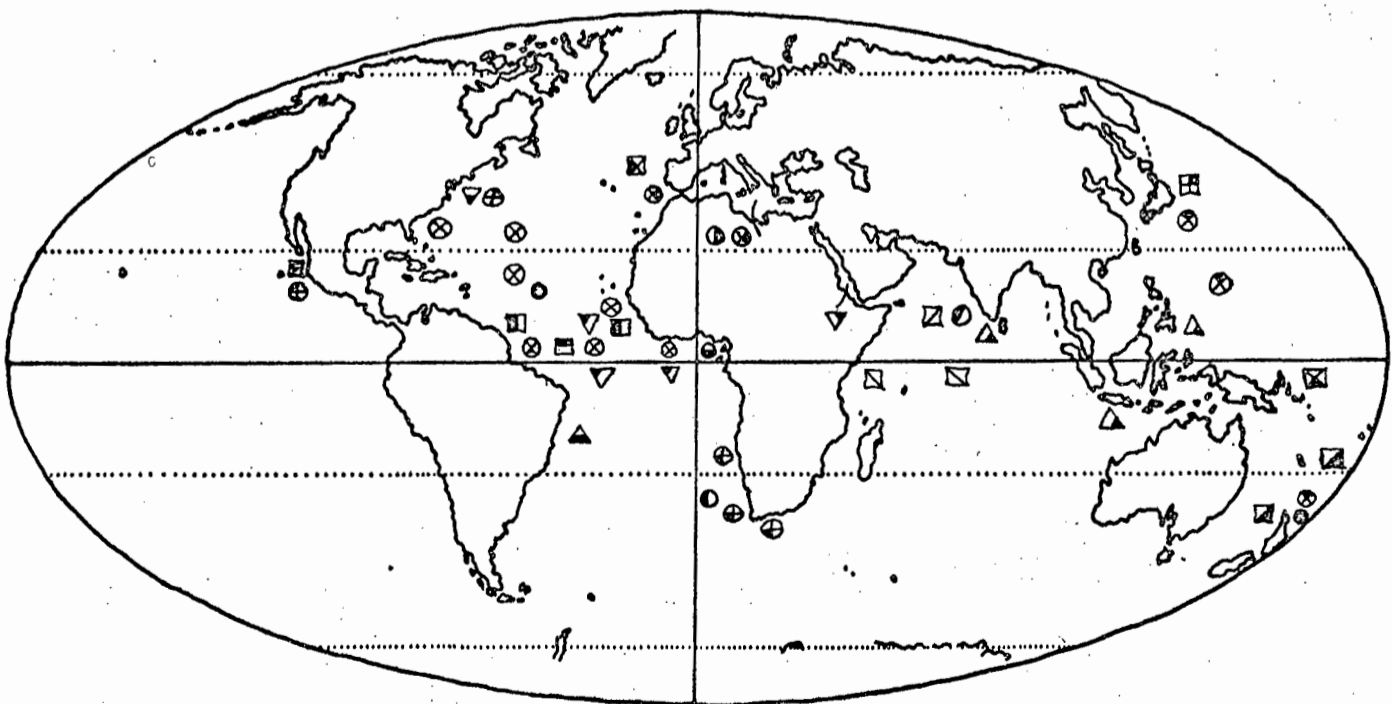
Remarks: The majority of the previous records of this species are from regions of the World Oceans within the Tropics. The inferred preference for warm conditions is supported by the occurrence in NGY samples from the first and second cruises mainly.

The NGY records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
PHRONIMELLA ELONGATA



WORLD DISTRIBUTION OF
ANCHYLOMERA BLOSSEVILLEI



GENUS PHRONIMELLA CLAUSPhronimella elongata (Claus) 1862Phronima elongata Claus 1862, Evans 1961 (■)

Phronimella elongata Claus 1871, Stebbing 1888 (⊗), Vosseler 1901 (⊗),
Walker 1909 (□), K. Stephensen 1924 (⊗), Mogk 1927 (⊞),
Pirlot 1929 (⊞), K.H. Barnard 1930 (⊗), Pirlot 1930 (⊞),
K.H. Barnard 1932 (⊗), K.H. Barnard 1937 (⊗), Pirlot 1939 (⊞),
K.H. Barnard 1940, (▽), Shoemaker 1945 (⊕), Reid 1955 (⊖),
Furnestin 1960 (⊞), Hurley 1960a (⊞), Siegfried 1963 (⊕),
Tsuruta 1963 (△)

South African Records additional to those of the NGY:

K. H. Barnard 1940, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 15

N 100B Samples: Staa. 4, 6, 12, 13, 15, 16

Cruise II - N 100H Samples: Staa. 23, 25

N 100B Samples: Staa. 18, 30, 31, 38, 39

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 60, 72, 87

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be distributed in all World Oceans, mainly in regions within the Tropics. The suggested preference for warm conditions is supported by the occurrence in NGY samples mainly from the first two cruises.

FAMILY ANCHYLOMERIDAE BOVALLIUSGENUS ANCHYLOMERA MILNE-EDWARDSAnchylomera blossevillei Milne-Edwards 1830Anchylomera hunteri Bovallius 1889

Anchylomera blossevillei Stebbing 1888 (⊗), Vosseler 1901 (⊗), Walker 1904 (⊞),
Walker 1909, (⊞), Chilton 1912 (⊞), Stewart 1913 (△),
Spandl 1924 (▽), K. Stephensen 1924 (⊗), Shoemaker 1925 (⊕),
Spandl 1927, (▽), Pirlot 1929 (⊞), K.H. Barnard 1930 (⊗),
Pirlot 1930 (⊞), K.H. Barnard 1932 (⊗), K.H. Barnard 1937 (⊗),
Pirlot 1939 (⊞), Ruffo 1939 (⊗), Shoemaker 1945 (⊕), Reid 1955 (⊖),
Hurley 1956 (⊞), Irie 1959 (⊞), Hurley 1960a (⊞), Evans 1961 (■),
Grice & Hart 1962 (▽), Siegfried 1963 (⊕), Tsuruta 1963 (△)

South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 5, 7, 8, 12, 16

N 100B Samples: Staa. 3, 6, 12, 13, 14, 16

Cruise II - N 100H Samples: Staa. 20, 23, 31, 32, 44, 46

N 100B Samples: Staa. 23, 31, 32, 36, 39, 46

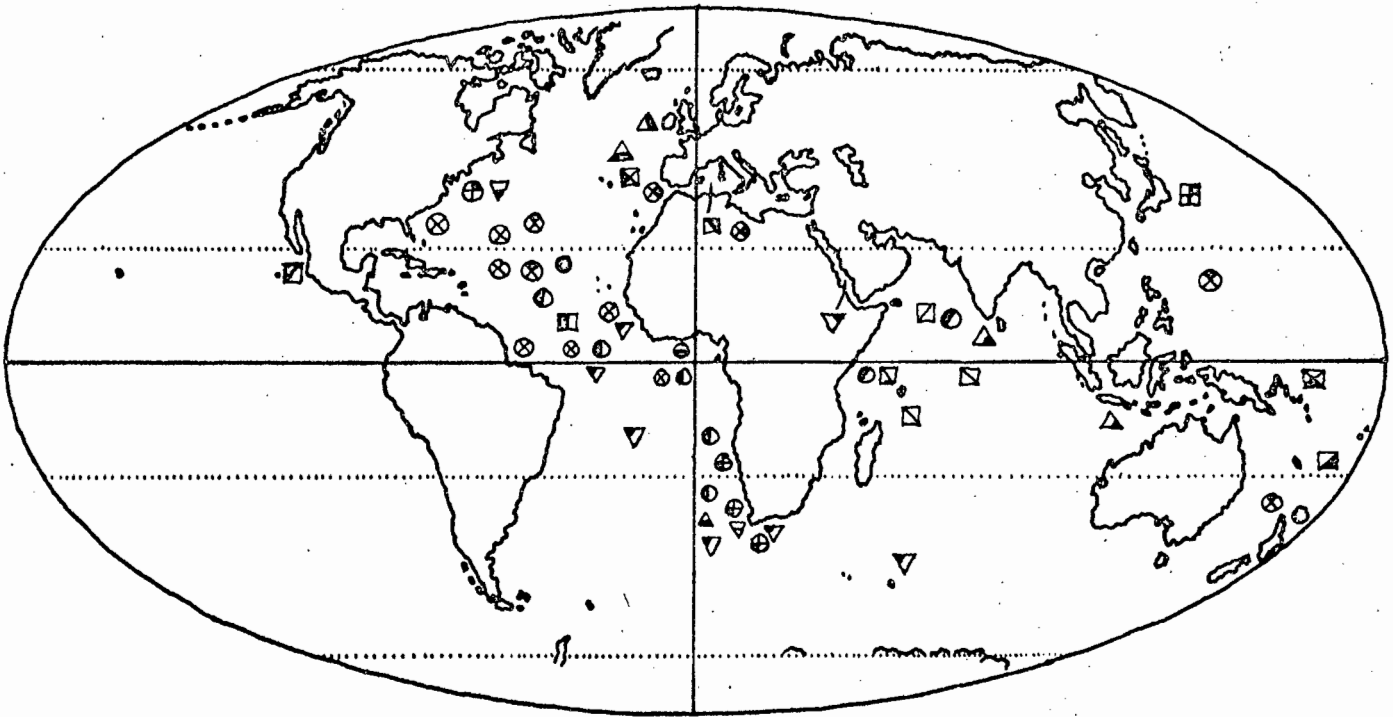
Cruise III - N 100H Samples: Staa. 61, 62, 64, 66, 70, 74, 76,
79, 80

N 100B Samples: Staa. 61, 62, 65, 66, 73, 76, 80, 85

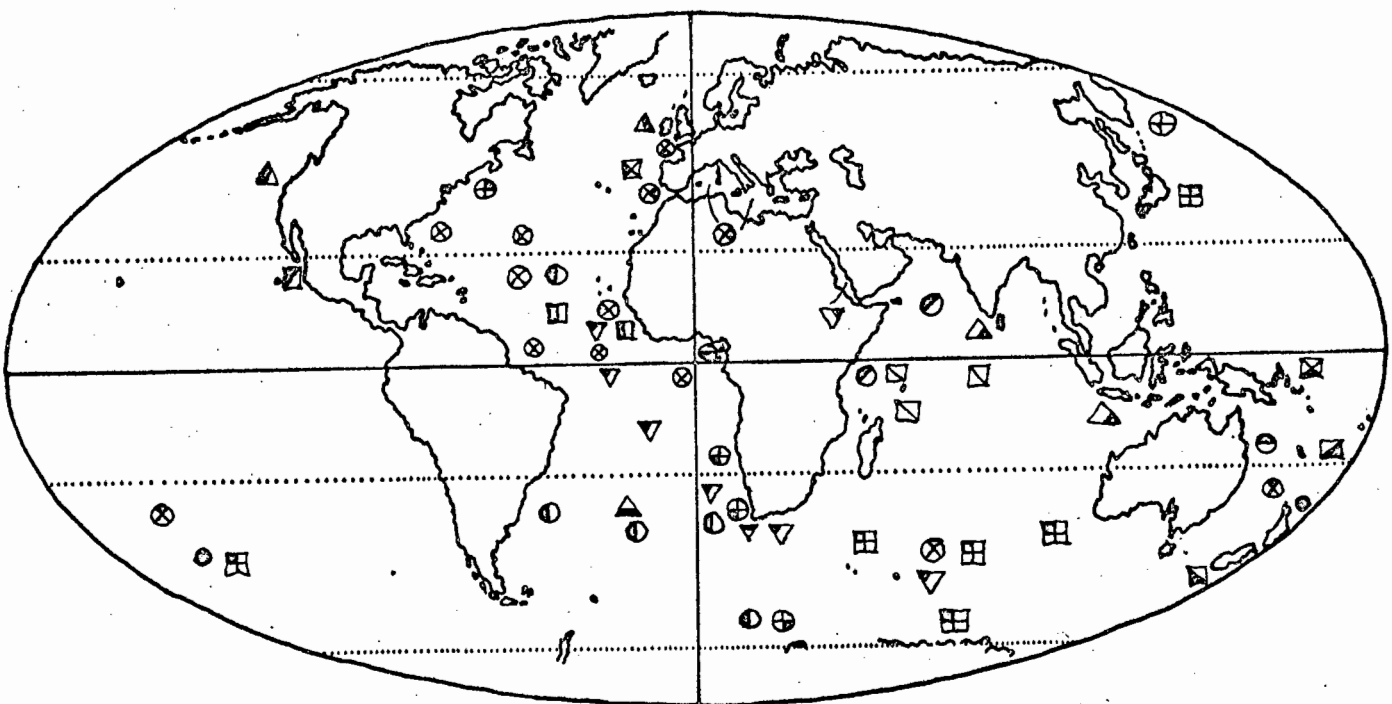
World Distribution: See map opposite.

Remarks: This species is widely distributed in the temperate and tropical regions of the World Oceans. Its occurrence in NGY samples in all of the three cruises suggests eurythermal tolerances which tends to be supported by the geographic distribution of previous records.

WORLD DISTRIBUTION OF
PHROSINA SEMILUNATA



WORLD DISTRIBUTION OF
PRIMNO MACROPA



GENUS PHROSINA RISSO

Phrosina semilunata Risso 1822

Phrosina semilunata Stebbing 1888 (⊗), Vosseler 1901 (⊗), Walker 1904 (⊠),
Tattersall 1906 (▲), Stebbing 1910 (▽), Stewart 1913 (▲),
K.H. Barnard 1916 (▽), Spandl 1924 (▽), K. Stephensen 1924 (⊗),
Spandl 1927 (▽), Pirlot 1929 (⊠), K.H. Barnard 1930 (⊙),
Pirlot 1930 (⊠), K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙),
Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (⊠), Irie 1959 (⊠),
Furnestin 1960 (⊠), Hurley 1960a (⊠), Evans 1961 (⊠),
Siegfried 1963 (⊕), Tsuruta 1963 (▲)

Phrosina australis Stebbing 1888Phrosina pacifica Stebbing 1888, Bovallius 1889Phrosina semi-lunata Walker 1909 (⊠)Phronima semilunata Grice & Hart 1962South African Records additional to those of the NGY:

Stebbing 1910, Stewart 1913, K.H. Barnard 1916, Spandl 1927, K.H. Barnard 1932
Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 16

Cruise II - N 100H Samples: Staa. 18, 21, 23, 29, 35, 45, 46

N 100B Samples: Staa. 24, 27, 30, 31, 32, 38, 39,
40, 45, 46, 49, 50

Cruise III - N 100H Samples: Staa. 61, 70, 74, 79, 80

N 100B Samples: Staa. 61, 69, 70, 72, 74, 75, 79,
81, 85, 86, 87, 88, 89

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be distributed throughout the temperate and tropical regions of the World Oceans. The suggested eurythermal tolerance is not supported by the low frequency of occurrence in the first NGY cruise.

GENUS PRIMNO GUÉRIN MÉNEVILLE

Primno macropa Guérin Méneville 1836

Primno macropa Stebbing 1888 (⊗), Stebbing 1904 (⊗), Tattersall 1906 (▲),
Stewart 1913 (▲), Spandl 1924 (▽), K.H. Barnard 1925 (▽),
Spandl 1927 (▽), K.H. Barnard 1930 (⊙), Pirlot 1930 (⊠),
K.H. Barnard 1931 (⊖), K.H. Barnard 1932 (⊙), K.H. Barnard 1937
(⊙), Thorsteinson 1941 (▲), Shoemaker 1945 (⊕), Hurley 1955 (⊠),
Hurley 1956 (⊠), Vinogradov 1956 (⊕), Stadel 1958 (⊕),
Irie 1959 (⊠), Hurley 1960a (⊠), Hurley 1960b (⊠),
Grice & Hart 1962 (▽), Siegfried 1963 (⊕)

Euprimno macropa Walker 1909 (⊠)

Euprimno macropus Bovallius 1889, Vosseler 1901 (⊗), K. Stephensen 1924 (⊗),
Pirlot 1929 (⊠), Reid 1955 (⊖), Furnestin 1960 (⊠), Evans 1961 (⊠)
Tsuruta 1963 (▲)

Primno antarctica, latreillei & menevillei Stebbing 1888South African Records additional to those of the NGY:

K.H. Barnard 1925, 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 16

N 100B Samples: Staa. 3, 4, 12, 13, 15, 16

Cruise II - N 100H Samples: Staa. 20, 21, 22, 23, 28, 31, 33, 45,
46

N 100B Samples: Staa. 18, 19, 20, 23, 24, 27, 31, 34,
35, 36, 39, 44, 45, 46

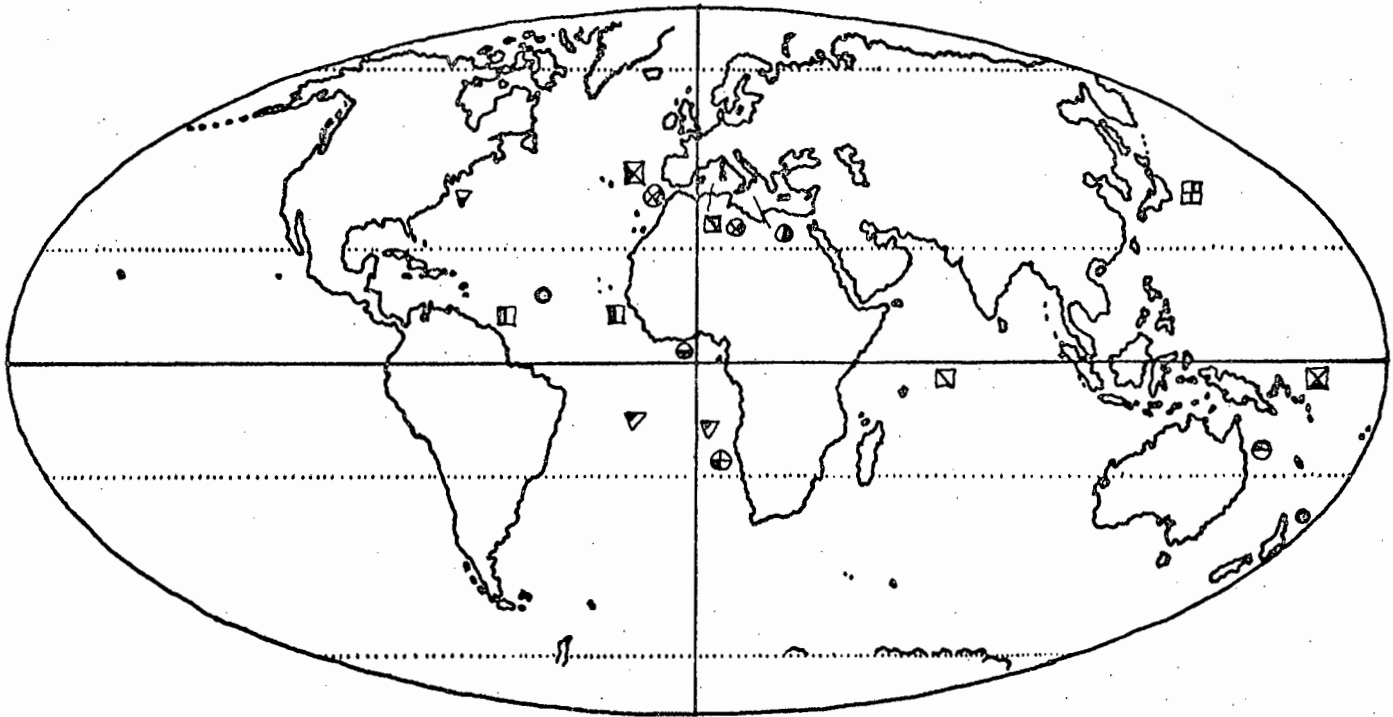
Cruise III - N 100H Samples: Staa. 62, 65, 66, 71, 74, 75, 80,

N 100B Samples: Staa. 61, 64, 65, 66, 70, 72, 73, 74,
76, 77, 79, 80, 85, 87, 88, 89

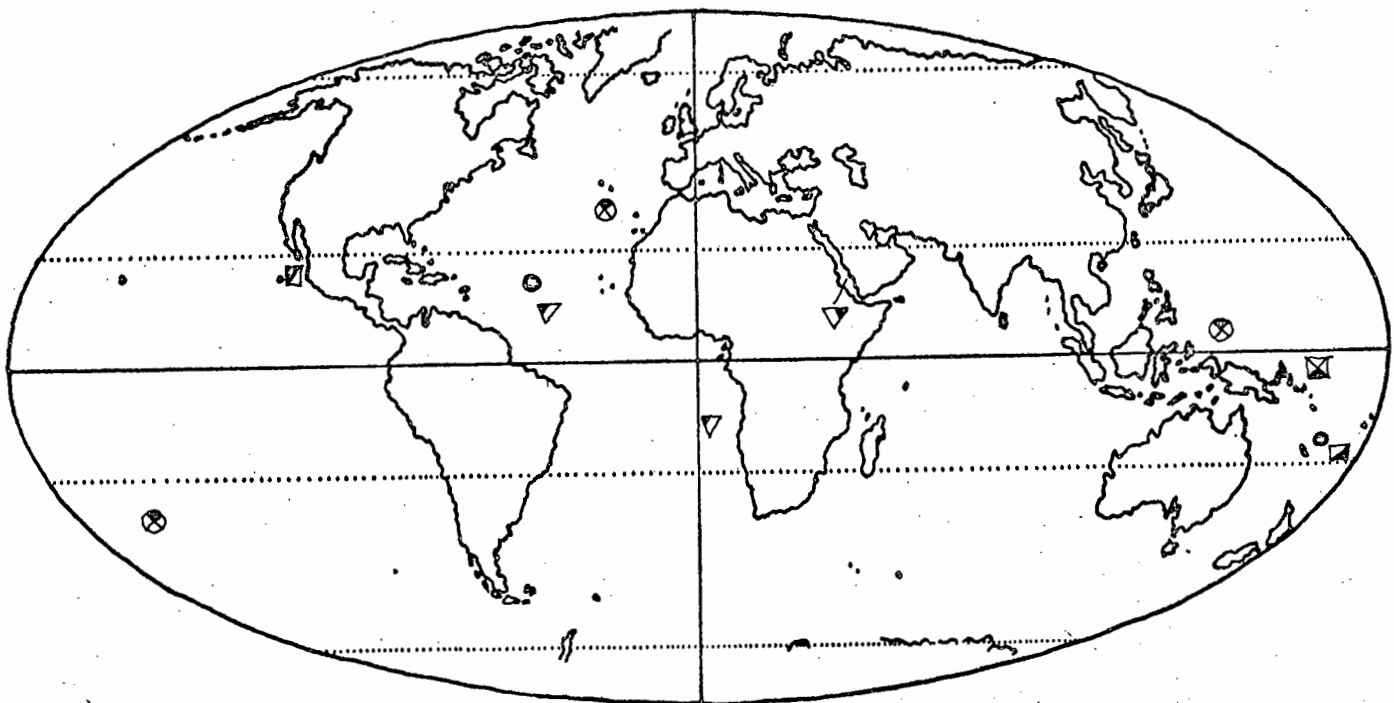
World Distribution: See map opposite.

Remarks: Previous records of this species show it to be the most widely distributed of the hyperiids. The inferred eurythermal and euryhaline tolerances are not supported by the maximum frequency of occurrence in the second and third NGY cruises.

WORLD DISTRIBUTION OF
LYCAEOPSIS THEMISTOIDES



WORLD DISTRIBUTION OF
LYCAEOPSIS ZAMBOANGAE



FAMILY LYCAEOPSIDAE CHEVREUX

GENUS LYCAEOPSIS CLAUS

Lycaeopsis themistoides Claus 1879

Lycaeopsis themistoides K. Stephensen 1926, (⊗), Spandl 1927 (▽), Pirlot 1929 (⊠)
 K.H. Barnard 1930 (⊙), Pirlot 1930 (⊠), K.H. Barnard 1931 (⊖),
 Ruffo 1939 (⊙), Reid 1955 (⊖), Irie 1959 (⊠), Furnestin 1960 (⊠),
 Evans 1961 (⊠), Grice & Hart 1962 (▽), Siegfried 1963 (⊕)

Phorcorrhaphis raynaudi Walker 1909 (⊠)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Sta. 13

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 46

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 88

World Distribution: See map opposite.

Remarks: Previous records of the distribution of this species show it to be distributed mainly in the tropical regions of the World Oceans. The NGY records are the first for the Southwest Indian Ocean. Although not numerous they tend to support an inferred preference for warm conditions.

Lycaeopsis zamboangae (Stebbing) 1888Phorcorrhaphis zamboangae Stebbing 1888 (⊗)

Lycaeopsis zamboangae Spandl 1924 (▽), Spandl 1927 (▽), K.H. Barnard 1930 (⊙),
 Pirlot 1930 (⊠), K.H. Barnard 1931 (⊖), Hurley 1956 (⊠),
 Hurley 1960a (⊠)

South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 14

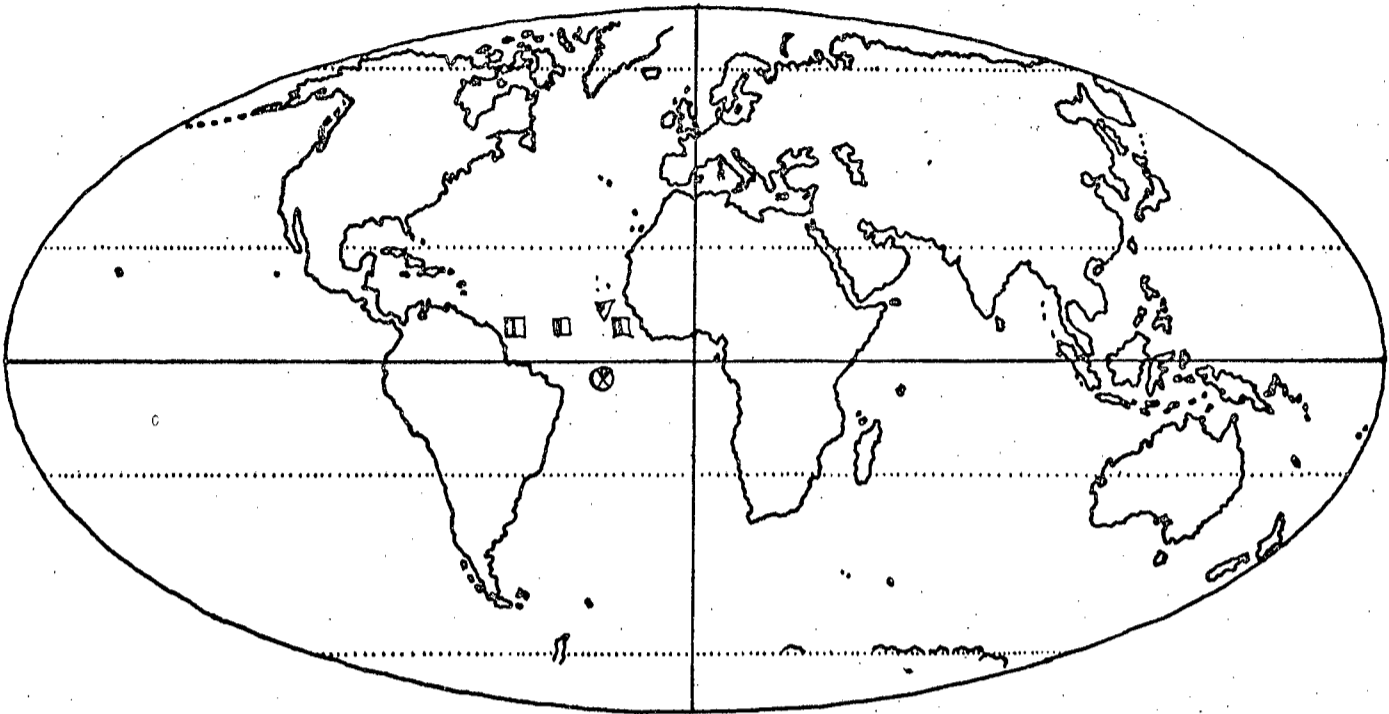
Cruise II - nil.

Cruise III - nil.

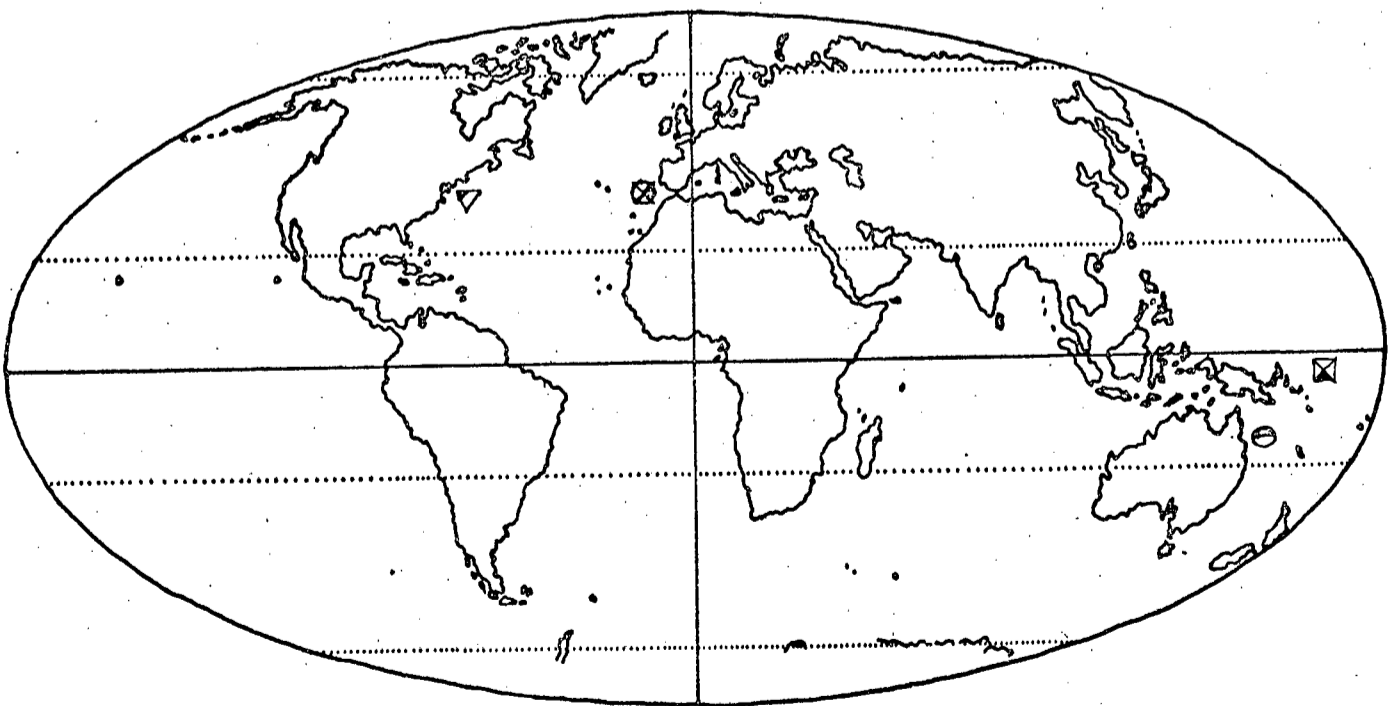
World Distribution: See map opposite.

Remarks: The majority of the previous records of this species are from regions of the World Oceans within the Tropics. The sole NGY record is the first for the Southwest Indian Ocean and cannot have any ecological significance until augmented.

WORLD DISTRIBUTION OF
EUPRNOE INTERMEDIA



WORLD DISTRIBUTION OF
EUPRNOE LATICARPA



FAMILY PRONOIDAE CLAUSGENUS EUPRONOE CLAUSEupronoe intermedia Stebbing 1888

Eupronoe intermedia Stebbing 1888 (⊗), Spandl 1927 (▽), Evans 1961 (⊠)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Staa. 7, 11

N 100B Samples: Staa. 3, 4, 12, 14

Cruise II - N 100H Samples: Staa. 17, 20, 21, 23, 25, 28, 29, 32,
35, 45, 46, 50

N 100B Samples: Staa. 18, 19, 20, 24, 26, 27, 28, 30,
31, 34, 38, 44, 49, 50

Cruise III - N 100H Samples: Staa. 62, 63, 74, 76, 79, 80, 81, 89

N 100B Samples: Staa. 66, 69, 72, 74, 79, 80

World Distribution: See map opposite.

Remarks: Previous records of this species are all from the tropical Atlantic. The occurrence mainly in NGY samples from the second and third cruises suggests an avoidance of high temperature conditions.

Examination of the type specimens of the species of Eupronoe will probably show this species to be synonymous with E. maculata. The NGY records are the first for the Southwest Indian Ocean.

Eupronoe laticarpa K. Stephensen 1926

Eupronoe laticarpa K. Stephensen 1926 (⊗), Firrot 1930 (⊠), K.H. Barnard 1931
(⊙), Grice & Hart 1962 (▽)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 13, 14

Cruise II - N 100H Samples: Staa. 20, 22, 33, 35, 45

N 100B Samples: Staa. 18, 19, 20, 24, 31, 44, 45

Cruise III - N 100H Samples: Staa. 79, 80

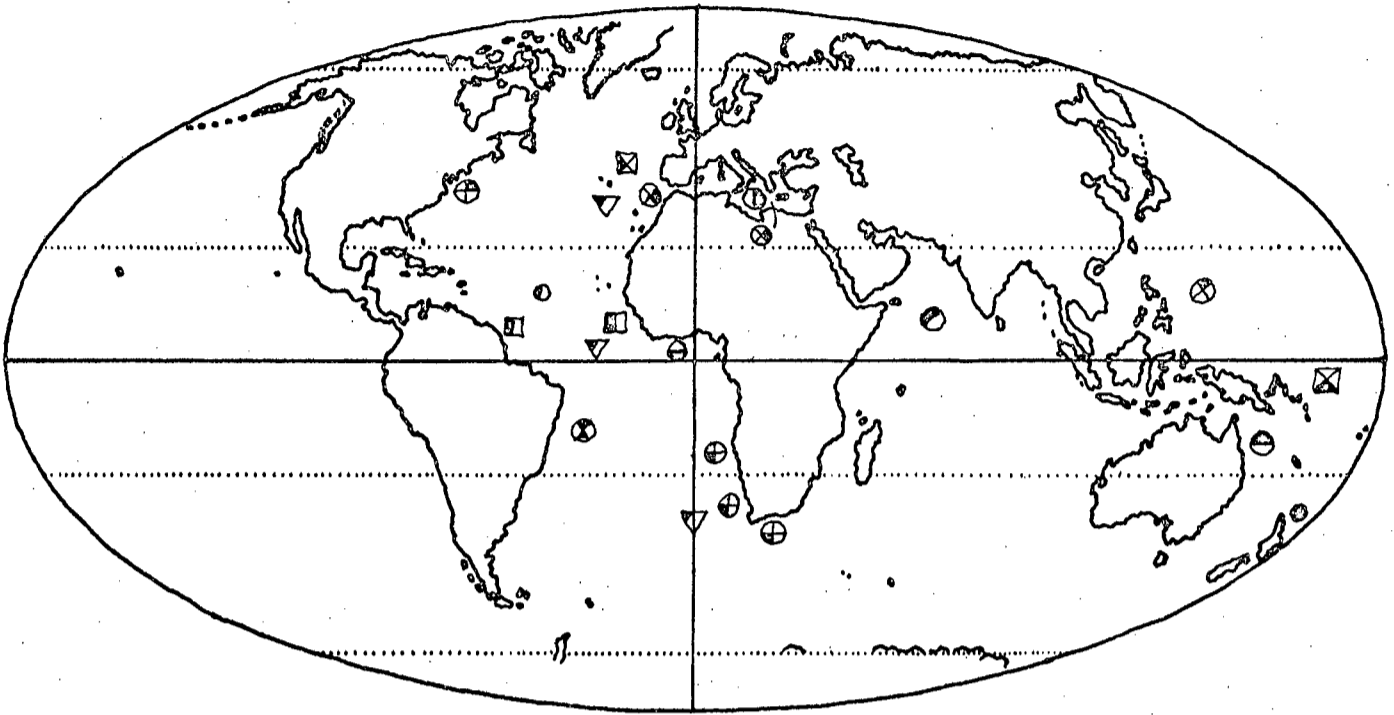
N 100B Samples: Staa. 80, 89

World Distribution: See map opposite.

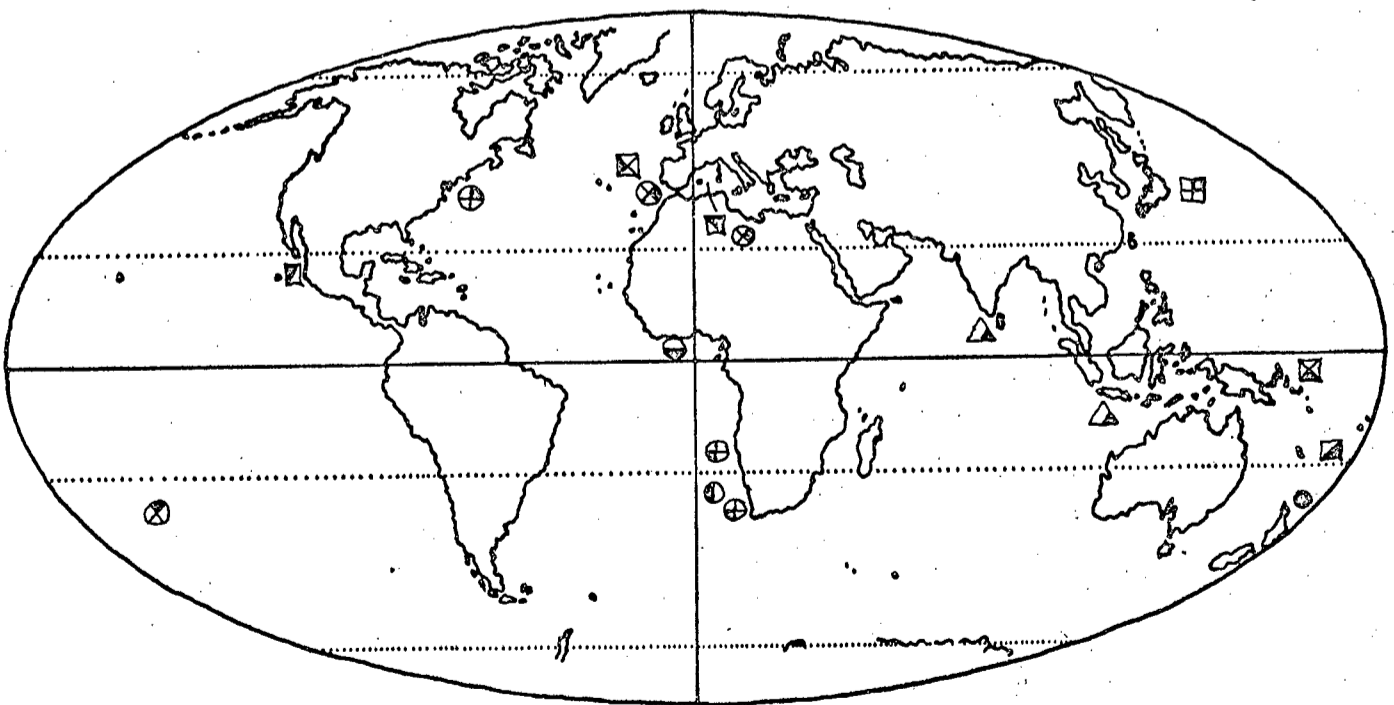
Remarks: The few scattered previous records of this species are from warm temperate and tropical regions of the Atlantic and Pacific Oceans respectively. The occurrence in NGY samples suggests an avoidance of high temperature conditions and a possible preference for salinities less than 35.40‰.

The NGY Records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
EUPRNOE MACULATA



WORLD DISTRIBUTION OF
EUPRNOE MINUTA



Eupronoe maculata Claus 1879

Eupronoe maculata K. Stephensen 1926 (⊗), Spandl 1927 (∇), Pirlot 1929 (⊠),
 K.H. Barnard 1930 (⊙), Pirlot 1930 (⊠), K.H. Barnard 1931 (⊙),
 K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙), Ruffo 1939 (⊙),
 Shoemaker 1945 (⊕), Reid 1955 (⊖), Evans 1961 (⊠),
 Siegfried 1963 (⊕)

Eupronoe inscripta Stebbing 1888 (⊗)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 6

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 18, 30, 50

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 72, 85

World Distribution: See map opposite.

Remarks: Previous records show this species to be distributed in the temperate and tropical regions of the World Oceans with a slight preference for tropical and warm temperate conditions. The number of NGY records is not really large enough for ecological inferences to be drawn from them.

Eupronoe minuta Claus 1879

Eupronoe minuta Stebbing 1888 (⊗), K. Stephensen 1926 (⊗), Pirlot 1929 (⊠),
 K.H. Barnard 1930 (⊙), Pirlot 1930 (⊠), K.H. Barnard 1932 (⊙),
 Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (⊠), Irie 1959 (⊠),
 Furnestin 1960 (⊠), Hurley 1960a (⊠), Siegfried 1963 (⊕),
 Tsuruta 1963 (△)

South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Sta. 12

Cruise II - N 100H Samples: Sta. 46

N 100B Samples: Staa. 18, 26, 27, 28, 31, 32, 44,
 45, 46

Cruise III - N 100H Samples: Sta. 79

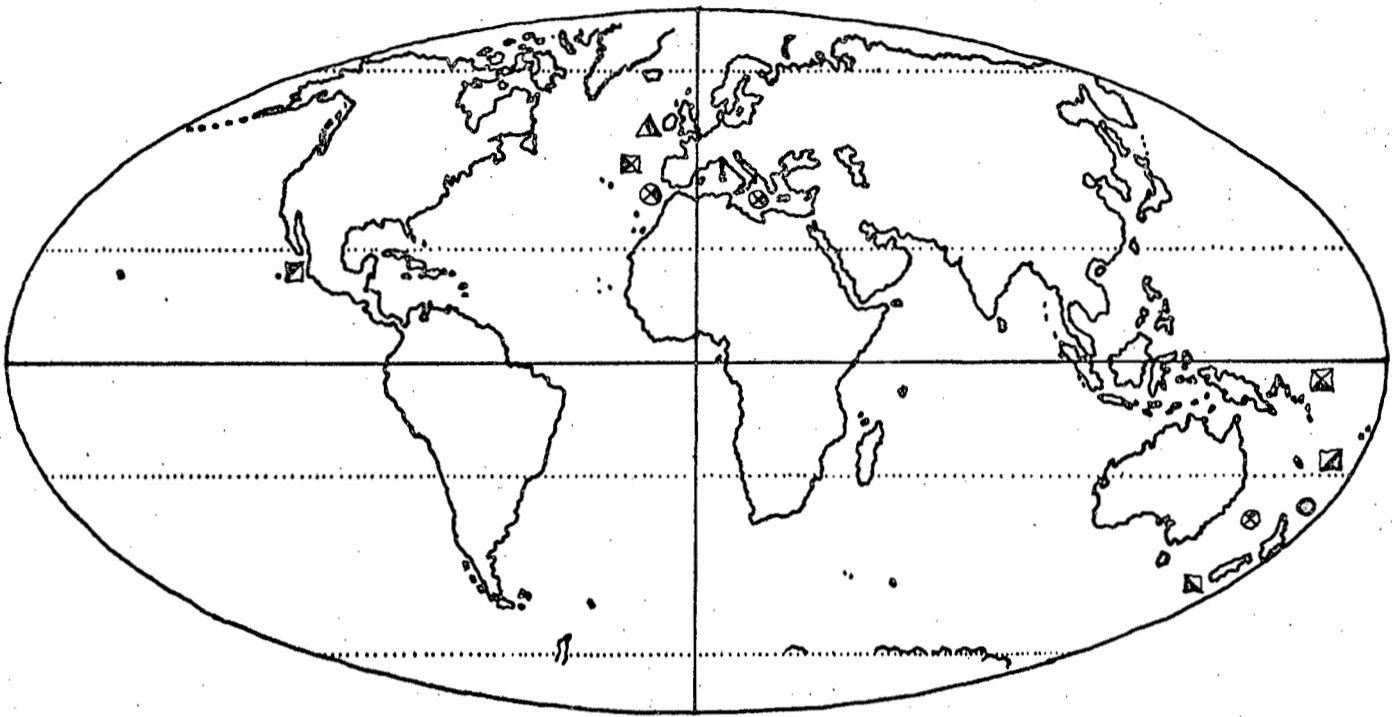
N 100B Samples: Staa. 60, 61, 64, 69, 73, 75, 88

World Distribution: See map opposite.

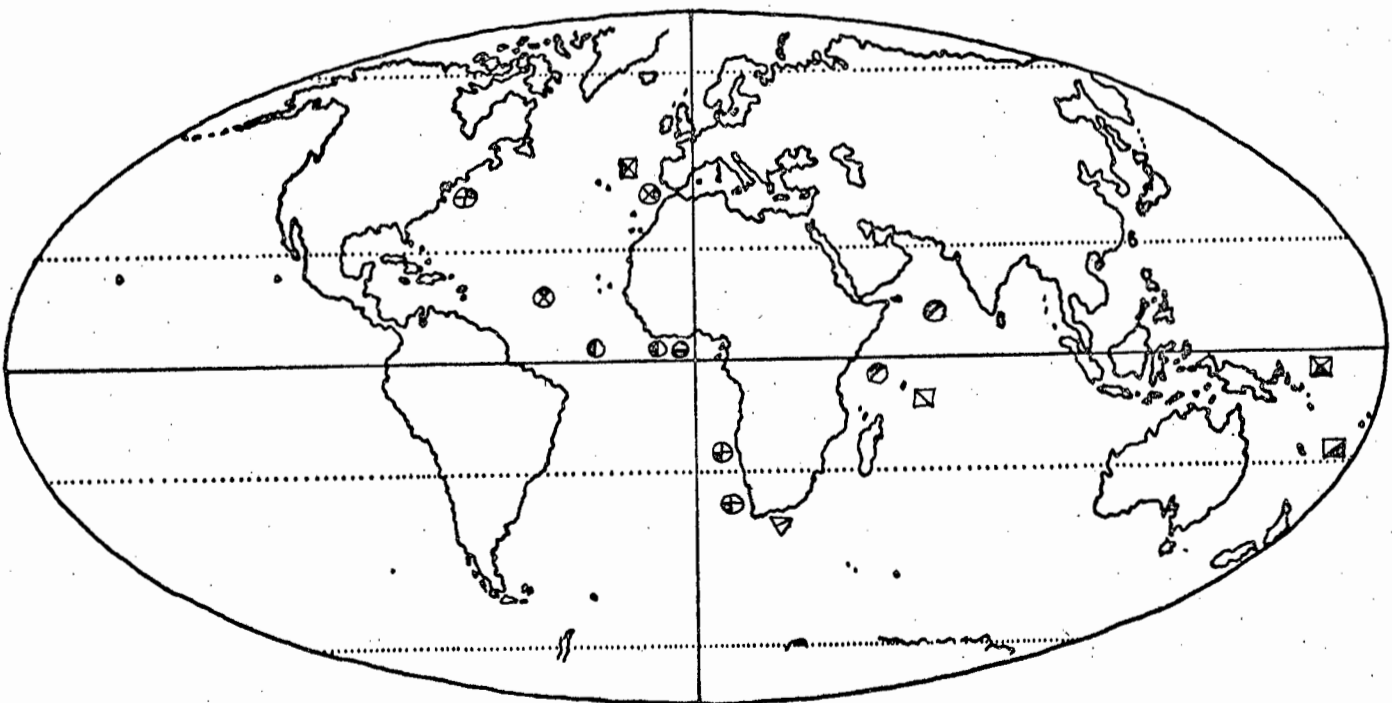
Remarks: Previous records of this species are from scattered areas of the tropical and temperate regions of the World Oceans. The occurrence in NGY samples mainly from the second and third cruises suggests an avoidance of high temperature conditions.

The NGY Records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
PARALYCAEA GRACILIS



WORLD DISTRIBUTION OF
PARAPRONOE CRUSTULUM



GENUS PARALYCAEA CLAUSParalycaea gracilis Claus 1879

Paralycaea gracilis Stebbing 1888 (⊗), Tattersall 1906 (▲), K. Stephensen 1926 (⊗), Pirlot 1929 (⊗), K.H. Barnard 1930 (⊗), Pirlot 1930 (⊗), Hurley 1955 (⊗), Hurley 1956 (⊗), Hurley 1960a (⊗)

Paralycaea gracilis newtoniana Pirlot 1930South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Sta. 20

N 100B Samples: Sta. 35

Cruise III - N 100H Samples: Sta. 80

N 100B Samples: Sta. 66

World Distribution: See map opposite.

Remarks: Previous records show this species to be distributed mainly in the temperate regions of the Atlantic and Pacific Oceans. The NGY records are not numerous enough for ecological inferences to be drawn from them.

The NGY records represent the first for the Southwest Indian Ocean.

Parapronoe crustulum Claus 1879

Parapronoe crustulum Stebbing 1888 (⊗), Walker 1909 (⊗), K. Stephensen 1926 (⊗), Pirlot 1929 (⊗), Pirlot 1930 (⊗), K.H. Barnard 1932 (⊗), K.H. Barnard 1937 (⊗), Shoemaker 1945 (⊗), Hurley 1960a (⊗), Siegfried 1963 (⊗)

Parapronoe clausi K.H. Barnard 1916 (▽)Parapronoe crusculum Reid 1955 (⊗)South African Records additional to those of the NGY:

K.H. Barnard 1916, Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 45

Cruise III - nil.

World Distribution: See map opposite.

Remarks: Previous records show this species to be distributed mainly in regions of the World Oceans within the Tropics. The sole NGY record is the second for the Southwest Indian Ocean.

GENUS PRONOE GUÉRIN MÉNEVILLEPronoe capito Guérin Méneville 1836Pronoe capito Stebbing 1888 (⊗), Walker 1909 (⊠), Spandl 1924 (∇), Spandl 1927 (∇), Pirlot 1929 (⊠), K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙), Reid 1955 (⊖)South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 34

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 76

World Distribution: See map opposite.Remarks: Previous records show this species to be distributed almost exclusively in regions of the World Oceans within the Tropics. The two NGY records are the first for the Southwest Indian Ocean and can only be used to extend the range of distribution of the species.GENUS SYMPRONOE STEBBINGSympronoe parva (Claus) 1879Parapronoe parva Claus 1879Sympronoe parva Stebbing 1888 (⊗), Walker 1904 (⊠), Walker 1909 (⊠), K. Stephensen 1926 (⊗), Spandl 1927 (∇), Pirlot 1929 (⊠), Pirlot 1930 (⊠), K.H. Barnard 1931 (⊖), K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙), Pirlot 1939 (⊠), Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (⊠), Pillai 1957 (⊠), Irie 1959 (⊠), Hurley 1960a (⊠), Evans 1961 (⊠), Siegfried 1963 (⊕)Sympronoe parva var. 7-articulata K. Stephensen 1926Sympronoe parva var. septemarticulata Pirlot 1930South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 3, 12, 13, 14

Cruise II - nil.

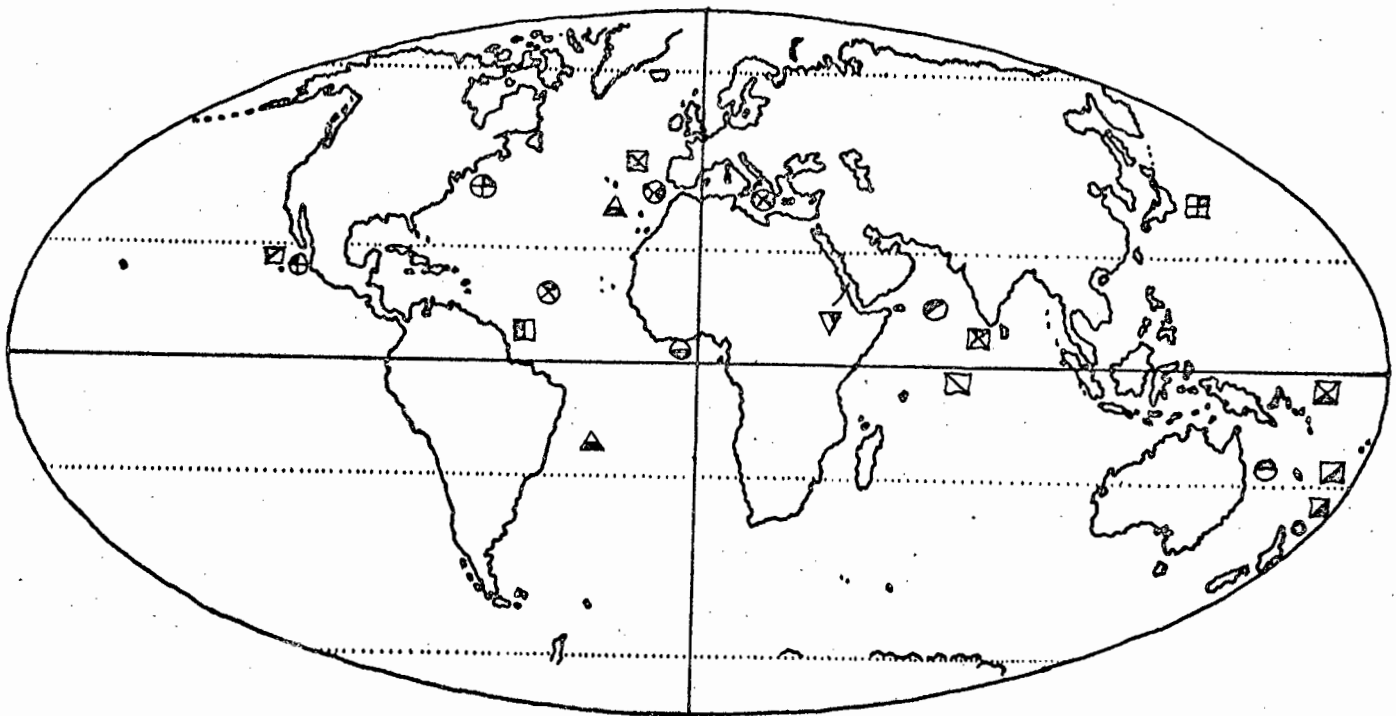
Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 89

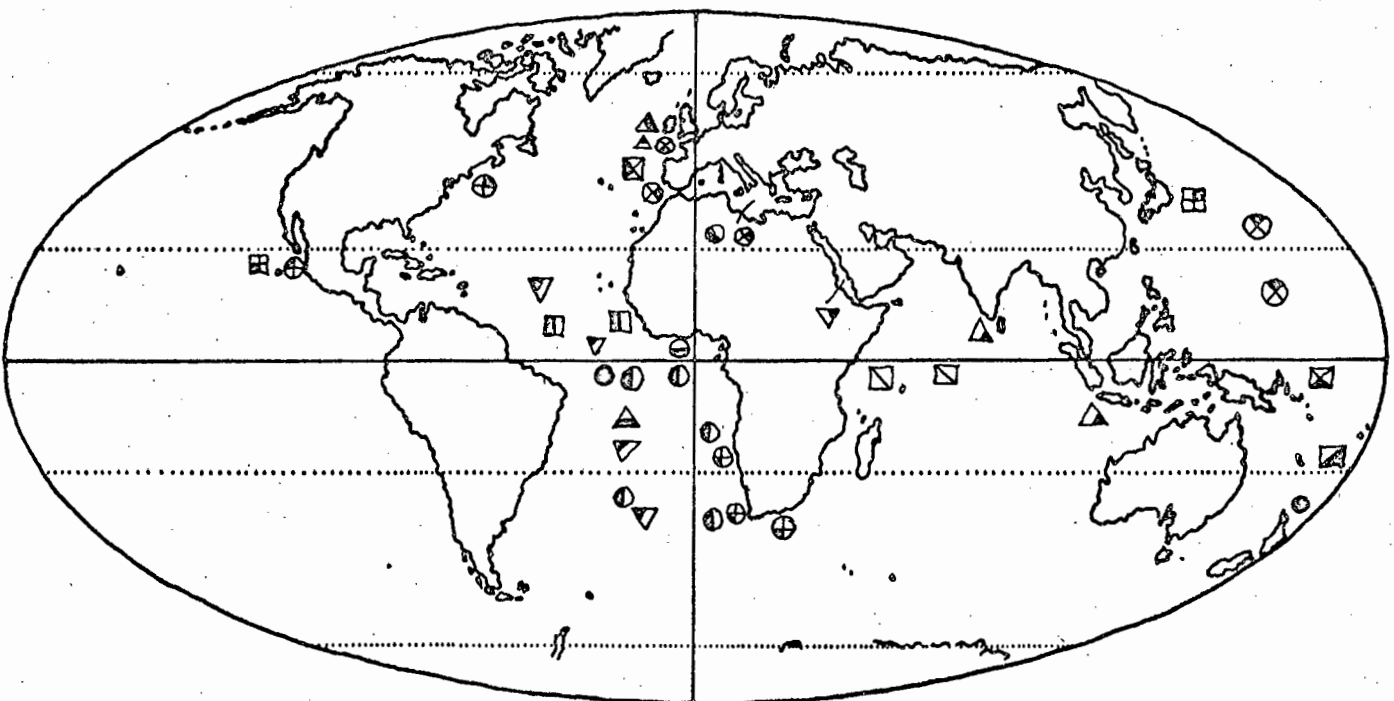
World Distribution: See map oppositeRemarks: The majority of previous records of this species are from regions of the World Oceans within the Tropics. The inferred preference for high temperature conditions is supported by the occurrence in NGY samples mainly from the first cruise.

The NGY records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
LYCAEA PULEX



WORLD DISTRIBUTION OF
BRACHYSCELUS CRUSCULUM



FAMILY LYCAEIDAE CLAUSGENUS LYCAEA DANALycaea pulex Marion 1874Lycaea pulex Stebbing 1888 (⊗), Spandl 1924 (▽), K. Stephensen 1926 (⊗), Pirlot 1930 (⊗), K.H. Barnard 1937 (⊗), Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (⊗), Pillai 1957 (⊗), Irie 1959 (⊗), Hurley 1960a (⊗)Lycaea baiensis Shoemaker 1925 (⊕), K.H. Barnard 1930 (⊖), K.H. Barnard 1931 (⊖), Irie 1959 (⊗)Lycaea bovallii K. Stephensen 1926, (⊗), Pirlot 1929 (⊗)Lycaea bovallioides K. Stephensen 1926 (⊗), Evans 1961 (⊗)Lycaea gracilis Spandl 1924 (▽)Lycaea pauli Stebbing 1888 (⊗)Lycaea paulii K.H. Barnard 1930 (⊖)Lycaea similis Walker 1909 (⊗), Pirlot 1929 (⊗)Lycaea vincentii Stebbing 1888 (⊗), Stewart 1913 (△), Pirlot 1929 (⊗), K.H. Barnard 1930 (⊖)South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Staa. 7, 12
 N 100B Samples: Sta. 12
 Cruise II - N 100H Samples: Sta. 50
 N 100B Samples: Sta. 50
 Cruise III - N 100H Samples: Sta. 81
 N 100B Samples: Nil.

World Distribution: See map opposite.Remarks: The majority of previous records are from scattered areas of the World Oceans within the Tropics. The NGY records are the first for the Southwest Indian Ocean but are not numerous enough for ecological inferences to be drawn from them.FAMILY BRACHYSCELIDAE K. STEPHENSENGENUS BRACHYSCELUS SPENCE BATEBrachyscelus cruscum Spence Bate 1861Brachyscelus cruscum Stebbing 1888 (⊗), Tattersall 1906 (△), Holmes 1909 (⊗), Sexton 1911 (△), Stewart 1913 (△), Spandl 1924 (▽), Shoemaker 1925 (⊕), K. Stephensen 1926 (⊗), Spandl 1927 (▽), Pirlot 1929 (⊗), K.H. Barnard 1930 (⊖), Pirlot 1930 (⊗), K.H. Barnard 1932 (⊖), Shoemaker 1945 (⊕), Reid 1955 (⊖), Irie 1959 (⊗), Hurley 1960a (⊗), Evans 1961 (⊗), Siegfried 1963 (⊕), Tsuruta 1963 (△)Brachyscelus mediterraneus Senna 1903, (⊖), Stebbing 1904 (⊗)South African Records additional to those of the NGY:

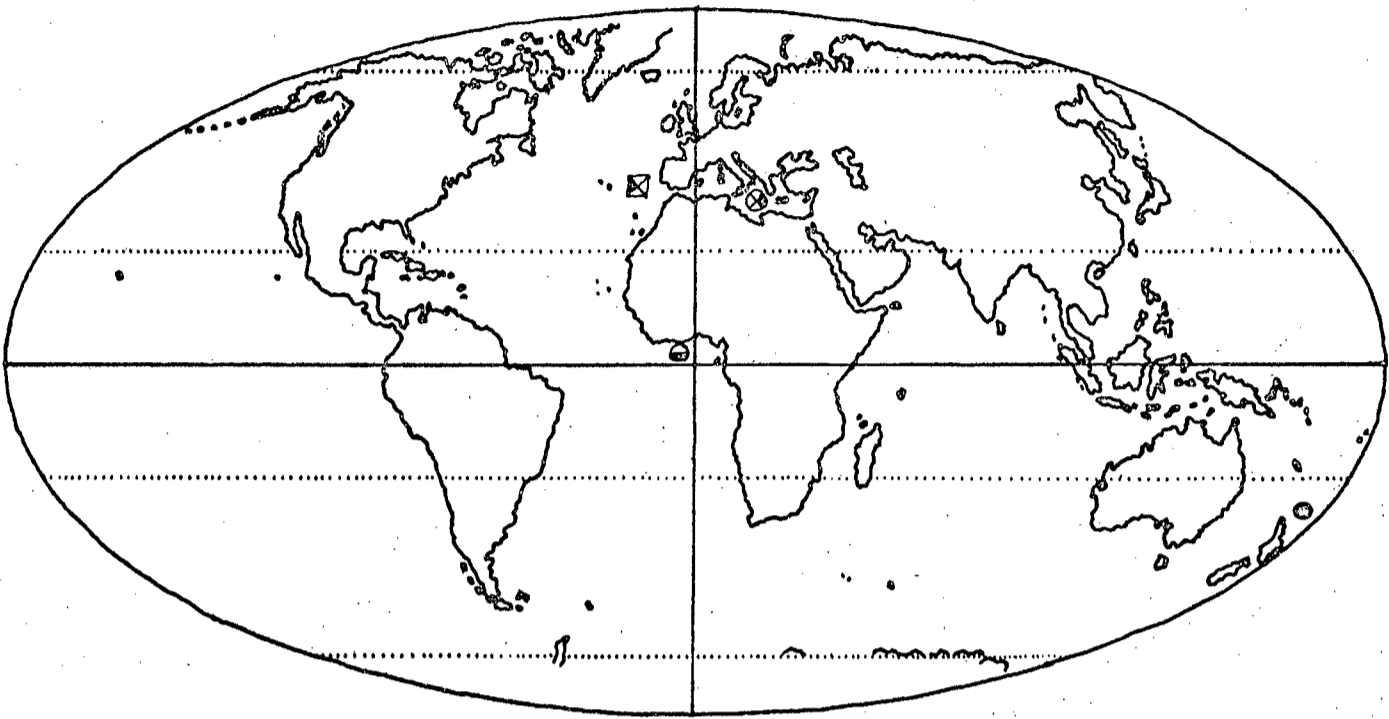
K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 16
 N 100B Samples: Staa. 4, 12, 15
 Cruise II - N 100H Samples: Staa. 45, 46, 50
 N 100B Samples: Staa. 18, 19, 20, 27, 38, 39, 40, 44,
 45, 46, 49, 50
 Cruise III - N 100H Samples: Staa. 62, 66, 70, 73, 75, 76, 79, 80
 N 100B Samples: Staa. 60, 61, 62, 64, 66, 70, 72, 74,
 76, 86

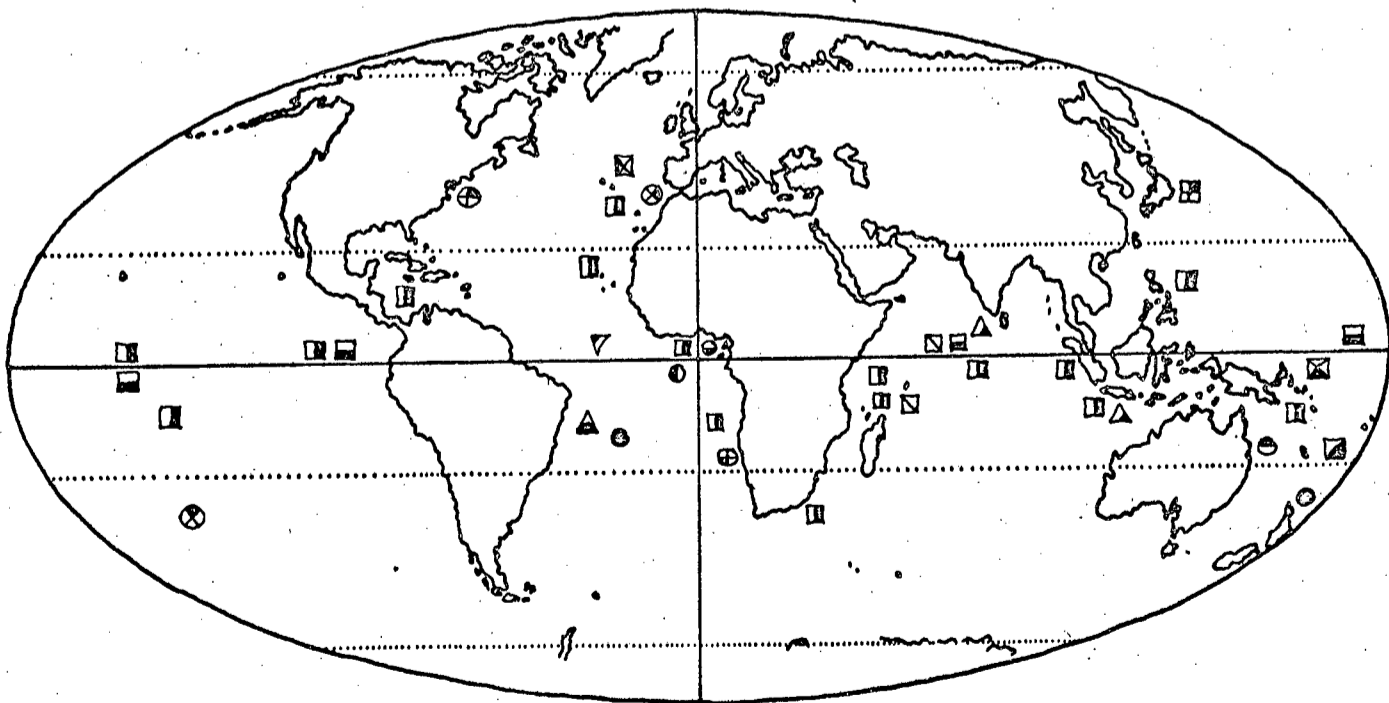
World Distribution: See map opposite.Remarks: This species is extremely widely distributed in the temperate and tropical regions of the World Oceans as evidenced by previous records. Its occurrence in NGY samples mainly from the second and third cruises suggests that it avoids high temperature conditions.

The status of species within the genus, Brachyscelus, is in dire need of clarification. Examination of Spence Bate's drawings revealed that his type specimens probably had damaged uropods and is not adequately described. Only an examination of all the types of the species of the genus appears likely to provide final clarification of the position.

WORLD DISTRIBUTION OF
BRACHYSCELUS RAPACOIDES



WORLD DISTRIBUTION OF
LEPTOCOTIS TENUIROSTRIS



Brachyscelus rapacoides K. Stephensen 1926

Brachyscelus rapacoides K. Stephensen 1926 (⊗), K.H. Barnard 1930 (⊙),
Pirlot 1939 (⊗), Reid 1955 (⊖)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Staa. 5, 6

N 100B Samples: Sta. 12

Cruise II - nil.

Cruise III - nil.

World Distribution: See map opposite.

Remarks: The previous records of this species are few in number and from widely scattered regions of the oceans of the world. It is not possible to infer anything from them or the occurrence in NGY samples regarding the ecology of the species.

The NGY records are the first for the Southwest Indian Ocean.

FAMILY OXYCEPHALIDAE SPENCE BATE

GENUS LEPTOCOTIS STREETS

Leptocotis tenuirostris (Claus) 1871

Oxycephalus tenuirostris Claus 1871

Dorycephalus ambobus Colosi 1918 (⊗), Spandl 1927 (∇)

Dorycephalus lindströmi Stewart 1913 (△)

Leptocotis ambobus Stebbing 1888 (⊗), Irie 1959 (⊗), Tsuruta 1963 (△)

Leptocotis similis Spandl 1927 (∇)

Leptocotis tenuirostris Walker 1909 (⊗), K. Stephensen 1926 (⊗), Spandl 1927 (∇)
Pirlot 1929 (⊗), K.H. Barnard 1930 (⊙), K.H. Barnard 1931 (⊙),
K.H. Barnard 1937 (⊙), Pirlot 1938 (⊗), Shoemaker 1945 (⊕),
Reid 1955 (⊖), Fage 1960 (⊗), Hurley 1960a (⊗), Siegfried 1963 (⊕)

South African Records additional to those of the NGY:

Fage 1960, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 12, 13

Cruise II - N 100H Samples: Staa. 17, 25

N 100B Samples: Staa. 18, 19, 20, 26, 27, 32, 38, 39,
40, 43, 49

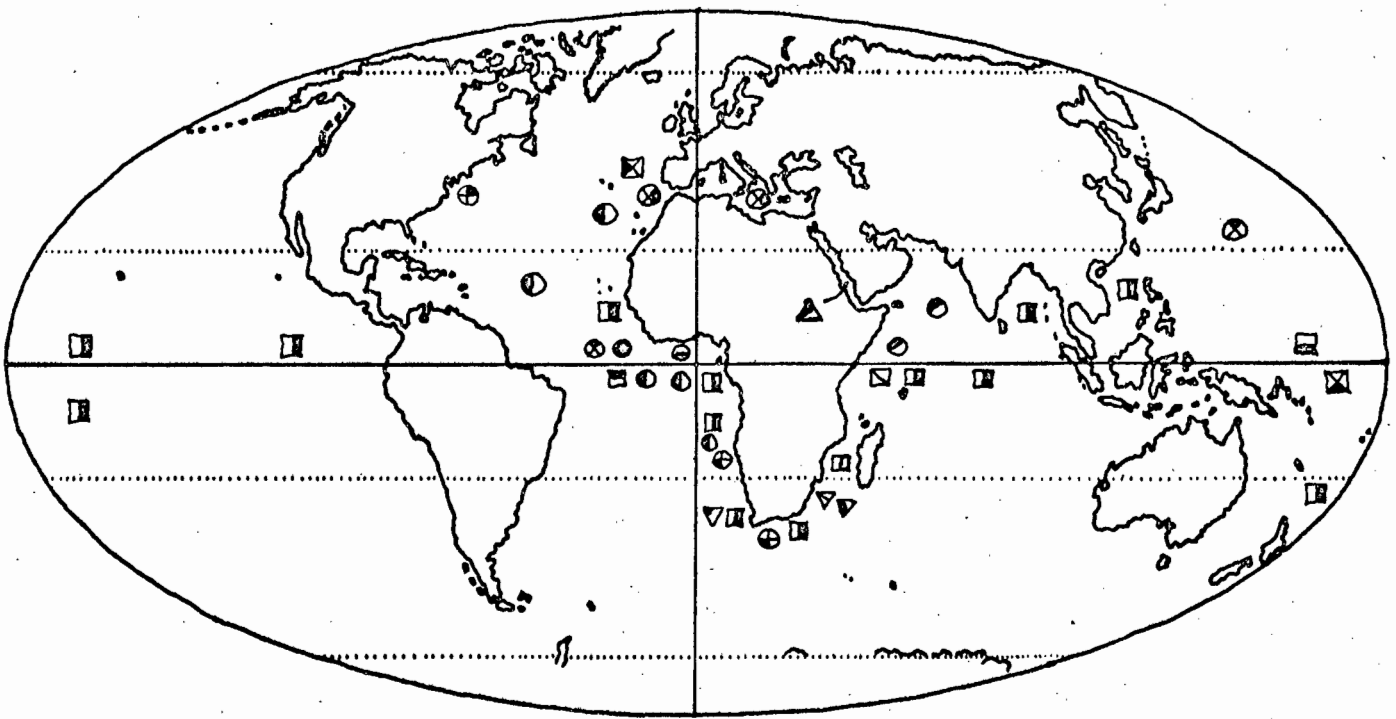
Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 69, 73, 88

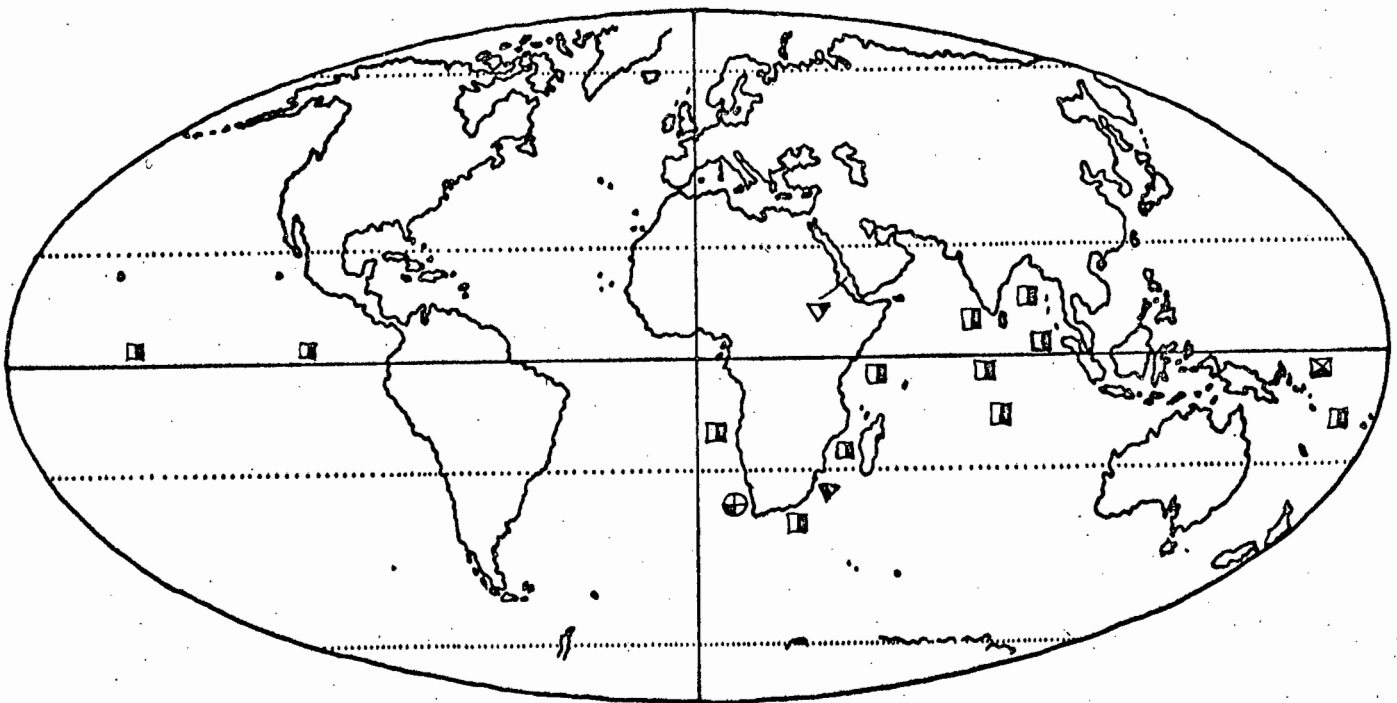
World Distribution: See map opposite.

Remarks: The majority of previous records of this species are from the tropical regions of the oceans of the world. The occurrence in NGY samples mainly from the second cruise suggests an avoidance of high temperature conditions and possibly salinities in excess of 35.40‰.

WORLD DISTRIBUTION OF
OXYCEPHALUS CLAUSI



WORLD DISTRIBUTION OF
OXYCEPHALUS LATIROSTRIS



GENUS OXYCEPHALUS MILNE-EDWARDSOxycephalus clausi Bovallius 1887

Oxycephalus clausi Stebbing 1888 (⊙), Walker 1909 (◻), Chilton 1912 (◻),
 Stebbing 1924 (▽), K. Stephensen 1926 (⊗), Spandl 1927 (▽),
 Cecchini 1929 (▲), Pirlot 1929 (◻), K.H. Barnard 1930 (⊙),
 K.H. Barnard 1931 (⊖), K.H. Barnard 1932 (⊙), K.H. Barnard 1937
 (⊙), Pirlot 1938 (◻), K.H. Barnard 1940 (▽), Shoemaker 1945, (⊕),
 Reid 1955 (⊖), Pillai 1957 (◻), Fage 1960 (◻), Siegfried 1963 (⊕)

Oxycephalus clausi Colosi 1918 (◻)Oxycephalus erythraeus, mancinii Cecchini 1929 (▲)South African Records additional to those of the NGY:

Stebbing 1924, K.H. Barnard 1932, 1940, Fage 1960, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 5, 7, 16

N 100B Samples: Staa. 4, 12, 13, 14

Cruise II - N 100H Samples: Staa. 17, 19, 20, 21, 22, 25, 27, 31,
32, 35, 45, 46, 50

N 100B Samples: Staa. 18, 19, 20, 24, 34, 45, 46, 50

Cruise III - N 100H Samples: Staa. 62, 66, 70, 73, 75, 76, 80, 86

N 100B Samples: Staa. 62, 70, 75

World Distribution: See map opposite.

Remarks: This species is predominantly distributed in the regions of the oceans of the world within the Tropics. It was unique among the hyperiids recorded from NGY samples in being vastly more abundant in surface samples excepting those collected during the first cruise. The surface temperature-salinity differences between the cruises do not adequately explain these findings which may depend on biological factors.

Oxycephalus latirostris Claus 1879

Oxycephalus latirostris Pirlot 1938 (◻), K.H. Barnard 1940 (▽), Fage 1960 (◻),
 Siegfried 1963 (⊕)

Oxycephalus notabilis Spandl 1924 (▽)South African Records additional to those of the NGY:

K.H. Barnard 1940, Fage 1960, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Staa. 7, 12

Cruise II - N 100H Samples: Nil.

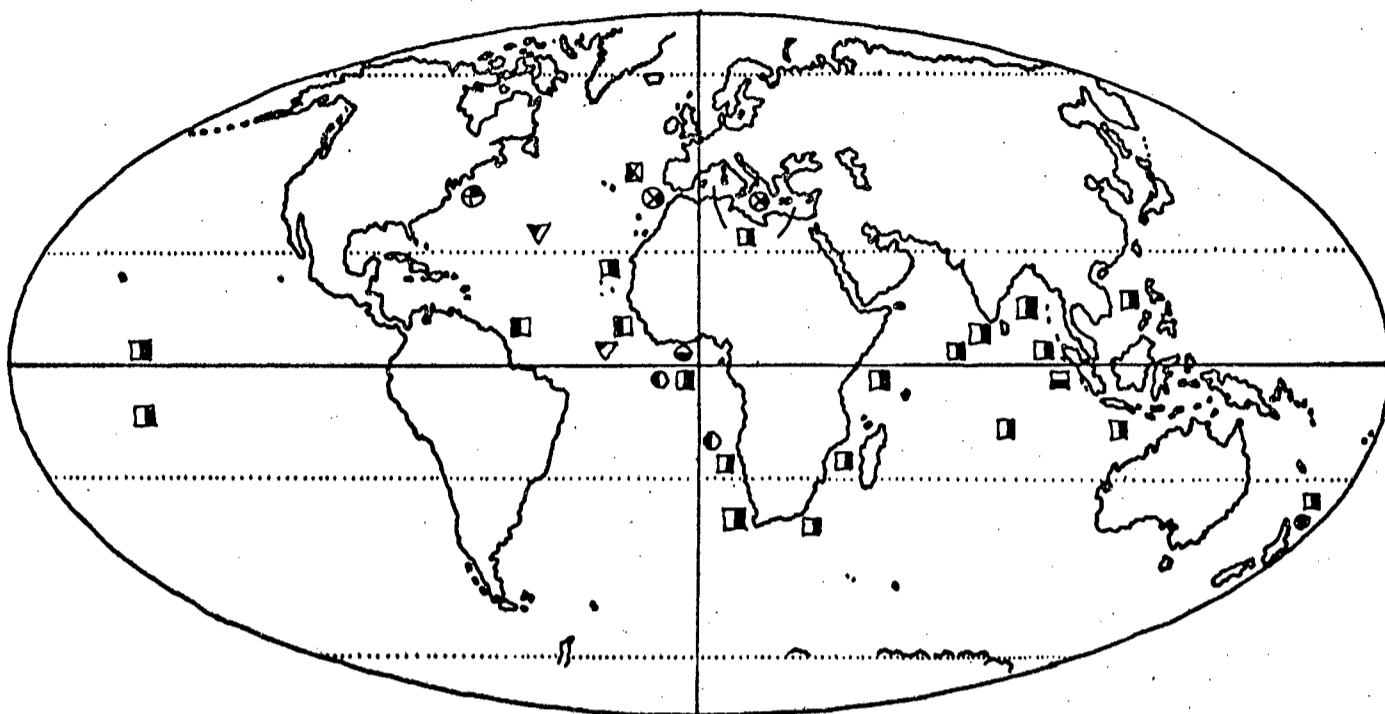
N 100B Samples: Sta. 49

Cruise III - nil.

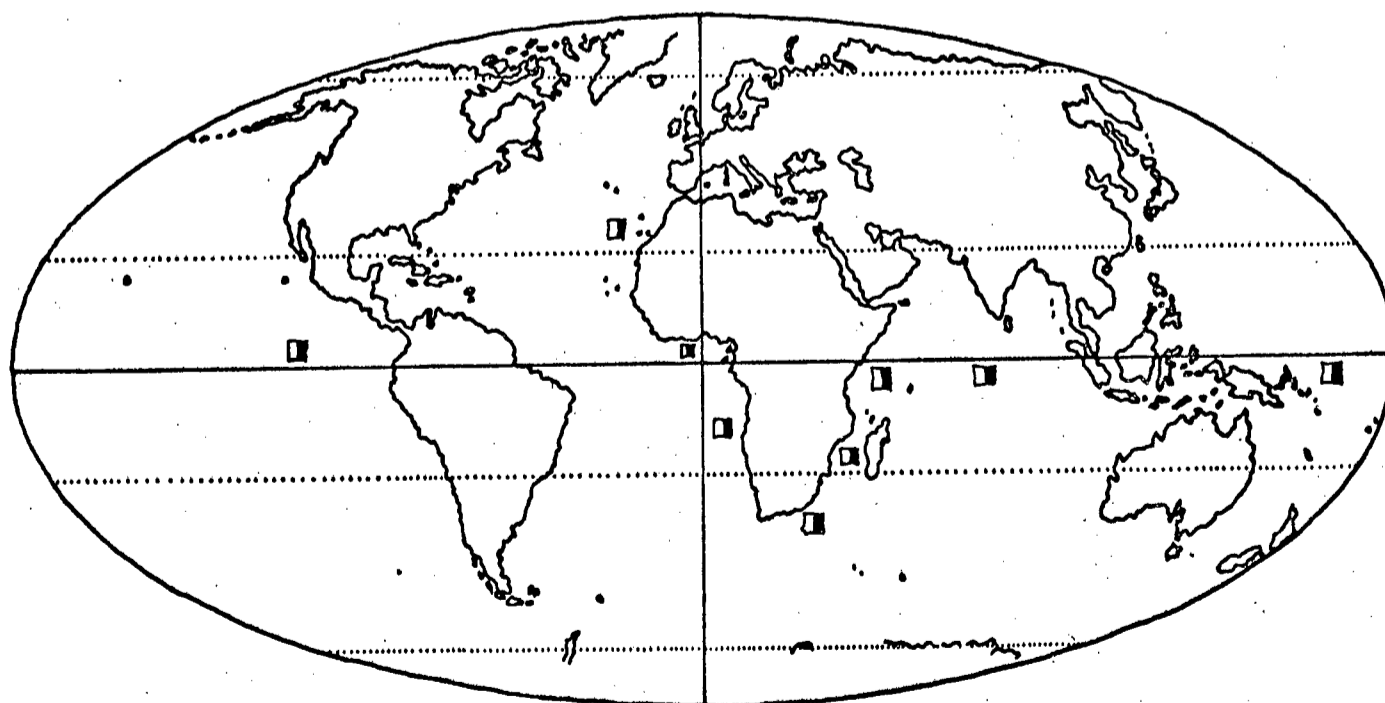
World Distribution: See map opposite.

Remarks: The majority of previous records of this species are from regions of the oceans of the world within the Tropics. The few NGY records are not sufficient to make possible any inferences regarding the possible preference of the species for warm conditions.

WORLD DISTRIBUTION OF
OXYCEPHALUS PISCATOR



WORLD DISTRIBUTION OF
RHABDOSOMA MINOR



Oxycephalus piscator Milne-Edwards 1830

Oxycephalus piscator Colosi 1918 (☐), K. Stephensen 1926 (⊗), Spandl 1927 (▽),
Pirlot 1929 (☒), K.H. Barnard 1930 (⊙), K.H. Barnard 1932 (●),
Shoemaker 1945 (⊕), Reid 1955 (⊖), Fage 1960 (☐), Evans 1961 (☐)

South African Records additional to those of the NGY:

Fage 1960

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 20, 36

Cruise III - nil.

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be predominantly distributed in regions of the oceans of the world within the Tropics with a possible preference for warm conditions. The limited occurrence in NGY samples cannot be used to further the knowledge of the ecology of the species.

GENUS RHABDOSOMA ADAMS & WHITE

Rhabdosoma minor Fage 1954

Rhabdosoma minor Fage 1960 (☐)

South African Records additional to those of the NGY:

Fage 1960

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 18

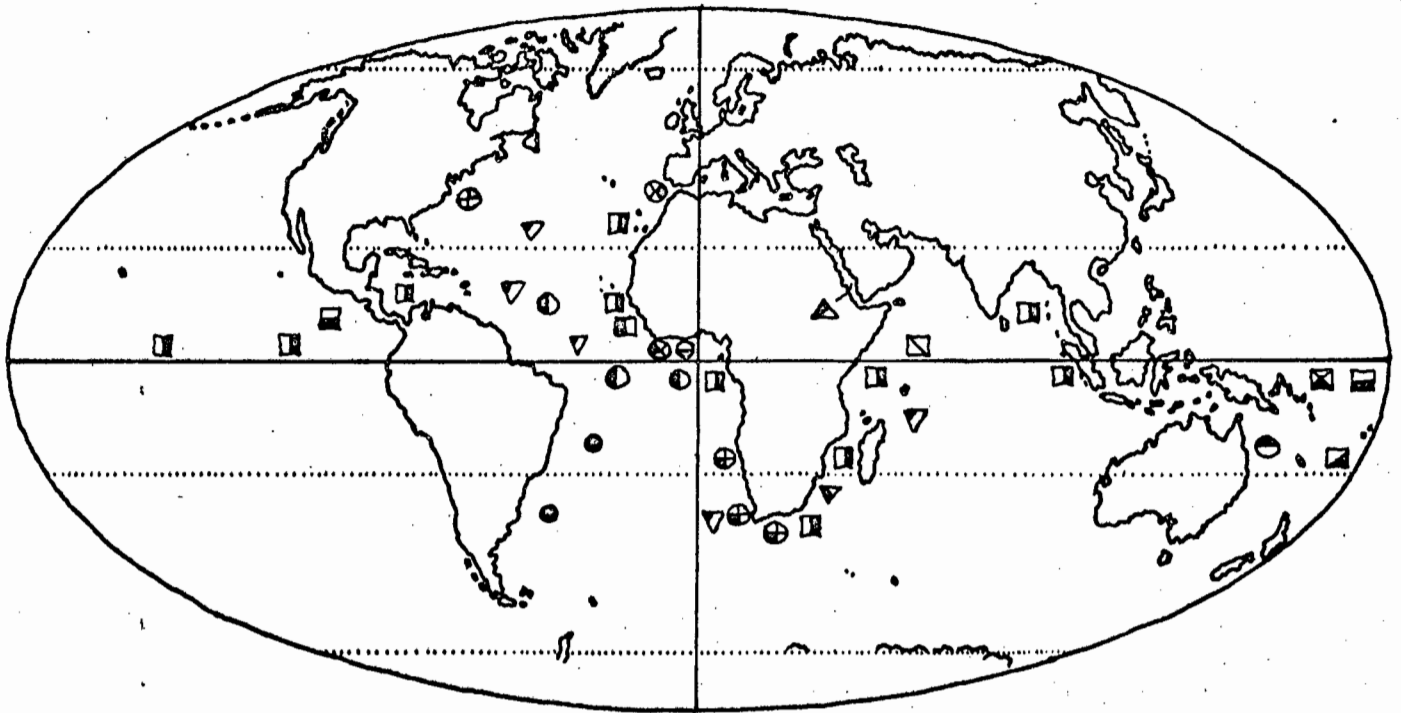
Cruise III - nil.

World Distribution: See map opposite.

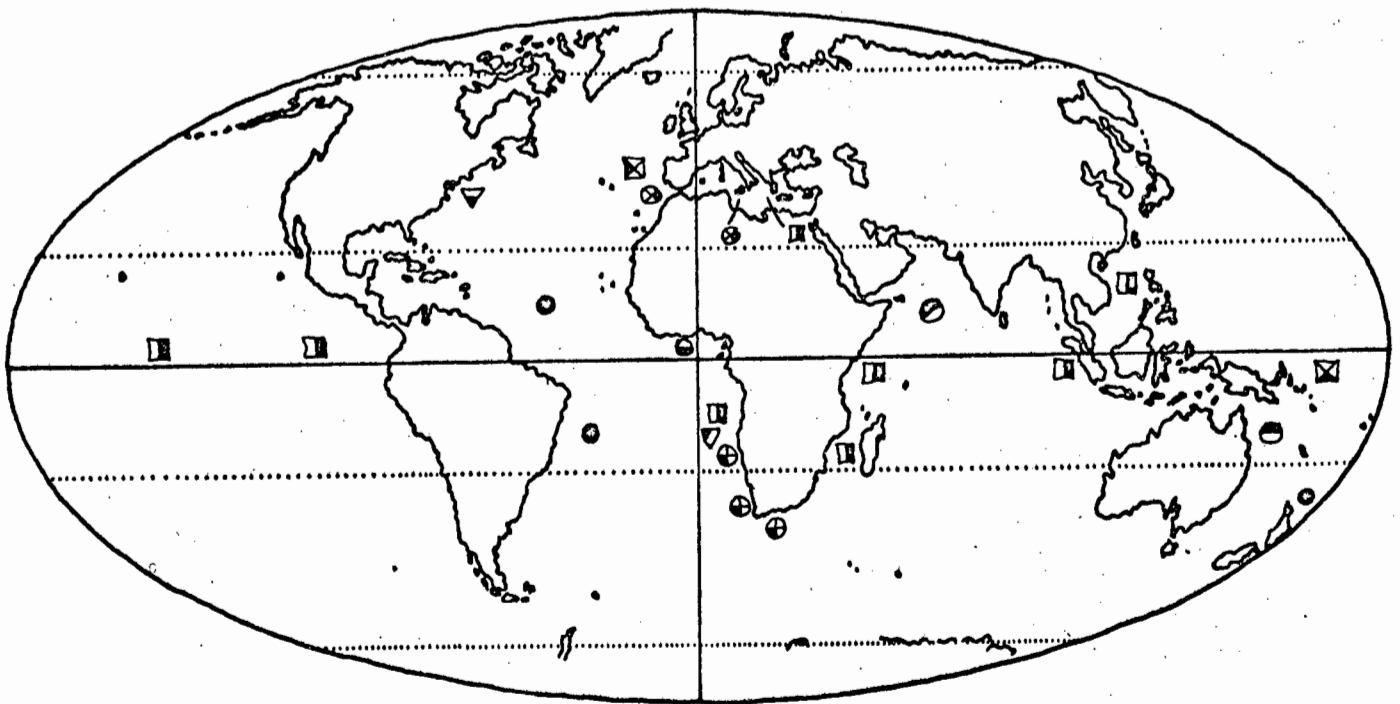
Remarks: The distribution of this species is known from a few records from widely scattered areas of the World Oceans. Since the majority of these are from regions within the Tropics, a possible preference for warm conditions may be inferred.

The two NGY records cannot provide further information on this point.

WORLD DISTRIBUTION OF
RHABDOSOMA WHITEI



WORLD DISTRIBUTION OF
SIMORHYNCHOTUS ANTENNARIUS



Rhabdosoma whitei Spence Bate 1861

Rhabdosoma whitei K. Stephensen 1926 (⊗), Cecchini 1929 (▲), K.H. Barnard 1930 (●), K.H. Barnard 1931 (⊖), K.H. Barnard 1932 (●), K.H. Barnard 1937 (●), Pirlot 1938 (⊗), K.H. Barnard 1940 (▼), Shoemaker 1945 (⊕), Reid 1955 (⊖), Fage 1960 (■), Hurley 1960a (■), Evans 1961 (■), Siegfried 1963 (⊕)

Rhabdosoma withei Spandl 1927 (▼)

Rhabdosoma brachyteles Stebbing 1895 (⊗)

Xiphocephalus lilljeborgi Colosi 1918 (■)

Xiphocephalus whitei Walker 1909 (■), Colosi 1918 (■)

South African Records additional to those of the NGY:

K.H. Barnard 1940, Fage 1960, Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Sta. 42

N 100B Samples: Staa. 49, 50

Cruise III - nil.

World Distribution: See map opposite.

Remarks: Previous records of this species show it to be predominantly present in areas of the World Oceans within the Tropics and widely distributed. The three NGY records merely increase the number from the Southwest Indian Ocean and do not clarify the nature of the factors governing distribution.

GENUS SIMORHYNCHOTUS STEBBING

Simorhynchotus antennarius (Claus) 1871

Simorhynchus antennarius Claus 1871

Simorhynchotus antennarius Stebbing 1888 (⊗), K. Stephensen 1926 (⊗), Spandl 1927 (▼), Pirlot 1929 (⊗), K.H. Barnard 1930 (●), K.H. Barnard 1931 (⊖), K.H. Barnard 1937 (●), Pirlot 1938 (⊗), Reid 1955 (⊖), Pillai 1957 (⊗), Fage 1960 (■), Grice & Hart 1962 (▼), Siegfried 1963 (⊕)

Simorhynchotus lilljeborgi Spandl 1927 (▼)

South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Staa. 4, 12

Cruise II - N 100H Samples: Staa. 47, 48, 49, 50

N 100B Samples: Sta. 50

Cruise III - N 100H Samples: Nil.

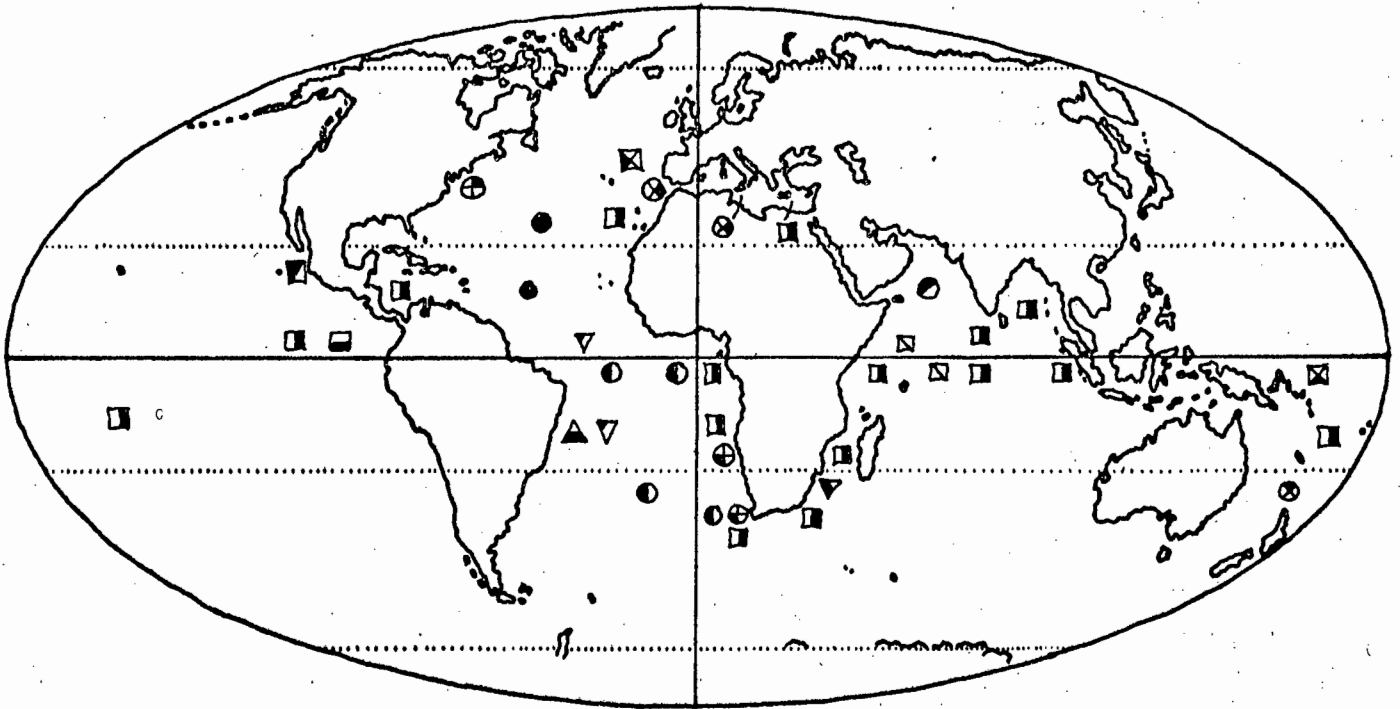
N 100B Samples: Staa. 72, 87

World Distribution: See map opposite.

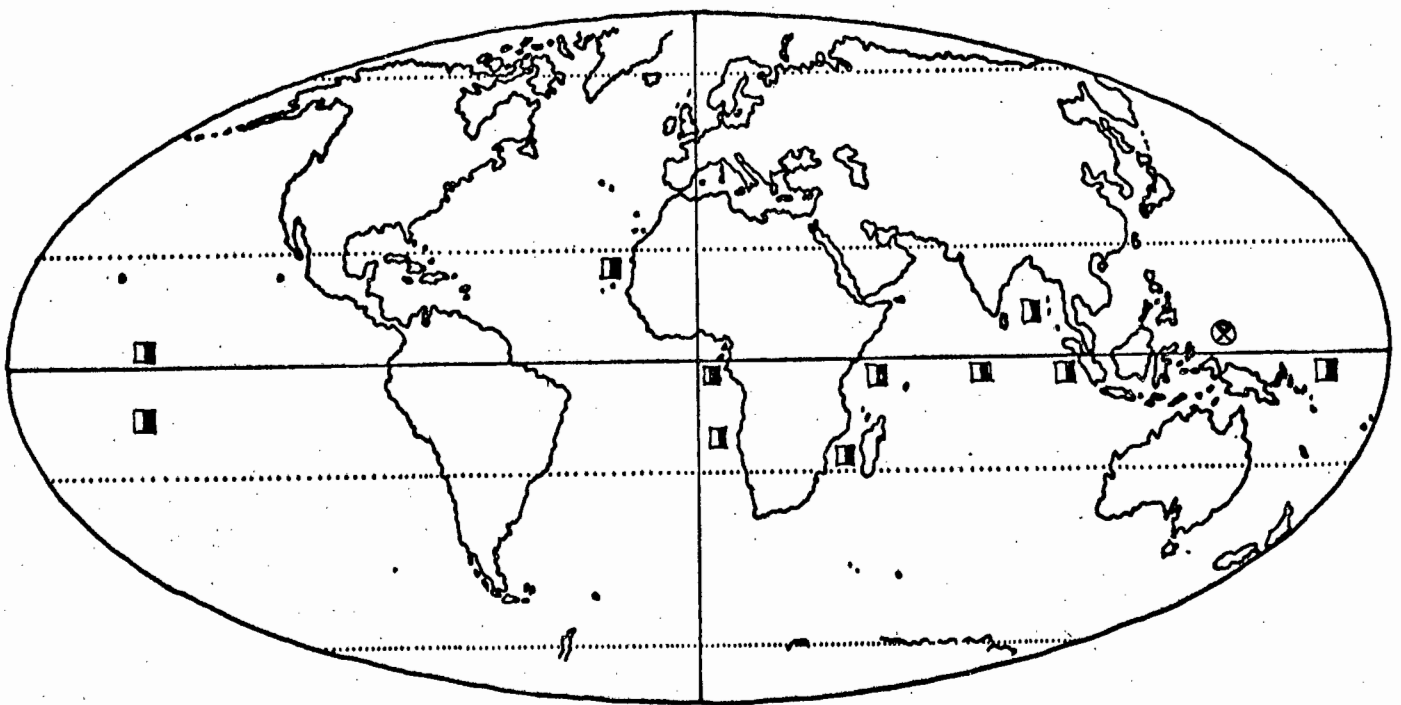
Remarks: Although previous records indicate a world-wide distribution of this species within the Tropics, the occurrence in NGY samples infers a preference for warm neritic water under certain conditions. This latter point awaits further clarification.

The NGY records are the first from waters off the east coast of the Republic.

WORLD DISTRIBUTION OF
STREETSIA CHALLENGERI



WORLD DISTRIBUTION OF
STREETSIA MINDANAONIS



GENUS STREETSIA STEBBINGStreetsia challengeri Stebbing 1888Streetsia challengeri Stebbing 1888 (⊗), Walker 1909 (⊠), K. Stephensen 1926 (⊗)
Spandl 1927 (∇), Pirlot 1929 (⊠), K.H. Barnard 1930 (●),
K.H. Barnard 1932 (●), K.H. Barnard 1937 (●), Pirlot 1938 (⊠),
Shoemaker 1945 (⊕), Fage 1960 (■)Streetsia gausi Spandl 1927 (∇)Streetsia pronoides Pirlot 1929 (⊠), K.H. Barnard 1940 (∇), Hurley 1956 (⊠),
Siegfried 1963 (⊕)Streetsia sabauda Colosi 1918 (■)Streetsia washingtoni Stewart 1913 (▲)South African Records additional to those of the NGY:

K.H. Barnard 1932, 1940, Fage 1960, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 4

Cruise II - N 100H Samples: Nil.

N 100B Samples: Staa. 26, 38, 45

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 66, 88

World Distribution: See map opposite.Remarks: This species is distributed on a world-wide basis in the warm temperate and tropical regions of the oceans. The occurrence in NGY samples although limited, favours a preference for temperatures in the 18 - 22 °C. range.Streetsia mindanaonis (Stebbing) 1888Leptocotis mindanaonis Stebbing 1888 (⊗)Streetsia mindanaonis Fage 1960 (■)South African Records additional to those of the NGY:

Fage 1960

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Sta. 12

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 19

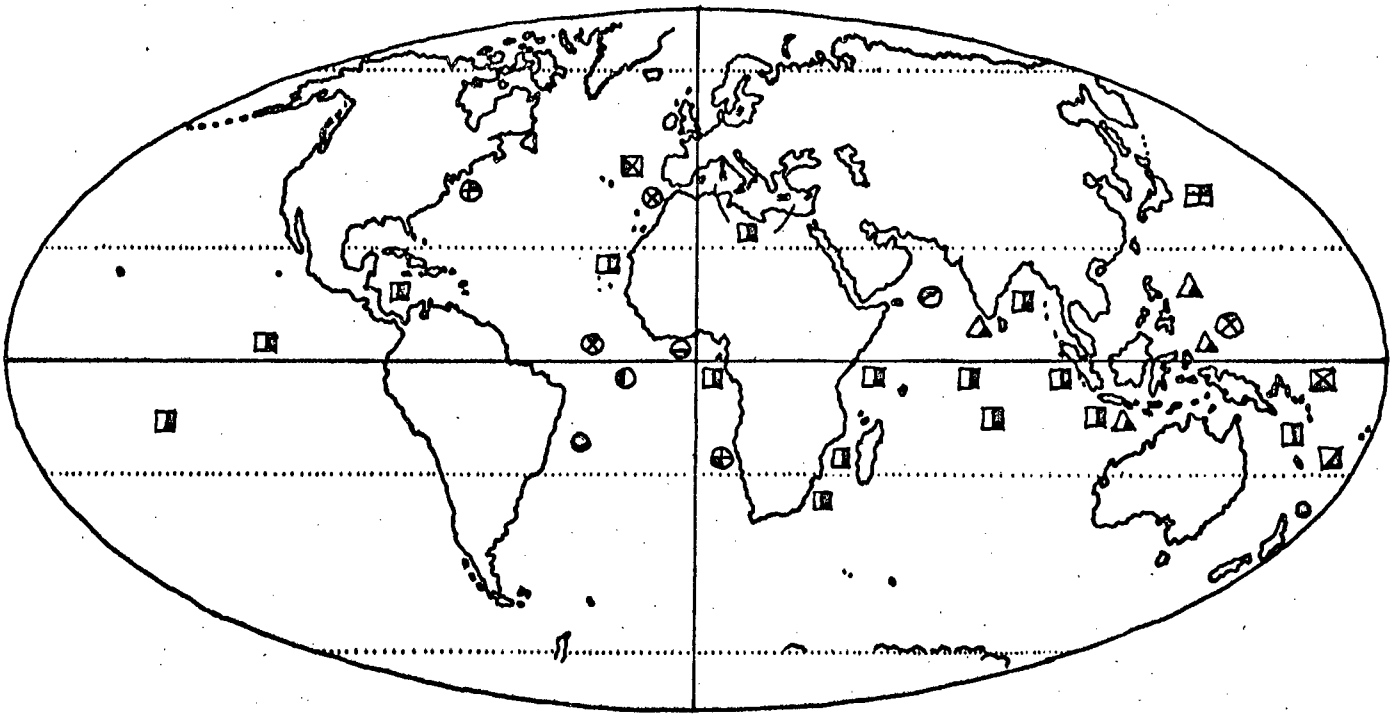
Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 88

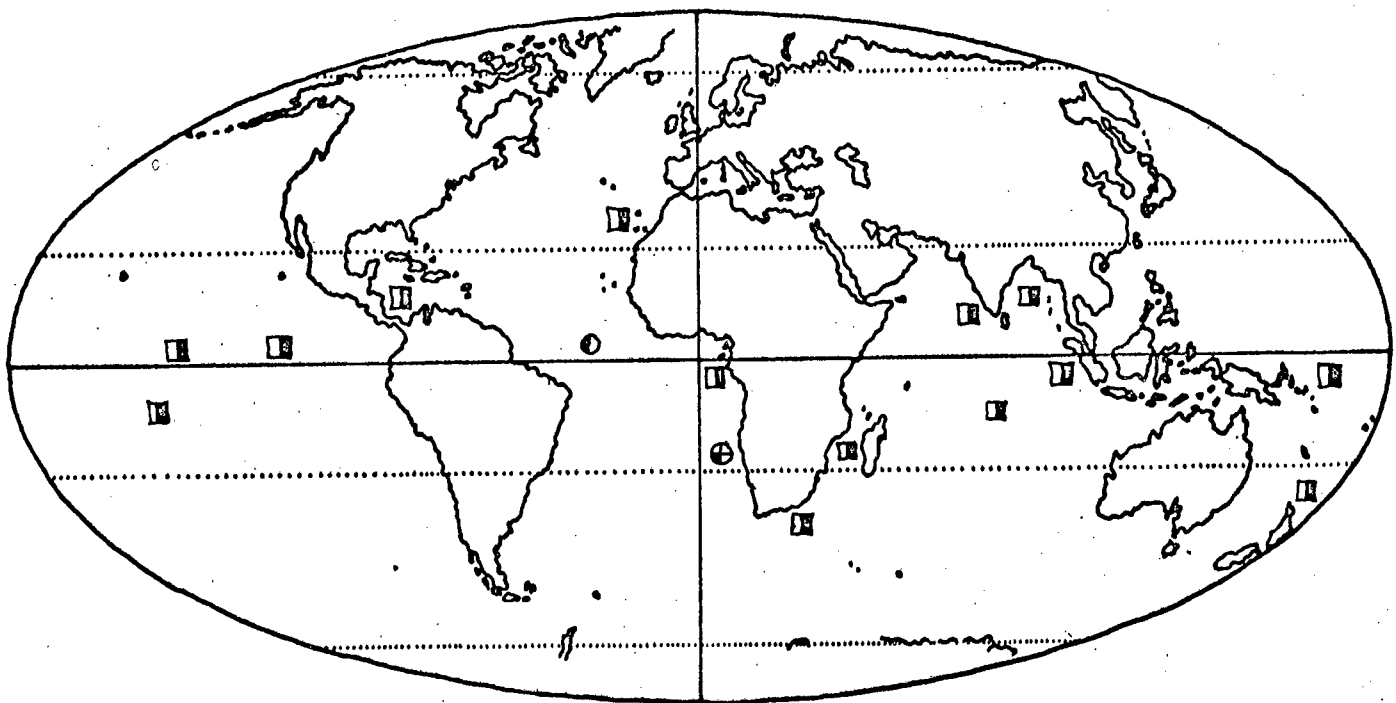
World Distribution: See map opposite.Remarks: Previous records of this species are exclusively from regions within the Tropics which suggests a preference for warm conditions. Unfortunately the limited number of NGY records cannot clarify this point.

The NGY records are the first from waters off the East coast of the Republic.

WORLD DISTRIBUTION OF
STREETSIA PORCELLA



WORLD DISTRIBUTION OF
STREETSIA STEENSTRUPI



Streetsia porcella (Claus) 1879

Oxycephalus porcellus Claus 1879, Tsuruta 1963 (△)

Oxycephalus porcelus Irie 1959 (H)

Streetsia porcella Stebbing 1888 (⊗), K. Stephensen 1926 (⊗), Pirlot 1929 (⊗),
Pirlot 1938 (⊗), Shoemaker 1945 (⊕), Reid 1955 (⊖), Fage 1960 (□),
Hurley 1960a (■), Siegfried 1963 (⊕)

Streetsia intermedia Spandl 1927 (▽)

Streetsia porcellus K.H. Barnard 1930 (●), K.H. Barnard 1932 (○)

K.H. Barnard 1937 (●)

South African Records additional to those of the NGY:

Fage 1960

NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Nil.

N 100B Samples: Sta. 18

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 60

World Distribution: See map opposite.

Remarks: This species is predominantly present in regions of the World Oceans within the Tropics. The inferred preference for warm conditions cannot be clarified by the two NGY records which are the first from waters off the east coast of the Republic.

Streetsia steenstrupi Bovallius 1887

Streetsia steenstrupi K.H. Barnard 1932 (●), Fage 1960 (□), Siegfried 1963 (⊕)

South African Records additional to those of the NGY:

Fage 1960, Siegfried 1963

NGY Records: Cruise I - nil.

Cruise II - nil.

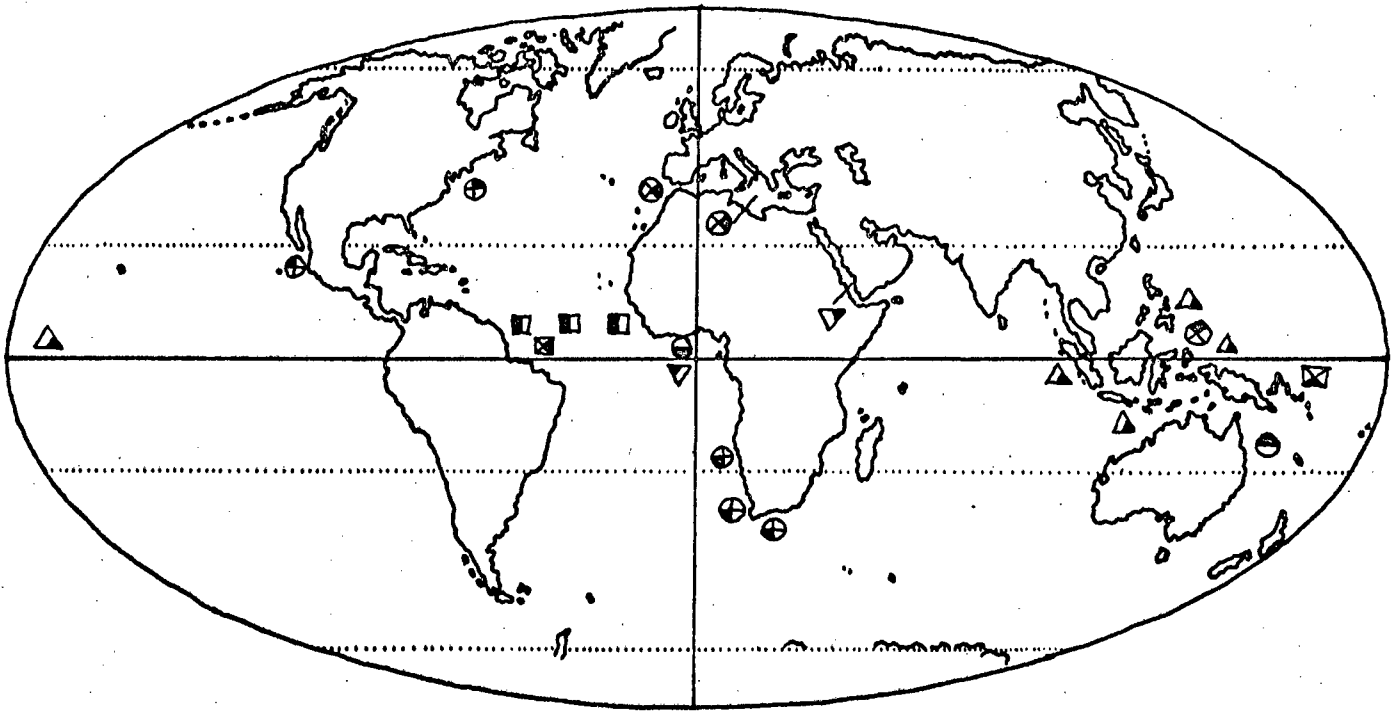
Cruise III - N 100H Samples: Sta. 62

N 100B Samples: Staa. 70, 80

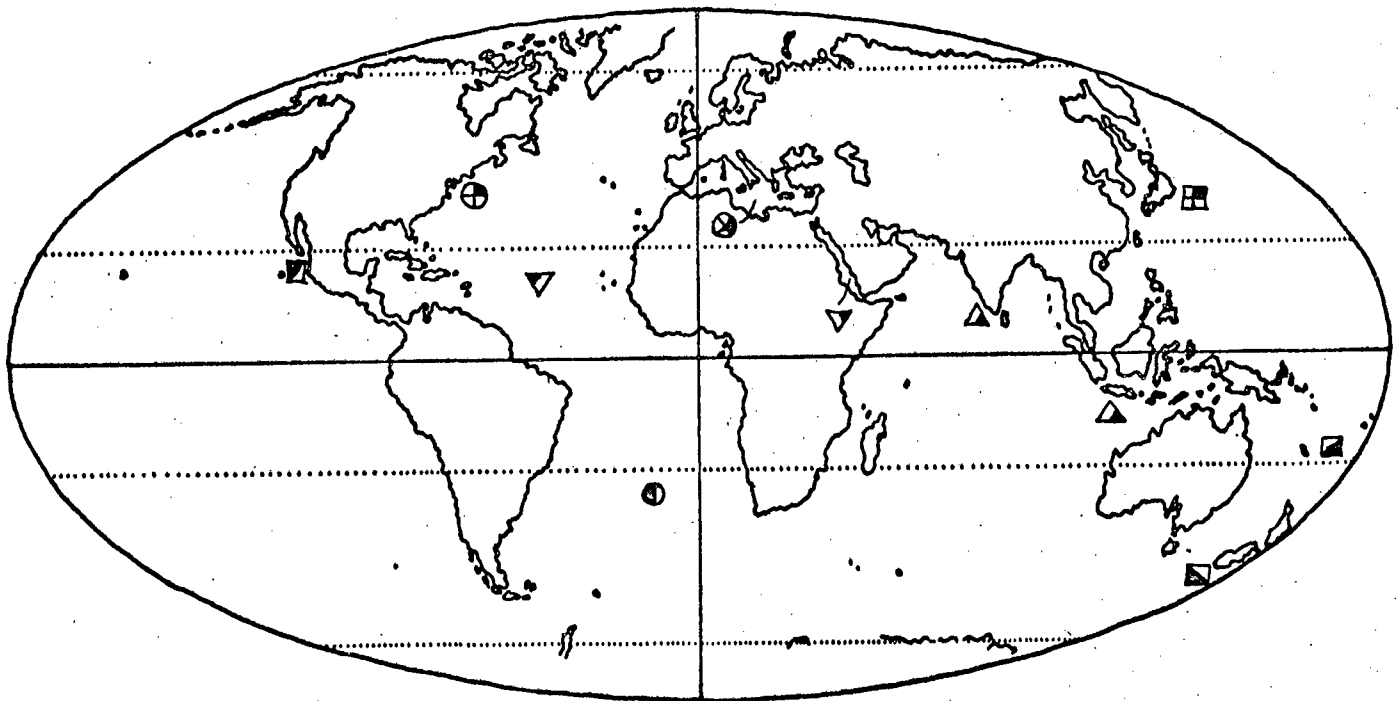
World Distribution: See map opposite.

Remarks: The distribution of this species is known from a limited number of records scattered mainly throughout the regions of the World Oceans within the Tropics. The limited occurrence of the species only in NGY samples from the third cruise can only be used to increase the number of records from the Southwest Indian Ocean. As a result it is only possible to tentatively suggest a preference of the species for warm conditions.

WORLD DISTRIBUTION OF
PARASCELUS EDWARDSI



WORLD DISTRIBUTION OF
PARASCELUS TYPHOIDES



FAMILY PARASCELIDAE BOVALLIUSGENUS PARASCELUS CLAUSParascelus edwardsi Claus 1879Parascelus edwardsi Spandl 1924 (∇), Spandl 1927 (∇), K.H. Barnard 1931 (⊖), Pirlot 1939 (⊗); Shoemaker 1945 (⊕), Reid 1955 (⊖), Siegfried 1963 (⊕)Parascelus edwardsii Pirlot 1930 (⊗)Parascelus zebu Stebbing 1888 (⊗), Shoemaker 1925 (⊕), K. Stephensen 1926 (⊗), Irie 1959 (⊞), Evans 1961 (⊞), Tsuruta 1963 (△)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 4, 12, 13, 14, 16

Cruise II - N 100H Samples: Staa. 31, 42, 46, 50

N 100B Samples: Sta. 19

Cruise III - N 100H Samples: Sta. 75

N 100B Samples: Sta. 60

World Distribution: See map opposite.Remarks: The majority of previous records occur in regions of the World Oceans within the Tropics. The preference for warm conditions suggested by this is supported by the occurrence in NGY samples mainly from the first and second cruises. The records are the first from waters off the east coast of the Republic.Parascelus typhoides Claus 1879Parascelus typhoides Spandl 1924 (∇), K. Stephensen 1926 (⊗), Spandl 1927 (∇), K.H. Barnard 1932 (⊕), Shoemaker 1945 (⊕), Hurley 1955 (⊞), Hurley 1956 (⊞), Irie 1959 (⊞), Hurley 1960a (⊞), Tsuruta 1963 (△)South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - N 100H Samples: Staa. 4, 7

N 100B Samples: Staa. 3, 7, 13, 15

Cruise II - N 100H Samples: Staa. 19, 20, 21, 22, 25, 33, 44, 50

N 100B Samples: Staa. 19, 20, 23, 24, 31, 32, 38, 50

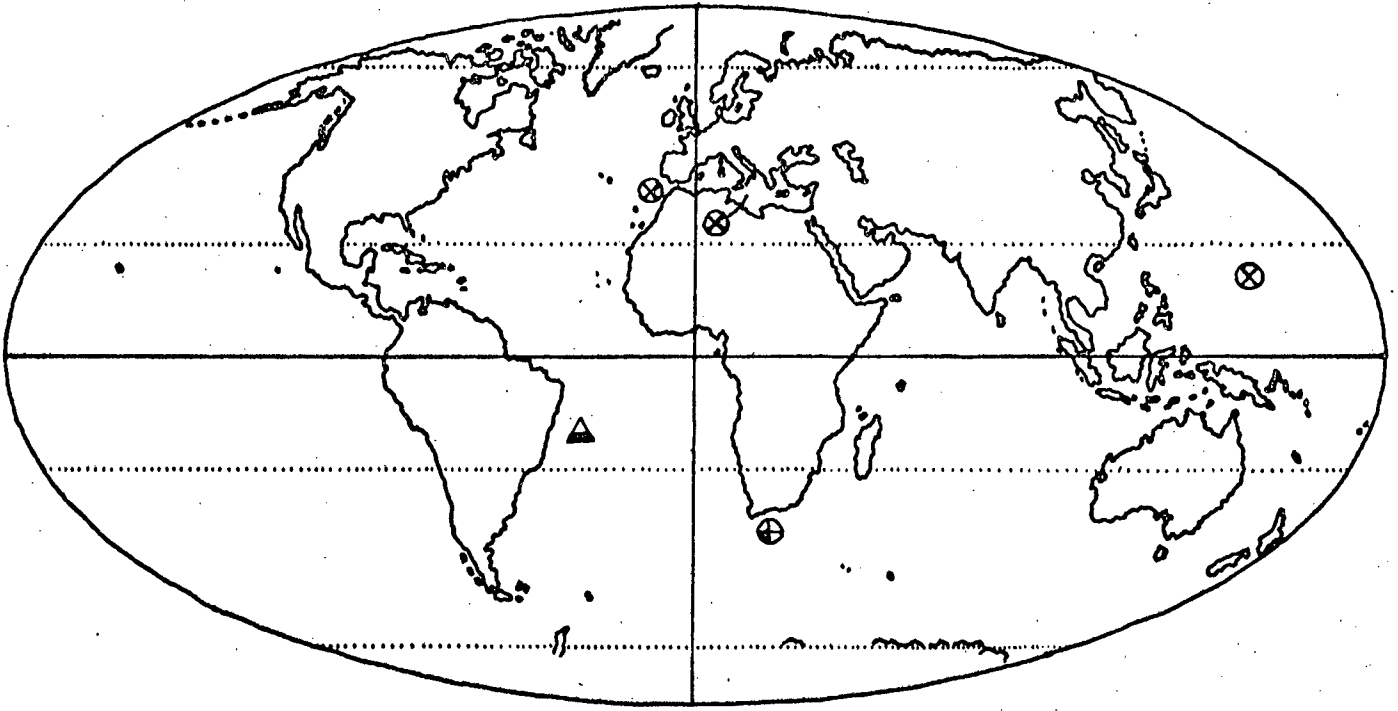
Cruise III - N 100H Samples: Sta. 63

N 100B Samples: Staa. 60, 64, 77, 81, 89

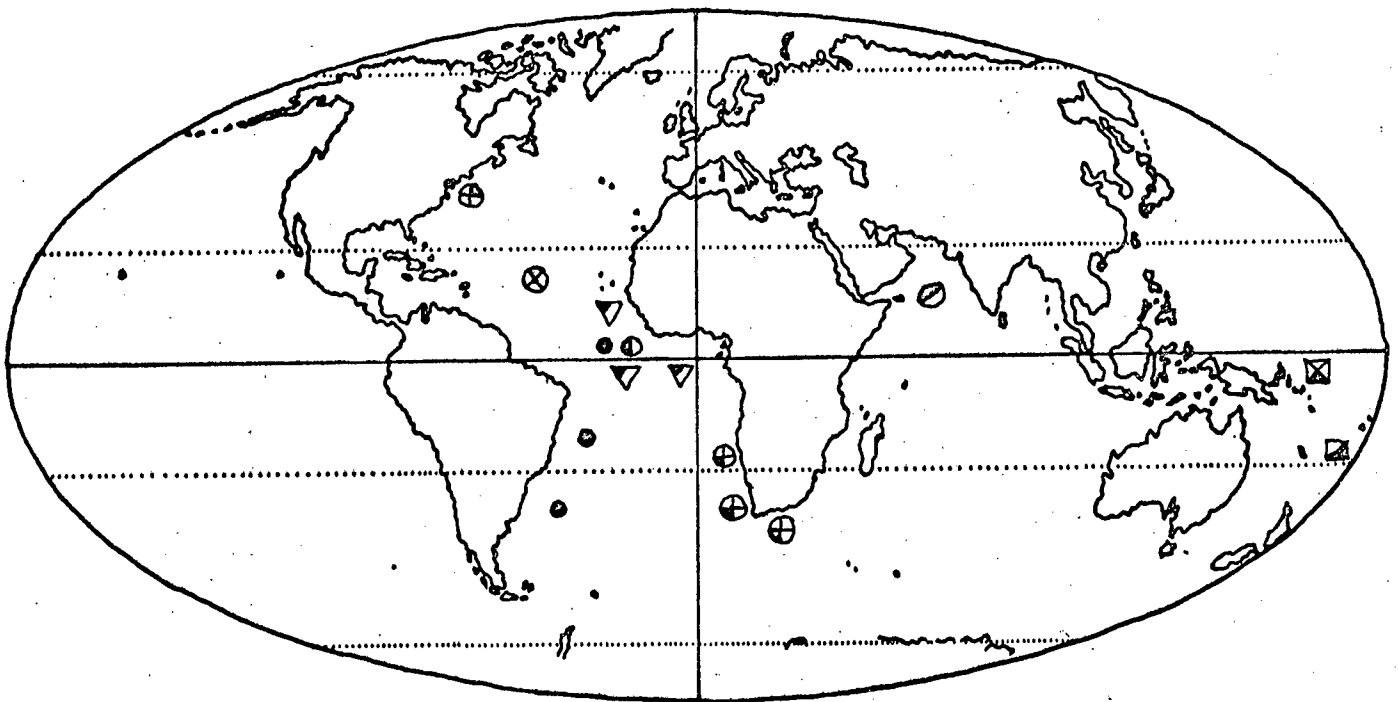
World Distribution: See map opposite.Remarks: Previous records of this species are from widely scattered areas in the warm temperate and tropical regions of the oceans of the world. The optimal temperature range is probably lower than that of the previous species since the majority of NGY records occur in the samples from the second and third cruises.

The NGY records are the first from waters of the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
SCHIZOSCELUS ORNATUS

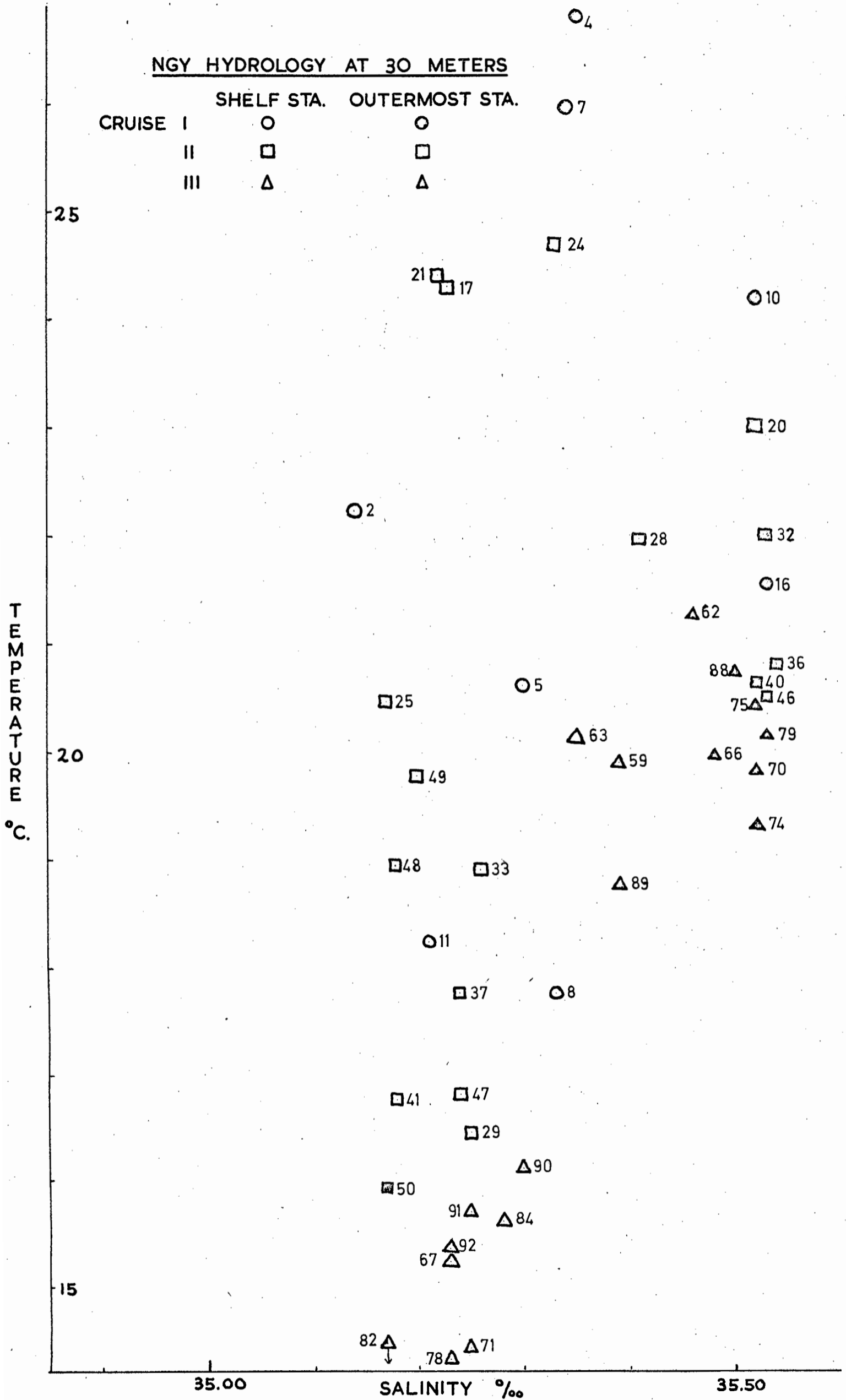


WORLD DISTRIBUTION OF
THYROPLUS SPHAEROMA



NGY HYDROLOGY AT 30 METERS

	SHELF STA.	OUTERMOST STA.
CRUISE I	○	○
II	□	□
III	△	△



GENUS SCHIZOSCELUS CLAUSSchizoscelus ornatus Claus 1879Schizoscelus ornatus Stebbing 1888 (⊗), Stewart 1913 (▲), K. Stephensen 1926 (⊗), Siegfried 1963 (⊕)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Nil.

Cruise II - N 100H Samples: Staa. 17, 27

N 100B Samples: Nil.

Cruise III - N 100H Samples: Staa. 64, 85

N 100B Samples: Nil.

World Distribution: See map opposite.

Remarks: Previous records of this species are widely scattered and few in number. Although the number of NGY records is equal to the total number from the rest of the world, it is still not large enough to enable any positive conclusion to be arrived at.

The NGY records are the first from waters off the east coast of the Republic.

GENUS THYROPUS DANAThyropus sphaeroma (Claus) 1879Tanyscelus sphaeroma Claus 1879

Thyropus sphaeroma Stebbing 1888 (⊗), Spandl 1927 (▽), K.H. Barnard 1930 (●), Pirlot 1930 (⊗), K.H. Barnard 1932 (●), K.H. Barnard 1937 (●), Shoemaker 1945 (⊕), Hurley 1960a (⊗), Siegfried 1963 (⊕)

South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 13

N 100B Samples: Staa. 4, 6, 12, 14

Cruise II - N 100H Samples: Staa. 17, 19, 21, 25, 46

N 100B Samples: Staa. 43, 50

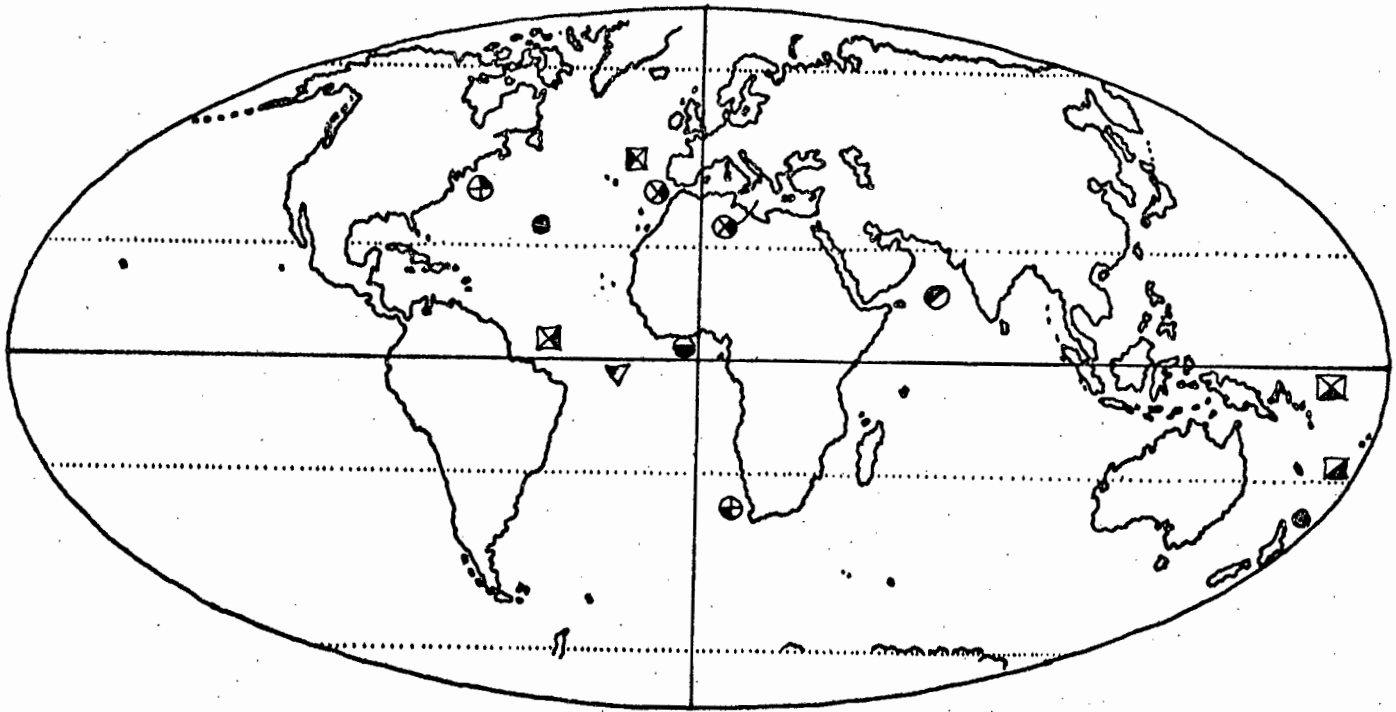
Cruise III - nil.

World Distribution: See map opposite.

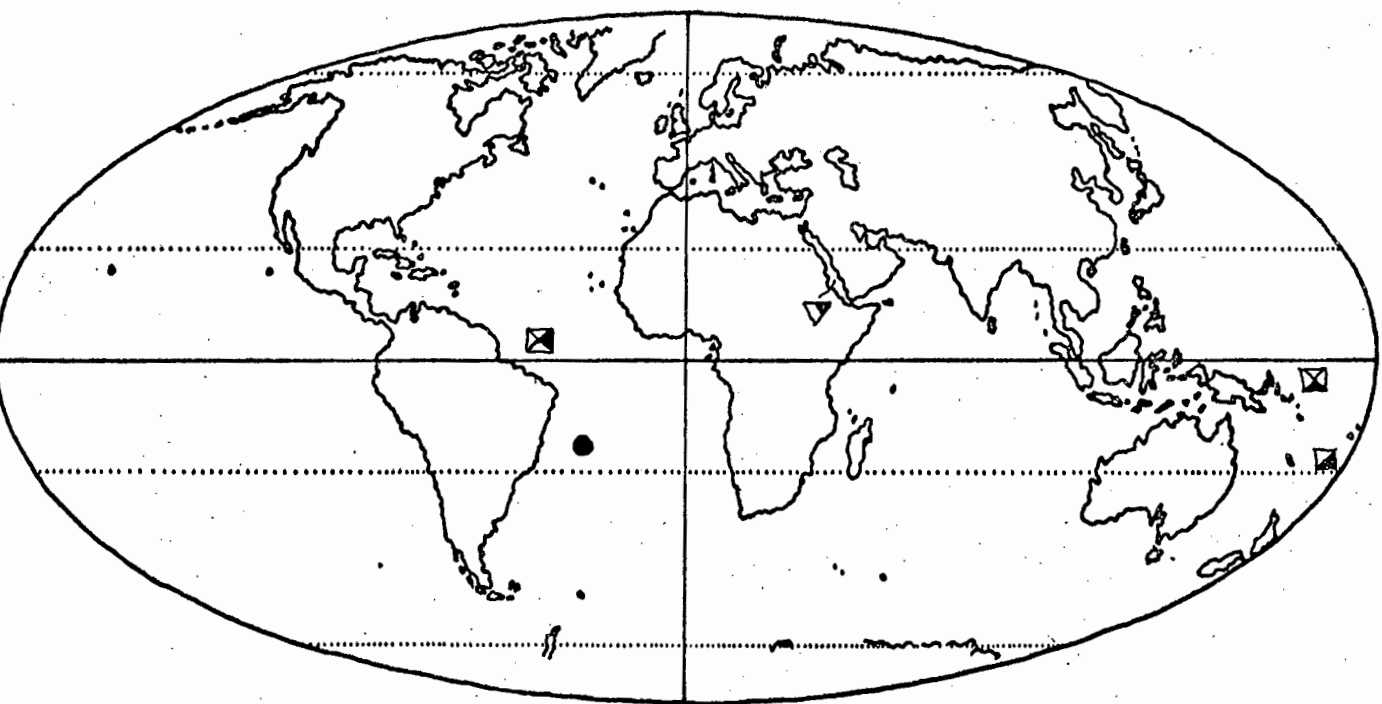
Remarks: This species, as evidenced by previous records, is predominantly distributed in regions of the World Oceans within the Tropics. The occurrence in NGY samples from the first and second cruises only tends to support the inferred preference for warm conditions.

The NGY records are the first from waters off the east coast of the Republic.

WORLD DISTRIBUTION OF
AMPHITHYRUS BISPINOSUS



WORLD DISTRIBUTION OF
AMPHITHYRUS GLABER



FAMILY PLATYSCELIDAE STEBBINGGENUS AMPHITHYRUS CLAUSAmphithyrus bispinosus Claus 1879

Amphithyrus bispinosus Stebbing 1888 (⊗), K. Stephensen 1926 (⊗), Spandl 1927 (▽), Pirlot 1929 (⊗), K.H. Barnard 1930 (●), Pirlot 1930 (⊗), Pirlot 1939 (⊗), Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1960a (⊗), Siegfried 1963 (⊕)

Amphithyrus bispinosa K.H. Barnard 1937 (●)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 8

N 100B Samples: Sta. 12

Cruise II - N 100H Samples: Staa. 19, 21, 25, 29

N 100B Samples: Staa. 18, 19, 31, 40, 49

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 62, 69, 73, 74, 77, 79, 88

World Distribution: See map opposite

Remarks: Previous records of this species are from widely scattered areas in the warm temperate and tropical regions of the World Oceans. An avoidance of high temperature conditions but a preference for warm conditions is suggested by the occurrence in NGY samples mainly from the second and third cruises. The NGY records are the first for the Southwest Indian Ocean.

Amphithyrus glaber Spandl 1924

Amphithyrus glaber Spandl 1924 (▽), K.H. Barnard 1930 (●)

Amphithyrus sculpturatus glaber Pirlot 1930 (⊗), Pirlot 1939 (⊗), Hurley 1960a (⊗)

South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Staa. 7, 8, 9, 14

N 100B Samples: Staa. 3, 4, 6, 7, 12, 13, 14

Cruise II - N 100H Samples: Staa. 19, 21, 25, 42, 50

N 100B Samples: Staa. 18, 19, 27, 30, 43

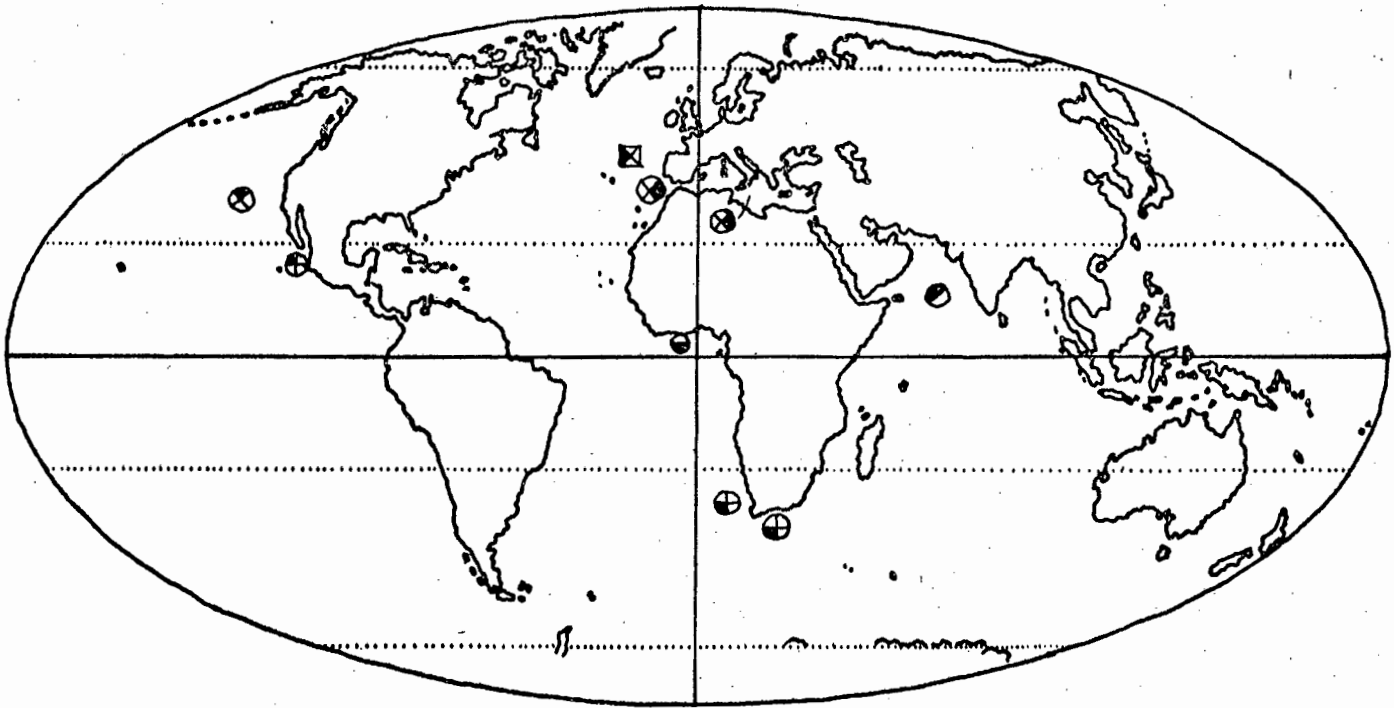
Cruise III - nil.

World Distribution: See map opposite.

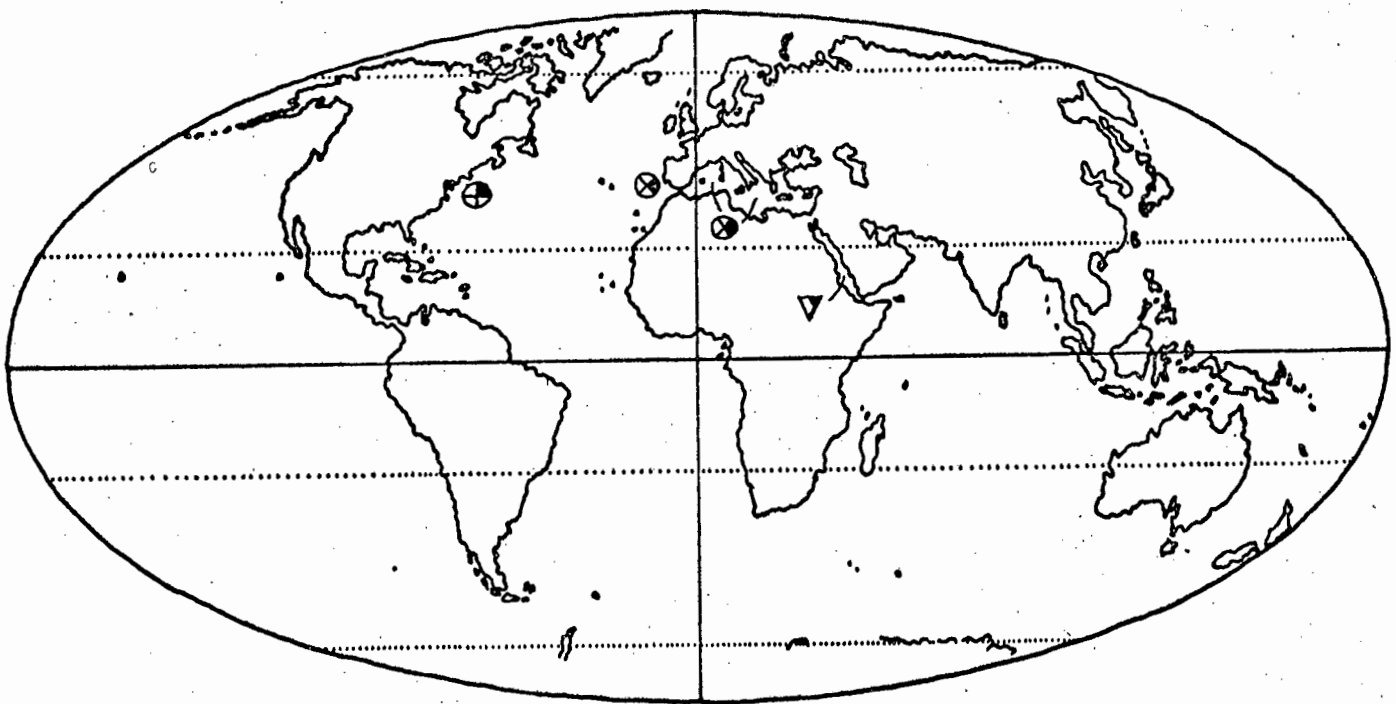
Remarks: The previous records of this species, being all within the Tropics, suggest a preference for warm conditions. A possible high temperature tolerance is indicated by the large number of NGY records from samples collected during the first cruise.

The NGY records are the first from the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
AMPHITHYRUS SCULPTURATUS



WORLD DISTRIBUTION OF
AMPHITHYRUS SIMILIS



Amphithyrus sculpturatus Claus 1879Amphithyrus sculpturatus K. Stephensen 1926 (⊗), Pirlot 1929 (⊗),

K.H. Barnard 1937 (⊙), Reid 1955 (⊖), Siegfried 1963 (⊕)

Amphithyrus orientalis Stebbing 1888 (⊗), Shoemaker 1925 (⊕)South African Records additional to those of the NGY:

Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 12

N 100B Samples: Staa. 7, 12

Cruise II - N 100H Samples: Staa. 20, 22, 48

N 100B Samples: Sta. 49

Cruise III - N 100H Samples: Sta. 80

N 100B Samples: Sta. 74

World Distribution: See map opposite.Remarks: Knowledge of the distribution of this species is based on a comparatively small number of records from widely separated areas in the warm temperate and tropical regions of the World Oceans. The number of records from NGY samples is not large enough to clarify the position regarding the ecology of the species.

The NGY records are the first from waters off the east coast of the Republic.

Amphithyrus similis Claus 1879Amphithyrus similis Spandl 1924 (∇), K. Stephensen 1926 (⊗), Shoemaker 1945 (⊕)South African Records additional to those of the NGY: Nil.NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Sta. 12

Cruise II - nil.

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 60

World Distribution: See map opposite.Remarks: The few previous records of this comparatively rare species are all from the Northern Hemisphere. The two NGY records are the first for the Southwest Indian Ocean and are only of significance in extending the geographic range of the species.

GENUS HEMITYPHIS CLAUSHemityphis rapax (Milne-Edwards) 1830Typhis rapax Milne-Edwards 1830Hemityphis rapax Pirlot 1929 (☒), K.H. Barnard 1930 (⊙), Pirlot 1930 (☒),
K.H. Barnard 1932 (⊙), Pirlot 1939 (☒), Shoemaker 1945 (⊕),
Reid 1955 (⊖), Evans 1961 (☒), Siegfried 1963 (⊕)Hemityphis crustulatus Walker 1909 (☒), Reid 1955 (⊖)Hemityphis crustulum Spandl 1927 (▽), K.H. Barnard 1937 (⊙)Hemityphis tenuimanus Stebbing 1888 (⊕), Stebbing 1910 (▽), Stewart 1913 (▲),
K. Stephensen 1926 (⊕), Spandl 1927 (▽)South African Records additional to those of the NGY:

Stebbing 1910, K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

NN 100B Samples: Staa. 3, 6, 13, 14, 15, 16

Cruise II - N 100H Samples: Sta. 17

N 100B Samples: Staa. 20, 31, 40, 44, 46

Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 62, 65, 66, 70, 74, 79, 88

World Distribution: See map opposite.Remarks: Previous records of this species from the warm temperate and tropical regions of the World Oceans suggest a preference for warm conditions. A possible high temperature tolerance is suggested by the maximum abundance in samples from the first NGY cruise.

The NGY records are the first from the Southwest Indian Ocean.

GENUS PARATYPHIS CLAUSParatyphis maculatus Claus 1879Paratyphis maculatus Stebbing 1910 (▽), K. Stephensen 1926 (⊕), Pirlot 1930 (☒),
K.H. Barnard 1937 (⊙), Pirlot 1939 (☒), Shoemaker 1945 (⊕),
Reid 1955 (⊖), Hurley 1960a (☒), Siegfried 1963 (⊕)South African Records additional to those of the NGY:

Stebbing 1910, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Sta. 7

N 100B Samples: Staa. 4, 6, 12

Cruise II - N 100H Samples: Sta. 20

N 100B Samples: Staa. 18, 26

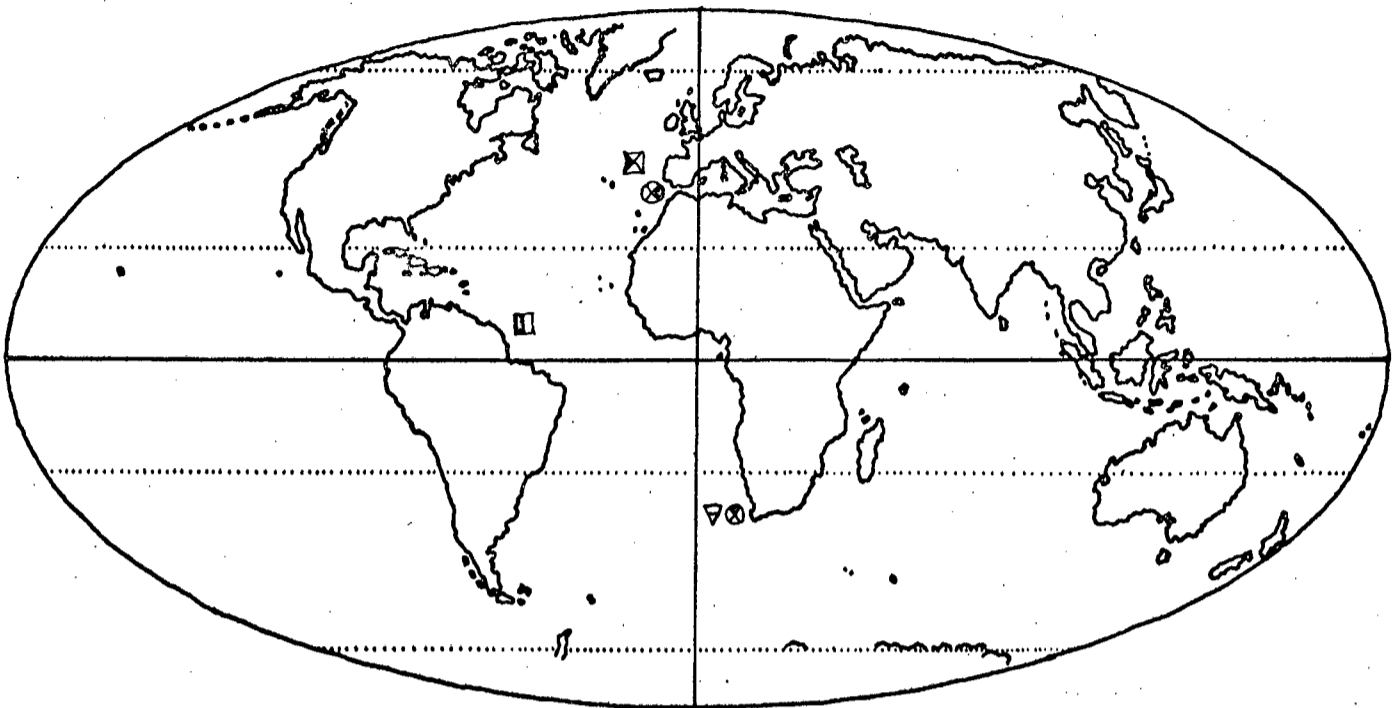
Cruise III - N 100H Samples: Nil.

N 100B Samples: Staa. 62, 64, 65, 72, 74, 77, 88

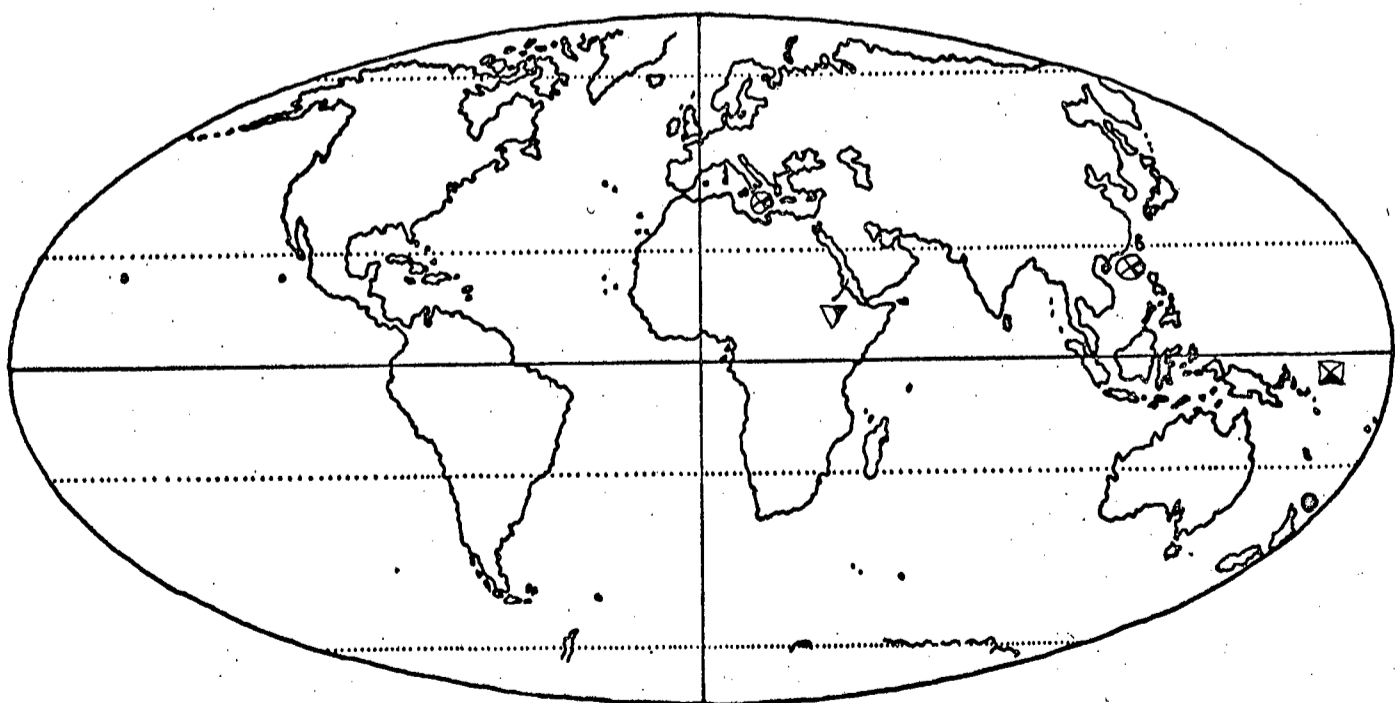
World Distribution: See map opposite.Remarks: Previous records of this species are from widely scattered areas and few in number. No definite indication of preferences regarding hydrological conditions is provided by them. The NGY cruises provided more records than the world total of previous records. The maximum frequency of occurrence in the third cruise suggests a preference for temperatures in the range 18° - 21°C. and salinities greater than 35.35‰.

The NGY records are the first for the Southwest Indian Ocean.

WORLD DISTRIBUTION OF
PARATYPHIS PROMONTORII



WORLD DISTRIBUTION OF
PARATYPHIS SPINOSUS



Paratyphis promontorii Stebbing 1888

Paratyphis promontorii Stebbing 1888 (⊗), Stebbing 1910 (▽), K. Stephensen 1926 (⊗), Pirlot 1929 (⊗), Evans 1961 (■)

South African Records additional to those of the NGY:
Stebbing 1888, 1910

NGY Records: Cruise I - N 100H Samples: Sta. 7
N 100B Samples: Staa. 3, 12
Cruise II - N 100H Samples: Sta. 50
N 100B Samples: Staa. 36, 43
Cruise III - N 100H Samples: Sta. 66
N 100B Samples: Staa. 61, 69, 86, 87

World Distribution: See map opposite.

Remarks: The NGY records of this species are the first outside the Atlantic Ocean and suggest a preference for hydrological conditions similar to those preferred by the previous species. Like the previous species, a maximum frequency of occurrence is present in samples from the third cruise.

Paratyphis spinosus Spandl 1924

Paratyphis spinosus Spandl 1924 (▽), K.H. Barnard 1930 (●), Pirlot 1930 (⊗)

Paratyphis clausii K. Stephensen 1926 (⊗)

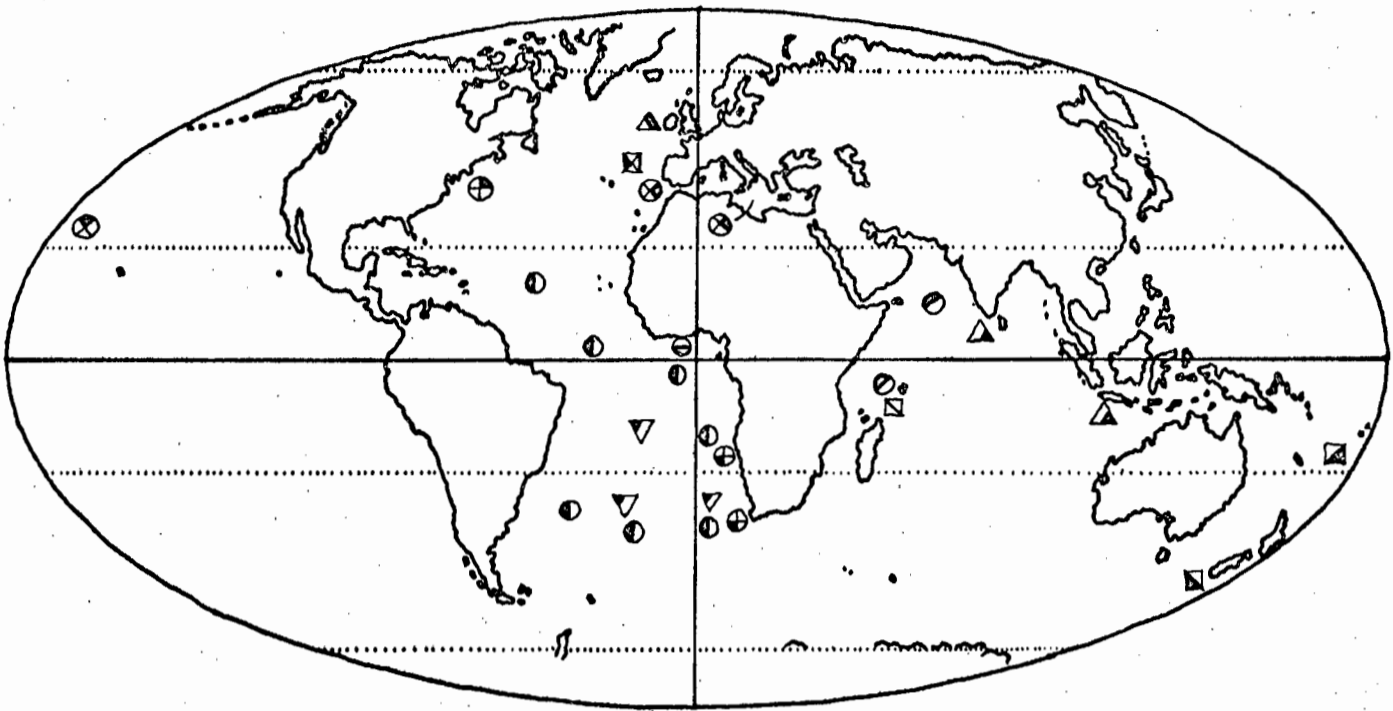
South African Records additional to those of the NGY: Nil.

NGY Records: Cruise I - N 100H Samples: Nil.
N 100B Samples: Sta. 12
Cruise II - N 100H Samples: Nil.
N 100B Samples: Staa. 27, 31
Cruise III - N 100H Samples: Nil.
N 100B Samples: Staa. 88, 89

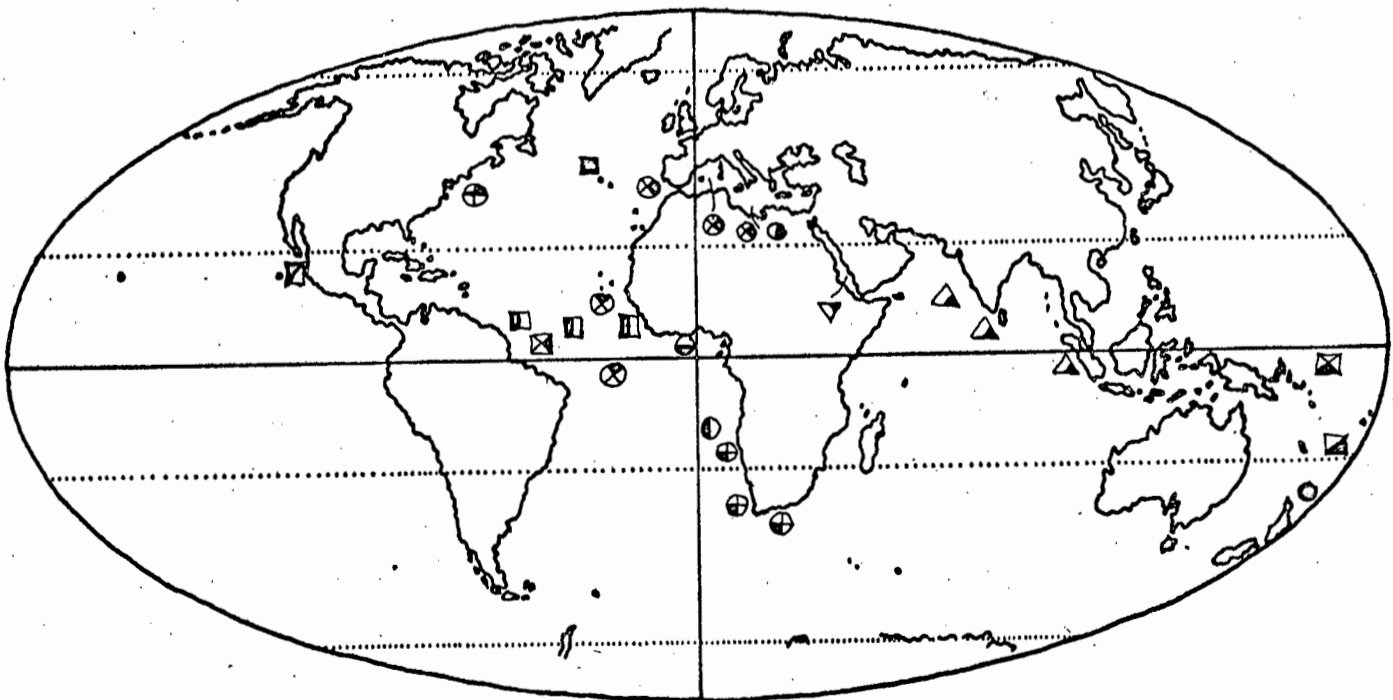
World Distribution: See map opposite.

Remarks: This is the rarest of the species of Paratyphis present in samples from the IGY cruises. The records are the first for the Southwest Indian Ocean and are not numerous enough to enable positive conclusions to be drawn.

WORLD DISTRIBUTION OF
PLATYSCELUS OVOIDES



WORLD DISTRIBUTION OF
PLATYSCELUS SERRATULUS



GENUS PLATYSCELUS CLAUSPlatyscelus ovoides (Claus) 1879Eutyphis ovoides Claus 1879, Walker 1909 (☒), Pirlot 1929 (☒)Platyscelus ovoides Stebbing 1888 (⊗), Tattersall 1906 (▲), K. Stephensen 1926 (⊗), Spandl 1927 (▽), K.H. Barnard 1932 (⊙), K.H. Barnard 1937 (⊙), Shoemaker 1945 (⊕), Hurley 1955 (☒), Reid 1955 (⊖), Hurley 1960a (☒), Siegfried 1963 (⊕), Tsuruta 1963 (▲)South African Records additional to those of the NGY:

K.H. Barnard 1932, Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Nil.

N 100B Samples: Staa. 4, 12, 14, 15

Cruise II - N 100H Samples: Staa. 22, 46

N 100B Samples: Sta. 20

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 69

World Distribution: See map opposite.Remarks: A possible high temperature tolerance for this species is suggested by its maximum frequency of occurrence in samples from the first cruise. The wide geographic range of previous records suggests however, that the species is very possibly eurythermal and the relatively small number of NGY records is incapable of further clarifying this point.

The NGY records are the first for the Southwest Indian Ocean.

Platyscelus serratulus Stebbing 1888Platyscelus serratulus Stebbing 1888 (⊗), Chevreux 1900 (☒), Spandl 1924 (▽), K. Stephensen 1926 (⊗), K.H. Barnard 1930 (⊖), Pirlot 1930 (☒), K.H. Barnard 1932 (⊙), Pirlot 1939 (☒), Ruffo 1939 (⊙), Shoemaker 1945 (⊕), Reid 1955 (⊖), Hurley 1956 (☒), Hurley 1960a (☒), Evans 1961 (☒), Siegfried 1963 (⊕), Tsuruta 1963 (▲)South African Records additional to those of the NGY:NGY Records: Cruise I - nil.

Cruise II - N 100H Samples: Staa. 36, 46

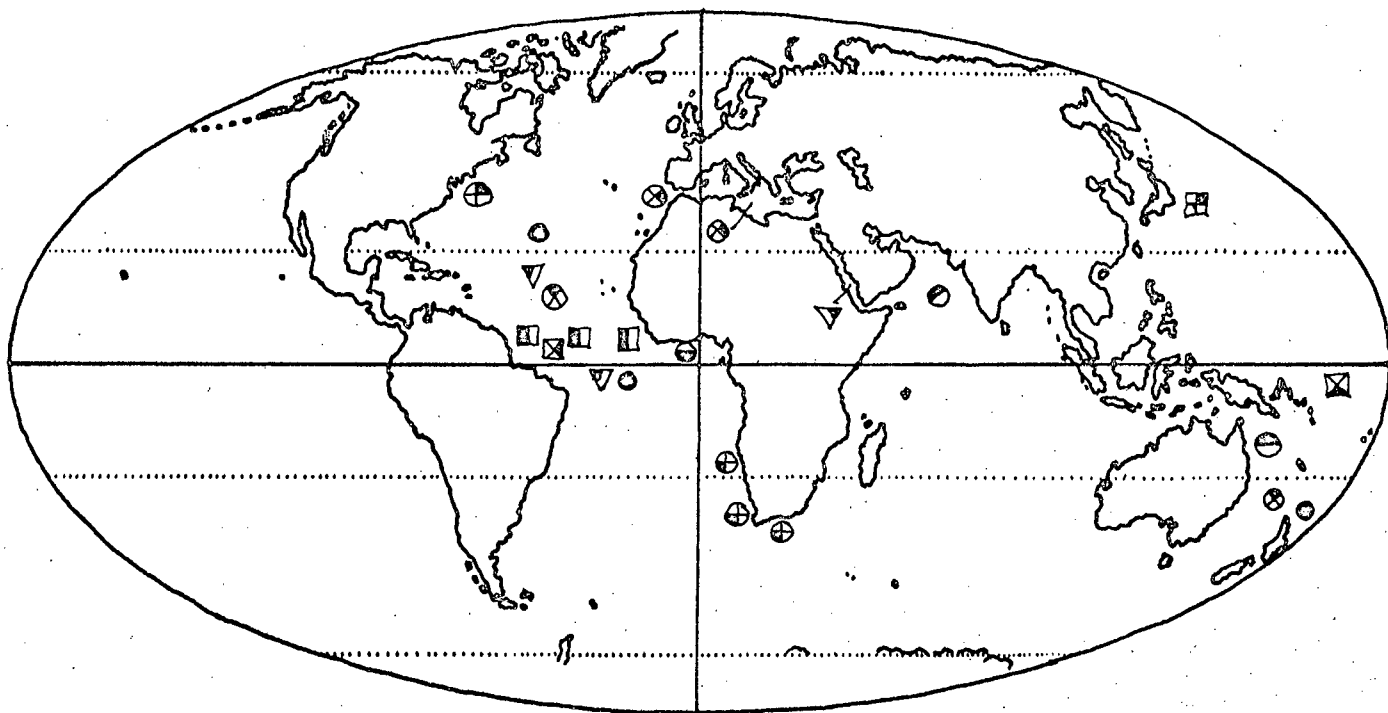
N 100B Samples: Nil.

Cruise III - nil.

World Distribution: See map opposite.Remarks: The previous records of this species, being predominantly from areas within the Tropics, suggest a preference for warm conditions.

The two NGY records are the first from waters off the East coast of the Republic and can only be used in extending the geographic range of the species.

WORLD DISTRIBUTION OF
TETRATHYRUS FORCIPATUS



GENUS TETRATHYRUS CLAUSTetrathyrus forcipatus Claus 1879

Tetrathyrus forcipatus Stebbing 1888 (⊗), Stebbing 1910 (▽), Spandl 1924 (▽),
 K. Stephensen 1926 (⊗), Spandl 1927 (▽), K.H. Barnard 1930 (⊙),
 Pirlot 1930 (⊗), K.H. Barnard 1931 (⊙), K.H. Barnard 1937 (⊙),
 Pirlot 1939 (⊗), Shoemaker 1945 (⊕), Reid 1955 (⊖), Irie 1959 (⊕),
 Evans 1961 (■), Siegfried 1963 (⊕)

Tetrathyrus moncoeuri Stebbing 1888 (⊗)South African Records additional to those of the NGY:

Stebbing 1910, (Siegfried 1963

NGY Records: Cruise I - N 100H Samples: Staa. 7, 13

N 100B Samples: Staa. 12, 14, 16

Cruise II - N 100H Samples: Staa. 48, 50

N 100B Samples: Staa. 49, 50

Cruise III - N 100H Samples: Nil.

N 100B Samples: Sta. 60

World Distribution: See map opposite.

Remarks: The frequency of occurrence of this species in samples from the first and second cruises suggests a preference for temperatures in excess of 21°C and salinities lower than 35.35‰. Previous records tend to support the former suggestion but give little clarification or support to the latter.

INTER-"CLASS" CORRELATIONS OF HYDROLOGICAL "CLASSES"

<u>TEMPERATURE</u> <u>CLASS MARK</u> (°C.)	<u>TEMPERATURE CLASS MARK</u>																	
	16.75	17.25	17.75	18.25	18.75	19.25	19.75	20.25	20.75	21.25	21.75	22.25	22.75	23.25	23.75	24.25	24.75	25.25
35.13	<u>.262</u>	<u>.156</u>	<u>.333</u>	-.036	.167	-.082	.116	-.192	-.111	-.124	-.100	-.108	-.085	-.093	-.102	.043	-.099	-.100
35.18	<u>.209</u>	-.061	.092	-.042	-.116	-.092	-.006	-.135	-.086	-.061	-.070	-.076	-.060	-.065	-.072	-.084	-.069	-.070
35.23	<u>.501</u>	-.011	-.118	.088	-.245	-.127	-.085	-.175	-.081	-.124	-.097	.007	-.083	-.083	-.064	-.099	.023	<u>.326</u>
35.28	<u>.181</u>	<u>.413</u>	.081	-.158	.095	-.128	-.027	-.167	-.119	-.191	.041	-.090	-.090	-.038	-.035	<u>.202</u>	.060	<u>.420</u>
35.33	-.086	-.016	-.083	.139	-.214	-.161	-.171	-.242	-.245	-.204	-.093	.015	<u>.238</u>	-.075	-.061	<u>.580</u>	<u>.448</u>	.105
35.38	.015	-.081	.147	.104	.026	-.105	-.030	-.227	-.217	-.062	.093	.019	.056	<u>.544</u>	.081	.157	.149	-.021
35.43	-.097	-.031	-.091	-.035	-.072	-.198	-.017	-.226	-.166	<u>.490</u>	.069	.072	.083	.014	<u>.222</u>	-.174	.016	.060
35.48	-.197	-.112	-.027	-.048	.097	.079	.030	<u>.230</u>	<u>.387</u>	<u>.260</u>	-.098	.020	-.113	-.062	.006	-.235	-.253	-.248
35.53	-.158	-.080	.048	-.018	<u>.212</u>	<u>.333</u>	.139	<u>.388</u>	<u>.239</u>	-.196	.139	.005	-.029	-.085	-.029	-.192	-.176	-.215
35.58	-.058	-.073	-.004	-.151	<u>.227</u>	<u>.197</u>	<u>.167</u>	.006	-.055	.006	.028	.056	-.071	-.077	-.086	.070	-.083	-.083

The Correlation Analysis of Associations within Hyperiid Amphipod Species,
between Hyperiids and Chaetognaths, and between Hydrological Variables and
Hyperiids and Chaetognaths

The output of the computation of Pearson product-moment correlation coefficients by the computer took the form of a matrix of 2628 correlation coefficients. Of these, 465 were between hyperiids and hyperiids, 91 were between chaetognaths and chaetognaths, 434 were between hyperiids and chaetognaths, 868 were between hyperiids and hydrological "classes", 392 were between chaetognaths and hydrological "classes", and 378 were between hydrological "classes" and hydrological "classes".

Within the first three categories of coefficients it was found that only twenty-eight were positive and greater than 0.455 . In the same categories three were negative (Appendix 1.).

The correlations between planktonic species and the hydrological "classes" were characterized by ranges of positive or negative correlations. The "change-over" class mark was generally from 20°C. to 22°C. in the case of temperature and from 35.30 to 35.40‰ in the case of salinity.

The matrix of inter-"class" correlation coefficients for hydrological classes revealed three clusters of coefficients (Table). These were centered around points with temperature-salinity coordinates of, 17.25°C. and 35.18‰ , 19.85°C. and 35.52‰, and 24.30°C. and 35.33‰ . It will be shown later that the hyperiid amphipods and chaetognaths may be grouped according to their degree of correlation with hydrological "classes" in the latter two clusters.

DISCUSSION.Hydrology of the Agulhas Current Area

Prior to the International Geophysical Year, the Agulhas Current area had been made the subject of study of several international expeditions. These included the "Novara-", "Gazelle-", "Challenger-", "Valdivia-" (Deutsche Tiefsee), "Gauss-" (Deutsche Südpolar), "Planet-", "Möwe-", "Meteor-", "Discovery-" (II), "Dana-" and "Galathea" expeditions.

Dietrich (1935), using the earlier data, made the first major contribution towards a synthesis of facts relating to the hydrology and dynamics of the Agulhas Current. Deacon (1937) in a survey of the hydrology of the Southern Ocean in the light of data gathered on the cruises of R.R.S. "Discovery II", commented briefly on the Agulhas Current. A further contribution was made by Clowes (1950) who restricted his choice of data to that originating from the cruises of "Meteor" and "Discovery II", since it was only on these cruises that pressure-protected and unprotected reversing thermometers were used - a necessary condition for accurate measurements.

From these accounts the Agulhas Current emerged as the western component of an anticyclonic circulation of fluctuating intensity with a mass transport in the main current reaching 22.4 million cubic meters per second at times. Deacon (1937) attributed the greater strength of the current in Summer to greater deflection of the South Equatorial Current south of Madagascar and increased strength of the Mozambique Current due to accumulation of water in the Gulf of Zanzibar caused by the Equatorial Current and the Northeast Monsoon Drift. The current itself was visualized by Dietrich (1935) as a wedge-shaped stream sandwiched between water of greater density on either side.

Clowes (1950) pictured the current as having a surface layer of Sub-tropical Water plus a subsurface layer of similar water but of higher salinity beneath it. Clowes also maintained that an anticyclonic circulation of Antarctic Intermediate Water was present beneath the Agulhas Current and that this water upwelled at places on the inside of the Agulhas Current, mixing with the surface and subsurface layers along the $\sigma_t = 26.5$ isopycnal as it did so. In the region of longitude 18° to 20° east deflection of the current by the Agulhas Bank and the northeast thrust of Atlantic Subtropical Water (according to Clowes) cause it to turn south and east to flow parallel to the West Wind Drift as the Agulhas Return Current.

During the International Geophysical Year, stations were occupied in the Mozambique Channel by the "Commandant Robert Giraud" (October–November 1957) and by the "Orsom I" (October 1958). Menaché (1961) reported that the data from these cruises showed that at the times in question the Mozambique Current turned back on itself, proceeding up the Mozambique Channel along the West coast of Madagascar. Data published by Menaché (1961) will be considered when dealing with the hydrological conditions prevailing during the cruises of S.A.S. "Natal".

In the course of previous investigations a controversy had arisen regarding the precise nature of Agulhas Water. Orren (1966), reporting on the results of the second and third SCOR-UNESCO International Indian Ocean Expedition cruises of "Africana II" of the Division of Sea Fisheries, maintained that Tropical Water was synonymous with Agulhas Water, having temperatures greater than 23°C . and salinities in the range, 35.2 to 35.4 ‰ . According to Ivanenkov & Gubin (1960) and Darbyshire (1966), Tropical Water is characterised by having salinities greater than 35.50 ‰ . Darbyshire (1964) distinguished 'cool' Agulhas Water with temperatures from 17° to 20°C . and salinities from 35.50 to 35.70 ‰ , from 'warm' Agulhas Water with temperatures greater than 20°C . and salinities greater than 35.70 ‰ . Darbyshire (1966) confused the issue further by defining Boundary Water with properties intermediate between those of Tropical Water as defined by Orren (1966) and those listed for the same water by Ivanenkov & Gubin (1960). Unfortunately the maps and diagrams published by Darbyshire (1966) are of little use in resolving the issue. If they are to be taken literally, Agulhas Water is present in the Mozambique channel before the formation of the Current which apparently stops flowing for three months in the year!

It is considered that for the region in question the most realistic definition of Tropical Water has been given by Orren (1966). Water with the characteristics of the South Equatorial Surface Water defined by Ivanenkov & Gubin (1960) - temperatures of about 24°C and salinities of about 35.50 ‰ does contribute to the Agulhas Current and will be shown to have an effect on the abundance of certain planktonic species. For the present it must be accepted that variable proportions of Mozambique Current Water and South Equatorial Current Water are contributed to make up the Agulhas Current at various times of the year.

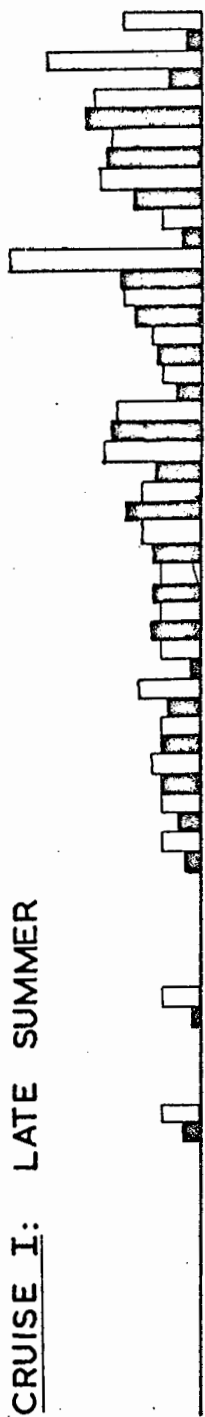
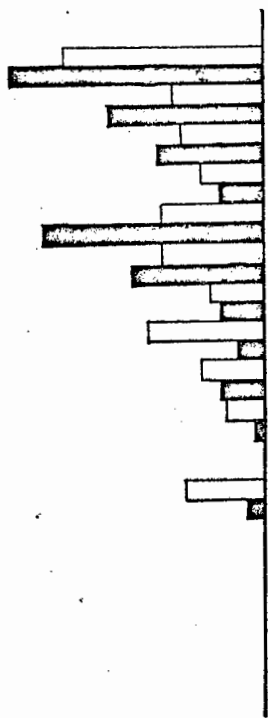
Hydrological Conditions in the Agulhas Current Area during 1958

Two approaches were employed in demonstrating the changes in hydrology that occurred over the period covered by the three IGY cruises. First, a temperature-salinity diagram was prepared using the data available on temperature and

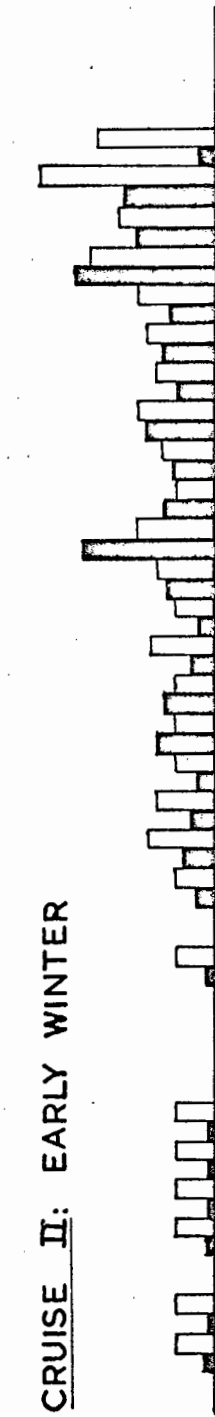
A FREQUENCY SUMMARY OF HYDROLOGICAL CONDITIONS DURING THE IGY CRUISES OF S.A.S. "NATAL"

■ TOTAL FREQUENCY □ MEAN FREQUENCY PER STATION OF OCCURRENCE

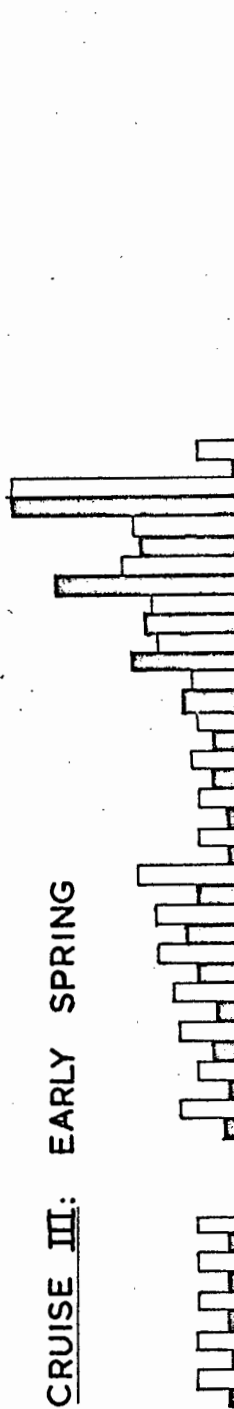
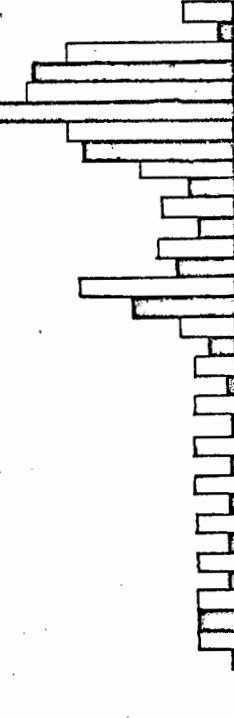
CRUISE I: LATE SUMMER



CRUISE II: EARLY WINTER



CRUISE III: EARLY SPRING



35.56 - 35.60
 35.51 - 35.55
 35.46 - 35.50
 35.41 - 35.45
 35.36 - 35.40
 35.31 - 35.35
 35.26 - 35.30
 35.21 - 35.25
 35.16 - 35.20
 35.11 - 35.15
 35.06 - 35.10
 35.01 - 35.05
 34.96 - 35.00
 34.91 - 34.95
 34.86 - 34.90
 34.81 - 34.85
 34.76 - 34.80
 34.71 - 34.75

27.01 - 27.50
 26.51 - 27.00
 26.01 - 26.50
 25.51 - 26.00
 25.01 - 25.50
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 14.01 - 14.50
 13.51 - 14.00
 13.01 - 13.50
 12.51 - 13.00
 12.01 - 12.50
 11.51 - 12.00
 11.01 - 11.50
 10.51 - 11.00
 10.01 - 10.50
 9.51 - 10.00

SALINITY ‰

TEMPERATURE °C

salinity conditions at thirty meters, the maximum depth for which data was available for every station occupied. Only data for the station(s) on the continental shelf and the outermost station on a "line" was plotted, each type being given a different symbol. The pairs of symbols used also differed for each of the three cruises.

The temperature-salinity diagram indicated that the stations on the continental shelf were generally located in water with lower temperatures and salinities than the outer stations and that a general decrease in temperature occurred over the period covered by the cruises.

In the second approach to demonstrating changes in hydrology the ranges of values of temperature and salinity that occurred in the 150-meter water stratum over the period covered by the cruises were divided into a number of classes in 0.5°C . increments in the case of temperature and $0.05^{\circ}/\text{oo}$ increments in the case of salinity. The total frequencies of occurrence and the mean frequencies per station of occurrence of each class were then entered on histograms, separate ones being used for each cruise and for temperature and salinity.

Again it was demonstrated that there occurred a general decrease in temperature over the period covered by the cruises. The most significant feature however, was a change in the pattern of distribution of the salinity class frequencies, indicating an increase in abundance of the class with a class mark of $35.48^{\circ}/\text{oo}$ in the third cruise. This latter fact assumes increased importance when the salinity sections published by Menaché (1961) are examined. The section based on data from the cruise of the "Commandant Robert Giraud" (October-November 1957) demonstrates clearly that before the Mozambique Current turns back on itself the salinities are predominantly less than $35.30^{\circ}/\text{oo}$, while after this in the South Equatorial Water they are from 35.40 to $35.50^{\circ}/\text{oo}$. Similar trends are shown by the sections based on the cruise of "Orsom I" (October 1958), two months after the third cruise of S.A.S. "Natal". It is therefore suggested that in the first and second cruises the contributions of the Mozambique and South Equatorial Currents to the Agulhas Current were approximately equal but in the third cruise the major contribution was made by the South Equatorial Current. From the data of Menaché (1961) it appears that the salinity core of the Mozambique Current's water is in the range 35.20 to $35.30^{\circ}/\text{oo}$ while that of the South Equatorial Current is in the range 35.40 to $35.50^{\circ}/\text{oo}$. It is within the extremes of these two ranges that the bulk of NGY salinities are located - i.e. from 35.20 to $35.50^{\circ}/\text{oo}$.

TABLE 1. - SPECIES RANKS OF NGY HYPERIID AMPHIPODS.

	<u>CRUISE I</u>			<u>CRUISE II</u>			<u>CRUISE III</u>		
	<u>T.A.</u>	<u>F.O.</u>	<u>M.F.S.</u>	<u>T.A.</u>	<u>F.O.</u>	<u>M.F.S.</u>	<u>T.A.</u>	<u>F.O.</u>	<u>M.F.S.</u>
<u>GROUP I</u>									
Amphithyrus glaber	3	1	4	-	-	-	-	-	-
Anchylomera blossevillei	1	2	2	-	-	-	-	-	-
Hemityphis rapax	-	2	4	-	-	-	-	-	-
Parascelus edwardsi	-	3	-	-	-	-	-	-	-
Parascelus typhoides	-	3	-	-	-	-	-	-	-
Phronimella elongata	-	2	-	-	-	-	-	-	-
Phronimopsis spinifera	-	3	-	-	-	-	-	-	-
Tetrathyrus forcipatus	2	-	1	-	-	1	-	-	-
<u>GROUP II</u>									
Eupronoe intermedia	4	3	3	1	1	3	-	-	3
<u>GROUP III</u>									
Phrosina semilunata	-	-	-	2	4	4	2	2	1
Primno macropa	-	4	-	3	2	-	1	1	2
<u>GROUP II/III</u>									
Brachyscelus crusculum	-	-	-	-	3	-	3	4	4
Hyperioides longipes	-	-	-	4	-	2	4	3	-

TABLE 2. - RESTRICTED SPECIES RANKS.

<u>GROUP I</u>									
Anchylomera blossevillei	1	2	2	-	-	-	-	-	-
Hemityphis rapax	-	2	-	-	-	-	-	-	-
Phronimella elongata	-	2	-	-	-	-	-	-	-
Tetrathyrus forcipatus	2	-	1	-	-	1	-	-	-
<u>GROUP II</u>									
Eupronoe intermedia	4	3	-	1	1	3	-	-	3
Hyperioides longipes	-	-	-	4	-	2	4	3	-
<u>GROUP III</u>									
Phrosina semilunata	-	-	-	2	4	4	2	2	1
Primno macropa	-	4	-	3	2	-	1	1	2

ABBREVIATIONS:

T.A.: Total abundance; F.O.: Frequency of occurrence

M.F.S.: Mean frequency per station of occurrence

The Relations between Hydrological Conditions and Hyperiid Amphipoda

The thirty-one most frequently occurring hyperiid amphipoda from N 100B samples were ranked according to three criteria (total abundance, frequency of occurrence and mean frequency per station of occurrence), being given ranks from 1 to 4 according to whether the species in question was represented amongst the four highest values for each criterion. This procedure was applied to each of the three cruises and reduced the number of species to be considered from thirty-one to thirteen.

When the tabulated species ranks (table 1) are arranged according to attainment of maximum rankings in a particular cruise it is found that four groups emerge. Of the thirteen species, eight fall in the first group which attains maximum ranks in the first cruise, one attains maximum ranks in the second cruise, two species attain their maxima in the third cruise and two attain their best ranks in the second and third cruises. If the species considered are further limited to those that attain ranks 1 or 2 in at least one criterion in at least one cruise the number is reduced to eight (table 2). There are now four species in the first group, two in the second group (with the addition of one of the doubtful species) and two in the third group.

The relations between the species groups and hydrological conditions may now be defined in general terms. It is suggested that the members of the first group are either eurythermal or tolerant of high temperatures but are not able to tolerate salinities above 35.35‰ or some factor(s) associated with them. The second group apparently can tolerate slightly higher salinities or associated factors while still preferring higher temperatures. Members of the third group apparently cannot tolerate lower salinities (less than 35.35‰) or factors associated with them, and temperatures above about 22°C. A more precise definition of the relation of the groups to hydrological conditions will be given later in the light of the results of analysis of species-hydrology correlations.

The Indicator Species Concept

The idea of using planktonic species as indicators of specific hydrological conditions, ocean currents and indirectly fishing grounds, is not a recent one. Its origin is attributed to early workers in planktology - Cleve, Aurivillius, Gran, Kramp and others, by Russel (1935a, 1935b) and to A. Agassiz by Bieri (1959). The development of the concept and its application owe a great deal to the initiation in 1932 of the Plankton Recorder Survey in the North Sea by Hardy and his coworkers at the University of Hull, and to Russel at the Plymouth Marine Laboratory who collaborated with Hardy.

In its simplest form the concept envisages the finding of planktonic species, each of which would be associated with one water mass or ocean current. This idea underwent modification as the concept developed.

Russel (1935a, 1935b, 1939) made a number of suggestions and observations regarding the choice and use of indicator species. If a species is to be a useful indicator, knowledge of its biology (life history, population dynamics, trophic relations with other species etc.) and its relationship to hydrological conditions should be taken into account in its selection. It should be readily identifiable and should show marked quantitative reactions to the conditions it is to indicate, which reactions should be readily distinguishable from normal fluctuations in abundance resulting from its life cycle. In most cases more than one species should be considered before conclusions are drawn from presence-or-absence data and relative proportions of species (each on its own indicative of a "pure" water mass or ocean current) should be considered in areas where mixing is known to occur. Finally, not all indicator species are likely to have world-wide application. An indicator species found to be unsuitable in one area may prove to be a perfectly good indicator of similar conditions in another area.

The Development of the Concept and its Application

As the study of the distribution of planktonic organisms progressed it became increasingly apparent that many species were distributed on a world-wide basis and could hardly be used as indicators in the original terms of the concept. However, while such species may not be restricted to one water mass in their distributions, many are restricted to one hydrological or biological(?) type of water (e.g. the amphipod, *Parathemisto gaudichaudi*, is distributed on a world-wide basis but is still restricted to waters of West coast origin around the coasts of the Republic of South Africa). Sund (1961, 1964) working on the Chaetognatha of the Pacific Ocean found that the species could be divided into three groups on the

basis of their hydrological tolerances and depth preferences:

(i) Species with wide hydrological tolerances which were restricted by unknown factors to one water mass, (ii) Species with narrow tolerances which were restricted to a particular depth stratum. and (iii) Truly cosmopolitan species with wide hydrological tolerances and depth distributions.

Both Sund (1961, 1964) and Bary (1963a, 1963b, 1964) have used what is best described as the hydrology-plankton-diagram technique in evaluating species for their possible use as indicators. Abundances of a species or number of species are plotted at points determined by the hydrological coordinates of the variables chosen as they are found at the localities where the species occurs. Bary (1963a, 1963b, 1964) used this method to process data from the Plankton Recorder Survey (extended) in the Eastern North Atlantic and extract from it, indicator groups. It was found that the groups extracted in this manner were representative of more than one taxonomic group in the zooplankton. They were found to show seasonal shifts in salinity preference which could not be explained and Bary postulated that unknown factors, possibly biological, were responsible.

With the shift in emphasis from the use of single indicator species to that of using groups of species and the more intensive sampling of the oceanic environments, electronic computers are playing an increasingly bigger role in processing the large amounts of data involved. Concurrently there has been a marked revival of interest in the application of statistical procedures to ecology. Glover et al. (1961), Colebrook (1964), and Colebrook & Robinson (1964) combined rank correlation analysis with principal component analysis as suggested by Williamson (1961) in correlating the data from the Plankton Recorder Survey with hydrological conditions. The hydrological factors used were ones derived from the "primary" factors, temperature and salinity - i.e. Smed's Anomaly, Craig's Difference and Craig's Assessment of Oceanic Influence.

Another approach to the computer-aided extraction of indicator groups is that due to Fager & McGowan (1963). It has since been used by Sheard (1965) and Stone (1965), for several planktonic "groups" by the former author. The method uses only presence-or-absence data, and groups together those species that co-occur to the extent that the geometric mean of the proportion of their joint occurrences, corrected for sample size, exceeds a preselected value. Regression analysis by Fager & McGowan (1963) of the groups' relations with ten "independent" hydrological variable again demonstrated that the major factors governing distribution were not those measured.

TABLE 3.

TAXONOMIC GROUPS THAT HAVE BEEN USED AS INDICATORS OF HYDROLOGICAL CONDITIONS.

<u>Foraminifera:</u>	Bradshaw 1959
<u>Dinoflagellata:</u>	Colebrook 1964, Colebrook & Robinson 1964, Williamson 1961
<u>Siphonophora:</u>	Corbin 1947
<u>Scyphomedusae:</u>	Furnestin 1966
<u>Hydromedusae:</u>	Furnestin 1966
<u>Polychaeta:</u>	Glover et al. 1961, McGowan 1959, Williamson 1961
<u>Copepoda:</u>	Bary 1963a, 1963b, Colebrook 1964, Colebrook & Robinson 1964, Furnestin 1966, Glover et al. 1961, Grainger 1963, Jaschnov 1961, 1963, Williamson 1961
<u>Euphausiacea:</u>	Fager & McGowan 1963, Furnestin 1966, Glover et al. 1961, Sheard 1965
<u>Hyperiid Amphipoda:</u>	Bary 1959, Bigelow 1926, Bousefield 1951
<u>Cladocera:</u>	Furnestin 1966, Glover et al. 1961, Williamson 1961
<u>Heteropoda (Mollusca)</u>	Fager & McGowan 1963
<u>Pteropoda (Mollusca)</u>	Bary 1963a, 1963b, Colebrook 1964, Colebrook & Robinson 1964, Fager & McGowan 1963, Furnestin 1966, Glover et al. 1961, Hida 1957, Rampal 1965, Williamson 1961
<u>Cephalopoda:</u>	Pickford 1946
<u>Chaetognatha:</u>	Bainbridge 1963, Bary 1963a, 1963b, Bieri 1959, Colebrook 1964, Fager & McGowan 1963, Fraser 1952, Furnestin 1966, Hida 1957, Russel 1935a, 1939, Sheard 1965, Sund 1961, 1964, Sund & Renner 1959, Thomson 1947, Williamson 1961
<u>Tunicata:</u>	Colebrook 1964, Glover et al. 1961, Sheard 1965, Thompson 1942
<u>Pisces:</u>	Haffner 1952

Cassie (1961, 1963) employed the Pearson product-moment correlation coefficient as an index of affinity for plankton species. He felt that the use of presence-or-absence data was not a satisfactory approach in dealing with plankton data unless the sample spacing and the geographic range covered is such that abundant species are not present in every sample. Even if the latter conditions were fulfilled, Cassie (1961) felt that the use of such data would result in appreciable losses of information. For these reasons it was decided to adopt Cassie's approach in the present investigation, using product-moment correlation coefficients as indices of species affinities after logarithmic transformation of the raw data, which has been shown by Barnes (1952) to have an approximate normalizing effect on plankton data.

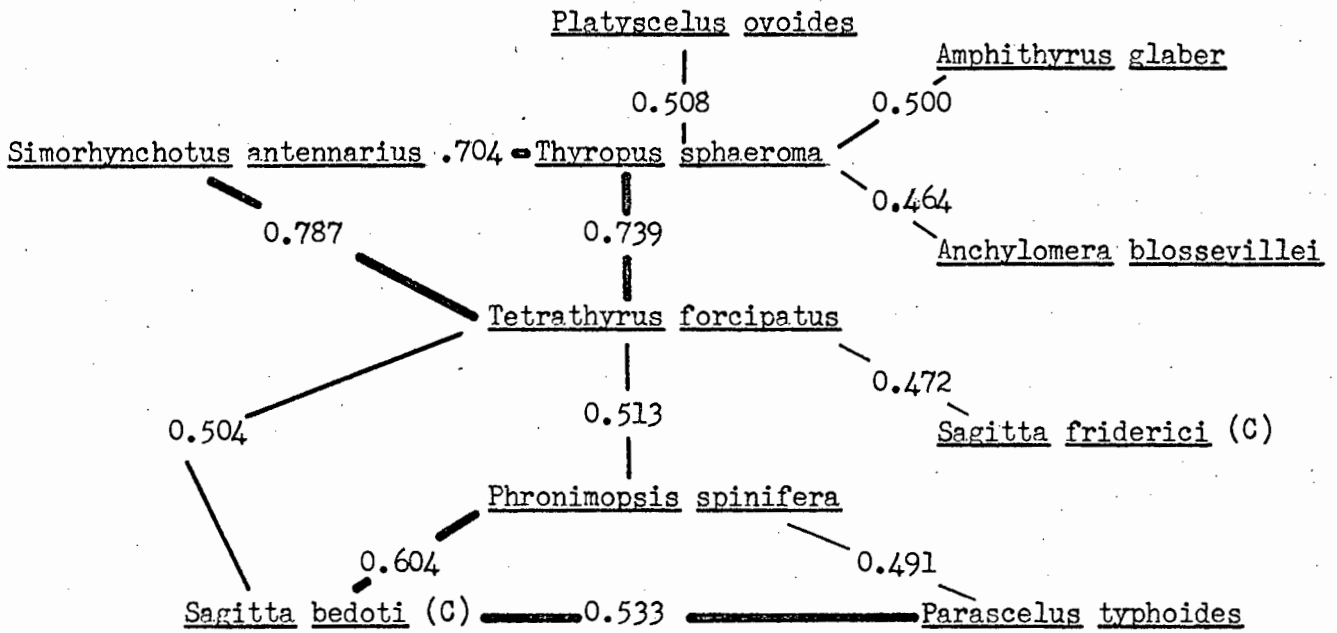
In spite of the rise in popularity of computer techniques in dealing with plankton data, there is still a tendency to restrict analysis to a few taxonomic groups (table 3). Ideally, all available species should be considered when a preliminary evaluation is made for the purpose of extracting indicator groups and this should be feasible with the advent of more powerful computers. What is required is that the groups traditionally employed should be augmented with species from the ranks of both the common and the rare groups (e.g. the copepods and the hyperiid amphipods).

The index of affinity used in providing a basis for grouping species should take account of quantitative and directional (positive/negative) reactions to the factors governing the distribution of the species, whether they are hydrological or biological. Species should only be grouped together if it can be positively demonstrated that they are reacting quantitatively in the same direction to the same factor or factors. Contrary to Fager (1963), it is felt that species can be negatively correlated (predator and prey) and still be grouped together by virtue of their similar reactions to hydrological conditions.

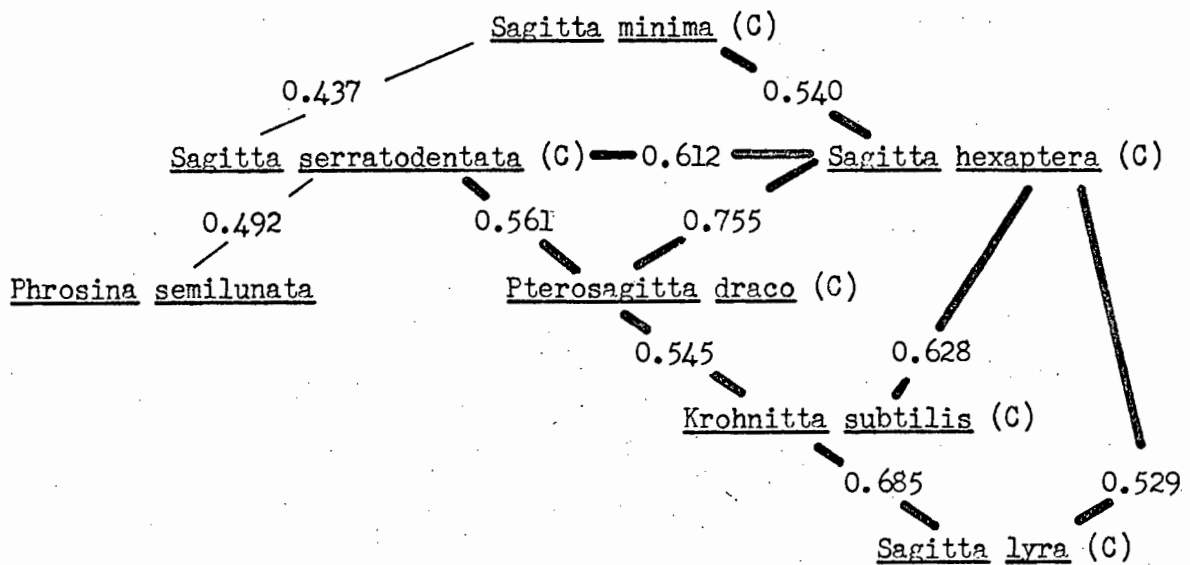
The future development and use of indicator groups must depend to a large extent on the precise determination of the nature of the statistical distributions underlying the distribution of plankton organisms and the characterization of types of water through a consideration of both hydrological and biological factors. As these ideals could not be realised in the present study, the evaluation and discussion of the results obtained for the hyperiid amphipoda must necessarily be regarded as preliminary.

INTER-SPECIES GROUPS OBTAINED USING CORRELATION ANALYSIS.

GROUP I



GROUP II



NOTE: All chaetognaths have the designation, (C), after the species name.

Intra-hyperiid, hyperiid-chaetognath and hyperiid-hydrology correlations

Analysis of the correlation matrix prepared by the computer makes it possible to construct two multispecies groups using species pairs with correlation coefficients of 0.510 or greater. The components of the first group are five amphipod species and one chaetognath species. If species linked to the original ones by coefficients of 0.464 or greater are added, the group contains eight amphipods and two chaetognaths. It may be split into two subgroups if its major components are divided on the basis of species pairs with coefficients greater than 0.520. When this is done it is found that the one subgroup (Thyropus sphaeroma, Tetrathyrus forcipatus, Simorhynchotus antennarius, Platyscelus ovoides, Anchylomera blossevillei and Amphithyrus glaber) has associated with it, the neritic (Alvarino 1965) chaetognath, Sagitta friderici. The other subgroup (Phronimopsis spinifera, Parascelus typhoides) has associated with it, the warm neritic (Alvarino 1965) chaetognath, Sagitta bedoti.

The second multispecies group has only chaetognaths as major components (Krohnitta subtilis, Pterosagitta draco, Sagitta hexaptera, Sagitta minima, Sagitta lyra and Sagitta serratodentata). The amphipod, Phrosina semilunata, may be added as a minor component by virtue of its association (apparent) with Sagitta serratodentata. In contrast to the former two subgroups, the chaetognaths in the second multispecies group are all oceanic (Alvarino 1965).

In addition to the main groups there are a number of species pairs which are quite markedly positively correlated and three which show marked negative correlation. In the case of the latter three the members of the pairs show opposite correlations in the same range of values of a hydrological variable. Members of pairs with positive coefficients of 0.750 and greater show the greatest similarity in correlation as far as ranges of hydrological variables are concerned, but there are occasions when species with very similar (apparent) hydrological preferences are not highly correlated.

The best picture of the relationships between the hyperiid amphipods and hydrological conditions is obtained when the results of the computer analysis are combined with those obtained using ranking methods (table 4). The main factor which appears to separate the first and second groups obtained using ranking methods from the third group obtained using these, is salinity or some associated factor. The members of the first and second groups, with two exceptions, show a positive correlation with salinity up to 35.35‰ whereas members of the third group are positively correlated in the range 35.41‰ to 35.60‰. Hyperioides

TABLE 4 - HYDROLOGICAL CORRELATIONS OF SPECIES GROUPS OBTAINED USING RANKING METHODS.

	<u>TEMPERATURE</u>		<u>SALINITY</u>	
	<u>POSITIVE RANGE</u>	<u>NEGATIVE RANGE</u>	<u>POSITIVE RANGE</u>	<u>NEGATIVE RANGE</u>
<u>GROUP I</u>				
Anchylomera blossevillei	no definite range		35.26-35.30‰	on either side of positive range
Hemityphis rapax	22.51-24.00°C.	16.51-22.50°C. 24.01-25.50°C.	35.36-35.60‰	35.11-35.35‰
Phronimella elongata	inconclusive	inconclusive	35.11-35.35‰	35.36-35.60‰
Tetrathyrus forcipatus	no definite range		35.11-35.30‰	35.31-35.60‰
<u>GROUP II</u>				
Eupronoe intermedia	22.51-25.50°C.	16.51-22.50°C.	35.11-35.35‰	35.36-35.60‰
Hyperioides longipes	18.01-22.50°C.	16.51-18.00°C. 22.51-25.50°C.	35.46-35.60‰	35.11-35.45‰
<u>GROUP III</u>				
Phrosina semilunata	18.01-21.00°C.	21.01-25.50°C.	35.46-35.60‰	35.11-35.45‰
Primno macropa	18.51-21.50°C.	21.51-25.50°C.	35.41-35.55‰	35.11-35.40‰

GROUPINGS OF CHAETOGNATH SPECIES OBTAINED USING DIFFERENT METHODS OF ANALYSIS.

<u>Method of Fager & McGowan used by Stone (1965)</u>	<u>Method of Cassie (1961) used in present study.</u>
Pterosagitta draco	Pterosagitta draco
Krohnitta pacifica	Krohnitta subtilis
Krohnitta subtilis	Sagitta hexaptera
Sagitta enflata	Sagitta lyra
Sagitta hexaptera	Sagitta minima
Sagitta bipunctata	Sagitta serratodentata
Sagitta minima	
Sagitta robusta/ferox	Sagitta bedoti
Sagitta lyra	
Sagitta bedoti	Sagitta friderici
Sagitta serratodentata	
<hr/>	<hr/>
Sagitta decipiens	Krohnitta pacifica
	Sagitta enflata
<hr/>	<hr/>
<u>Ungrouped species:</u>	<u>Ungrouped species:</u>
Sagitta regularis/neglecta	Sagitta decipiens Sagitta pulchra
Sagitta pulchra	Sagitta regularis/neglecta
Eukrohnia hamata	Sagitta robusta/ferox
	Sagitta bipunctata

longipes which was placed tentatively in the second group on the basis of ranks should be placed in the third group, while Hemityphis rapax which was placed in the first group should be placed in a separate group midway between the second and third groups by virtue of its positive correlation with salinities in excess of $35.35^{\circ}/\text{oo}$ and temperatures in excess of 22.50°C . The members of the modified third group are further distinguished from the other species by their positive correlation with temperatures in the range, 18.01° to 22.50°C ., and it is suggested that these species are true indicators of oceanic water. Eupronoe intermedia, the sole member of the second group, may have its abundance governed by the abundance of specific temperature and salinity classes within the ranges with which it is positively correlated or it may owe its maximum in the period covered by the second cruise to some biological factor. It is considered appropriate to separate it from the first group until it is possible to clarify aspects of its biology and its relationships with hydrological conditions.

When the four modified groups obtained through the combined use of correlation analysis and ranking methods are considered it is apparent that the first group has certain similarities to the first group resulting from the inter-species correlation analysis. When the correlations with salinity of members of the latter group are examined it is seen that they are invariably negatively correlated with salinity classes greater than $35.35^{\circ}/\text{oo}$. It is tentatively suggested that the presence in abundance, although a rare event, of members of this group is indicative of the presence of warm neritic water. It is further suggested that the presence of members of the second group obtained in the inter-species analysis and the modified third group obtained by ranking is indicative of the presence of oceanic water.

If the grouping of chaetognaths obtained by Stone(1965) using the method due to Fager and McGowan(1963) is compared with that obtained using correlation analysis, a number of facts emerge. The correlation method appears to give a better separation of species (Stone grouped Sagitta bedoti with the oceanic species) although it rejects a greater number of species. It is considered that in the case of an abundant group such as the chaetognaths, species abundance must be taken into account in evaluating correlations otherwise serious criticism may be levelled at the coefficients of similarity used if they achieve the "desired" result. The method due to Fager and McGowan(1963) seems to lack the precision required distinguish between interspecies correlations resulting from similarities in hydrological preferences and those resulting from co-distribution. The method

COMPARISON OF THE PERCENTAGE COMPOSITION OF THE HYPERIID AMPHIPOD FAUNAS OF THE WEST, SOUTH AND EAST COASTS OF THE REPUBLIC OF SOUTH AFRICA, AS REPRESENTED IN SAMPLES FROM THE IGY AND THE ROUTINE PROGRAM CRUISES OF THE DIVISION OF SEA FISHERIES, CONSIDERING ONLY THE MAJOR COMPONENTS.

	West Coast		Mixing Zone			South Coast			East Coast (IGY)		
	Jan. 1963	Apr. 1963	Jan. 1963	Apr. 1963	Jul. 1963	Jan. 1963	Apr. 1963	Jul. 1963	F.-Mar. 1958	May 1958	Aug. 1958
<u>Hyperioides longipes</u>										7.36	6.12
<u>Parathemisto gaudichaudi</u>	40.32	7.95	12.50	16.30							
	94.32	88.23	14.32	3.92							
<u>Phronimopsis spinifera</u>									2.38	2.24	
<u>Phronimella elongata</u>			6.24						6.80	1.92	
<u>Anchylomera blossevilliei</u>					0.87				21.00	9.50	15.20
					0.87				12.58	3.52	3.06
<u>Phrosina semilunata</u>			2.15		1.76				9.9	13.7	9.9
									8.32	12.24	8.32
<u>Primno macropa</u>					1.18				7.60	8.36	7.60
									8.32	14.28	8.32
<u>Eupronoe, intermedia</u> mainly									22.04	28.12	22.04
									17.60	10.9	17.60
<u>Lycaea, pulex</u> mainly											
					2.23						
					5.9						
<u>Oxycephalus, clausi</u> mainly											
									4.16	7.48	4.16
									12.54	9.9	12.54
<u>Leptocottis tenuirostris</u>											
									2.38	5.12	2.38
										4.16	4.16
<u>Hemityphis rapax</u>											
									4.08	2.24	4.08
											2.72

NOTE: Percentages underlined are based on ten or more records; others are based on five to nine records.

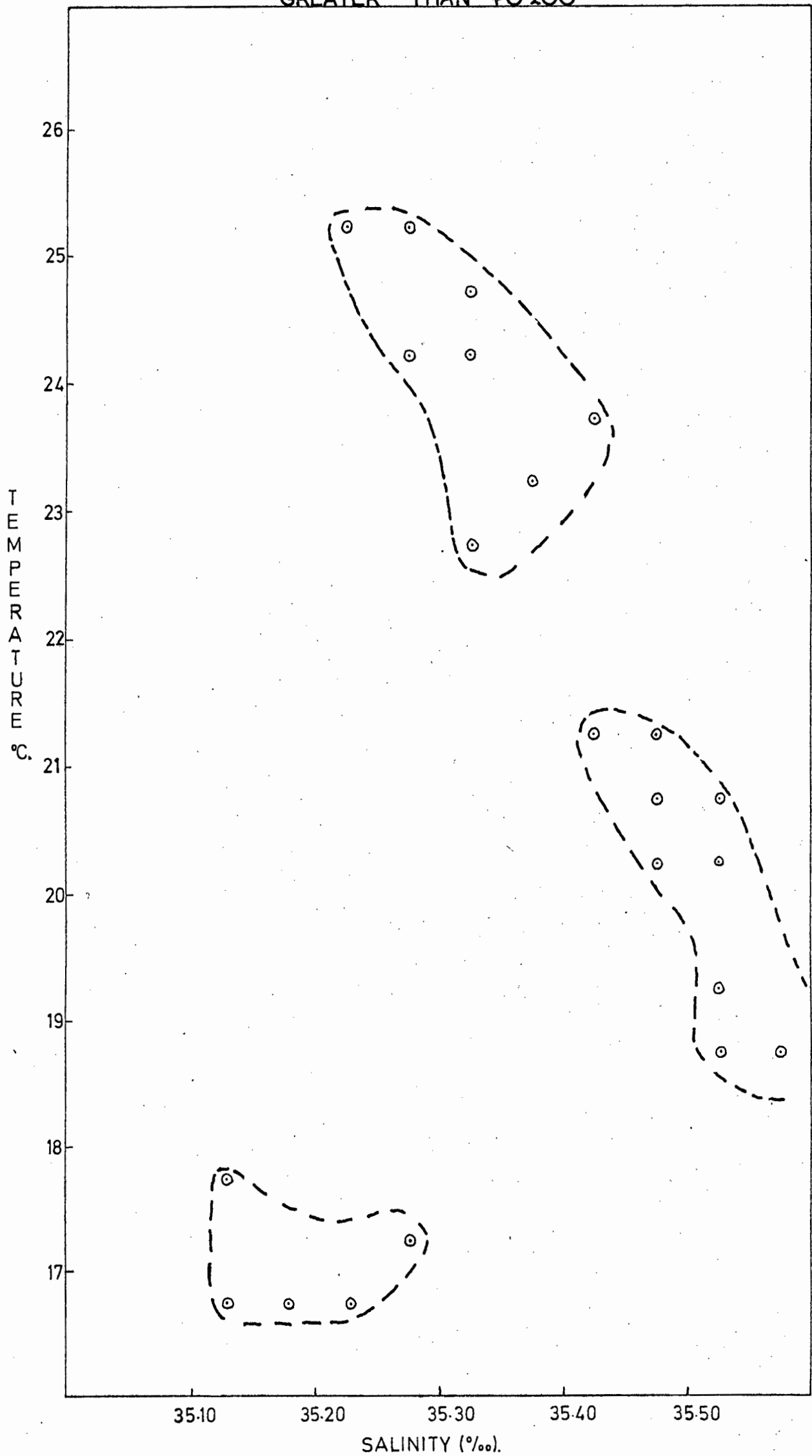
of correlation analysis is considered to give a more objective and more meaningful grouping of species if due regard is taken of its limitations. The degree of correlation is primarily dependent on the relation between the two variables being considered. If these are rare the degree of correlation tends to be exaggerated, making it necessary to view with caution the high correlations between some of the less common hyperiid amphipods.

Characteristics of the Hyperia Fauna in East and South Coast Waters

Previously it was seen that some confusion existed regarding the Tropical /Subtropical nature of Agulhas Water. If the percentage contributions of the more common amphipods to the faunas of the west-, south-, and east coast waters off the Republic, as well as that of the zone of mixing of south- and west coast waters, are tabulated (opposite) it is possible to make some suggestions in this regard. It is readily apparent that the amphipod fauna in waters off the east coast is dominated to a large extent by five species, Anchylomera blossevillei, Eupronoe intermedia, Oxycephalus clausi, Phrosina semilunata and Primno macropa. In contrast, the fauna in waters off the west coast is dominated by two species with neritic tendencies, Hyperia gaudichaudi (not tabulated) and Parathemisto gaudichaudi, of which the latter is believed to exist in two forms, one of which can apparently tolerate oceanic conditions. Thus it appears that within the same distance from the coast, the east coast hyperiid fauna is more oceanic in character than that of the west coast. It is remarkable however, that the two oxycephalid species, Craniocephalus scleroticus and Glossocephalus milne-edwardsi, were not present in any of the NGY samples, whereas the former of the two has been recorded from three successive stations off Lourenco Marques, occupied during the first SCOR-UNESCO IIOE cruise of "Africana II" of the Division of Sea Fisheries. It has also been recorded by Siegfried (1963) off Angola. The only records of the two species for the area investigated during the IGY are those of Fage (1960) based on the material from the "Dana" Expedition, during which at least twenty net hauls were made at each station. It is suggested that the species in question favour more typically tropical conditions than those found (if at all) in Agulhas Water and this receives support from the extensive world-wide records of Fage (1960), the majority of which are from regions within the Tropics.

The extent of the contribution to the west coast circulation by the Agulhas Current may also be assessed using the data on the composition of the various faunas. Apart from the great differences already mentioned there

TEMPERATURE-SALINITY DIAGRAM OF CLASSES
INTERCORRELATED WITH COEFFICIENTS
GREATER THAN ± 0.200



are additional facts which tend to preclude any significant contribution. While Parathemisto gaudichaudi has been traced as far east as St. Sebastian Bay by the present author, Streetsia mindanaonis, which was recorded from the NGY samples, has not been recorded off the West coast by Fage (1960) or the present author.

In view of the above findings it is difficult to accept the statement by Defant (1961), repeated by Gallagher (1966), to the effect that a branch of the Agulhas Current flows north and west round the Cape Peninsula and gives rise to the Benguella Current. Similarly, the finding by Darbyshire (1966) of significant quantities of Agulhas Water off South West Africa cannot be accepted. The Atlantic nature of this water, as suggested by Orren & Shannon (1967), is supported by the fact that a fauna (amphipod) similar to that in the Agulhas Current only makes its appearance in waters one hundred miles and more distant from the west coast. The estimate of penetration of Agulhas water given by Shannon (1966) is probably exaggerated as his data was based on stations too widely spaced for such inferences.

Temperature-Salinity Relations and "Indicator" Properties of the Species Groups

If correlation coefficients, greater than 0.200, from the three clusters obtained from the correlation analysis of the distribution of hydrological "classes" are plotted as points on a temperature-salinity diagram (using the class-marks as the coordinates of the points) a clear picture of their significance is obtained. It is found that the two clusters with temperatures greater than 18°C. lie at opposite ends of the envelope published by Rochford (1967) for South Equatorial Current Water. The upper cluster lies within the envelope published by Orren (1966) for Tropical Water and the lower one lies within the Subtropical Water envelope published by the same author. The third cluster is nearest to the envelope for Central Water published by Orren (1966) but in the absence of further data should not be definitely interpreted as such. The upper two clusters assume a new significance if one examines the data of Menaché (1961). The upper one is nearest to what must be defined as Mozambique Current Water and the lower one almost definitely suggests South Equatorial Current Water.

When one now considers the fact that the first and third groups obtained using ranking methods and the groups obtained using correlation analysis are correlated with salinities and temperatures in the upper two clusters, their significance as indicators becomes clearer. The first group in each case is correlated with conditions in the upper cluster, and hence possibly Mozambique

Current Water. The second and third groups obtained using the two methods are correlated with conditions in the lower cluster, and hence most probably, South Equatorial Current Water. Of the two inferences, the one regarding the third and second groups is more definite since it still has to be explained why two neritic chaetognaths are associated with the first group. It is possible that the presence of the hyperiid amphipods in the first group is the result of penetration of Mozambique Current Water onto or adjacent to the continental shelf at certain times of the year which might tend to produce warm neritic conditions.

SUMMARY AND CONCLUSIONS.

Sixty-one species of hyperiid amphipods have been recorded from samples collected with N 100 nets during the International Geophysical Year cruises of S.A.S. "Natal". Of these, forty-eight are new to the area investigated and eighteen are new to South African waters.

The characteristics of the hyperiid fauna in the area investigated demonstrate a greater influence on the hydrology of the area by waters possibly of an original tropical nature, and a greater penetration of oceanic conditions inshore, than in the comparable area off the west coast of the Republic.

On the basis of the present results it appears that the groups of amphipods and chaetognaths obtained using ranking methods and the method of correlation analysis of Cassie (1961) may be correlated with Mozambique- and South Equatorial Current Water. Of the two correlations, the latter seems the more definite and in the light of this it would seem wise to restrict the use of hyperiid amphipods as indicators to the species, Hyperioides longipes, Phrosina semilunata, and Primno macropa. It should be emphasized that this is only applicable to the area investigated.

The method of correlation analysis of Cassie (1961) and the use of correlation with distribution of hydrological "classes" in delimiting ranges of hydrological tolerance are considered to have proved themselves satisfactory in this preliminary evaluation of the potential indicator properties of the hyperiid amphipoda. Until sampling methods are vastly more precise and the mathematical bases underlying the distributions of planktonic animals are known and made use of, it is considered futile to employ sophisticated multivariate analytical techniques in the hope of achieving the "desired" results.

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REFERENCES.

- Alvarino, A. (1965) Chaetognaths.
Oceanogr. Mar. Biol. Ann. Rev., III: 115 - 194.
- Bainbridge, V. (1963)
Continuous Plankton Records: Contribution towards a Plankton Atlas of the North Atlantic and the North Sea. Part VIII: Chaetognatha.
Bull. mar. Ecol., VI(2): 40 - 51.
- Barnard, K.H. (1916) Contributions to the Crustacean Fauna of South Africa 5.
The Amphipoda.
Ann. S. Afr. Mus., XV(3): 105 - 302.
- (1925) Contributions to the Crustacean Fauna of South Africa 8.
Further Additions to the list of Amphipoda.
Ann. S. Afr. Mus., XX(5): 319 - 380.
- (1930) Amphipoda.
Nat. Hist. Rep. Terra Nova Exped., Zool. VIII(4),
Crustacea XI: 307 - 454.
- (1931) Amphipoda.
Sci. Rep. Gr. Barrier Reef Exped., IV(4): 111 - 135.
- (1932) Amphipoda.
Discovery Rep., V: 1 - 326.
- (1937) Amphipoda.
Sci. rep. Murray Exped., IV(6): 131 - 201.
- (1940) Contributions to the Crustacean Fauna of South Africa 12.
Further Additions to the Tanaidacea, Isopoda and Amphipoda, together with keys for the identification of hitherto recorded marine and fresh-water species.
Ann. S. Afr. Mus., XXXII(5): 381 - 543.
- Barnes, H. (1952) The Use of Transformations in Marine Biological Statistics.
J. Cons., XVIII(1): 61 - 71.
- Bary, B.McK. (1959) Ecology and Distribution of some pelagic Hyperiidea (Crustacea, Amphipoda) from New Zealand Waters.
Pacif. Sci., XIII(4): 317 - 334.

Bary, B. McK. (1963a)

Temperature, salinity and plankton in the eastern North Atlantic and coastal waters of Britain, 1957. II. The relationships between species and water bodies.

J. Fish. Res. Bd. Can., XX(4): 1031 - 1065.

(1963b)

Temperature, salinity and plankton in the eastern North Atlantic and coastal waters of Britain, 1957. III. The distribution of zooplankton in relation to water bodies.

J. Fish. Res. Bd. Can., XX(6): 1519 - 1532.

(1964) Temperature, salinity and plankton in the eastern North Atlantic and coastal waters of Britain, 1957. IV. The species' relationship to the water body; its role in distribution and in selecting and using indicator species.

J. Fish. Res. Bd. Can., XXI(1): 183 - 202.

Bate, C. Spence. (1861)

On the Morphology of some Amphipoda of the Division Hyperina.

Ann. Mag. nat. Hist., Ser. 3, VIII: 1 - 16.

Behning, A. (1925) Amphipoda der Deutschen Tiefsee-Expedition. I. Hyperiidea Fam. Vibiliidae Claus 1872.

Wiss. Ergebn. 'Valdivia', Bd. XIX(9): 477 - 500.

(1927) Die Vibiliden der Deutschen Südpolar-Expedition 1901-1903.

Dtsch. Südpolar-Exped. 1901-1903., Bd. XIX, Zoologie

Bd. XI: 113 - 121.

Behning, A. & Woltereck, R. (1912)

Achte Mitteilung über die Hyperiden der Valdivia-Expedition, insbesondere über die Vibiliden.

Zool. Anz., Bd. XLI(1): 1 - 11.

Bieri, R. (1959) The distribution of planktonic Chaetognatha in the Pacific and their relationship to water masses.

Limnol. & Oceanogr., IV(1): 1 - 28.

Bigelow, H.B. (1915) Exploration of the Coast Water between Nova Scotia and Chesapeake Bay, July and August, 1913, by the U.S. Fisheries Schooner, "Grampus". Oceanography and plankton.

Bull. Mus. comp. Zool. Harv., LIX(4): 151 - 359.

- Bigelow, H.B. (1926) Plankton of the Offshore Waters of the Gulf of Maine.
Bull. U.S. Bur. Fish., XL(II): 1 - 509.
- Bousefield, E.L. (1951)
 Pelagic Amphipoda of the Belle Isle Strait region.
J. Fish. Res. Bd. Can., VIII(3): 134 - 163.
- Bovallius, C. (1885) On Some forgotten Genera among the Amphipodous Crustacea.
Bih. K. svenska VetenskAkad. Handl., Bd. X(14): 1 - 17.
- (1887) Systematical list of the Amphipoda Hyperiidea.
Bih. K. svenska VetenskAkad. Handl., Bd. XI(16): 1 - 50.
- (1889) Contribution to a Monograph of the Amphipoda Hyperiidea, Part
 I: 2. The Families Cyllopidae, Paraphronimidae, Thaumatops-
 idae, Mimonectidae, Hyperiidae, Phronimidae and Anchylomeridae.
K. svenska VetenskAkad. Handl., Bd. XXII(7): 1 - 434.
- Bradshaw, J.S. (1959)
 The Ecology of Living Foraminifera in the North and Equatorial
 Pacific Ocean.
Contr. Cushman Fdn, X(2): 25 - 64.
- Cassie, R.M. (1961) The Correlation Coefficient as an Index of Ecological Affini-
 ties in Plankton Populations.
Mem. Ist. ital. Idrobiol. de Marchi, XIII: 151 - 177.
- Cecchini, C. (1929) Oxicephalidi del Mar Rosso.
Ann. Idrogr. Genova Mem., 1929: 1 - 16.
- Chevreaux, E. (1900) Amphipodes provenant des campagnes de l'Hirondelle.
Résult. Camp. sci. Monaco, fasc. XVI: 1 - 195
- (1914) Sur quelques Amphipodes pélagiques nouveaux ou peu connus
 provenant des Campagnes de S.A.S. le Prince de Monaco.
Bull. Inst. océanogr. Monaco, 319: 1 - 16.
- Chilton, C. (1912) The Amphipoda of the Scottish National Antarctic Expedition.
Trans. roy. Soc. Edinb., XLVIII(II): 455 - 519.
- Claus, C. (1862) Bemerkungen über Phronima sedentaria Forskal und elongata
 n. sp.
Z. wiss. Zool., Bd. XII:
- (1871) Untersuchungen über den Bau die verwandschaft der Hyperiden.
Nachr. K. Geselsch. Wiss. u. Georg-August Univ. Göttingen

- Claus, G. (1879) Die Gattungen und Arten der Platysceliden in systematischer
Übersicht.
Arb. zool. Inst. Univ. Wien, II: 59 - 146.
- Clowes, A.J. (1950) An Introduction to the Hydrology of South African Waters.
Investl Rep. Div. Sea Fish. S. Afr., 12: 1 - 42.
- Colebrook, J.M. (1964)
Continuous plankton records; A principal component analysis
of the geographical distribution of zooplankton.
Bull. mar. Ecol., VI(3): 78 - 100.
- Colebrook, J.M. & Robinson, G.A. (1964)
Continuous plankton records: Annual Variations of Abundance
of Plankton, 1948 - 1960.
Bull. mar. Ecol., VI(3): 52 - 69.
- Colosi, G. (1918) Oxicefalidi Raccolte planctoniche fatte dalla R. Nave
„Liguria.“
Publ. Ist. Sc. Sup. Firenze, II(8): 207 - 224.
- Corbin, P.G. (1947) The spawning of mackerel, Scomber scomberus L. and pilchard,
Clupea pilchardus Walbaum, in the Celtic Sea in 1937-39.
With suggestions on the zooplankton indicator species,
Sagitta and Muggiaea.
J. mar. biol. Ass. U.K., XXVII(1): 65 - 132.
- Darbyshire, J. (1964)
A hydrological investigation of the Agulhas Current area.
Deep-Sea Res., XI(5): 781 - 815.
- Darbyshire, M. (1966)
The Surface Waters near the Coasts of Southern Africa.
Deep-Sea Res., XIII(1): 57 - 81.
- Deacon, G.E.R. (1937)
The Hydrology of the Southern Ocean.
Discovery Rep., XV: 1 - 124.
- Dietrich, G. (1935) Aufbau und Dynamik des Südlichen Agulhas-stromgebietes.
Veröff. Inst. Meersk., N.F., Geogr.-naturwiss. Reihe,
Heft XXVII: 1 - 80.
- Evans, F. (1961) The Planktonic Crustacea of the Petula Transatlantic
Expedition. Amphipoda.
Proc. Linn. Soc. Lond., Zool., CLXXII(2): 189 - 207.

- Fage, L. (1954) Les Amphipodes pelagiques du genre Rhabdosoma.
C.R. Acad. Sci., Paris, T. 239: 661.
- (1960) Oxycephalidae - Amphipodes pelagiques.
Dana Rep., LII: 1 - 145.
- (1964) Sur la répartition de deux espèces d'Amphipodes pelagiques
du genre Streetsia dans les parages du Cape de Bonne
Espérance.
Ann. Natal Mus., XVI: 111 - 112.
- Fager, E.W. (1963) Communities of Organisms.
in "The Sea" - Vol. II, ed. M.N. Hill.
Wiley, Interscience, New York.
- Fager, E.W. & McGowan, J.A. (1963)
Zooplankton Species Groups in the North Pacific.
Science, CXL(3566): 453 - 460.
- Fraser, J.H. (1939) Chaetognaths in Scottish Waters.
J. Cons., XIV(1): 25 - 34
- (1952) The Chaetognatha and other zooplankton of the Scottish area
and their value as biological indicators of hydrographical
conditions.
Mar. Res., 1952(2): 1 - 52.
- Furnestin, M.-L. (1960)
Zooplankton du Golfe du Lion et de la Cote Orientale de Corse.
Rev. Trav. Inst. Pêch. marit., XXIV(2): 153 - 252.
- (1966) Eléments de Planctologie Appliquée. 1^{re} Partie. Plancton
et Hydrologie - Le Plancton Indicateur Hydrologique.
Rev. Trav. Inst. Pêch. marit., XXX(2): 119 - 142.
- Gallagher, J.F. (1966)
The Variability of Water Masses in the Indian Ocean.
N.O.D.C., Gen. ser., G-11: 1 - 74.
- Glover, R.S., Cooper, G.A. & Forsyth, D.C.T. (1961)
An ecological survey of a Scottish herring fishery. Part III.
Geographical and Ecological groups in the plankton.
Bull. mar. Ecol., V(47): 195 - 205.

Grainger, E.H. (1963)

Copepods of the Genus Calanus as Indicators of Eastern Canadian Waters.

in "Marine Distributions," Roy. Soc. Can. Spec. Publ.,
5: 68 - 94.

Grice, G.D. & Hart, A.D. (1962)

Distribution of the Epizooplankton between New York and Bermuda.

Ecol. Monogr., XXXII(4): 287 - 309.

Haffner, R.E. (1952) Zoogeography of the bathypelagic fish, Chauliodus.

Syst. Zool., I(3): 113 - 133.

Hida, T.S. (1957) Chaetognaths and pteropods as biological indicators in the North Pacific.

Spec. sci. Rep. U.S. Fish. Wildl. Serv. Fish., 215

Holmes, S.J. (1909) The Amphipoda Collected by the U.S. Bureau of Fisheries Steamer, "Albatross" off the West Coast of North America in 1903 and 1904, with Descriptions of a New Family and Several New Genera and Species.

Proc. U.S. nat. Mus., XXXV(1654): 489 - 543.

Hurley, D.E. (1955) Pelagic Amphipods of the Suborder Hyperiidea in New Zealand Waters. I. Systematics.

Trans. roy. Soc. N.Z., LXXXIII(1): 119 - 194.

(1956) Bathypelagic and other Hyperiidea from Californian Waters.

Occ. Pap. Allan Hancock Fdn, XVIII: 1 - 25.

(1960a)

Pelagic Amphipoda of the N.Z.O.I. Pacific Cruise, March 1958.

N.Z. J. Sci., III(2): 274 - 289.

(1960b)

B.A.N.Z.A.R.E. Rep., ser. B, VIII(5): 107 - 114.

Irie, H. (1959) Studies on pelagic amphipods in the adjacent seas of Japan.

Bull. Fac. Fish. Nagasaki, VIII: 20 - 42.

Ivanenkov, V.N. & Gubin, F.A. (1960)

Water Masses and Hydrochemistry of the Western and Southern Parts of the Indian Ocean.

Trud. morsk. gidrofiz. Inst., XXII: 27 - 99. (translation by Scripta Technica Inc. for the American Geophysical Union).

Jaschnov, W.A. (1961)

Water Masses and Plankton. 1. Species of Calanus finmarchicus S.L. as Indicators of definite Water Masses
Zool. Zh., XL(9): 1314 - 1334.

(1963) Water Masses and Plankton. 2. Calanus glacialis and Calanus pacificus as indicators of definite water masses in the Pacific.

Zool. Zh., XLII(7): 1005 - 1021.

Kemp, S., Hardy, A.C. & Mackintosh, N.A. (1929)

Equipment and Methods used in Research.

Discovery Rep., I: 181 - 222.

Marion, A.F. (1874) Descriptions des Crust. Amph. parasites des Salpes.

Ann. Sci. nat. (b), ser. 5, XVII:

Menaché, M. (1961) Découverte d'un phénomène de remontée d'eaux profondes au sud du Canal de Mozambique.

Mém. Inst. sci. Madagascar (F), T. IV: 167 - 173.

Ménéville, F.E. Guérin. (1836)

Descriptions de quelques genres nouveaux des Crustacés appartenant à la famille des Hypérines.

Mag. Zool., Paris, cl. 7, VI: 1 - 12.

McGowan, J.A. (1959) The relationship of the distribution of the planktonic worm, Poebius meseres Heath, to the water masses of the North Pacific.

Deep-Sea Res., VI(2): 125 - 139.

Mogk, H. (1927)

Die Phronimiden.

Dtsch. Südpolar-Exped. 1901-1903, Bd. XIX, Zool. Bd. XI:

123 - 144.

Orren, M.J. (1966) Hydrology of the South West Indian Ocean.

Investl Rep. Div. Sea Fish. S. Afr., 55: 1 - 36.

Orren, M.J. & Shannon, L.V. (1967)

Letter to the Editors.

Deep-Sea Res., XIV(2): 279.

Pickford, G.E. (1946)

Vampyroteuthis infernalis Chun. An archaic dibranchiate cephalopod. I. Natural History and distribution.

Dana Rep., XXIX: 1 - 40.

- Pillai, N.K. (1957) Pelagic Crustacea of Travancore. III. Amphipoda.
Bull. centr. res. Inst. Univ. Travancore, 5C(1): 29 - 68.
- Pirlot, J.-M. (1929) Les Amphipodes Hypérides.
Résult. zool. Crois. Atlant. 1' "Armauer Hansen (1922),
fasc. I: 1 - 196.
- (1930) Les Amphipodes Hypérides.
Siboga Exped., XXXIIIa(1): 1 - 54.
- (1938) Les Amphipodes de l'Expedition du Siboga, Deuxième Partie.
 Premier Partie (Addendum). Les Amphipodes Hypérides
 Familles des Lanceolidae, Cystisomatidae et Oxycephalidae -
 La Sexualité chez Cystisoma Guérin-Meneville.
Siboga Exped., XXXIII f(): 360 - 388.
- (1939) Résultats Scientifiques des croisières du Navire-Ecole Belge,
 "Mercator", Vol. II. - III. Amphipoda.
Mém. Mus. roy. Hist. nat. Belg., Deuxième Sér., fasc. XV:
 47 - 80.
- Rampal, J. (1965) Pteropodes Thécosomes indicateurs hydrologiques.
Rev. Trav. Inst. Pêch. marit., XXIX(4): 393 - 400.
- Reid, D.M. (1955) Amphipoda (Hyperideia) of the Coast of Tropical West Africa.
Atlantide Rep., III: 7 - 40.
- Rochford, D.J. (1967)
 The phosphate levels of the major surface currents of the
 Indian Ocean.
Aust. J. Mar. Freshw. Res., XVIII(1): 1 - 22.
- Ruffo, S. (1939) Studi sui Crostacei Anfipodi. VIII. Gli Anfipodia Marini
 del Museo Civico die Storia Naturale di Genova.
Ann. Mus. Stor. nat. Genova, LX: 127 - 151.
- Russel, F.S. (1935a) On the value of certain plankton animals as indicators of
 water movements in the English Channel and North Sea.
J. mar. biol. Ass. U.K., XX(2): 309 - 332.
- (1935b)
 A review of some aspects of zooplankton research.
Rapp. Cons. Explor. Mer., XCV: 3 - 30.

- Russel, F.S. (1939) Hydrological and biological conditions in the North Sea as indicated by Plankton organisms.
J. Cons., XIV(2): 179 - 192.
- Sars, G.O. (1891) Amphipoda.
in "An Account of The Crustacea of Norway," Vol. I: 6 - 20.
- Senna, A. (1903) Su alcuni Anfipodi iperini del Museo zoologico di Napoli.
Annu. Mus. zool. Univ. Napoli, I(6): 1 - 8.
- Sexton, E.W. (1911) The Amphipoda collected by the "Hurley" from the North Side of the Bay of Biscay in August, 1906.
J. mar. biol. Ass. U.K., IX(2): 199 - 227.
- Shannon, L.V. (1966) Hydrology of the South and West Coasts of South Africa.
Investl Rep. Div. Sea Fish. S. Afr., 58: 1 - 62.
- Sheard, K. (1965) Species Groups in the Zooplankton of Eastern Australian Slope Waters.
Aust. J. Mar. Freshw. Res., XVI(2): 219 - 254.
- Shoemaker, C.R. (1925)
The Amphipods collected by the United States Fisheries Steamer, "Albatross" in 1911, chiefly in the Gulf of California, Scientific Results of the Expedition to the Gulf of California, etc.
Bull. Amer. Mus. nat. Hist., LII(art. 2): 21 - 61.
- (1945) The Amphipoda of the Bermuda Oceanographic Expeditions, 1929 - 1931.
Zoologica, N.Y., XXX(4): 185 - 266.
- Siegfried, W.R. (1963)
The Hyperiidea (Amphipoda) off the West Coast of Southern Africa.
Investl Rep. Div. Sea Fish. S. Afr., 48: 1 - 12.
- Spandl, H. (1924) Die Amphipodeen des Roten Meeres. Expedition S.M. Schiff „Pola" in das Roten Meer, Nördliche und Südliche Hälfte, 1895/96 - 1897/98.
Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl., Bd. XCIX: 19 - 73.
- (1927) Die Hyperiidea (exkl. Hyperiidea Gammaroidea und Phronimidae).
Dtsch. Südpolar-Exped. 1901-1903, Bd. XIX, Zool. Bd. XI: 145 - 287.

- Stadel, O. (1958) Die biologischen Arbeiten der "Deutschen Antarktischen Expedition, 1938 - 39."
Wiss. Ergebn. dtsh. antarkt. Exped., Bd. II: 101 - 102.
- Stebbing, T.R.R. (1888)
 Report on the Amphipoda collected by H.M.S. "Challenger".
Rep. Voy. Challenger 1873-76, Zool., XXIX(I, II and plates):
 (1895) Descriptions of nine new species of Amphipodous Crustaceans from the Tropical Atlantic.
Trans. zool. Soc. Lond., XIII(10): 349 - 372.
 (1904) Biscayan Plankton, Part 2. The Amphipoda and Cladocera.
Trans. Linn. Soc. Lond. (Zool.), ser. 2, X(2): 13 - 54.
 (1910) General Catalogue of South African Crustacea. Part 5 of South African Crustacea for the Marine Investigations in South Africa.
Ann. S. Afr. Mus., VI(4): 281 - 593.
 (1924) Crustacea of Natal.
Rep. Fish. Mar. biol. Surv. S. Afr., 3: 1 - 15.
- Stephensen, K. (1918)
 Hyperiidea-Amphipoda (Lanceolidae, Scinidae, Vibiliidae, Thaumatopsidae)
Rep. Dan. oceanogr. Expeds, 1908-1910, II, Biol., D.2: 1 - 70.
 (1923) Crustacea Malacostraca V. Amphipoda I.
Dan. Ingolf-Exped., IIIc(8): 1 - 100.
 (1924) Hyperiidea-Amphipoda. Part 2. (Paraphronimidae, Hyperiidae, Dairellidae, Phronimidae, Anchylomeridae).
Rep. Dan. oceanogr. Expeds, 1908-1910, II, Biol., D.4: 72 - 149.
 (1926) Hyperiidea-Amphipoda. Part 3. (Lycaeopsidae, Pronoidae, Lycaeidae, Brachyscelidae, Oxycephalidae, Parascelidae, Platyscelidae).
Rep. Dan. oceanogr. Expeds, 1908-1910, II, Biol., D.5: 151 - 252.
 (1933) The Gothaab Expedition 1928. Amphipoda.
Medd. Grønland, LXXIX(7): 3 - 88
- Stewart, D.A. (1913) A Report on the Extra-Antarctic Amphipoda Hyperiidea collected by the "Discovery."
Ann. Mag. nat. Hist., ser. 8, XII: 245 - 265.

- Streets, T. (1878) Pelagic Amphipoda.
Proc. Acad. nat. Sci. Philad., 1878: 276 - 290.
- Sund, P.N. (1961) Some features of the autecology and distributions of Chaetognatha in the eastern Tropical Pacific.
Bull. Inter.-Amer. trop. Tuna Comm., V(4): 307 - 340.
- (1964) The Chaetognaths of the Waters of the Peru Region.
Bull. Inter.-Amer. trop. Tuna Comm., IX(3): 115 - 216.
- Sund, P.N. & Renner, J.A. (1959) The Chaetognatha of the eastropic expedition with notes as to their possible value as indicators of hydrographic conditions.
Bull. Inter.-Amer. trop. Tuna Comm., III(9): 395 - 436.
- Tattersall, W.M. (1906) Pelagic Amphipoda of the Irish Atlantic Slope.
Sci. Invest. Fish. Ireland, 1905, IV(8): 1 - 39.
- (1913) Clare Island Survey. Part 42. Amphipoda.
Proc. R. Irish Acad. (B), XXXI(2): 1 - 24.
- Thompson, H. (1942) Pelagic Tunicates in the Plankton of South eastern Australian Waters and their place in Oceanographic Studies.
Bull. Coun. sci. ind. Res., Aust., 153
- Thomson, J.M. (1947) The Chaetognatha of South Eastern Australia.
Bull. Coun. sci. ind. Res., Aust., 222
- Thorsteinson, E.D. (1941) New or Noteworthy Amphipods from the North Pacific Coast.
Univ. Wash. Publ. Oceanogr., IV(2): 50 - 96.
- Tsuruta, A. (1963) Distribution of Plankton and its Characteristics in the Oceanic Fishing Grounds, with Special Reference to their Relation to Fishery.
J. Shimonoseki Univ. Fish., XII(1): 13 - 214.
- Vinogradov, M.E. (1956) Amphipoda-Hyperidea of the Western Bering Sea.
Zool. Zh., XXXV(2): 194 - 218.
- Vosseler, J. (1901) Die Amphipoda der Plankton-Expedition. I Theil. Hyperidea I.
Ergebn. Atlant. Planktonexped., Bd. II(G.e): 1 - 163.

- Wagler, E. (1926) Amphipoda 2. Scinidae der Deutschen Tiefsee-Expedition.
Wiss. Ergebn. 'Valdivia', Bd. XX(6): 317 - 446.
- (1927) Die Sciniden der Deutschen Südpolar-Expedition, 1901 - 1903.
Dtsch. Südpolar-Exped. 1901 - 1903, Bd. XIX, Zool. Bd. XI:
 85 - 111.
- Walker, A.O. (1904) Report on the Amphipoda.
 in "Report to the Government of Ceylon on the Pearl Oyster
 Fisheries in the Gulf of Manaar."
Suppl. Rep. roy. Soc. Lond., XVII(2): 229 - 300.
- (1909) Amphipoda Hyperiidea of the "Sealark" Expedition to the
 Indian Ocean.
Trans. Linn. Soc. Lond. (Zool.), ser. 2, XIII(1): 49 - 55.
- Williamson, M.H. (1961)
 An Ecological Survey of a Scottish Herring Fishery, Part IV.
 Changes in the Plankton during the period, 1949 to 1959.
Bull. mar. Ecol., V(48): 207 - 229.
- (1963) The relation of plankton to some parameters of the herring
 population of the north-western North Sea.
Rapp. Cons. Explor. Mer., CLIV: 179 - 185.
- Woltereck, R. (1903) Bemerkungen zu den Amphipoda Hyperiidea der Tiefsee-
 Expedition. I. Thaumatopsidae.
Zool. Anz., XXVI(700): 447 - 459.
- (1905) Mitteilungen über Hyperiden der Valdivia- (Nr. 4), der
 Gauss- (Nr. 2) und der Schwedischen Südpolarexpedition.
 a. Scypholanceola, eine neue Hyperidengattung mit
 Reflectororganen.
 b. Die Physosoma-Larve der Lanceoliden.
Zool. Anz., XXIX(13): 413 - 417
- ADDENDA:
- Cassie, R.M. (1963) Multivariate Analysis in the Interpretation of Numerical
 Plankton Data.
N.Z. J. Sci., VI(1): 36 - 59.
- Claus, C. (1887) Die Platysceliden.
 Alfred Hölder, Wien.

Milne-Edwards, H. (1830)

Extrait de recherches pou servir à l'Histoire Naturelle des
Crustacés Amphipodes.

Ann. Sci. nat. (b), XX: 1 - 48.

(1840) Histoire Naturelle des Crustacés, Vol. III. Paris.

Stone, J.H. (1965) The Chaetognatha Community of the Agulhas Current: Its
Structure and Related Properties.

Ph. D. Dissertation, University of Cape Town. Unpublished.

SOURCE OF HYDROLOGICAL DATA USED IN THE PRESENT STUDY:

Zoutendyk, P. (1960)

Hydrographic and Plankton Data Collected in the Agulhas
Current during I.G.Y.

Oceangr. Dept., U.C.T., Publ. No. 1: 1 - 4, and station
data

APPENDIX 1.

CORRELATION COEFFICIENTS FOR SPECIES PAIRS FROM NGY N 100B SAMPLES.

<u>SPECIES A</u>	<u>SPECIES B</u>	<u>CORR. COEFF.</u>
Simorhynchotus antennarius	Tetrathyrus forcipatus	0.787
Pterosagitta draco (C)	Sagitta hexaptera (C)	0.755
Tetrathyrus forcipatus	Thyropus sphaeroma	0.739
Simorhynchotus antennarius	Thyropus sphaeroma	0.704
Krohnitta subtilis (C)	Sagitta lyra (C)	0.685
Krohnitta subtilis (C)	Sagitta hexaptera (C)	0.628
Sagitta hexaptera (C)	Sagitta serratodentata (C)	0.612
Phronimopsis spinifera	Sagitta bedoti (C)	0.604
Phronima colletti	Streetsia challengerii	0.586
Pterosagitta draco (C)	Sagitta serratodentata	0.561
Oxycephalus clausi	Parascelus edwardsi	0.561
Krohnitta subtilis (C)	Pterosagitta draco (C)	0.545
Sagitta hexaptera (C)	Sagitta minima (C)	0.540
Amphithyrus bispinosus	Leptocotis tenuirostris	0.537
Parascelus typhoides	Sagitta bedoti (C)	0.533
Sagitta hexaptera (C)	Sagitta lyra (C)	0.529
Phronimopsis spinifera	Tetrathyrus forcipatus	0.513
Platyscelus ovoides	Thyropus sphaeroma	0.508
Krohnitta pacifica (C)	Sagitta enflata (C)	0.506
Tetrathyrus forcipatus	Sagitta bedoti (C)	0.504
Amphithyrus glaber	Thyropus sphaeroma	0.500
Phrosina semilunata	Sagitta serratodentata (C)	0.492
Parascelus typhoides	Phronimopsis spinifera	0.491
Parascelus edwardsi	Phronimella elongata	0.482
Amphithyrus glaber	Sympronoe parva	0.473
Tetrathyrus forcipatus	Sagitta friderici (C)	0.472
Anchylomera blossevillei	Thyropus sphaeroma	0.464
Phronimella elongata	Simorhynchotus antennarius	0.458
Hemityphis rapax	Sagitta enflata (C)	-0.502
Amphithyrus glaber	Sagitta serratodentata (C)	-0.411
Scina stenopus	Sagitta bipunctata (C)	-0.478

Data used for the Chaetognatha (C) was taken from Stone (1965).

APPENDIX 1a.

FREQUENCIES OF OCCURRENCE OF THE 31 MOST ABUNDANT HYPERIID AMPHIPODS IN
N 100B SAMPLES.

Number of Stations where samples were taken	CRUISE I			CRUISE II			CRUISE III		
	T.A.	F.O.	M.F.S.	T.A.	F.O.	M.F.S.	T.A.	F.O.	M.F.S.
Amphithyrus bispinosus	1	1	1	7	5	1.4	7	7	1
Amphithyrus glaber	23	7	3.3	9	6	1.5	2	1	2
Anchylomera blossevillei	37	6	6.2	11	6	1.8	9	8	1.1
Brachyscelus cruscum	8	3	2.7	15	12	1.3	21	10	2.1
Eupronoe intermedia	21	4	5.3	36	14	2.6	14	6	2.3
Eupronoe laticarpa	2	2	-1	8	7	1.2	6	3	2
Eupronoe maculata	1	1	1	3	3	1	1	1	1
Eupronoe minuta	1	1	1	11	9	1.2	10	7	1.4
Hemityphis rapax	12	6	2	7	5	1.4	8	7	1.2
Hyperioides longipes	6	2	3	23	8	2.9	18	12	1.5
Leptocotis tenuirostris	4	2	2	14	11	1.3	6	4	1.5
Oxycephalus clausi	5	4	1.3	13	8	1.6	33	3	1
Paraphronima gracilis	3	2	1.5	1	1	1	6	5	1.2
Parascelus edwardsi	8	5	1.6	6	1	6	1	1	1
Parascelus typhoides	9	5	1.8	17	8	2.1	6	6	1
Paratyphis maculatus	3	2	1.5	2	2	1	8	6	1.3
Paratyphis promontorii	3	2	1.5	2	2	1	6	4	1.5
Paratyphis spinosus	1	1	1	2	2	1	2	2	1
Phronima colletti	1	1	1	5	5	1	1	1	1
Phronima pacifica	1	1	1	5	5	1	4	3	1.3
Phronimella elongata	19	6	3.2	6	5	1.2	4	3	1.3
Phronimopsis spinifera	7	5	1.4	7	5	1.4	4	3	1.3
Phrosina semilunata	3	1	3	26	12	2.2	36	13	2.8
Platyscelus ovoides	5	4	1.3	1	1	1	1	1	1
Primno macropa	9	5	1.8	25	14	1.8	42	16	2.6
Scina stenopus	1	1	1	1	1	1	3	3	1
Simorhynchotus antennarius	5	2	2.5	2	1	2	2	2	1
Streetsia challengerii	2	1	2	3	3	1	2	2	1
Sympronoe parva	4	4	1	-	-	-	1	1	1
Tetrathyrus forcipatus	37	3	12.2	7	2	3.5	1	1	1
Thyropus sphaeroma	6	4	1.5	2	2	1	-	-	-

Abbreviations:

T.A.: Total abundance

F.O.: Frequency of occurrence

M.F.S.: Mean frequency per station of occurrence

APPENDIX. 2.

A CHECK LIST AND KEYS TO THE GENERA AND SPECIES OF SOUTH AFRICAN

HYPERIID AMPHIPODA.

AREAS INVESTIGATED DURING OCEANOGRAPHIC CRUISES

OVER THE PERIOD 1957 TO 1963.

DIVISION OF SEA FISHERIES CRUISES:

AREAS OF 1957-58 CRUISES (SIEGFRIED 1963): ———

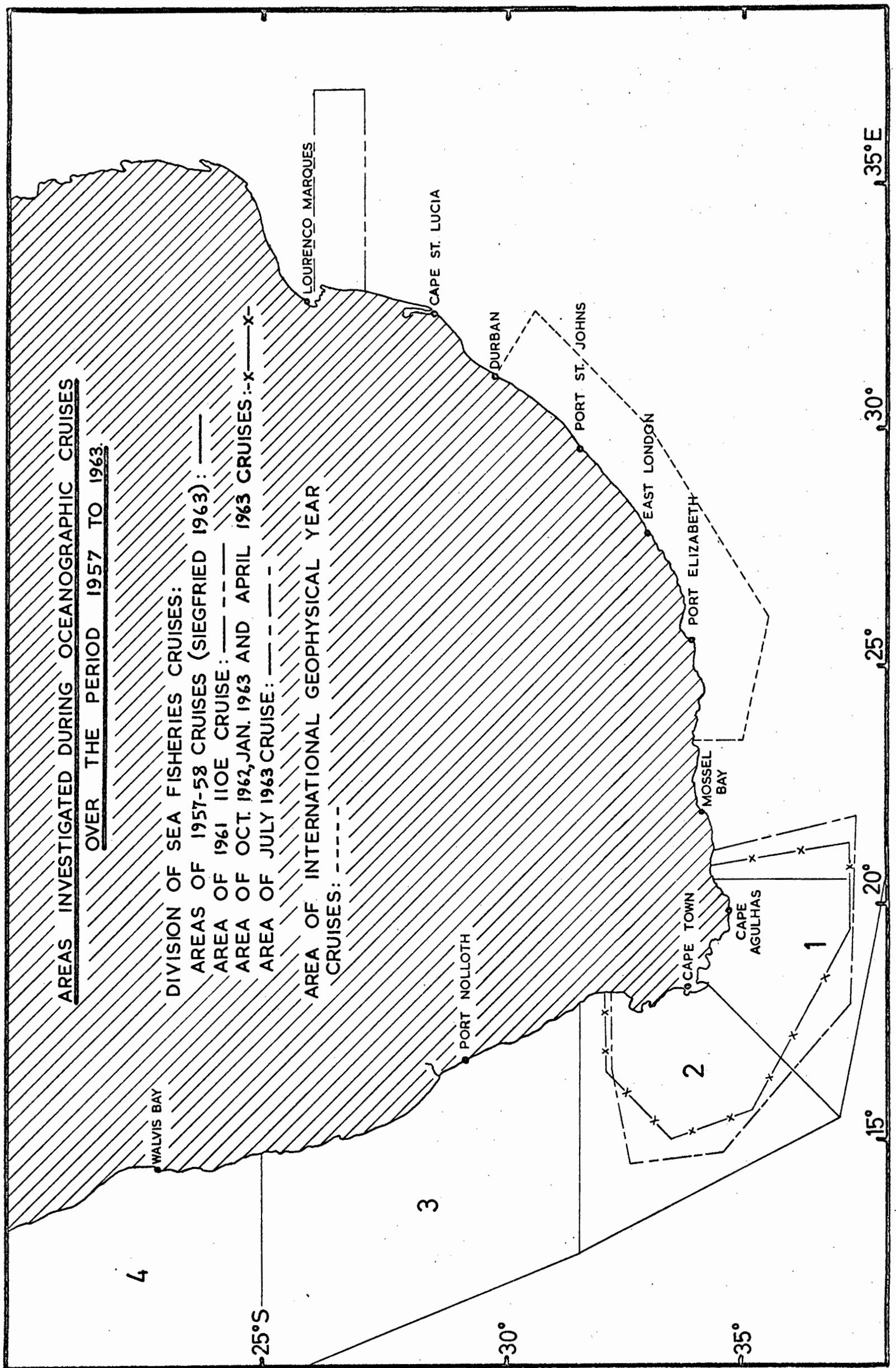
AREA OF 1961 IIOE CRUISE: - - - -

AREA OF OCT. 1962, JAN. 1963 AND APRIL 1963 CRUISES: -x-x-

AREA OF JULY 1963 CRUISE: - - - -

AREA OF INTERNATIONAL GEOPHYSICAL YEAR

CRUISES: - - - -



INTRODUCTION.

It is twenty-seven years since the late Dr. K.H. Barnard published the first comprehensive keys to the South African genera and species of Tanaidacea, Isopoda and Amphipoda. The intervening years have seen, exemplified in the contributions of the Republic to the International Geophysical Year (1957 - 1958) Program and the International Indian Ocean Expedition as well as the Routine Programs of the Division of Sea Fisheries, the most intensive sampling of the oceanic marine environment round the Republic that has ever taken place.

One result of this intensive sampling was a considerable increase in the number of recorded hyperiid amphipod species and in the number of records for each species. It was for these reasons that a new check list and keys to the genera and species of South African hyperiid amphipods were compiled.

MATERIAL AND METHODS.

The material used in the present investigation was collected during the International Geophysical Year cruises of S.A.S. "Natal", the first SCOR-UNESCO International Indian Ocean Expedition Cruise of R.V. "Africana II" of the Division of Sea Fisheries and the cruises of R.V. "Africana II" and R.V. "Sardinops" made in October 1962, January 1963, April 1963, and July 1963 under the Routine and Extended Routine Programs of the Division of Sea Fisheries.

The samples used were all obtained using nets of the "Discovery" pattern (see Kemp, Hardy and Mackintosh 1929). Although nets with mouth apertures of 70cm., 100cm. and 200cm. diameter were used, most of the material was obtained from samples taken with the 100cm. net. This latter net was hauled horizontally on the surface (N 100H) and obliquely, usually from 150 meters to the surface (N 100B).

Records for the check list were also obtained from published information relevant to the area under consideration which was defined as that south of 20°S. and up to 200 miles from the coast. Where records were rare or scattered over a large area each was referred to the degree square in which it occurred which was designated in terms of the latitude and longitude coordinates of the left upper corner. If records were numerous in a restricted area they were referred to this area (This procedure had to be adopted with Siegfried's data since coordinate positions were rarely given for the records cited). Areas 1 and 2 (Siegfried 1963) include the South coast and "Mixing zone" and West coast and "Mixing zone" respectively. Areas 3 and 4 (Siegfried 1963) are both West coast. The Division of Sea Fisheries Routine Program Cruises for October 1962, January 1963, and April 1963 covered Areas 1 and 2 (Siegfried). The July 1963 cruise

extended the area sampled about 70 miles east of the previous limit.

In the case of many of the records (e.g. Wagler 1926, 1927, K.H. Barnard 1932, and Fage 1960) the depth range covered by the sample was in excess of 1000 meters. It was therefore decided to give depth ranges only where these were 300 meters or less.

The characters used in the keys have been selected as far as possible to avoid the use of sexual characters and characters that change with maturation. The podomeres of appendages are referred to as joints and are numbered from the coxopodite outwards. The term, segment, is reserved for those of the body where there occur, peraeonal- (of the cephalothorax), pleon- (of the abdomen, bearing pleopods) and urosomal- (of the abdomen, bearing uropods) segments.

The drawings for the keys have, as far as possible, been produced using actual specimens. Where this was not possible the original drawings by the author of the species concerned were used and this is acknowledged in each case.

ACKNOWLEDGEMENTS.

The author would like to thank the following persons for the aid received from them which made possible the compilation of the check list and keys: Professor J.H.O. Day of the Department of Zoology, University of Cape Town, for criticisms and suggestions regarding the form and wording of the keys, Dr. B. van D. de Jager, Director of the Division of Sea Fisheries, for permitting the use of unpublished data resulting from the author's work while in the employ of the Division, and the Masters and crews of the research vessels which took part in the cruises which provided the bulk of the material used.

ABBREVIATIONS USED IN THE PLATES.

gnpd.: gnathopod ; prpd.: pereopod ; urpd.: uropod ; j.: joint ; L.: left ; R.: right.

CHARACTERS WHICH DISTINGUISH HYPERIID AND GAMMARIID AMPHIPODS.

	<u>HYPERIIDEA</u>	<u>GAMMARIDEA</u>
Eyes	Usually large, covering whole of head	Usually small
Epimeral side plates	Never very large	Usually large
Telson	Never terminally cleft	Terminally cleft in many

FAMILY CYSTISOMATIDAE.

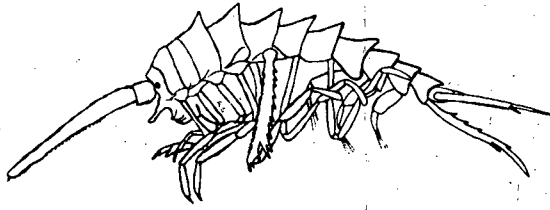
In view of the considerable confusion surrounding the status of species of Cystisoma, no key to the species of this genus has been constructed.

KEY TO THE FAMILIES OF SOUTH AFRICAN HYPERIID AMPHIPODA.

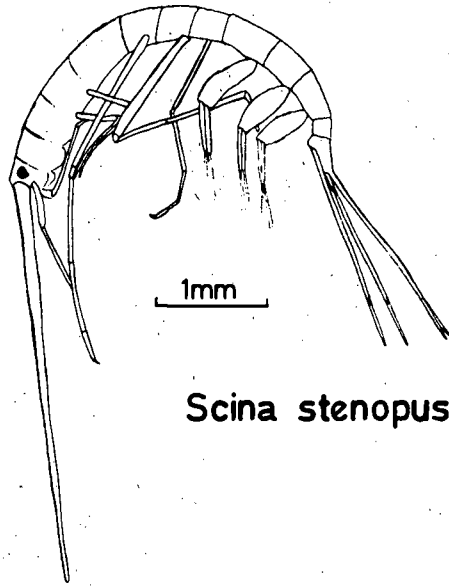
1. Mandible without palp 2.
Mandible with palp 6.
2. Uropod 2 absent Cystisomatidae 3.
Uropod 2 present
3. Uropod inner rami fused with peduncles; uropods 1 and 2, outer rami reduced to spines Scinidae
Uropod inner rami not fused with peduncles; uropods 1 and 2, outer rami not reduced to spines 4.
4. Pereiopod 3, 5th joint expanded or elongate and variably toothed with 6th and 7th joints folding against it Phronimidae
Pereiopod 3, 5th joint unmodified with 6th and 7th joints not folding against it 5.
5. Gnathopod 1, 2nd joint longer than combined length of 3rd to 7th joints Paraphronimidae
Gnathopod 1, 2nd joint shorter than combined length of 3rd to 7th joints Dairellidae
6. Uropods lack rami Anchylomeridae 7.
Uropods normal, biramous
7. Pereiopod 4, 3rd joint inserted subterminally on 2nd joint 9.
Pereiopod 4, 3rd joint inserted terminally on 2nd joint 8.
8. Pereiopod 5, all joints present 11.
Pereiopod 5, reduced to 1st and 2nd joints plus rudiments of joints 3 to 7 Pronoe (Pronoidae)
9. Mandibular palp, 2nd joint less than half length of 1st joint Pronoidae
Mandibular palp, 2nd joint greater than half length of 1st joint 10.
10. Pereiopod 3, 3rd joint inserted terminally on 2nd joint; pereiopod 5 with all joints usually; flagellum of antenna 2, male, 4th joint half to three quarters length of 3rd joint Parascelidae
Pereiopod 3, 3rd joint inserted in a terminal notch or subterminally on 2nd joint; pereiopod 5 reduced to 1st and 2nd joints plus variable number of rudiments of 3rd to 7th joints; flagellum of antenna 2, male, 3rd and 4th joints subequal Platyscelidae
11. Pereiopod 4, 4th joint about twice width of 3rd and 5th joints Lycaeopsidae
Pereiopod 4, 4th joint equal in width to 3rd and 5th joints 12.
12. Pereiopods 3 to 5, 7th joint covered by hooded process of 6th joint Lanceolidae
Pereiopods 3 to 5, 7th joint not covered by hooded process of 6th joint 13.
13. Flagellum of antenna 1, 1st joint large and more than three times combined length of rest of joints 14.
Flagellum of antenna 1, 1st joint small to medium sized and many times shorter than combined length of rest of joints Hyperiididae
14. Flagellum of antenna 1, 1st joint straight with 2nd terminally inserted on it Vibiliidae
Flagellum of antenna 1, 1st joint curved with 2nd subterminally inserted on it 15.
15. Mandibular palp, 2nd and 3rd joints subequal; rostrum present Oxycephalidae
Mandibular palp, 1st and 3rd joints subequal; rostrum absent 16.
16. Inner rami of uropods, not fused with peduncles; gnathopods 1 and 2 chelate Brachyscelidae
Inner rami of uropods, one or more pairs fused with peduncles; gnathopods 1 and 2 simple or tending to subchelate Lycaeidae

FAMILY SCINIDAE

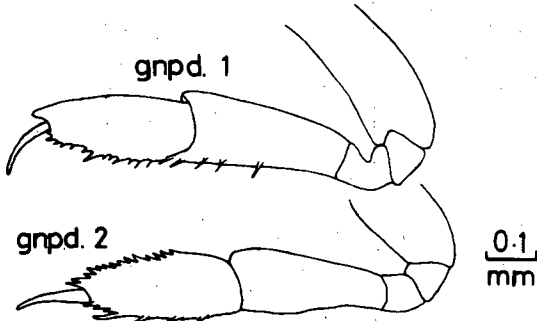
lateral aspect - after Wagler



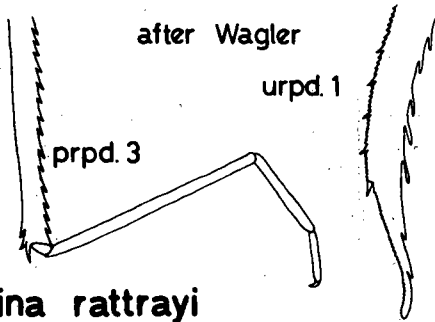
Ctenoscina brevicaudata



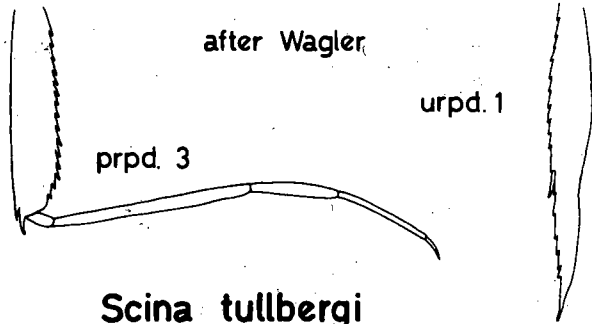
Scina stenopus



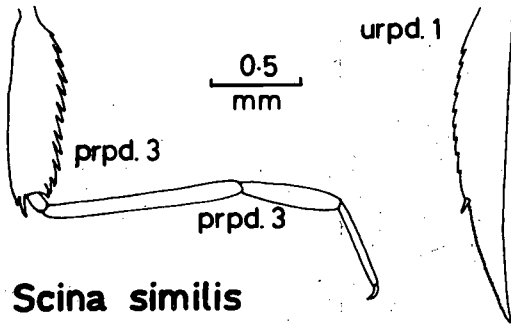
Scina marginata



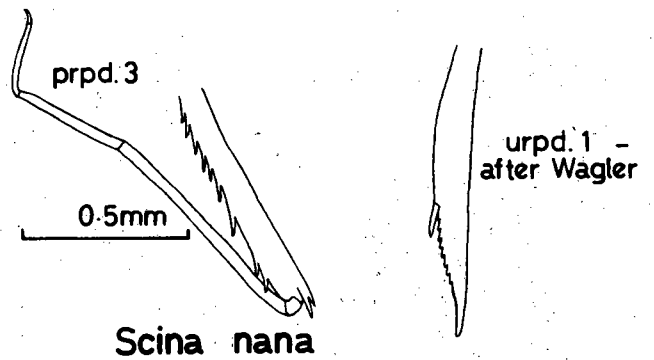
Scina rattrayi



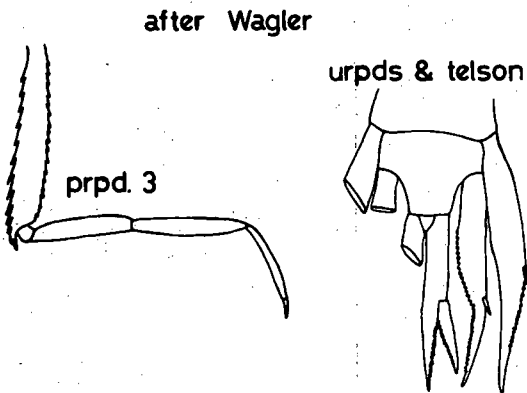
Scina tullbergi



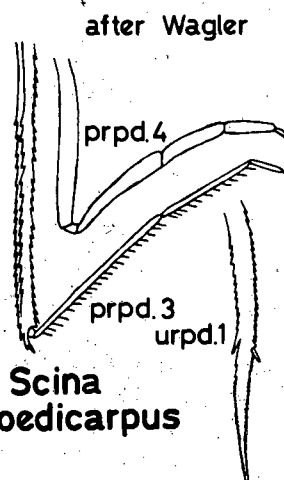
Scina similis



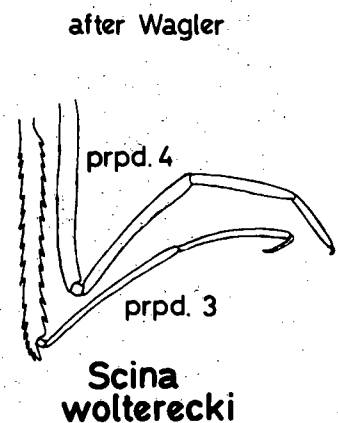
Scina nana



Scina excisa



Scina oedicarpus

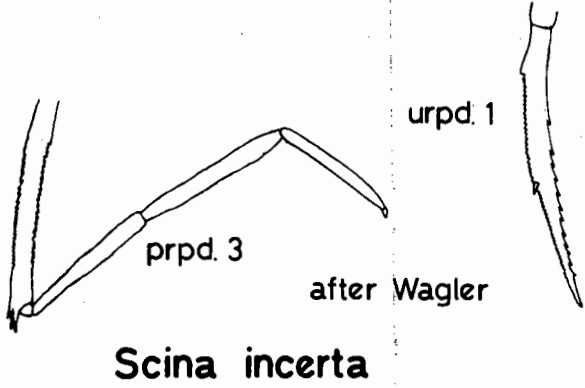


Scina wolterecki

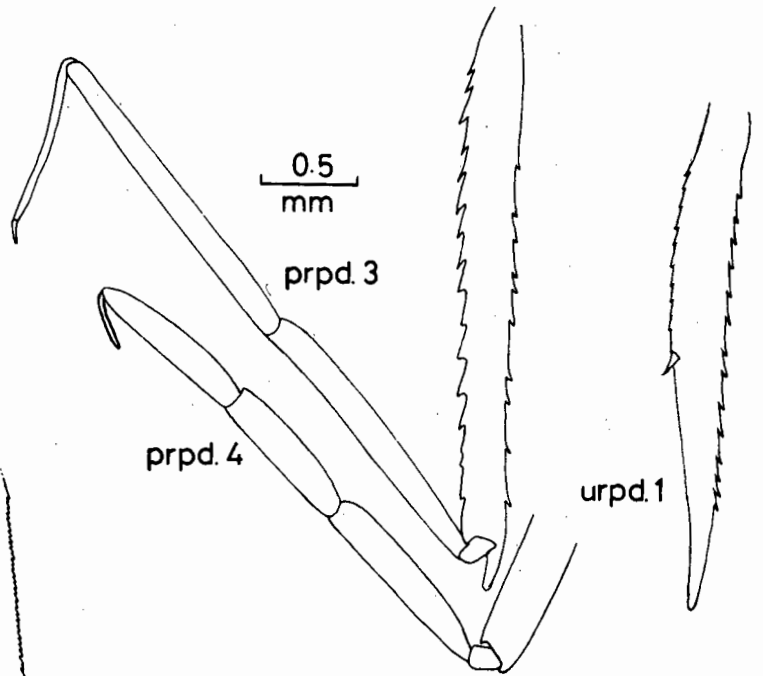
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN SCINIDAE.

1. Terga of body segments produced in erect middorsal spines; pereaeon segments 1 and 2 free (Ctenoscina); 9 middorsal spines Ct. brevicaudata
Terga of body segments without middorsal spines Scina 2.
2. All appendages, especially antenna 1, pereopod 3, and uropods greatly elongated Sc. stenopus
All appendages not greatly elongated 3.
3. Gnathopods 1 and 2, 6th joint anteriorly produced beyond insertion of 7th joint; 6th joint of gnathopod 1, posterior margin toothed; 6th joint of gnathopod 2, anterior margin toothed Sc. marginata
Gnathopods 1 and 2, 6th joint not anteriorly produced beyond insertion of 7th joint 4.
4. Pereopod 3, anterior margin of 2nd joint smooth 5.
Pereopod 3, anterior margin of 2nd joint with at least one distal tooth 8.
5. Pereopod 3, posterior margin of 2nd joint smooth, anterodistal angle of 2nd joint with a strong spine 6.
Pereopod 3, posterior margin of 2nd joint toothed, anterodistal angle of 2nd joint with a weak spine 7.
6. Pereopod 3, outer surface of 2nd joint with about 8 teeth (Sc. armauer-hanseni)
Pereopod 3, outer surface of 2nd joint smooth (Sc. stebbingi)
7. Uropod 1, inner margin smooth (Sc. latifrons)
Uropod 1, inner margin toothed (Sc. inermis)
8. Pereopod 3, anterior margin of 2nd joint only distally toothed 9.
Pereopod 3, anterior margin of 2nd joint toothed entire length 14.
9. Uropod 1, inner margin smooth 10.
Uropod 1, inner margin toothed Sc. rattrayi
10. Outer ramus of uropod 1 very long, about two thirds length of inner ramus and twice length of outer ramus of uropod 2; pereopods 3 and 4, 7th joint with a long seta from 6th joint over it (Sc. setigera)
Outer ramus of uropod 1 not very long and not longer than outer ramus of uropod 2 11.
11. Second joint of pereopod 3 equal to combined length of 3rd to 7th joints (Sc. alberti)
Second joint of pereopod 3 not a great deal longer than 4th joint 12.
12. Outer ramus of uropod 1 about one tenth length of peduncle Sc. similis
Outer ramus of uropod 1 about one sixth length of peduncle 13.
13. Uropod 1, outer margin of peduncle smooth Sc. nana
Uropod 1, outer margin of peduncle finely toothed Sc. tullbergi
14. Inner margin of uropod 1 smooth 15.
Inner margin of uropod 1 toothed 18.
15. Outer ramus of uropod 1 long, half length of peduncle (Sc. typhlops)
Outer ramus of uropod 1 short, one sixth(or less) length of peduncle 16.
16. Second joint of pereopod 3, teeth on anterior and posterior margins subequal; telson half length of peduncle of uropod 3 (Sc. pusilla)
Second joint of pereopod 3, teeth on anterior margin larger than those on posterior margin; telson less than one third length of peduncle of uropod 3 17.

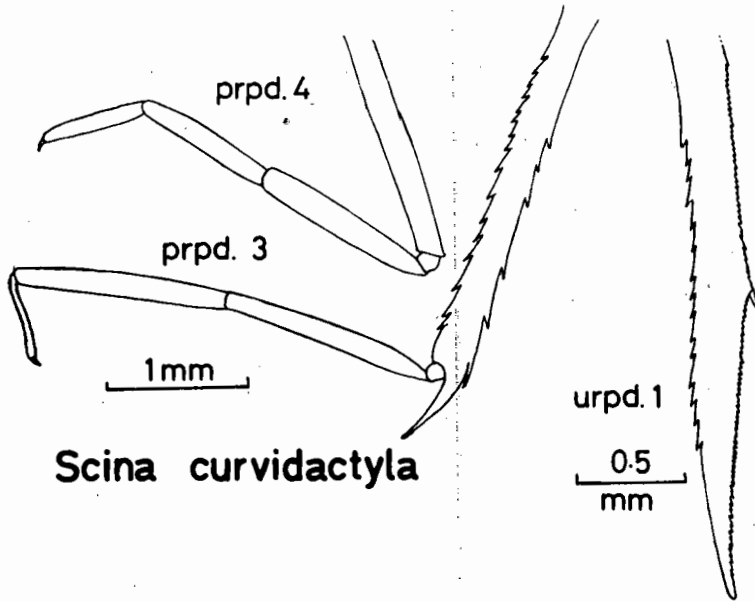
FAMILY SCINIDAE



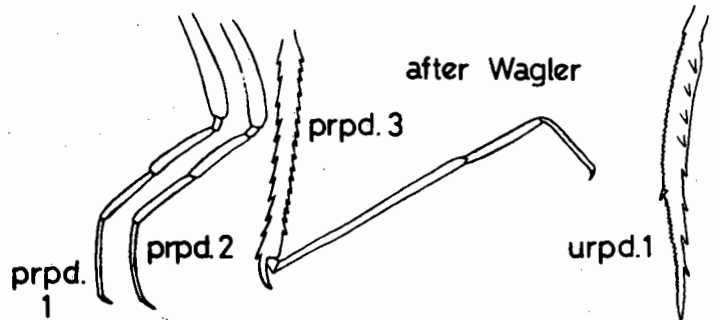
Scina incerta



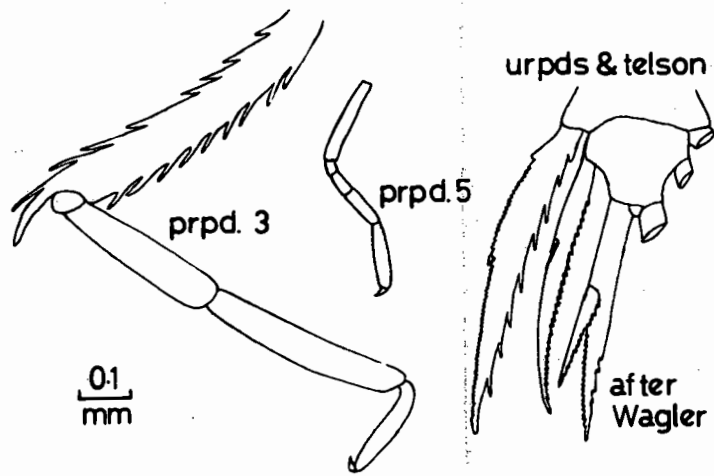
Scina crassicornis



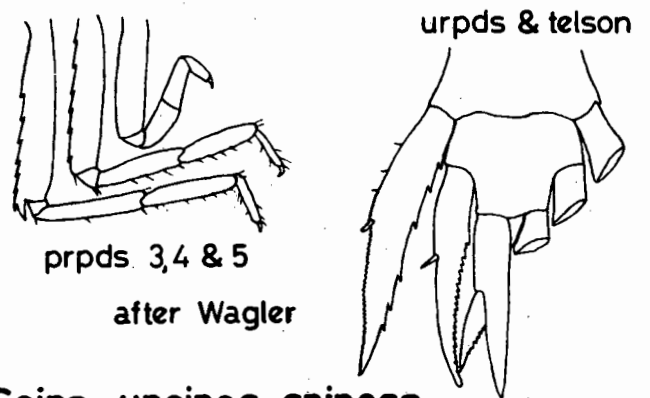
Scina curvidactyla



Scina langhansi



Scina borealis

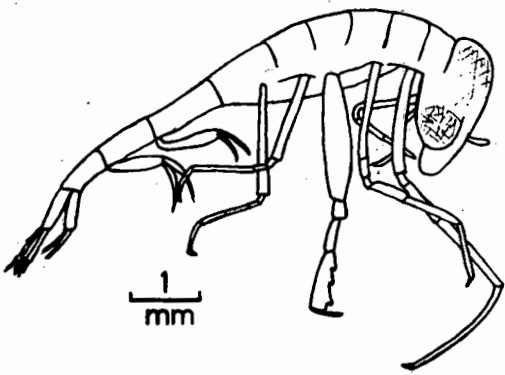


**Scina uncipes spinosa
var. affinis**

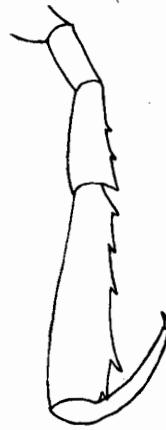
KEY TO SOUTH AFRICAN SCINIDAE CONTINUED.

17. Second joint of pereopod 3 shorter than combined length of 4th and 5th joints; inner ramus of uropod 2 curves inwards Sc. excisa
 Second joint of pereopod 3 longer than combined length of 4th and 5th joints; inner ramus of uropod 2 does not curve inwards
 (Sc. damasii)
18. Inner margin of uropod 1 with one large tooth and fine teeth proximal and distal to it 19.
 Inner margin of uropod 1 with teeth subequal, fine or coarse 20.
19. Pereopod 4 subequal in length to pereopod 3, slender; 7th joint of pereopod 4 small Sc. wolterecki
 Pereopod 4 shorter than combined length of 1st to 4th joints of pereopod 3; 7th joint of pereopod 4 about one third length of 6th joint
Sc. oedicarpus
20. Inner margin of uropod 1 with usually more than 12 fine teeth 21.
 Inner margin of uropod 1 with a maximum of 12 large teeth 24.
21. Antenna 1 longer than peraeon, subequal in length to peraeon plus pleon; 6th joint of pereopod 3 shorter than, or subequal in length to 5th joint; 7th joint of pereopod 3 very short 22.
 Antenna 1 subequal in length to peraeon; 6th joint of pereopod 3 longer than 5th joint; 7th joint of pereopod 3 half length of 6th joint
 (Sc. lepisma)
22. Sixth joint of pereopod 3 less than half length of 5th joint 23.
 Sixth joint of pereopod 3 subequal in length to 5th joint
Sc. incerta
23. Seventh joint of pereopod 4 almost half length of 6th joint; 4th joint of pereopod 4 subequal in length to 6th joint Sc. crassicornis
 Seventh joint of pereopod 4 less than one eighth length of 6th joint, hook-like; 4th joint of pereopod 4 twice length of 6th joint
Sc. curvidactyla
24. Antenna 1 longer than peraeon, subequal in length to peraeon plus pleon 25.
 Antenna 1 subequal in length to peraeon 26.
25. Fourth joint of pereopod 3 three times length of 6th joint; anterodistal angle of 2nd joint of pereopod 3 with a short smooth spine; pereopods 1 and 2, 4th joint equal in length to 6th joint Sc. langhansi
 Fourth joint of pereopod 3 subequal in length to 6th joint; anterodistal angle of 2nd joint of pereopod 3 with a strong spine toothed on the anterior and posterior margins; pereopods 1 and 2, 4th joint two thirds length of 6th joint
 (Sc. vosseleri)
26. Fourth joint of pereopod 3 subequal in length to 5th joint; uropod 2, outer margin of peduncle and inner ramus smooth; uropod 3, inner margin of peduncle smooth 27.
 Fourth joint of pereopod 3 twice length of 5th joint; uropod 2, outer margin of peduncle and inner ramus finely toothed; uropod 3, inner margin of peduncle with large teeth
 (Sc. antarctica)
27. Pereopod 5 slender, not longer than combined length of 1st to 3rd joints of pereopod 3 Sc. borealis
 Pereopod 5 stout, subequal to the combined length of 1st to 4th joints of pereopod 3 28.
28. Pereopods 3 and 4 are thickly setose (Sc. pubera)
 Pereopods 3 and 4 have few hairs Sc. uncipes spinosa var. affinis

FAMILY PHRONIMIDAE

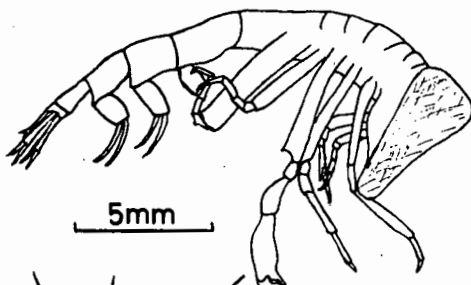


Phronimella elongata

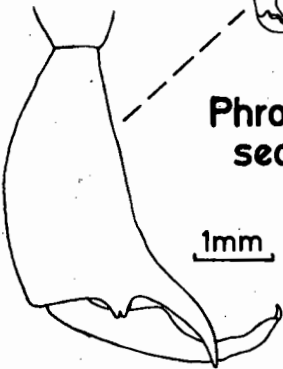


prpd. 3 - jj. 3 to 7

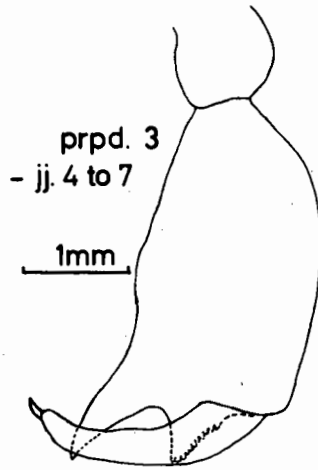
0.5 mm



Phronima sedentaria



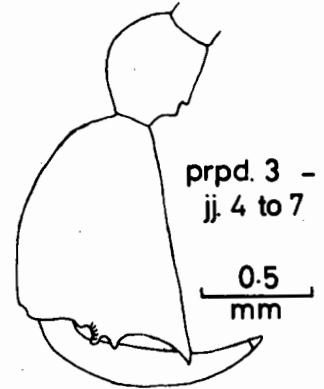
1mm



prpd. 3 - jj. 4 to 7

1mm

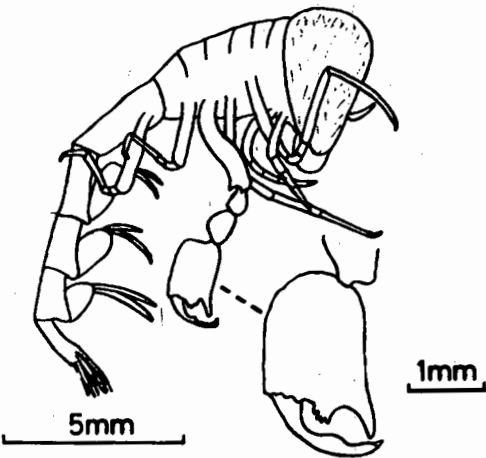
Phronima atlantica var. solitaria



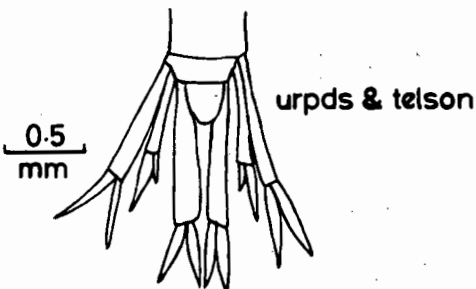
prpd. 3 - jj. 4 to 7

0.5 mm

Phronima atlantica



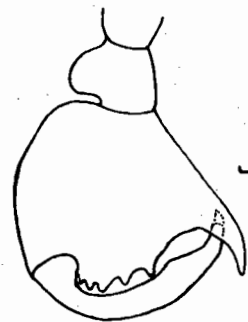
Phronima pacifica



urpds & telson

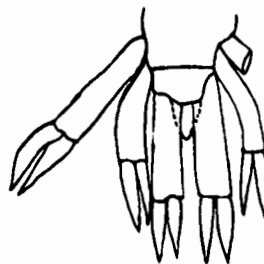
0.5 mm

prpd. 3 - jj. 4 to 7



0.5 mm

urpds & telson



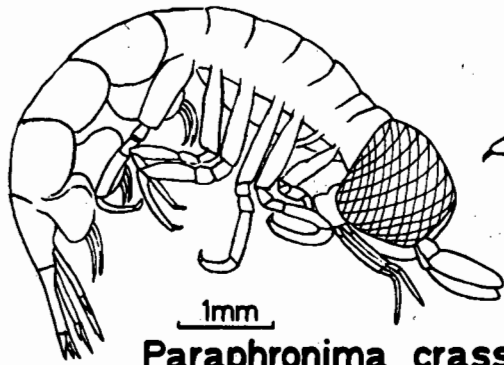
0.5 mm

Phronima colletti

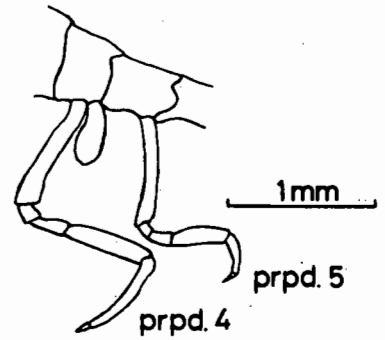
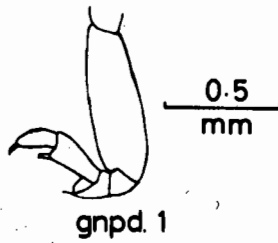
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN PHRONIMIDAE.

1. All appendages greatly elongate; 5th joint of pereopod 3 about three times as long as broad, with anterior margin toothed and 6th and 7th joints folding against it Phronimella elongata
 All appendages not greatly elongate; 5th joint of pereopod 3 distally expanded and toothed, not three times as long as broad Phronima 2.
2. Sixth joint of pereopod 3, longer than maximum width of 5th joint 3.
 Sixth joint of pereopod 3, as long as maximum width of 5th joint 5.
3. Fifth joint of pereopod 3, anterodistal process more than twice length of tubercle on expanded end Phronima sedentaria
 Fifth joint of pereopod 3, anterodistal process subequal to tubercle on expanded end 4.
4. Fifth joint of pereopod 3, tubercle preceded by a single tooth Ph. atlantica
 Fifth joint of pereopod 3, tubercle not preceded by any teeth Ph. atlantica var. solitaria
5. Inner ramus of uropod 2, less than half length of outer ramus Ph. pacifica
 Inner ramus of uropod 2, subequal to outer ramus Ph. colletti

FAMILY PARAPHRONIMIDAE

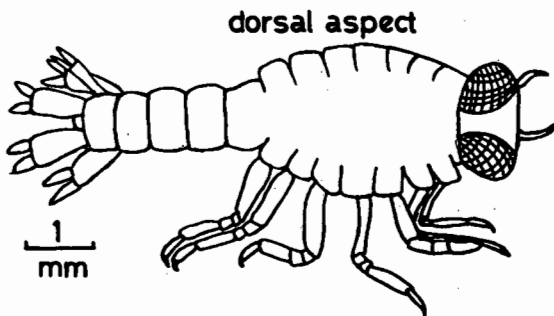


Paraphronima crassipes

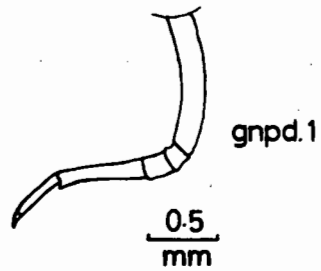


Paraphronima gracilis

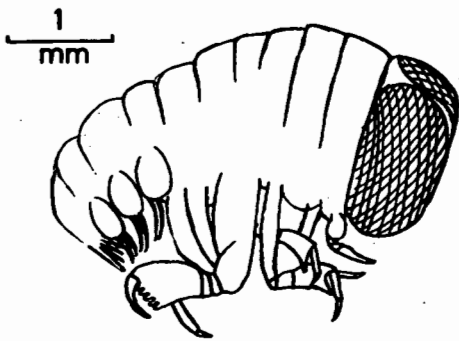
FAMILY DAIRELLIDAE



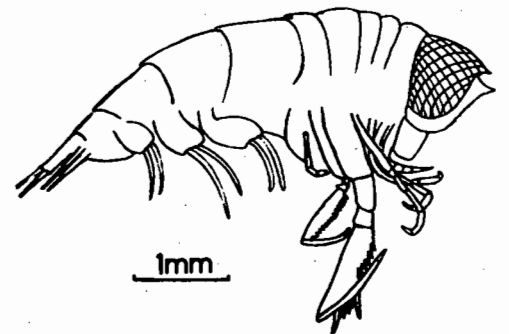
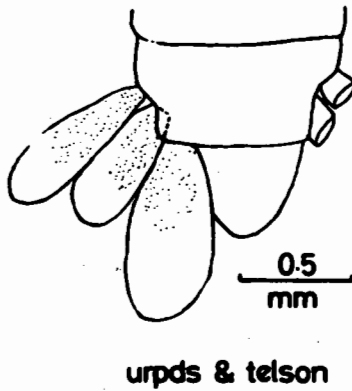
Dairella latissima



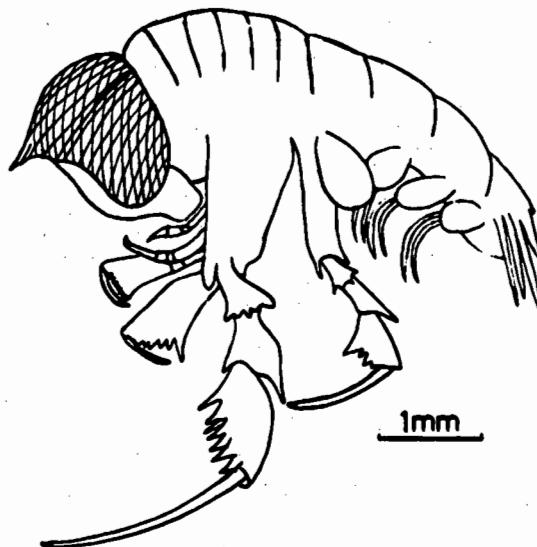
FAMILY ANCHYLOMERIDAE



Anchylomera blossevillei



Primno macropa



Phrosina semilunata

KEY TO THE SPECIES OF SOUTH AFRICAN PARAPHRONIMIDAE

1. Pereiopod 5 not longer than combined length of 1st to 4th joints of
 pereiopod 4 Paraphronima gracilis
 Pereiopod 5 subequal to pereiopod 4 P. crassipes

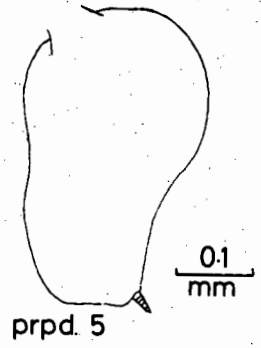
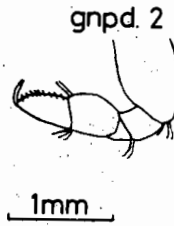
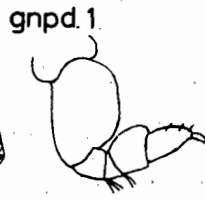
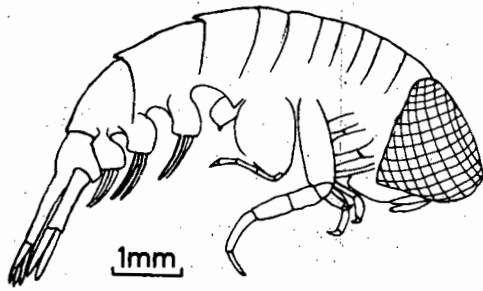
FAMILY DAIRELLIDAE

Dairella latissima is the only representative of the family.

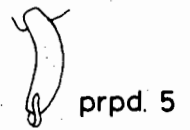
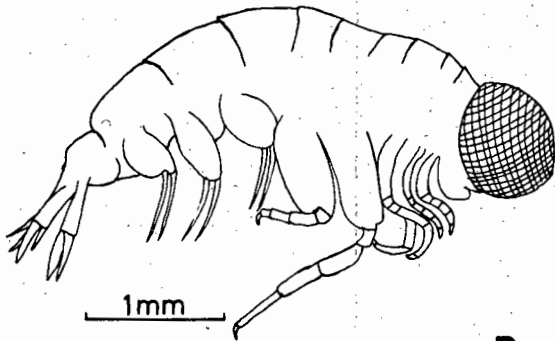
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN ANCHYLOMERIDAE

1. Pereiopods 1 and 2 simple Primno macropa
 Pereiopods 1 and 2 prehensile with 6th and 7th joints folding against 5th
 joint 2.
2. Fifth joint of pereiopods 1 and 2, with a single pointed process
Anchylomera blossevillei
 Fifth joint of pereiopods 1 and 2, with a multiple toothed process
Phrosina semilunata

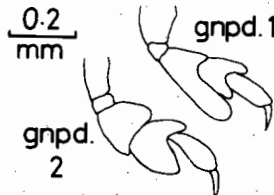
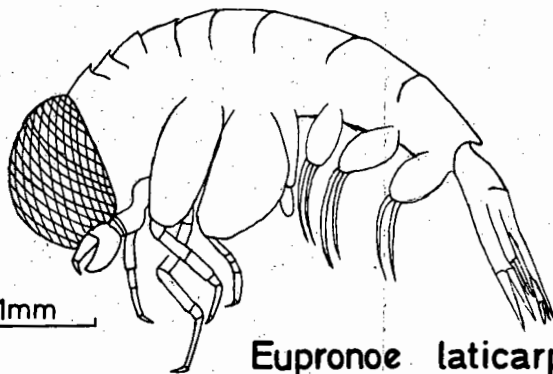
FAMILY PRONOIDAE



Pronoe capito



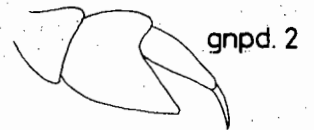
Paralycaea gracilis



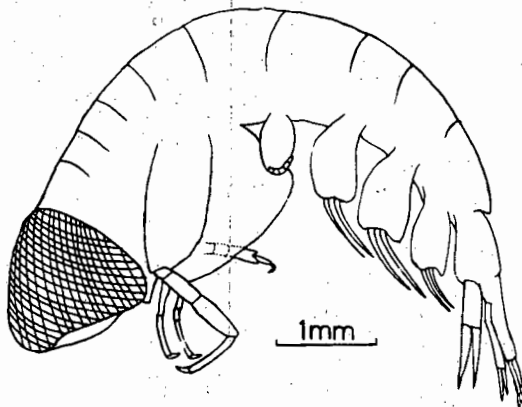
Eupronoe minuta



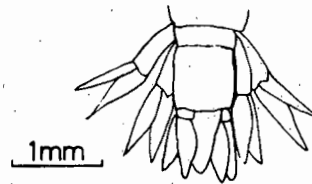
Eupronoe maculata



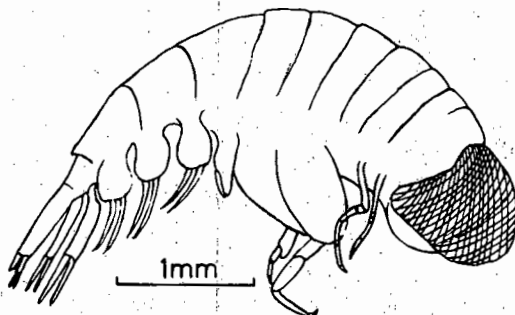
Eupronoe intermedia



urpds & telson

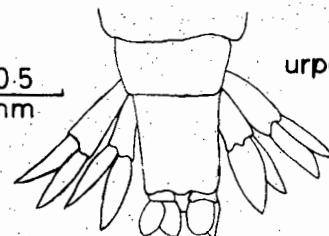


Parapronoe crustulum



0.5 mm

urpds & telson

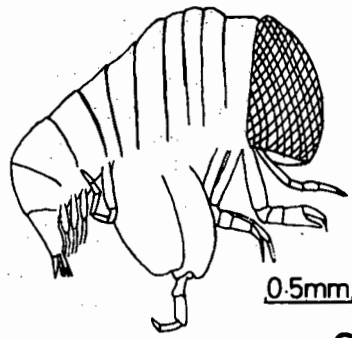


Sympronoe parva

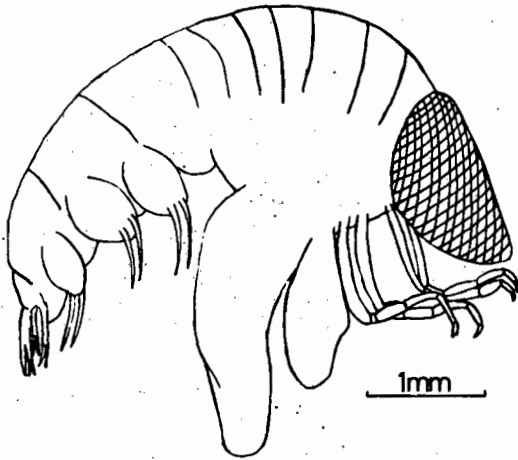
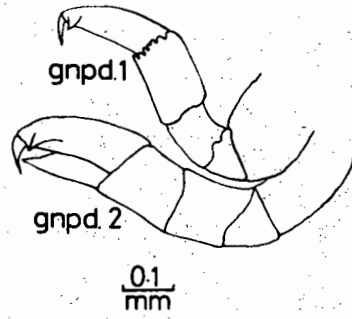
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN PRONOIDAE.

- | | | |
|----|---|-----------------------------|
| 1. | Gnathopods 1 and 2 both simple | 2. |
| | Gnathopod 1 subchelate; gnathopod 2 chelate | 3. |
| 2. | Gnathopods 1 and 2 robust; maximum width of pereopod 5 greater than half length; 2nd joint of pereopod 5 right-angled where rudiment of 3rd joint is inserted | <u>Pronoe capito</u> |
| | Gnathopods 1 and 2 slender; maximum width of pereopod 5 less than half length | <u>Paralycaea gracilis</u> |
| 3. | First urosome segment greater than half combined length of 2nd and 3rd urosome segments | <u>Eupronoe</u> 4. |
| | First urosome segment less than half combined length of 2nd and 3rd urosome segments | 7. |
| 4. | Fourth joint of gnathopod 1 produced under 5th joint | <u>Eupronoe minuta</u> |
| | Fourth joint of gnathopod 1 not produced under 5th joint | 5. |
| 5. | Gnathopod 2, posterior margin of process of 5th joint apically rounded | <u>E. laticarpa</u> |
| | Gnathopod 2, process of 5th joint apically acute | 6. |
| 6. | Gnathopod 2, anterodistal corner of 5th joint produced | <u>E. maculata</u> |
| | Gnathopod 2, anterodistal corner of 5th joint not produced | <u>E. intermedia</u> |
| 7. | Rami of uropod 3 broadly oval | <u>Sympronoe parva</u> |
| | Rami of uropod 3 lanceolate | <u>Parapronoe crustulum</u> |

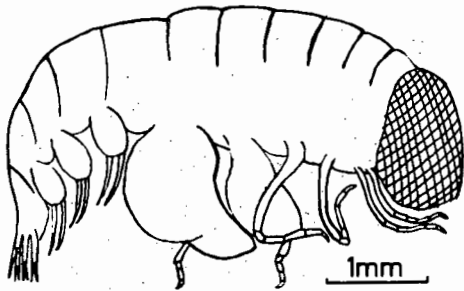
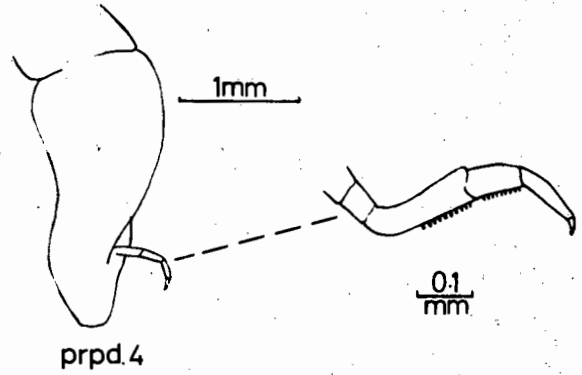
FAMILY PARASCELIDAE



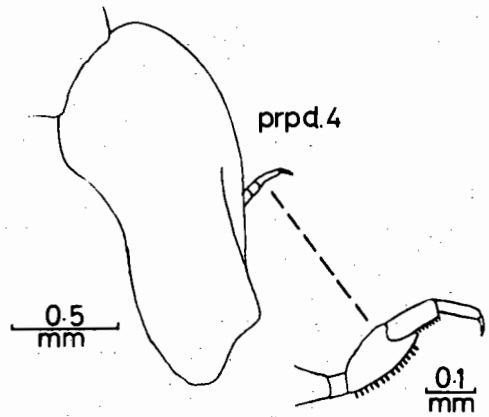
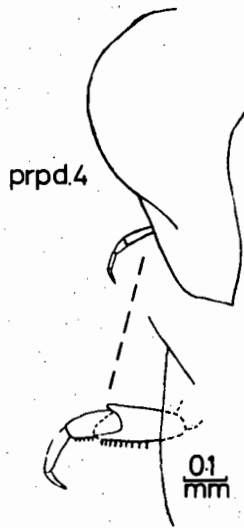
Schizoscelus ornatus



Thyropus sphaeroma

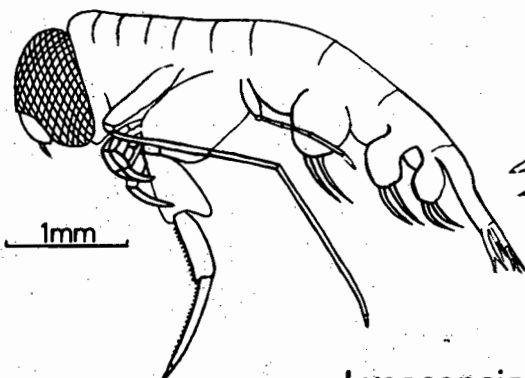


Parascelus edwardsi

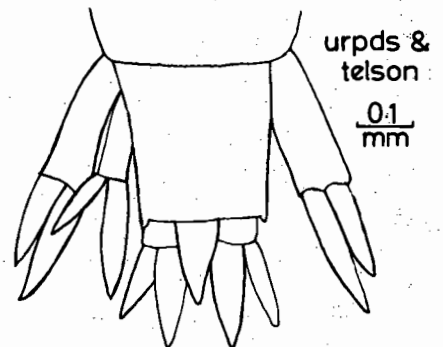
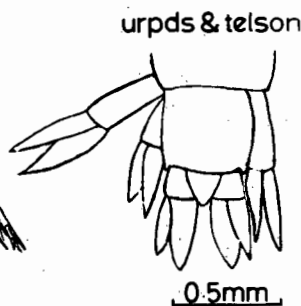


Parascelus typhoides

FAMILY LYCAEOPSIDAE



Lycaeopsis themistoides



Lycaeopsis zamboangae

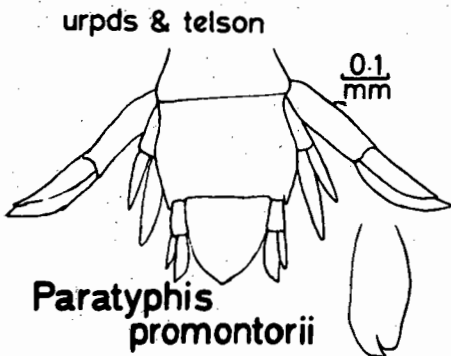
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN PARASCELIDAE.

- | | | |
|----|---|-----------------------------|
| 1. | Fifth joint of gnathopod 2 not produced | 2. |
| | Fifth joint of gnathopod 2 with a process as long as 6th joint which has a small inwardly directed process | <u>Schizoscelus ornatus</u> |
| 2. | Rami of uropod 1 narrow; 4th joint of pereopod 4 produced well beyond insertion of 5th joint and teeth on anterior margin larger than those on anterior margin of 5th joint | <u>Parascelus</u> 3. |
| | Rami of uropod 1 broad; 4th joint of pereopod 4 not produced beyond insertion of 5th joint and teeth on anterior margin subequal to those on anterior margin of 5th joint | <u>Thyropus sphaeroma</u> |
| 3. | Second joint of pereopod 4 not greatly tapering | <u>Parascelus typhoides</u> |
| | Second joint of pereopod 4 tapers greatly | <u>P. edwardsi</u> |

KEY TO THE SPECIES OF SOUTH AFRICAN LYCAEOPSIDAE.

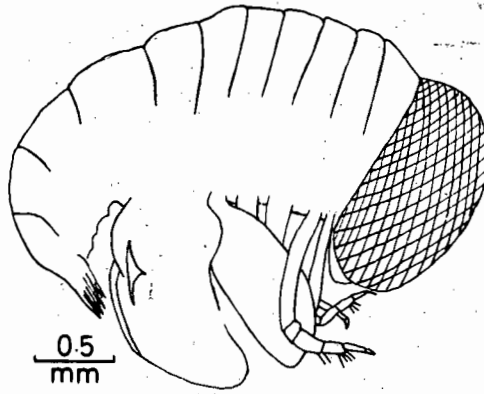
- | | | |
|----|--|------------------------------|
| 1. | Telson more than half as long as uropod 3, apical angle less than 45° | <u>Lycaeopsis zamboangae</u> |
| | Telson less than half as long as uropod 3, apical angle greater than 45° | <u>L. themistoides</u> |

FAMILY PLATYSCELIDAE

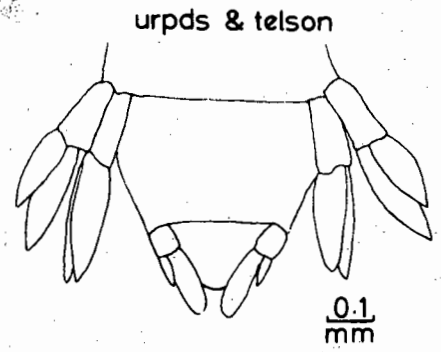


Paratyphis promontorii

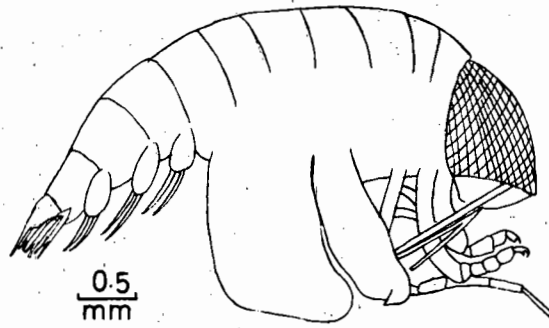
prpd.3 - j.2



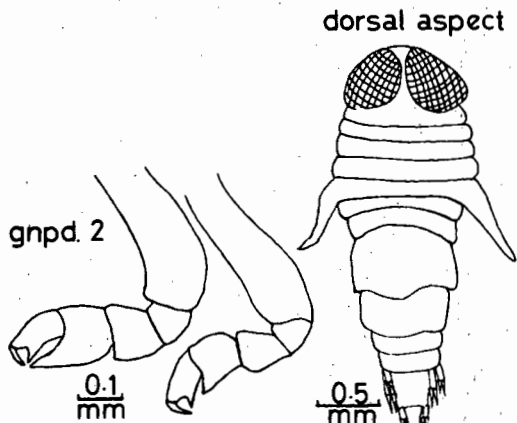
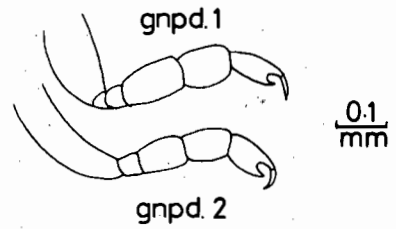
Paratyphis spinosus



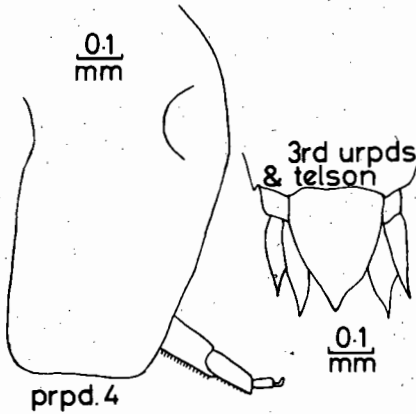
Paratyphis maculatus



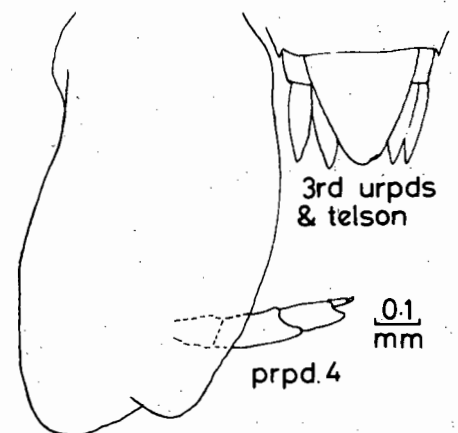
Tetrathyrus forcipatus



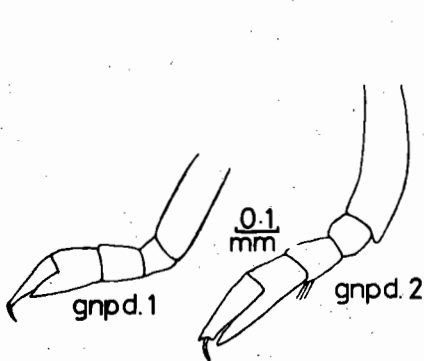
Amphithyrus bispinosus



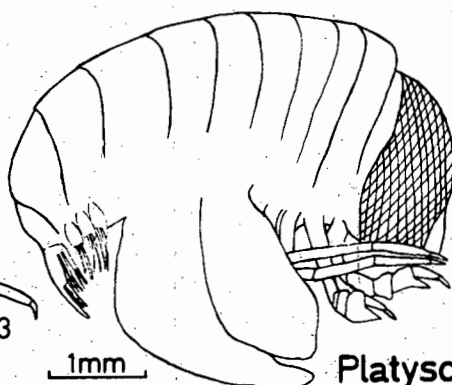
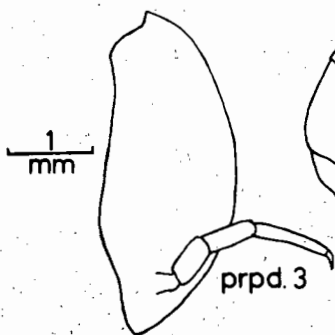
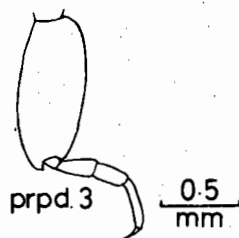
Amphithyrus similis



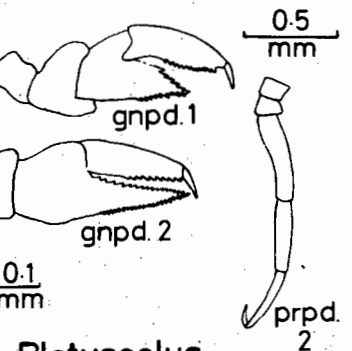
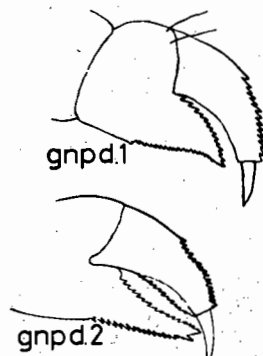
Amphithyrus glaber



Hemityphis rapax



Platyscelus ovoides



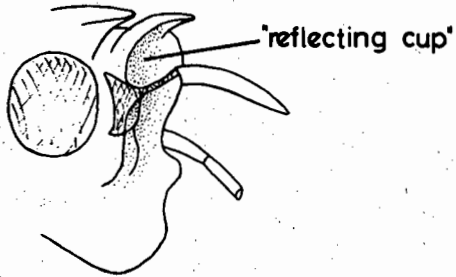
Platyscelus serratulus

KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN HYPERIIDAE.

1. Pereiopods 1 to 5, 6th joint distally produced opposite long 7th joint
 Phronimopsis spinifera
 Pereiopods 1 to 5, 6th joint not produced 2.
2. Pereiopods 1 and 2, 5th joint wider than 4th and 6th joints 3.
 Pereiopods 1 and 2, 5th joint not wider than 4th and 6th joints 4.
3. Pereiopods 1 and 2, 7th joint less than half length of 6th joint
 Parathemisto gaudichaudi
 Pereiopods 1 and 2, 7th joint subequal to 6th joint
 Hyperia macrodactyla
4. Gnathopods 1 and 2, process of 5th joint laterally compressed and always
 more than half length of 6th joint 5.
 Gnathopods 1 and 2, process of 5th joint broad and scoop-like and not
 always more than half length of 6th joint. Hyperia 9.
5. Dorsal surface of head flattened; gnathopods 1 and 2, anterior edge of
 process of 5th joint flattened Hyperioides longipes
 Dorsal surface of head rounded; gnathopods 1 and 2, anterior edge of
 process of 5th joint knife-like Hyperoche 6.
6. Posterodistal corners of pleon segments produced as small points 7.
 Posterodistal corners of pleon segments smoothly rounded 8.
7. Sixth joint of gnathopod 2 with a hooded process covering two thirds of
 7th joint Hyperoche cryptodactylus
 Sixth joint of gnathopod 2 with a minor process H. medusarum
8. Posterior margin of 4th joint of gnathopod 2 produced under 5th joint
 H. mediterranea
 Posterior margin of 4th joint of gnathopod 2 not produced
 H. martinezii
9. Species longer than ten millimeters Hyperia gaudichaudi
 Species maximally ten millimeters long 10.
10. Sides of head with a sharp pointed ventral process reaching level of
 mouthparts 11.
 Sides of head with a blunt ventral process not reaching level of mouthparts
 12.
11. Pereiopods 3 to 5, 6th joint with a distal forked spine opposing 7th joint
 H. crucipes
 Pereiopods 3 to 5, 6th joint without a distal spine
 H. schizogeneios
12. Pereiopods 3 to 5, width of 2nd joint greater than half length
 H. fabrei
 Pereiopods 3 to 5, width of 2nd joint less than half length 13.
13. Pereiopod 4, 7th joint with a group of hairs in its crook and 6th joint
 without a distal spine H. atlantica
 Pereiopod 4, 7th joint without a group of hairs in its crook; 6th joint
 with a distal spine opposing 7th joint H. macropthalma

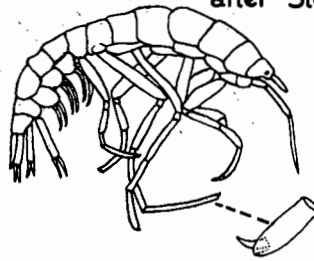
FAMILY LANCEOLIDAE

head - lateral aspect,
after Woltereck

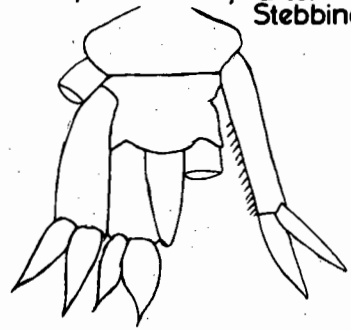


Scypholanceola vanhoeffeni

lateral aspect,
after Stebbing

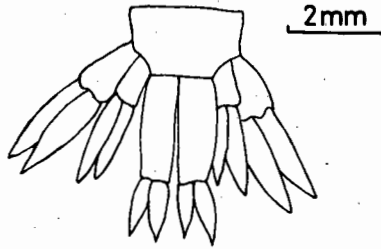
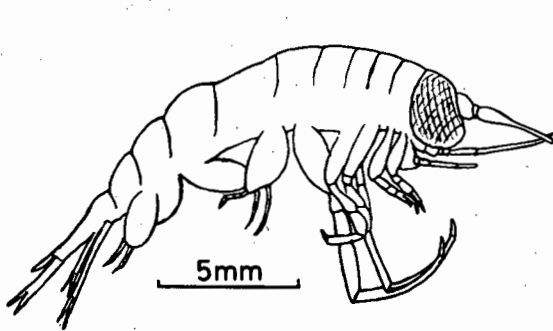


urpds & telson, after
Stebbing

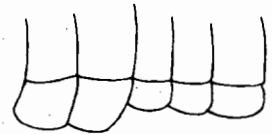


Lanceola pacifica

FAMILY VIBILIIDAE

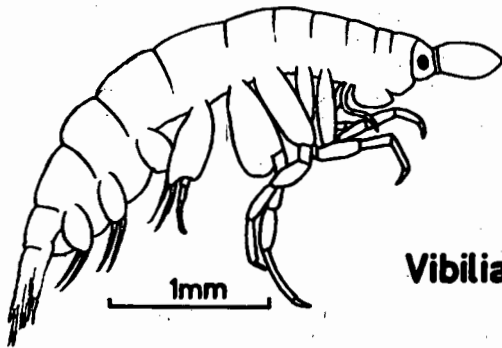


urpds & telson

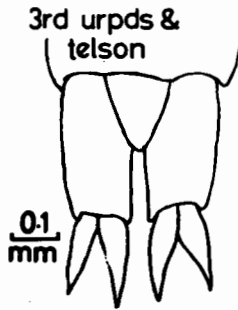


3rd to 7th epimeral
plates

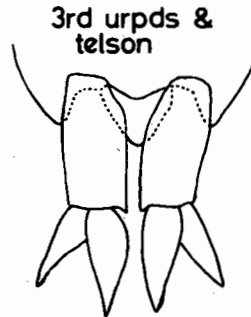
Cyllopus magellanicus



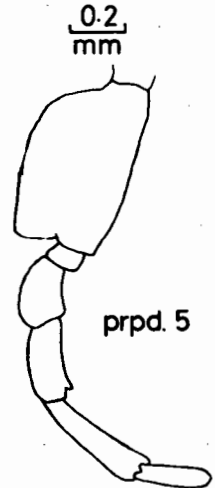
Vibilia chuni



0.1
mm



Vibilia armata



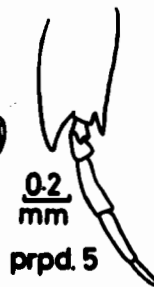
0.2
mm

prpd. 5



0.1
mm

gnpd. 2



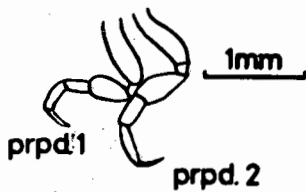
0.2
mm

prpd. 5



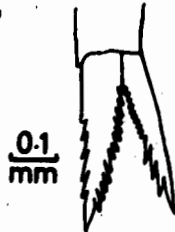
Vibilia cultripes

prpd. 5,
after Vosseler



prpd. 1

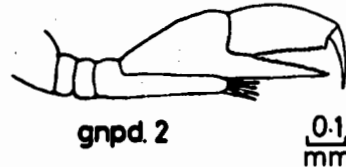
prpd. 2



0.1
mm

L. urpd. 1,
ventral
aspect

Vibilia stebbingi



gnpd. 2

0.1
mm



prpd. 5

0.5
mm

R. urpd. 1,
ventral
aspect

0.1
mm

Vibilia viatrix

KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN LANCEOLIDAE.

1. Eyes medium sized; "reflecting cups" present adjacent to eyes
Eyes small; no "reflecting cups" present

	<u>Scypholanceola vanhoeffeni</u>	2.
	<u>Lanceola</u>	2.
2. Pereiopod 4 longer than peraeon
Pereiopod 4 shorter than peraeon

	3.
	4.
3. Peduncle of uropod 3 longer than telson
Peduncle of uropod 3 equal to length of telson

	<u>L. serrata</u>
	<u>L. pacifica</u>
4. Pereiopod 2 equal to the combined length of 1st to 5th joints of pereiopod 4
Pereiopod 2 subequal to pereiopod 4

	(<u>L. felina</u>)
	(<u>L. clausi</u>)

KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN VIBILLIIDAE.

1. Eyes large, occupying whole of head; antenna 2 inserted on inferior surface of head; pereiopods 1 and 2, not longer than combined length of 1st to 5th joints of pereiopods 3 and 4; peduncle of uropod 3 longer than that of uropod 1 (Cyllopus); peraeonal epimeral plates 3 and 4 twice length of 5th to 7th epimeral plates
Eyes small to medium sized, not occupying whole of head; antenna 2 inserted on anterior surface of head; pereiopods 1 and 2, longer than combined length of 1st to 5th joints of pereiopods 3 and 4; peduncle of uropod 3 shorter than that of uropod 1

	<u>C. magellanicus</u>	2.
	<u>Vibilia</u>	2.
2. Posterodistal corners of 3rd urosome segment produced
Posterodistal corners of 3rd urosome segment not produced

	3.
	5.
3. Second joint of pereiopod 5 longer than combined length of 3rd to 7th joints
Second joint of pereiopod 5 shorter than, or equal to combined length of 3rd to 7th joints

	<u>V. chuni</u>	4.
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4. Pereiopod 5, anterodistal corners of 5th and 6th joints not obviously produced
Pereiopod 5, anterodistal corners of 5th and 6th joints obviously produced

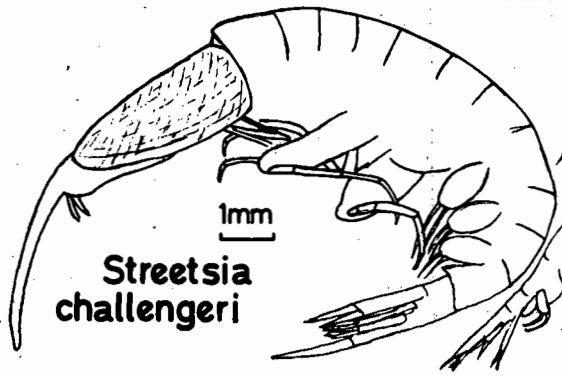
	<u>V. armata</u>
	<u>V. cultripes</u>
5. Pereiopods 1 and 2, 4th joint as wide as 3rd and 5th joints
Pereiopods 1 and 2, 4th joint wider than 3rd and 5th joints

	<u>V. antarctica</u>	6.
--	----------------------	----
6. Fifth joint of gnathopod 2, produced anteriorly more than half length of 6th joint
Fifth joint of gnathopod 2, produced anteriorly half length of 6th joint

	7.
	<u>V. propinqua</u>
7. Second joint of pereiopod 5 with antero- and posterodistal corners not obviously produced; uropods 1 and 2, inner side of outer ramus with small teeth proximally and large teeth distally
Second joint of pereiopod 5 with antero- and posterodistal corners not obviously produced; uropods 1 and 2, inner side of outer ramus has only small teeth

	<u>V. stebbingi</u>
	<u>V. viatrix</u>

FAMILY OXYCEPHALIDAE



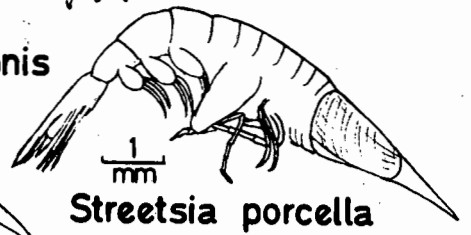
Streetsia challengerii



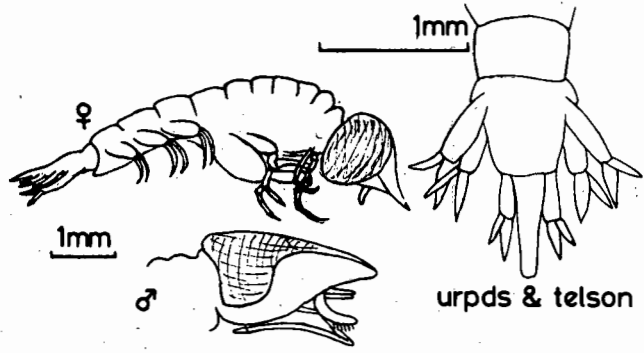
Streetsia mindanaonis



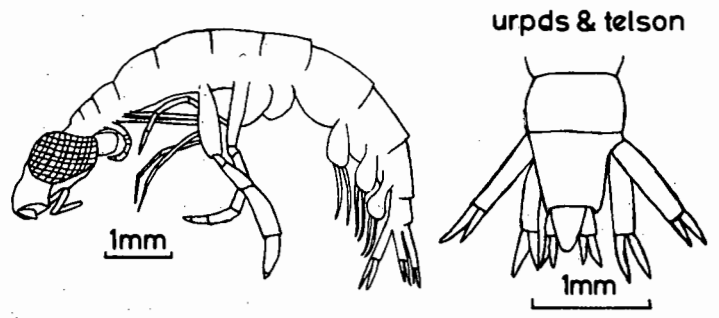
Streetsia steenstrupi



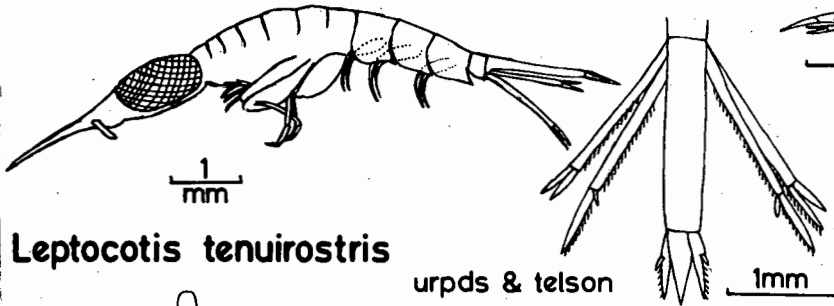
Streetsia porcella



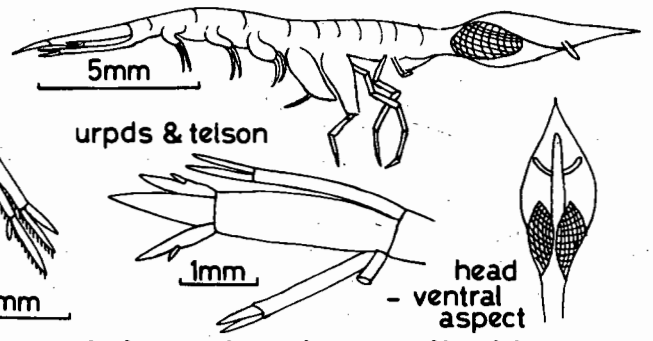
Cranocephalus scleroticus



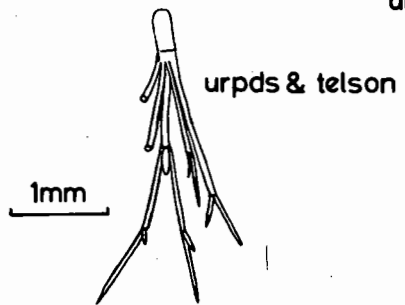
Glossocephalus milne-edwardsi



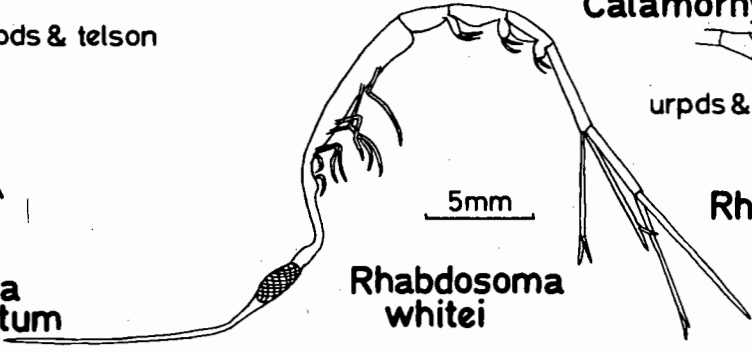
Leptocotis tenuirostris



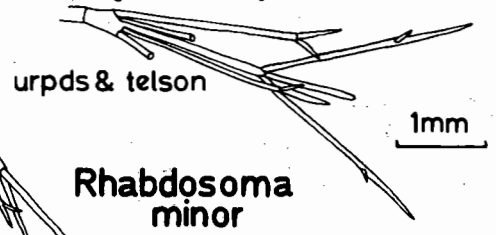
Calamorhynchus pellucidus



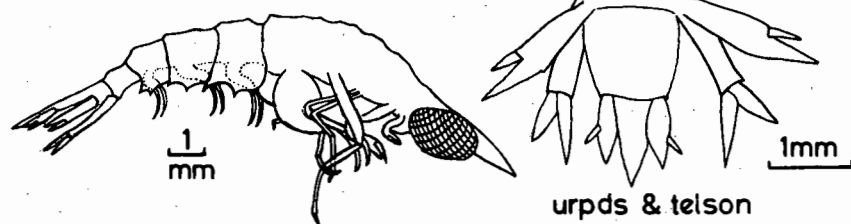
Rhabdosoma brevicaudatum



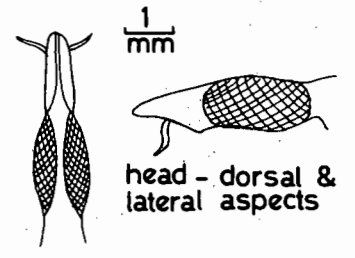
Rhabdosoma whitei



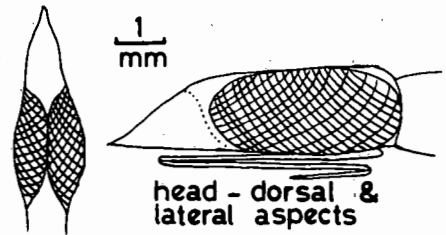
Rhabdosoma minor



Oxycephalus clausi

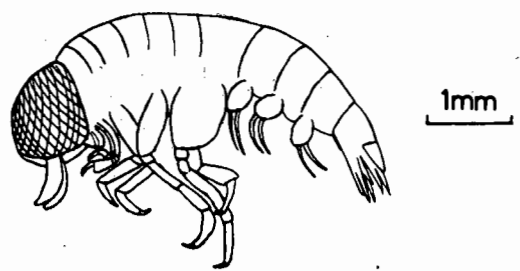


Oxycephalus latirostris



Oxycephalus piscator

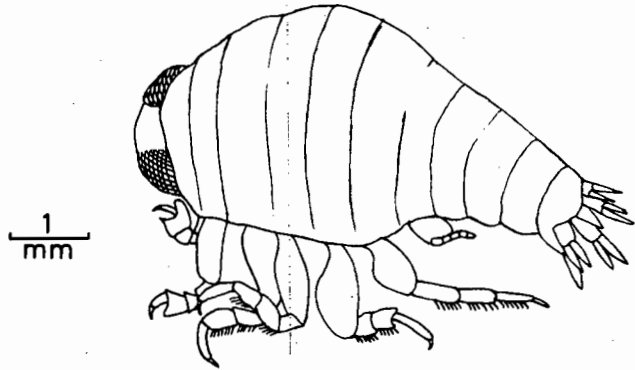
Simorhynchotus antennarius



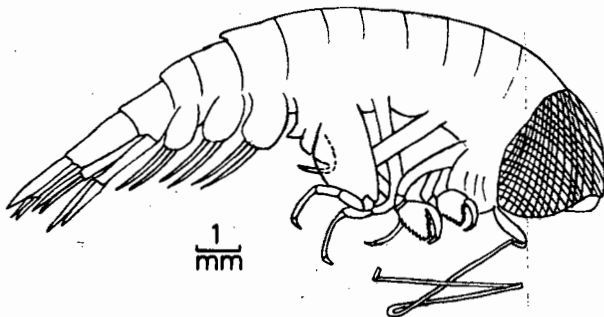
KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN OXYCEPHALIDAE.

- | | | | |
|-----|--|--------------------------------------|-----|
| 1. | Inner rami of uropods not fused with peduncles | | 2. |
| | Inner rami of one or more pairs of uropods fused with peduncles | | 7. |
| 2. | Head elongate with a long pointed rostrum | <u>Streetsia</u> | 3. |
| | Head globular with a short rostrum | | 6. |
| 3. | Head plus rostrum subequal to length of peraeon, or shorter | | 4. |
| | Head plus rostrum longer than peraeon | | 5. |
| 4. | Rostrum about half length of eyes; no obvious constriction of head posterior to eyes | <u>Streetsia steenstrupi</u> | |
| | Rostrum longer than eyes; head obviously constricted posterior to eyes | <u>S. mindanaonis</u> | |
| 5. | Rostrum as long, or longer than eyes | <u>S. challengeri</u> | |
| | Rostrum shorter than eyes | <u>S. porcella</u> | |
| 6. | Rostrum sharp-pointed | <u>Cranocephalus scleroticus</u> | |
| | Rostrum blunt, beaked | <u>Glossocephalus milne-edwardsi</u> | |
| 7. | Inner ramus of uropod 2 not fused with peduncle; 1st urosome segment about one third combined length of 2nd and 3rd segments | | 8. |
| | Inner ramus of uropod 2 fused with peduncle; 1st urosome segment about one half combined length of 2nd and 3rd segments | | 9. |
| 8. | Rostrum sharply pointed, without lateral expansions; inner ramus of uropod 1 less than a quarter length of outer ramus; uropods 1 and 2, inner margins of peduncles with large teeth | <u>Leptocotis tenuirostris</u> | |
| | Rostrum dorso-ventrally flattened and pointed, with lateral expansions; rami of uropod 1 subequal; uropods 1 and 2, inner margins of peduncles with small teeth | <u>Calamorhynchus pellucidus</u> | |
| 9. | Rostrum very long and needle-like | <u>Rhabdosoma</u> | 10. |
| | Rostrum not long and needle-like | | 12. |
| 10. | Telson as long, or longer than peduncle of uropod 3; uropods 2 and 3, rami subequal | <u>Rhabdosoma whitei</u> | |
| | Telson maximally half length of peduncle of uropod 3; uropods 2 and 3, outer ramus less than a quarter length of inner ramus | | 11. |
| 11. | Peduncle of uropod 3 not three times length of telson | <u>R. minor</u> | |
| | Peduncle of uropod 3 at least three times length of telson | <u>R. brevicaudatum</u> | |
| 12. | Gnathopods 1 and 2 subchelate | <u>Simorhynchotus antennarius</u> | |
| | Gnathopods 1 and 2 chelate | <u>Oxycephalus</u> | 13. |
| 13. | Pleon segments with two teeth at posterodistal corners | <u>Oxycephalus clausi</u> | |
| | Pleon segments with one tooth at posterodistal corners | | 14. |
| 14. | Rostrum terminally rounded | <u>O. latirostris</u> | |
| | Rostrum terminally pointed | <u>O. piscator</u> | |

FAMILY BRACHYSCELIDAE



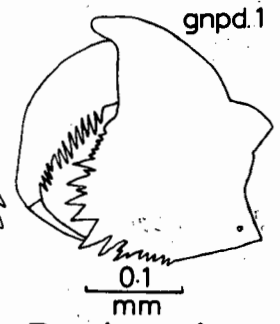
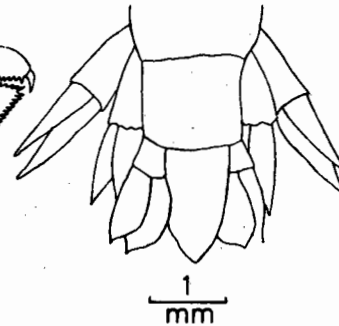
**Thamneus
platyrrhynchus**



Brachyscelus cruscolum

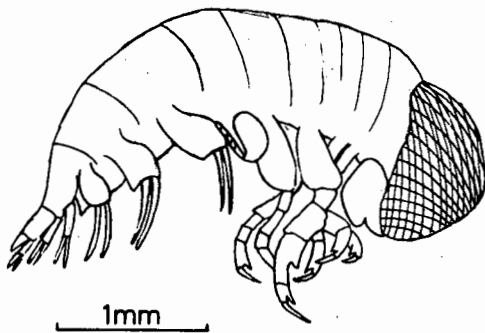


urpds & telson

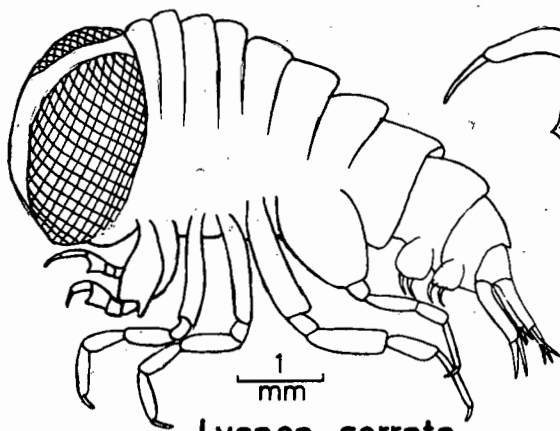
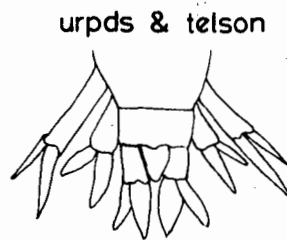


Brachyscelus rapacoides

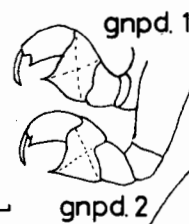
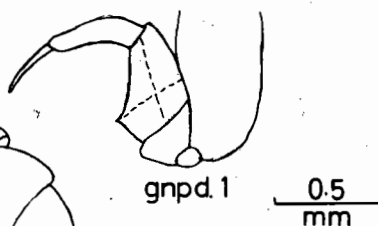
FAMILY LYCAEIDAE



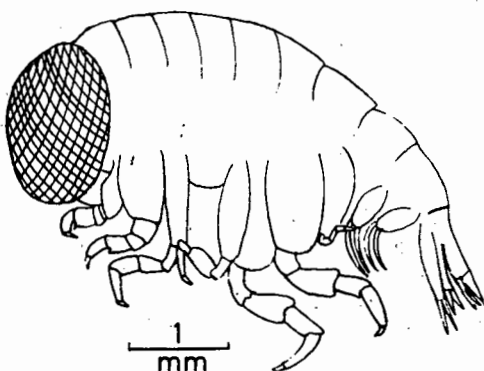
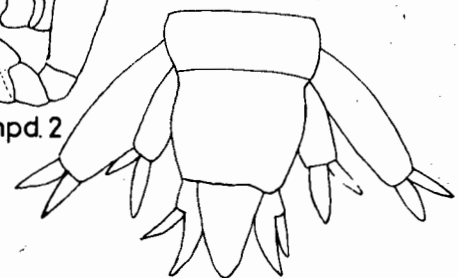
Tryphana malmii



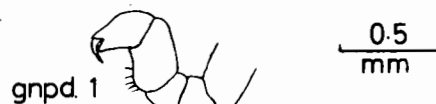
Lycaea serrata



Lycaea pulex



Pseudolycaea pachypoda



KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN BRACHYSCELIDAE.

1. Pereiopods 1 to 4, 4th and 5th joints with long hairs on anterior and posterior margins Thamneus platyrrhynchus
 Pereiopods 1 to 4, 4th and 5th joints without long hairs Brachyscelus 2.
2. Gnathopods 1 and 2, process of 5th joint has major teeth interspersed with minor ones; uropod rami not broad B. rapacoides
 Gnathopods 1 and 2, process of 5th joint has major teeth only; uropod rami broad B. crusculum

KEY TO THE GENERA AND SPECIES OF SOUTH AFRICAN LYCAEIDAE.

1. Pereiopods 1 to 4, 6th joint with small distal process to which 7th joint is opposed Tryphana malmii
 Pereiopods 1 to 4, 6th joint without a distal process 2.
2. Pereiopods 3 and 4 equal in length, with 4th joint wider than 3rd and 5th joints Pseudolycaea pachypoda
 Pereiopod 4 as long as combined length of 1st to 5th joints of pereiopod 3; pereiopods 3 and 4 with 4th joint as wide as 3rd and 5th joints Lycaea 3.
3. Fifth joint of gnathopods 1 and 2, length greater than maximum width; pleon segments with strong middorsal ridges Lycaea serrata
 Fifth joint of gnathopods 1 and 2, length subequal to maximum width 4.
4. Inner ramus of uropod 2 fused with peduncle L. nasuta
 Inner ramus of uropod 2 not fused with peduncle L. pulex

CHECK LIST OF SOUTH AFRICAN HYPERIID AMPHIPODA.FAMILY LANGEOLIDAE BOVALLIUSLanceola pacifica Stebbing 1888

K.H. Barnard 1932: 33/16, 950 - 850 m.

Lanceola serrata Bovallius 1885

K.H. Barnard 1932: 33/16, 34/16, 1410 - 1310 m.

Scypholanceola vanhoeffeni Woltereck 1905

K.H. Barnard 1916: 34/17

K.H. Barnard 1932: 34/16

FAMILY SCINIDAE STEBBINGScina borealis (G.O. Sars) 1882

Wagler 1926: 33/16, 33/18

Wagler 1927: 35/13

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/30, 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/17, 150 - 0 m.

Scina crassicornis (Fabricius) 1775

Wagler 1926: 33/16, 33/18, 34/18

Wagler 1927: 33/18

K.H. Barnard 1932: 34/16, 250 - 0 m.

Siegfried 1963: West Coast, South coast, "mixing zone"

Scina curvidactyla Chevreux 1914

NGY Samples: 31/29, 5 - 0 m.

Scina excisa Wagler 1926

Wagler 1926: 33/18

Scina incerta Chevreux 1900

K.H. Barnard 1932: 34/16

Scina langhansi Wagler 1926

K.H. Barnard 1932: 34/16

Scina marginata (Bovallius) 1885

NGY Samples: 31/25, 150 - 0 m.

Scina nana Wagler 1926

Wagler 1926: 33/18

Wagler 1927: 33/16, 250 - 0 m.

NGY Samples: 35/26, 150 - 0 m.

Scinidae continuedScina oedicarpus Stebbing 1895

Wagler 1926: 33/18

K.H. Barnard 1932: 34/16

Scina rattrayi Stebbing 1895

Wagler 1926: 33/18

Scina similis Stebbing 1895

NGY Samples: 33/28, 150 - 0 m.

Scina stenopus Stebbing 1895

Wagler 1926: 33/18, 34/18

NGY Samples: 30/31, 31/30, 31/31, 34/25, 34/27, 35/26; 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/17, 150 - 0 m.

Scina tullbergi (Bovallius) 1885

Siegfried 1963: West coast, South coast, "mixing zone"

Scina uncipes spinosa var. affinis Wagler 1927as Scina uncipes form affinis, K.H. Barnard 1932: 34/16Scina wolterecki Wagler 1926

Wagler 1926: 33/18

Ctenoscina brevicaudata Wagler 1926

Wagler 1926: 33/18

FAMILY VIBILIIDAE CLAUSVibilia antarctica Stebbing 1888

Behning 1925: 34/18, 35/18

Vibilia armata Bovallius 1887

K.H. Barnard 1925: 33/27

Behning 1925: 33/16, 33/18, 34/18

K.H. Barnard 1932: 34/16

Siegfried 1963: West coast, South coast, "mixing zone"

Division of Sea Fisheries IIOE Cruise I: 26/36, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16,

32/17, 33/16, 33/18, 34/16, 34/17, 34/18, 35/16, 35/17, 35/18, 36/18, 36/19;

150 - 0 m. and 5 - 0 m.

as Vibilia gracilentata, Stewart 1913: 34/15

Vibiliidae continuedVibilia chuni Behning & Woltereck 1912

NGY Samples: 31/25, 150 - 0 m.

Vibilia cultripes Vosseler 1901

Siegfried 1963: 24/14, 150 - 0 m.

Vibilia propinqua Stebbing 1888

Siegfried 1963: West coast

Vibilia stebbingi Behning & Woltereck 1912

NGY Samples: 34/25, 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 32/17, 33/16, 33/17, 34/15, 34/16, 35/15, 35/16, 35/17, 35/18, 36/19, 37/17, 37/18; 150 - 0 m. and 5 - 0 m.

Vibilia viatrix Bovallius 1887

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/31, 31/30; 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/17, 35/15, 37/18; 150 - 0 m. and 5 - 0 m.

Cylopus magellanicus Dana 1853

K.H. Barnard 1932: 34/16

FAMILY PARAPHRONIMIDAE BOVALLIUSParaphronima crassipes Claus 1879

K.H. Barnard 1932: 34/16, 250 - 0 m.

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/31, 31/31, 32/30, 34/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 35/15, 35/20, 36/18; 150 - 0 m.

Paraphronima gracilis Claus 1879

K.H. Barnard 1932: 29/14, 200 - 0 m.

Siegfried 1963: West coast

NGY Samples: 29/32, 30/31, 31/30, 32/30, 33/28, 34/25, 34/26, 34/27; 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 26/35; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 36/19; 150 - 0 m. and 5 - 0 m.

FAMILY CYSTISOMATIDAE STEBBINGCystisoma africana K.H. Barnard 1916

K.H. Barnard 1916: 33/17

Cystisoma coalitum (Woltereck) 1903

Woltereck 1903: 33/18

FAMILY HYPERIIDAE DANAHyperia atlantica Vosseler 1901

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 35/15, 35/18;

150 - 0 m. and 5 - 0 m.

Hyperia crucipes Bovallius 1889

Division of Sea Fisheries Routine Program Cruises 1962: 35/20, 50- 0 m.

Hyperia fabrei (Milne-Edwards) 1830

Division of Sea Fisheries Routine Program Cruises 1963: 32/16, 33/16, 35/15,

35/17, 35/19, 36/19; 150 - 0 m. and 5 - 0 m.

Hyperia gaudichaudi Milne-Edwards 1840

K.H. Barnard 1916: West coast - on scyphomedusae

Division of Sea Fisheries Routine Program Cruises 1963: 32/18, 33/16, 33/17,

33/18, 34/18; 60 - 0 m. and 5 - 0 m.

as Hyperia galba, Siegfried 1963: West coast, South coast, "mixing zone"Hyperia macrodactyla K. Stephensen 1924

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 35/17; 150 - 0 m.

Hyperia macrophthalma Vosseler 1901

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 33/16, 34/17,

35/17, 35/18, 35/20; 150 - 0 m. and 5 - 0 m.

Hyperia promontorii Stebbing 1888

Stebbing 1888: 34/18, surface

Siegfried 1963: West coast, South coast, "mixing zone"

Hyperia schizogeneios Stebbing 1888

Division of Sea Fisheries Routine Program Cruises 1962 and 1963: 32/16, 32/17,

33/15, 33/16, 33/17, 33/18, 34/16, 34/17, 34/18, 34/19, 35/17, 35/18, 35/19,

36/19, 36/21; 150 - 0 m. and 5 - 0 m.

Hyperioides longipes Chevreux 1900

K.H. Barnard 1932: 34/16

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: East and South Coasts from Durban to Cape Seal; 150 - 0 m. and

5 - 0 m.

Phronima sedentaria continued

Siegfried 1963: West coast, "mixing zone"

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m. and 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/15, 32/16, 33/16, 34/16, 34/17, 35/15, 35/17, 36/19; 150 - 0 m. and 5 - 0 m.

Phronimella elongata (Claus) 1862

K.H. Barnard 1940: 29/31, surface

Siegfried 1963: West coast, South Coast, "mixing zone"

NGY Samples: 30/31, 30/32, 31/29, 31/30, 31/31; 32/29, 32/30, 33/27, 34/25, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 32/17, 33/16, 34/17, 35/15, 35/16, 35/17, 35/18, 35/19, 35/20, 36/21; 150 - 0 m. and 5 - 0 m.

FAMILY ANCHYLOMERIDAE BOVALLIUSAnchylomera blossevillei Milne-Edwards 1830

K.H. Barnard 1932: 33/16

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 33/16, 34/15, 34/16, 34/17, 35/15, 35/16, 35/17, 35/18, 35/19, 35/20, 36/19, 36/20, 36/21, 37/21; 150 - 0 m. and 5 - 0 m.

Phrosina semilunata Risso 1822

Spandl 1927: 35/19

K.H. Barnard 1932: 29/14, 33/16, 34/16

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 26/35; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 33/16, 34/15, 34/16, 34/17, 35/15, 35/17, 35/18, 35/19, 36/20, 36/21, 37/18, 37/20, 37/21; 150 - 0 m. and 5 - 0 m.

FAMILY PHRONIMIDAE DANA

Phronima atlantica Guérin Méneville 1836

K.H. Barnard 1932: 34/16

K.H. Barnard 1940: 29/31, surface

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/32, 31/31, 34/25, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/15, 32/16, 32/17, 33/15, 33/16, 33/17, 34/15, 34/16, 34/17, 35/16, 35/18, 36/19, 37/21; 150 - 0 m. and 5 - 0 m.

Phronima atlantica var. solitaria Vosseler 1901

Siegfried 1963: 33/14, 5 - 0 m.

NGY Samples: 30/32, 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/16, 34/17, 35/16; 150 - 0 m.

Phronima colletti Bovallius 1887

K.H. Barnard 1940: 29/31, surface

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/30, 30/32, 31/29, 32/30, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35, 26/37; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/18, 150 - 0 m. and 5 - 0 m.

Phronima pacifica Streets 1887

K.H. Barnard 1932: 29/14, 200 - 0 m.

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/32, 31/30, 33/29, 34/23, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/15, 32/16, 32/17, 33/15, 33/16, 34/15, 34/16, 34/17, 35/15, 35/16, 35/17, 35/18, 36/19, 36/21, 37/18, 37/21; 150 - 0 m. and 5 - 0 m.

Phronima sedentaria (Forsk.) 1775

Stebbing 1910: 33/16

K.H. Barnard 1932: 29/14, 33/16

Hyperioides longipes continued

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/16, 33/16, 34/16, 34/17, 34/18, 35/18, 35/19, 35/21; 150 - 0 m. and 5 - 0 m.

Hyperoche cryptodactylus Stebbing 1888

Stebbing 1888, 1910: 34/18, surface

Hyperoche martinezii (Fr. Müller) 1864)

NGY Samples: 33/27, 34/25; 150 - 0 m.

Hyperoche mediterranea Senna 1906

Division of Sea Fisheries Routine Program Cruises 1963: 33/17, 150 - 0 m.

Hyperoche medusarum (Kröyer) 1838

Siegfried 1963: West coast, South coast, "mixing zone"

Division of Sea Fisheries Routine Program Cruises 1963: 33/18, 35/17; 5 - 0 m.

Parathemisto gaudichaudi (Guérin Méneville) 1825

K.H. Barnard 1932: 33/16, 1410 - 1310 m.

Siegfried 1963: West coast, South coast, "mixing zone"

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/16, 32/17, 33/16, 33/17, 33/18, 34/15, 34/16, 34/17, 34/18, 34/19, 35/16, 35/17, 35/18, 35/19, 36/20, 37/21; 150 - 0 m. and 5 - 0 m.

as Euthemisto gaudichaudi, K.H. Barnard 1925: 33/18, surface

Phronimopsis spinifera Claus 1879

NGY Samples: 30/31, 30/32, 31/31, 32/29, 32/30, 33/27, 33/28, 34/23, 34/25, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 34/16, 34/17, 35/19; 150 - 0 m. and 5 - 0 m.

FAMILY DAIRELLIDAE VOSSELERDairella latissima Bovallius 1887

K.H. Barnard 1932: 34/16

Division of Sea Fisheries Routine Program Cruises 1963: 34/16, 34/17, 35/18; 150 - 0 m. and 5 - 0 m.

Eupronoe minuta continued

NGY Samples: 30/31, 30/32, 31/29, 32/29, 32/30, 33/29, 34/25, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/35, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 33/16, 34/16, 34/17, 35/15, 35/16, 35/17, 35/18, 36/20; 150 - 0 m. and 5 - 0 m.

Paralycaea gracilis Claus 1879

NGY Samples: 30/32, 31/31, 33/28, 34/27; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/15, 33/16, 34/16; 150 - 0 m. and 5 - 0 m.

Parapronoe crustulum Claus 1879

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 35/26, 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 32/16, 34/16, 34/17, 36/21, 37/18, 37/21; 150 - 0 m. and 5 - 0 m.

as Parapronoe cambelli, Siegfried 1963: West coast, "mixing zone"

as Parapronoe clausi, K.H. Barnard 1916: 33/28

Pronoe capito Guérin Méneville 1836

NGY Samples: 33/28, 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m.

Sympronoe parva (Claus) 1879

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/31, 32/30, 34/23, 34/25, 34/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 33/16, 33/17, 34/17, 35/18; 150 - 0 m. and 5 - 0 m.

FAMILY LYCAEIDAE CLAUSLycaea nasuta Claus 1887

K.H. Barnard 1932: 34/16

Siegfried 1963: West coast, "mixing zone"

Lycaea pulex Marion 1874

NGY Samples: 32/30, 33/27, 34/23, 34/25; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 33/16, 34/16, 34/17, 34/19, 35/18, 35/19, 35/20, 36/18, 36/21; 150 - 0 m. and 5 - 0 m.

Anchylomeridae continuedPrimno macropa Guérin Méneville 1836

K.H. Barnard 1932: 29/14, 34/16

Siegfried 1963: West coast, "mixing zone"

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 33/16, 34/16, 34/17, 35/16, 35/17, 35/18, 35/19, 35/20, 36/19, 37/21; 150 - 0 m. and 5 - 0 m.

FAMILY LYCAEOPSIDAE CHEVREUXLycaeopsis themistoides Claus 1879

Siegfried 1963: 23/12

NGY Samples: 32/30, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Lycaeopsis zamboangae (Stebbing) 1888

NGY Samples: 34/26, 150 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/17, 5 - 0 m.

FAMILY PRONOIDAE CLAUSEupronoe armata Claus 1879

Siegfried 1963: West coast, South coast, "mixing zone"

Eupronoe intermedia Stebbing 1888

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 35/15, 150 - 0 m.

Eupronoe laticarpa K. Stephensen 1926

NGY Samples: 30/31, 30/32, 31/31, 32/27, 32/29, 32/30, 33/28, 34/23, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Eupronoe maculata Claus 1879

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/31, 31/30, 32/29, 34/23, 34/25; 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/16, 34/17, 35/15, 35/17, 35/18, 35/19, 35/21, 36/18, 36/19, 37/18, 37/21; 150 - 0 m. and 5 - 0 m.

Eupronoe minuta Claus 1879

K.H. Barnard 1932: 29/14, 34/16

Siegfried 1963: West coast, "mixing zone"

Lycaeidae continuedLycaea serrata Claus 1879

Division of Sea Fisheries Routine Program Cruises 1963: 32/16, 35/17, 35/18;
150 - 0 m.

Pseudolycaea pachypoda Claus 1879

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/17, 35/15;
150 - 0 m. and 5 - 0 m.

Tryphana malmii Boeck 1870

Siegfried 1963: West coast, South coast, "mixing zone"

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/16, 34/17;
150 - 0 m. and 5 - 0 m.

FAMILY BRACHYSCELIDAE K. STEPHENSENBrachyscelus cruscolum Spence Bate 1861

K.H. Barnard 1932: 33/16, 34/16

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and
5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m. and
5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 34/16, 34/17,
35/15, 35/18, 35/19, 36/18, 36/19; 150 - 0 m. and 5 - 0 m.

Brachyscelus rapacoides K. Stephensen 1926

NGY Samples: 31/29, 31/30, 34/25; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Brachyscelus rapax Claus 1879

Claus according to Stebbing 1910: 34/18

Thamneus platyrrhynchus Stebbing 1888

Siegfried 1963: West coast

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 34/17, 35/20;
150 - 0 m. and 5 - 0 m.

FAMILY OXYCEPHALIDAE SPENCE BATECalamorhynchus pellucidus Streets 1878

Fage 1960: 24/38, 25/36, 34/27; 300 - 0 m., 200 - 0 m., 150 - 0 m., 50 - 0 m.

NGY Samples: 34/26 (N 70 net sample)

Division of Sea Fisheries Routine Program Cruises 1962: 33/16, 150 - 0 m.

Oxycephalidae continuedCranocephalus scleroticus (Streets) 1878

Page 1960: 25/36, 29/32, 36/21; 200 - 0, 100 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Glossocephalus milne-edwardsi Bovallius 1887

K.H. Barnard 1940: 29/31, surface

Page 1960: 24/38, 34/27, 35/23; 300 - 0 m., 250 - 0 m., 50 - 0 m.

Leptocotis tenuirostris (Claus) 1871

Page 1960: 24/38, 25/36, 29/31, 31/30, 34/27, 35/23, 36/21; 300 - 0 m. and 100 - 0 m.

NGY Samples: 30/31, 30/32, 31/29, 31/30, 32/29, 32/30, 33/27, 33/28, 34/23, 34/25, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 35/17, 150 - 0 m.

Oxycephalus clausi Bovallius 1887

Stebbing 1924: 29/31

K.H. Barnard 1932: 33/16

K.H. Barnard 1940: 29/31, surface

Page 1960: 24/38, 25/36, 29/31, 29/32, 30/33, 31/30, 35/23, 36/21; 300 - 0 m., 200 - 0 m., 100 - 0 m.

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/32, 26/33, 26/34, 26/35, 26/36; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 32/14, 32/16, 33/15, 33/16, 34/15, 34/17, 35/15, 35/16, 35/17, 35/19, 35/21, 36/18, 36/21, 37/21; 150 - 0 m. and 5 - 0 m.

Oxycephalus latirostris Claus 1879

K.H. Barnard 1940: 29/31, surface

Page 1960: 24/38, 25/36, 29/31, 34/27, 35/23; 300 - 0 m., 250 - 0 m., 200 - 0 m., 100 - 0 m.

Siegfried 1963: 32/13, 150 - 0 m.

NGY Samples: 32/30, 34/23, 34/25; 150 - 0 m.

Oxycephalidae continuedOxycephalus piscator Milne-Edwards 1830

Fage 1960: 24/38, 25/36, 27/33, 34/27, 35/23; 300 - 0 m., 200 - 0 m., 100 - 0 m.,
50 - 0 m.

NGY Samples: 30/32, 33/28; 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34, 26/35; 300 - 0 m., and
5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 35/15, 35/16, 35/18;
150 - 0 m.

Rhabdosoma brevicaudatum Stebbing 1888

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/17, 150 - 0 m.

Rhabdosoma minor Fage 1954

Fage 1960: 24/38, 25/36, 28/33, 29/31, 34/27, 36/21; 300 - 0 m., 200 - 0 m.,
100 - 0 m.

NGY Samples: 30/31, 34/25; 150 - 0 m.

Rhabdosoma whitei Spence Bate 1861

K.H. Barnard 1940: 29/31, surface

Fage 1960: 25/36, 29/31, 35/23; 200 - 0 m., 100 - 0 m., 50 - 0 m.

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 34/23, 34/25; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/17, 35/17,
35/19, 36/19; 150 - 0 m. and 5 - 0 m.

Simorhynchotus antennarius (Claus) 1871

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/32, 32/29, 33/23, 34/23, 34/25, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 34/17, 35/18,
35/19, 35/20, 36/18; 150 - 0 m. and 5 - 0 m.

Streetsia challengerii Stebbing 1888

K.H. Barnard 1932: 29/14, 200 - 0 m.

Fage 1960: 24/38, 25/36, 28/33, 29/31, 29/32, 34/27, 35/23, 31/14; 300 - 0 m.,
250 - 0 m., 200 - 0 m., 100 - 0 m.

NGY Samples: 30/32, 31/29, 31/31, 33/27, 35/26; 150 - 0 m.

Streetsia challengeri continued

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1962, 1963: 32/16, 34/16, 34/17, 35/15; 150 - 0 m. and 5 - 0 m.

as Streetsia pronoides, Siegfried 1963: West coast, "mixing zone"

Streetsia mindanaonis (Stebbing) 1888

Page 1960: 24/38, 28/33, 29/31; 300 - 0 m., 200 - 0 m., 100 - 0 m.

NGY Samples: 30/32, 32/30, 34/25, 35/26; 150 - 0 m. and 5 - 0 m.

Streetsia porcella (Claus) 1879

Page 1960: 24/38, 25/36, 28/33; 200 - 0 m. and 50 - 0 m.

NGY Samples: 30/31, 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/35, 300 - 0 m.

Division of Sea Fisheries Routing Program Cruises 1963: 37/21, 5 - 0 m.

Streetsia steenstrupi (Bovallius) 1887

Page 1960: 29/32, 31/30, 34/27, 35/23, 31/14; 300 - 0 m., 200 - 0 m., 100 - 0 m.

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/32, 32/30, 34/27; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/16, 34/16, 35/17, 37/21; 150 - 0 m. and 5 - 0 m.

FAMILY PARASCCELIDAE BOVALLIUSParascelus edwardsi Claus 1879

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/31, 30/32, 32/29, 33/29, 34/23, 34/25, 34/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/32, 26/35; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 34/17, 35/17, 35/18, 35/19, 36/19, 36/20, 37/21; 150 - 0 m. and 5 - 0 m.

Parascelus typhoides Claus 1879

NGY Samples: East and South coasts from Durban to Cape Seal; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 26/35; 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 33/15, 33/16, 34/16, 34/17, 35/17, 35/18, 35/19, 37/18, 37/21; 150 - 0 m. and 5 - 0 m.

Platyscelidae continuedPlatyscelus serratulus Stebbing 1888

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 33/28, 35/26; 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/16, 33/16, 34/17, 35/17, 35/18; 150 - 0 m. and 5 - 0 m.

Tetrathyrus forcipatus Claus 1879

Claus 1879 according to Stebbing 1910: 34/18

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/31, 32/30, 34/23, 34/25, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 33/16, 34/16, 34/17, 35/18, 35/19, 35/20; 150 - 0 m. and 5 - 0 m.

Parascelidae continuedSchizoscelus ornatus Claus 1879

Siegfried 1963: 34/19, 5 - 0 m.

NGY Samples: 29/31, 30/31, 32/30, 34/25; 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/18, 36/20; 5 - 0 m.

Thyropus sphaeroma (Claus) 1879

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 29/31, 30/30, 30/32, 31/29, 31/30, 32/30, 34/23, 34/25, 34/26,
35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/18, 35/18; 150 - 0 m.
and 5 - 0 m.

FAMILY PLATYSCELIDAE STEBBINGAmphithyrus bispinosus Claus 1879

Siegfried 1963: 34/17, 5 - 0 m.

NGY Samples: 30/30, 30/31, 30/32, 31/29, 31/30, 32/28, 32/29, 32/30, 33/28,
34/23, 34/25, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 34/16, 35/15, 35/17,
36/21, 37/18, 37/21; 150 - 0 m.

Amphithyrus glaber Spandl 1924

NGY Samples: 30/30, 30/31, 30/32, 31/29, 32/27, 32/29, 32/30, 34/23, 34/25,
34/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 33/16, 34/16,
35/15, 35/18, 35/19, 37/21; 150 - 0 m.

Amphithyrus sculpturatus Claus 1879

Siegfried 1963: West coast, South coast, "mixing zone"

NGY Samples: 30/31, 30/32, 32/29, 32/30, 34/23, 34/25, 34/27; 150 - 0 m. and
5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/17, 34/19,
35/18, 35/19; 150 - 0 m. and 5 - 0 m.

Platyscelidae continuedAmphithyrus similis Claus 1879

NGY Samples: 30/31, 150 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/33, 26/34; 300 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/17, 34/16, 34/17, 35/15; 150 - 0 m. and 5 - 0 m.

Hemityphis rapax (Milne-Edwards) 1830

K.H. Barnard 1932: 34/16

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 29/31, 30/31, 30/32, 31/31, 32/29, 32/30, 34/26, 34/27, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 32/14, 32/15, 32/16, 33/16, 34/16, 34/17, 35/15, 35/18, 35/19, 36/18, 37/18; 150 - 0 m. and 5 - 0 m.

as Hemityphis tenuimanus, Claus 1879 according to Stebbing 1910: 34/18

Paratyphis maculatus Claus 1879

Claus 1879 according to Stebbing 1910: 34/18

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/31, 30/32, 31/30, 31/31, 32/29, 32/30, 33/28, 34/25, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 34/17, 35/15, 35/16, 35/18, 35/19; 150 - 0 m. and 5 - 0 m.

Paratyphis promontorii Stebbing 1888

Stebbing 1888, 1910: 35/18, surface

NGY Samples: 30/31, 31/30, 31/31, 32/30, 33/28, 34/23, 34/25, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/16, 34/16, 34/17, 35/15, 35/19, 36/18, 36/19; 150 - 0 m. and 5 - 0 m.

Paratyphis spinosus Spandl 1924

NGY Samples: 32/29, 32/30, 34/23, 34/25, 35/26; 150 - 0 m.

Platyscelus ovoides (Claus) 1879

K.H. Barnard 1932: 34/16

Siegfried 1963: West coast, "mixing zone"

NGY Samples: 30/32, 31/30, 34/25, 34/26, 35/26; 150 - 0 m. and 5 - 0 m.

Division of Sea Fisheries IIOE Cruise I: 26/34, 300 - 0 m.

Division of Sea Fisheries Routine Program Cruises 1963: 33/15, 37/21; 150 - 0 m.