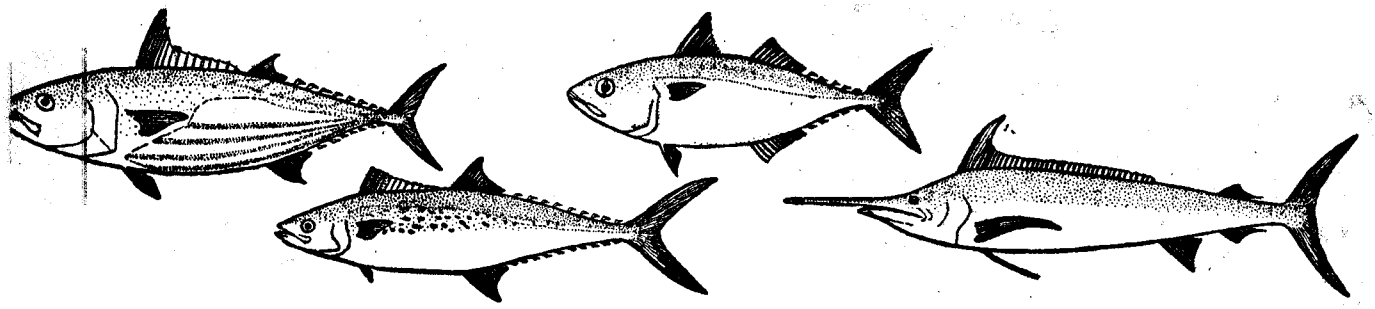
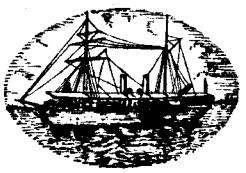


SYMPOSIUM ON SCOMBROID FISHES

PART II



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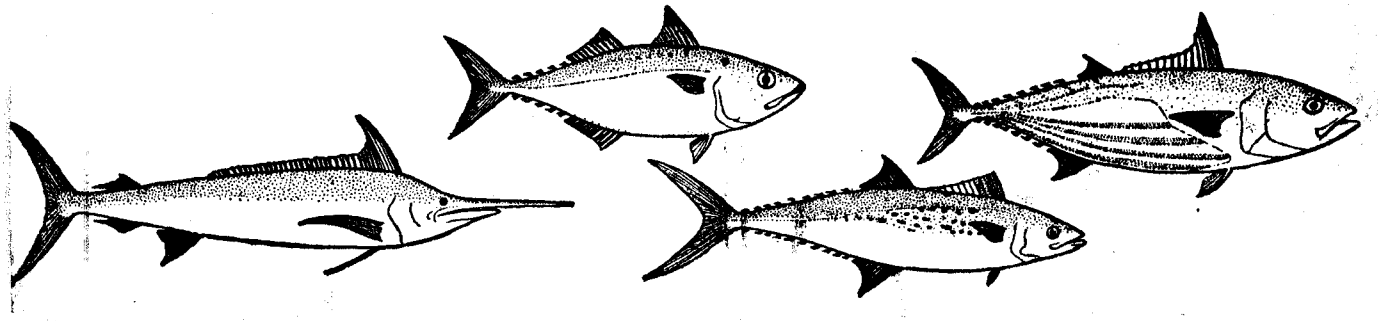
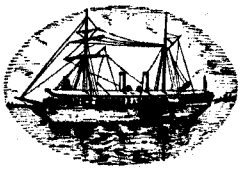


PROCEEDINGS OF THE

SYMPOSIUM
ON
SCOMBROID FISHES

HELD AT MANDAPAM CAMP FROM JAN. 12-15, 1962

PART II



SYMPOSIUM SERIES I

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THE PHENOMENAL FISH MORTALITY IN THE ARABIAN SEA IN 1957— A SPECULATION ON THE POSSIBLE IDENTITY OF THE SPECIES CONCERNED

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ONE of the most sensational items of news received in fishery circles in recent years has been an instance of fish mortality in the Arabian Sea during the second week of June 1957 estimated to involve over 20 million tons of fish nearly equalling world's annual catch. Attempts were also made to explain the phenomenon based on the information available on similar incidents elsewhere. Unfortunately no specimen was collected and as such the identity of the fish remained a matter of speculation.

Though the incident took place far from the Indian shores, efforts were made to collect as much information as possible on account of the increasing importance of the high seas from the fishery resources point of view. The following particulars were kindly furnished by Prof. Th. S. Rass of the Institute of Oceanology, Academy of Sciences of the U.S.S.R.

' According to the information given by the captain of the Soviet ship *IRKUTSK* from the 8th June of this year in the Arabian Sea between 60-70°E. and 10-12°N. were observed on the sea surface during five days abundant quantities of dead fish up to 10 per square meter in some places. Most of the fishes were of a red colour, and mainly 20-25 cm. long. A similar phenomenon was recorded in January-February by a Polish ship the *BALTIISK*.

' Prof. P. A. Moiseev immediately informed Dr. Kesteven in Rome. Judging from the size of the fish Dr. Kesteven supposes that it was *Rastrelliger* or *Scomberomorus*, but no specimens of fish have been collected and this identification is merely a supposition.'

Attempts were made to get some information from the Polish Shipping Company regarding the mortality referred to in the communication but with no success.

The area of fish mortality reported by the Russian ship lies in the main shipping route between Aden and Colombo and an incident of such a magnitude could not escape the notice of other ships that would have passed through the area then. In the course of the enquiries made an article entitled *Fish mortality in the Arabian Sea*, 1957 published in the January 1959 issue of *Marine Observer* was brought to my notice by Dr. A. Ramasastry of the India Meteorological Department and the instances recorded therein are given below.

' We have received observations from seven ships which make it clear that there was an extensive mortality of fish in the Arabian Sea region during three periods of the year 1957. The observations, arranged in order of date, are given below :

C. S. Edward Wilshaw. Captain C. C. Muckleston. Mombasa to Aden.

10th January 1957, between 0530 G.M.T. in 61° 15' E. and 0830 in 16° 08'N., 60°45'E. During the three hours' steaming between the above positions many dead fish were seen floating on the surface. There was no great concentration of fish, two or three bodies being seen every 5 minutes. All of them seemed to be intact and of one species, pinkish in colour and measuring 3-4 inches in length.

M. V. Trelissick. Captain F. G. Bolton, Mombasa to Kuwait.

20th January 1957, at 0730 G.M.T. in 17° 10′N., 57° 47′E. Observed numerous scattered dead fish floating on the surface, all of which appear to be of the same species, having flattish

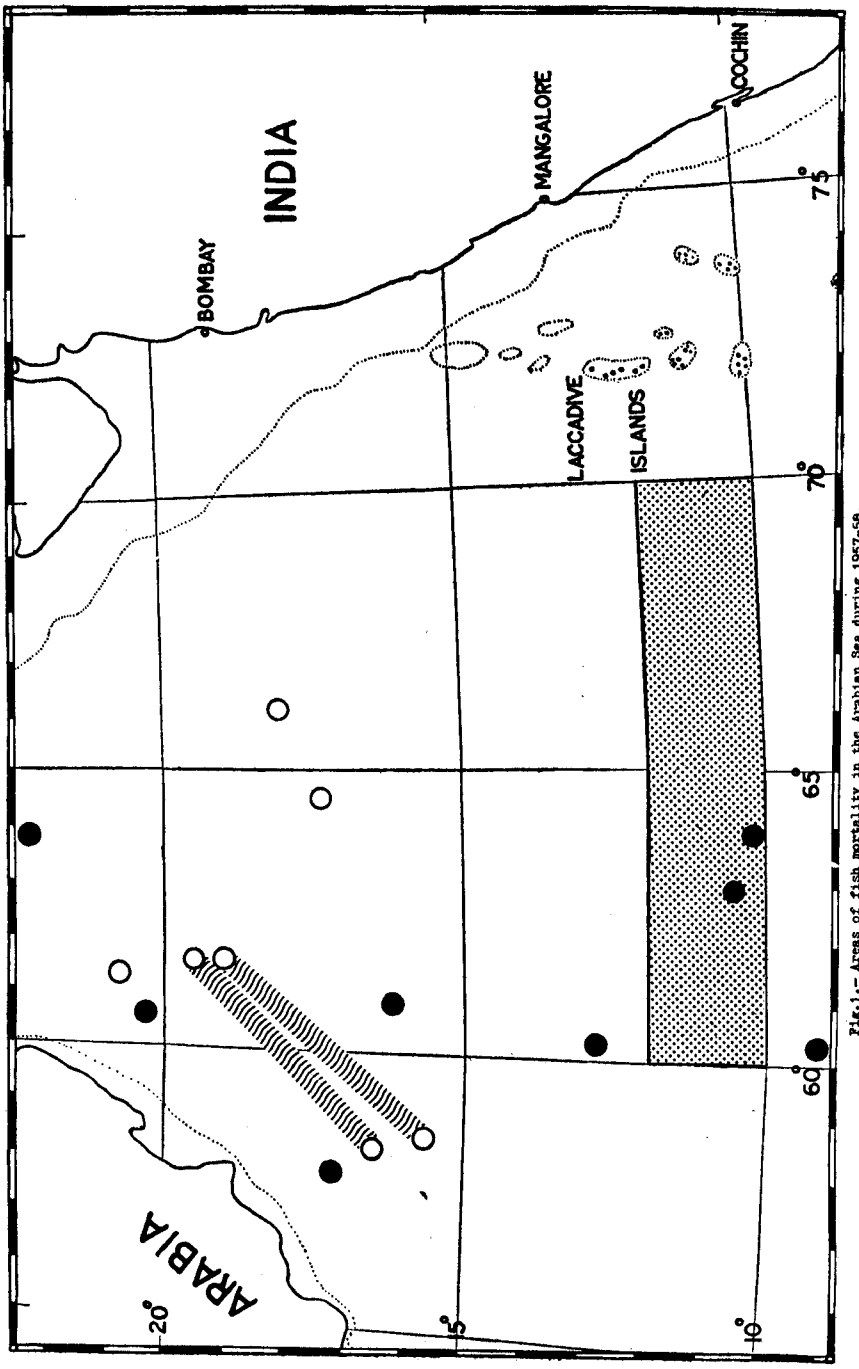

Fig.1.- Areas of fish mortality in the Arabian Sea during 1957-58.
● 1957 records. ○ 1958 records. ..... The affected area according to the report by the Russian ship Irkutsk in 1957.
○ Track of S.S.Karanja through the affected areas in 1958.

bodies, 6-9 in. in length, silver underneath, tinged pink on top with reddish gills, fins and tail. They were similar to an English golden carp. Flying fish were to be seen as usual.

S.S. Mahseer. Captain A. Hill, O.B.E. Aden to Colombo. Observers, the Master and Mr. J. Lyle, Chief Officer.

1st June, 1957. Between 1300 and 1430 G.M.T. number of dead fish were seen floating on the surface of the sea. They were all reddish brown in colour with white underneath and measured about 6-8 in. in length. It was unfortunately not possible to obtain a sample. Air Temp. 86°F., Sea 81°. Wind WSW, force 5.

Position of ship : 10° 34′ N., 62° 51′ E.

M.V. Bellerophon. Captain H. H. Sanderson. Aden to Penang. Observer, Mr. D. D. McDonald, 2nd Officer.

11th June 1957, at 0900 G.M.T. in 10° 16′N., 64° 20′E. For the next three hours the vessel passed through widely scattered quantities of dead fish floating on the surface. They appeared to be between 5 and 7 in. long. A few were of a reddish colour, but most were gray with white under parts.

S.S. Albistan. Captain R. Mace. Bandar Shahpur to Durban. Observers, Mr. J. Brown, Chief Officer and Mr. T. W. Feather, 2nd Officer.

12th June, 1957, from noon and until sunset, great numbers of dead fish were observed floating on the surface, singly or in groups, at intervals of about 100 ft. apart. They were from 9 in. to 12 in. in length and had bright red backs and white undersides. Some sea birds were in the area but none were seen to be feeding on the fish. Wind SW., force 4. Sea moderate or rough.

Position of ship : 12° 56′ N., 60° 03′ E.

13th June. During daylight hours, dead fish were again seen floating, but there were less numerous and scattered at greater intervals than those of yesterday. As before, no sea birds were observed feeding on the fish.

Position of ship : 9° 15′ E., 60° 14′ E.

M.V. Eucadia. Captain A. J. F. Colquhoun, M.D.E. Aden to Karachi. Observers, the Master, Mr. J. Scrimgeour, 2nd Officer and Mr. J. Walker, 3rd Officer.

10th October, 1957, 0730 G.M.T. During the last four hours we have been passing thousands of dead fish, which range between 4 in. and 8 in. in length and are about 2 in. in width. The dorsal fin, tail and back are a reddish colour, while the underside is white. Air temp. 80°F. Sea 81° F. Wind W., force 5. Sea rough.

Position of ship at 0600 : 22° 18′ N., 63° 2′ E.

M.V. City of Chester. Captain T. S. Dennis. Aden to Karachi. Observers, Mr. J. Campbell, 2nd Officer and Mr. R. M. Jones, 3rd Officer.

15th October, 1957. Dead fish about 2-5 in. long, reddish in colour with white undersides, were observed floating, evenly distributed, about 20-30 ft., apart, during the whole of the daylight hours. Though many sea birds accompanied the ship, none were interested in the fish. Sea slight, wind light and variable.

Position of ship at noon : 20° 21′ N., 60° 39′ E.

There were reports in the press that an anonymous Russian Merchant vessel had encountered large quantities of dead fish while crossing the Arabian Sea in June 1957 and over considerable area it was estimated that there were 10 fish in each square yard.'

The areas referred to in the various reports are indicated in the figure.

Whatever might have been the causative factor, it is clear that 1957 has been a year of extensive fish mortality in the Arabian Sea and that the incident in June was noticed by a number of ships passing through the area. Unfortunately no specimens were collected and therefore the identity of the fish could only be a matter of conjecture. According to the reports the size of fish ranged from about 15 cm. to 30 cm. and the colour was reddish brown dorsally with white under sides except in one instance where ' most of the specimens were gray with white under parts.' Though more than one species could have been involved, the probability is that the fishes affected could have been mostly pelagic species only and not deep sea forms. The commonest surface fish in the area is the flying fish and the ships' observers being very familiar with this would have identified it without any difficulty if this was the fish involved. It may be of interest to mention here that in an instance of fish mortality reported by S. S. City of Cape Town on 25th January 1958 at 20° 40′ N., 61° 07′ E. and recorded in the *Marine Observer* (*op. cit.*) it is stated that ' No sign of distress or weakness was evident in flying fish which were seen.' Similarly in the incident reported upon by M. V. Trelissick on 20th January 1957 flying fish were not affected. The fact that flying fishes could be affected is evident from the report of the presence of large numbers of dead flying fish made by S. S. Karanja one of the ' Voluntary Observing Ships ' of the India Meteorological Department on 23-1-1958 while passing through 15° 36′ N., 58° 30′ E ; 19° 6′ N., 61° 30′ E.

The area of the extensive fish mortality lies west of the Laccadive Archipelago. All the inhabited islands there were visited in 1958 and 1959 and enquiries were made if any dead fish were seen in the sea around at any time and the reply was in the negative.

With regard to the suggestion made that the fish could have been mackerel it may be said here that it is not known to occur in the Laccadive Sea and even solitary specimens have never been caught from around any of the islands and as such it is not likely that this fish will be occurring so far out in the open sea. Similarly *Scomberomorus* also has not been reported from there so far and even should it occur, it is doubtful if it would be found in such great numbers. It is therefore suggested that juvenile tunas could have been among the fishes affected in the catastrophe since the area of mortality is rich in tunas and the reference to the gray colour of the fish by one of the ships helps to support this view. The skipjack, the frigate mackerel and the little tunny are known to move about in large shoals and any sudden unfavourable environmental condition is liable to affect them *en masse*.

The June 1957 fish mortality was confined to between 60 and 70° E. and 9 and 13°N. The mortalities reported on other occasions also in 1957 lie more or less within the above longitudes though the latitudes are more to the north. The possibility that fish mortality would have taken place in other areas also but would have gone unnoticed being outside the regular shipping routes cannot be ruled out.

The object of this note is to focus attention on this important problem of fish mortality in the high seas. From the information available the central sector of the Arabian Sea is one of the worst affected areas deserving special study. This is known to be an area of confluence of ocean currents and of very high productivity. Extensive fish mortalities are bound to affect adversely the fishery potential there and the problem therefore is of vital importance to the countries bordering the Indian Ocean and the nations interested in the exploitation of the fishery resources of the area.

ACKNOWLEDGEMENT

My thanks are due to Prof. Th. S. Rass of the Institute of Oceanology, Moscow for the information furnished about the fish mortality observed by the Soviet Ship, *IRKUTSK* and to Dr. A. Ramasastry of the India Meteorological Department, Poona for bringing to my notice the article cited from the *Marine Observer* and for sending me copies of reports of the voluntary observing ships.

APPENDIX

Reports of Fish Mortality in the Arabian Sea during 1958

S.S. City of Cape Town. Captain T. Lovell. Aden to Karachi. Observer, Mr. D. Russell, 2nd Officer.

25th January, 1958. Numerous dead fish were seen between 0900 G.M.T. and dark, but unfortunately, a specimen could not be obtained. They were observed carefully with the aid of binoculars during the 4-8 p.m. watch and it was seen that they were about 6-8 in. long with silver sides and belly : the back, dorsal fin and tail were orange and red, though some fish were red all over. All the fish were floating on their sides. Although there were sea birds in the vicinity they were apparently not feeding on the dead fish. No sign of distress or weakness was evident in flying fish which were seen.

Position of ship at 0900 : 20°40′N., 61° 07′ E.
(Vide *Marine Observer*, January 1959. p. 12).

Name of ship—S.S. Karanja
Name of Captain—R. Weatherseed
Observing Officer—G. Merchant, 3/0.

Voyage :—From Mombasa to Bombay *via* Karachi.

23-1-1958. Throughout the day numerous dead fish were seen floating on top of the water. These were about two inches long and were taken to be flying fish as the latter were seen frequently and appeared to be of the same size and shape as of the dead ones. The only difference was the colouring. The flying fish were of the usual colour i.e. bluish green. However the dead ones varied from bright orange red all over to just the tail of the fish being of that colour. Apart from this colour the most prominent other colour was white and then the greenish blue of the flying fish. No traces of oil were seen and the current for previous four days was the same i.e. 256°, 3/4 knot. Weather had been the same, few clouds. Wind forces 3, north-easterly.

Position between 15° 36′ N., 58° 30′ E ; 19° 6′ N., 61° 30′ E.

On 24-3-1958 numerous dead fish were seen similar to those already reported on 23-1-1958. Current for previous 24 hours 068°, 1/2 knot. Wind 2-3 SSE. Slight sea, low swell and no oil slick or other cause for death apparent.

Position between 16° 24′ N., 58° 30′ E. and 19° 30′ N., 61° 30′ E.

Vessel—S.S. Amra.
Captain—A. G. Smythe.
Voyage—Porebunder to Mombasa and back.
Observer—I. Tomkins, 3/0.

20th October, 1958. 0800 hrs. G.M.T. Observed numerous dead fish floating close to ship, 4"-8" in length with red backs and white bellies.

Position 17° 17′ N., 64° 38′ E. Course 229° T. Speed 15 kts. Wind S'ly, 1-2. Sea water Temp. 81°F.

7th November, 1958. 0730 hrs. G.M.T. Position 17° 49′ N. 66° 07′ E. Observed numerous dead fish floating close to ship, 4″-8″ in length with red backs and white bellies.

Passed Kanker at 0730 hrs. G.M.T. approx. Course 140° T. Our Course 041° T. Speed 16 kts. Wind NNE-2.

(Vide information obtained by voluntary observing ships and furnished by the India Meteorological Department).

Comments by R. Raghu Prasad

Several hypotheses have been put forward as the causes of mass mortality of fishes in sea such as volcanism, poisoning by H_2S derived from the decay of enormous masses of plankton, sudden changes in the temperature, red water caused by the dinoflagellates, etc. Amongst these, factors consequent on high plankton production and subsequent death and decay seem to be the likely suspect of the catastrophe. From the available information on the productivity of the Arabian Sea it may be mentioned that certain regions are extremely productive. Gilson (1937) states that production in the Arabian Sea calculated by him from nitrogen consumption is of a higher order than in many temperate regions. Recently *VITIAZ* expedition also observed high production rates in the Arabian Sea especially in the regions of deep water ascent. The area in which large scale fish mortality was observed coincides with the area of high production. The planktologists of the expedition believe that it was due to the shifting of oxygen minimum layer to the surface. However, in the absence of any details it is not possible to ascribe more precisely the factor or factors responsible for the reported fish mortality.