

INTERNATIONAL INDIAN OCEAN EXPEDITION



NEWSLETTER

INDIA



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The Indian participation in the International Indian Ocean Expedition has made much headway since its start in the year 1962.

The details of the Indian Scientific Programme along with the description of the vessels participating in the cruises, the various facilities made available by the Government of India to the visiting research ships and their scientific personnel are included in a booklet entitled "INDIAN SCIENTIFIC PROGRAMME 1962-65" issued by the Indian National Committee on Oceanic Research. This booklet has been distributed to several organizations/institutions including IOC SCOR and National Committees of other countries. In accordance with the resolution of the INCOR and in keeping with the practice followed by other members of the Inter-Governmental Oceanographic Commission, it has now been decided to issue the Indian News Letter containing progress made from time to time in the Indian Programme of the Expedition as is being done by other participating countries.

CRUISING PROGRAMME OF INDIAN VESSELS

INS Kistna :

The cruising programme of *INS Kistna* is going on according to schedule. The first scientific cruise of *INS Kistna* was inaugurated by Prof. Humayun Kabir, Minister for

Scientific Research and Cultural Affairs on October 9, 1962. Prior to the inauguration the ship had made one training cruise and some observations and collections were made in the northern part of the Arabian Sea including Gulf of Oman. Since inauguration seven cruises have been completed in all. In these cruises, a number of sections have been worked out in the Arabian Sea, parts of the Indian Ocean from Cape Comorin to the equator and Southern & Central Bay of Bengal including the Andaman Sea.

R. V. Varuna :

R. V. Varuna has done two equatorial crossings in connection with the International Indian Ocean Expedition Programme during September-October, 1962 and is currently doing her cruises near the east coast. Extensive physical oceanographic observations with special reference to temperature, salinity and oxygen have been made during these cruises. This vessel which has a deep echosounder has made soundings in an extensive area near the Laccadives and Maldives. Echo traces revealing fish concentrations have been confirmed by actual fishing, using various types of gear.

The data collected in the cruises have been quite voluminous; the processing is, therefore, still in the preliminary stage.

Detailed processing and analysis would take considerable amount of time. It has however been arranged that significant findings be highlighted as early as possible.

International Meteorological Centre :

This centre has started functioning in Bombay from January 1, 1962. The scientists belonging to the US team of meteorologists have arrived in Bombay.

The United Nations Special Fund has agreed to give assistance to the extent of \$ 824,700 towards setting up of this Centre along with the Institute of Tropical Meteorology at Poona. The matching contribution from the Indian side is \$ 1.038 million (Rs. 49.43 lakhs). The International Meteorological Centre provides a unique opportunity for the collection of valuable meteorological data from the Indian Ocean as well as for studies on tropical cyclones. The Inter-Governmental Oceanographic Commission's resolution recommends that regular meteorological observations be made from oceanographic vessels and also that 35mm photographs of weather radarscopes for each synoptic hours where echoes are present, and at more frequent intervals during disturbed periods, be sent to International Meteorological Centre (IMC).

Indian Ocean Biological Centre :

The Biological Centre at Ernakulam (Cochin) has started functioning from November 1962. Besides the regular scientific staff six Research Fellows of the Indian National Committee on Oceanic Research are working in this Centre on the collections received so far from the Indian participating ships. Standard collections from the participating vessels of other countries have started coming. The UNESCO has appointed Dr. Vagn K. Hansen of Denmark for the post of a Curator and he has assumed duty at the Centre on 18.4.1963.

The Consultative Committee of Indian Ocean Biological Centre comprising Prof. Martin

Johnson of USA and Prof. Sigeru Motoda of Japan met in Ernakulam on February 25 & 26, 1963 and in Delhi on February 28 and March 1, 1963 to discuss the details regarding the working of the Centre. Other foreign scientists who participated in the discussions were Dr. R. Serene from SEASCO Office, Djakarta, Dr. J. E. Wallen, Smithsonian Institute, Washington, U. S. A., Dr. T. R. Parsons of the UNESCO office of Oceanography, Paris, Dr. Vagn K. Hansen, Curator-Designate of Indian Ocean Biological Centre and Dr. Evastafiev of UNESCO (SASCO) Office, New Delhi.

The main recommendations of the Committee are as follows:—

1. The organization of the analysis at the Centre should consist of three parts:

- (i) Sorting of the plankton samples into a fairly few number (30-50 categories) of taxonomic groups.
- (ii) Descriptive treatments of the variations of the above groups according to their occurrence in time and space distribution in the Indian Ocean. This work will be done by the staff of Indian Ocean Biological Centre when sufficient material has become available.
- (iii) Studies on taxonomy, ecology and zoogeography will be started by the personnel of IOBC and by specialists from India and abroad in accordance with the description of the activities of the Centre.

2. The Curator's responsibilities should be in the following order of priorities:

- (i) To establish methods and techniques to be used in the processing of the International samples.
- (ii) To determine the order in which the International samples will be sorted.
- (iii) To supervise the preparation of station lists, of catalogues of material in the International Collections, identification sheets to facilitate internal sorting at the Centre and atlases dealing with distribution

etc. of major groups which have been sorted.

(iv) To select with the advice of the IOBC Consultative Committee the specialists for study of the various fractions of the standard samples from a current international list of specialists who have expressed willingness to study the material (ref. NS/9/45A p. 5).

(v) To supervise the preparation and provide on request from recognised institutions, Named Collections from the International samples.

3. The UNESCO should continue to support the project at least up to 1966.

4. The INCOR should prepare a report on the present status of marine collections already retained in India.

5. The Secretary, IOC to compile and distribute a list of taxonomists who are prepared to work on Indian Ocean material.

Fellowships Sanctioned by the Indian Government :

Out of 8 Senior and 8 Junior Fellowships sanctioned by the Government of India for work connected with the expedition, 7 Senior Fellows and 6 Junior Fellows are already in position and are fully participating in the Scientific programme including the cruises of Indian Vessels.

UNESCO Fellowships & Deputation of Indian Scientists in connection with IIOE

The following persons have completed their training under the UNESCO Fellowships Programmes and deputations by the Government of India.

UNESCO Fellowships :

(a) Shipboard Fellowships

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|-----------------------------|-----------------------------------|
| 1. Dr. A. Daniel | } On board the USSR
R/V VITYAZ |
| 2. Shri P. V. Bhavanarayana | |

- | | |
|--------------------------|---------------------------------|
| 3. Shri A. V. S. Murthy | } On board the U.S.
R/V ARGO |
| 4. Shri K. Venkataratnam | |

(b) Fellowships for Instrumentation Training :

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|----------------------|--------------------------------------------|
| 1. Dr. H. N. Swamy | } At the CSIRO
Laboratories, Australia. |
| 2. Shri T. C. S. Rao | |

(c) Regular Fellowships for Institutional Training :

- | | |
|--------------------|--------------------------------------------------------------------------------------------------------|
| 1. Shri N. M. Shah | In Chemical Oceanography at the Laboratories of the Pacific Oceanography group, Nanaimo, B. C. Canada. |
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Deputation by Govt. of India :

(a) Shipboard Training :

- | | |
|-------------------------------|---------------------------------------|
| 1. Shri C. Poornachandra Rao | } On board the
USSR R/V
VITYAZ. |
| 2. Shri S. Dutta | |
| 3. Shri C. P. Gopala-Krishnan | |
| 4. Shri T. D. Krishna Kartha | |

(b) Institutional Training :

Dr. A. A. Ramasastry—Studies relating to Air-Sea Interactions, UK, USA, Japan.

News about the Programme of other Countries in connection with their Participation in the Expedition :

The Research Vessels *Argo* and *Horizon* of the Scripps Institution of Oceanography USA visited Cochin towards the end of September, 1962 on the completion of their first series of cruises

and the scientists on board were taken round the city and the educational institutions. Seminars were conducted in which foreign scientists as well as Indian scientists participated.

The plans of the U. S. Biology group to base their R/V *Anton Bruun* in Bombay, and take out several cruises during 1963-64 have been going on according to schedule. The R/V *Anton Bruun* arrived in Bombay in the first week of March. The first cruise of this vessel was inaugurated in Bombay on March 7, 1963 by Shrimati Vijayalakshmi Pandit, Governor of Maharashtra. A reception was also got up in honour of the visit of this research vessel by the Hospitality Committee at Bombay set up by the INCOR with the Vice-Chancellor of Bombay University as its Chairman. The National Committee has arranged with the Bombay University for giving office accommodation for the U. S. Biology Programme at the Bombay University Club House.

Facilities have been provided by arrangement with the Ministry of Food & Agriculture for the scientists of the U. S. Biology Programme to work at the Central Marine Fisheries Research Institute, Mandapam Camp for varying periods to supplement the field work with shore programmes. The R/V *Anton Bruun* completed her first cruise Bombay-Puket-Visakhapatnam-Bombay. She worked a number of sections in the Bay of Bengal, in the Andaman Sea and along the Indian, Burma and Thailand coasts. Prof. E. C. LaFond was the chief scientist on this cruise. Along with the American scientists, a few of our scientists participated in the cruise. During the first leg of the cruise, which ended at Visakhapatnam the participants were: Shri C. P. Rao, of the India Meteorological Department, Dr. R. V. Unnithan, INCOR Senior Research Fellow, Shri K. Balasubramanian of the Marine Biological Station, Porto Novo, Shri V. Chalapati Rao of Andhra University, Waltair and Shri S. P. Anand of the Research & Development Organization, Ministry of Defence. Most of the detailed work was completed during this leg of the cruise.

At Waltair a Marine Science Seminar was held

on April 26 & 27 1963, when the ship touched at the end of the first leg of the cruise. The results obtained were presented by the American and Indian scientists and this was followed by discussions in which a number of scientists from all over India, who had assembled there as delegates, participated. Among the results obtained, the most interesting were the delimitation of areas of upwelling along the east coast of India, Arakan coast of Burma and eastern side of Andaman-Nicobar islands.

The vessel left on her second leg of the cruise from Visakhapatnam to Madras and Dr. N. K. Panikkar, Director, Indian Ocean Expedition participated in this cruise along with a few other Indian scientists. The third leg of the cruise from Madras to Bombay was a training cruise and several of our Junior Scientists were given training on board the vessel in field methods and instrumentation.

The second cruise of *Anton Bruun* began on May 22, 1963 under the leadership of Mr. Richard Shomura. On this cruise which is primarily a fishing cruise, two Indian scientists, one from the Government of India Deep-Sea Fishing Station and the other from the Maharashtra State Fisheries Department, have been nominated.

U. S. Weather Bureau Research Flight Facility (RFF)

Towards the end of November 1962 Messrs Robert (Director of the RFF) Youmans (Business Manager) and Cunningham (Chief Pilot) visited Teheran, Karachi, Nairobi, Tananarive, Mauritius, Bombay, Delhi, Madras, Colombo, Bangkok and Singapore, to discuss facilities for the weather flight programmes. Bombay has been considered the most suitable place as operation base from the point of view of maintenance, hangar and office space as well as coordination of flights. The aircraft arrived in May 1963 and have completed the major part of their weather flights.

U. K. Programme

The Scientific Programme of the United King-

dom has been received along with the detailed cruise programme of *RRS Discovery* and *HMS Owen* for 1963-64. Copies of these scientific programme have been distributed to the members of the National Committee and the Cruise programme to various institutions/departments, Chairmen of the Hospitality Committees etc. The following are the salient features of the programme:

1. They intend to cover following scientific disciplines:

- (a) Geology, Geophysics and Bathymetry
- (b) Biology (c) Chemistry (d) Physics and (e) Meteorology.

2. The area chosen for the geological, geophysical and bathymetric studies is the north-west sector of the Indian Ocean comprising the Red Sea, the Gulf of Aden, the Persian Gulf, the Arabian Sea and to the south by a line joining Zanzibar, Mauritius, and Ceylon. The principal aim of the geophysical investigations in this area is to establish the crustal structure of the Arabian Sea and to determine its relation to the surrounding continental land masses.

3. In their biology programme, they intend to make substantial contributions to the descriptive study of the plants and animals in the Arabian Sea by collecting plankton and making physical and chemical measurements in both monsoon seasons; the U. K. effort aims at special studies of the cycle of events in a typical upwelling region and of variations of fertility in relation to current boundaries and water layerings. The work will fall into the following phases:—

(a) Collections and observations on the main *latitudinal* lines of stations of the two general surveys of the Arabian Sea. These lines of stations will be worked twice, once in the North-East Monsoon and once in the South-West Monsoon. This part of the programme will be carried out by *RRS Discovery*.

(b) Supplementary to the first phase of the programme, it is hoped that the East African Fisheries Research Vessel *Manihine* will work shorter latitudinal sections off the East African Coast.

(c) The third phase of the biological work will be done in conjunction with the physical work in the equatorial region and will consist again mainly of a descriptive survey to a depth of about 500 metres, of the biological structure of the equatorial current system by means of a number of short meridional sections. These observations will also be made on two occasions.

(d) The fourth phase of the biological work will commence with a brief survey of the South African coastal upwelling region and this will be followed by detailed observations in one Area. This survey should provide unique opportunity for detailed co-operation between the physical, chemical and biological programmes, and will be aimed at using the most recent methods to obtain as comprehensive a picture as possible of the ecology of the region.

(e) A study will be made of the birds in the Arabian Sea and of their inter-relationships with the marine plants and animals. The work is being done in cooperation with the British Ornithologists' Union and is made possible by a grant from the Nuffield Foundation.

4. The chemical work of the expedition will be divided into two projects. First there will be two general surveys of the Arabian Sea, which will be done by *RRS Discovery* in both monsoon seasons, and secondly there is the more specialised chemical work necessary in conjunction with the biological programme for studies of nutrient cycles in the upwelling region off the South Arabian Coast and in the equatorial region.

5. The physical work mainly consists of current measurement, BT etc. with particular

emphasis on detailed work in the equatorial region and that of Agulhas current. The study of Agulhas current is made in cooperation with U.S. and South African Scientists and that it will include continuous recordings at all depths below anchored buoys. They also intend to supplement their existing network of tide gauge stations.

6. In the meteorology programme there will be the following main aspects:—

- (1) The establishment of a new radio-sonde/radar-wind stations in the Seychelles.
- (2) Continued operation of existing radio-sonde/radar-wind stations at Aden, Bahrain, and Gan.
- (3) Continued synoptic observations at Sharjah, Masira, Salalah, Riyan, Mukeire, Beiban, Dhala, and Pilot Balloon observations at Sharjah, Masira, Salah, and Riyan.
- (4) Surface vessels—
 - (i) Royal Navy Hydrographic ships—full synoptic observations (*HMS Owen* throughout the period of the expedition and *HMS Dalrymple* 1961/63 only).
 - (ii) All H. M. Ships on passage in the area—full synoptic observations.
 - (iii) Carriers and cruisers on passage—daily radio-sonde ascents.
 - (iv) *RRS Discovery* full synoptic observations and radio-sonde ascents.
 - (v) British voluntary observing ships—observations at main synoptic hours whilst in the area. All vessels are being particularly requested to record time and intensity of rainfall and measurement of air and sea temperature as carefully as possible.

USSR Programme :

The USSR Research Vessel *Vityaz* touched Madras Port towards the third week of September, 1962, at the end of her cruise Djakarta-Fremantle-Madras. Hospitality was extended to foreign scientists on board this vessel.

Miscellaneous :

1. On January 3, 1963 an informal meeting of the Delhi members of the Indian National Committee on Oceanic Research was held, primarily to discuss with Prof. LaFond, the U. S. Oceanographer, the mutual problems affecting U. S. and Indian participation in the IIOE.
2. Special courses of lectures on oceanography and related topics have been sponsored by the National Committee. In addition to the many talks which Prof. LaFond has given at the University Centres, Dr. E. J. Denton of the Marine Biological laboratory, Plymouth, U. K., and a wellknown zoophysiologicalist has been visiting a few universities and giving talks on physiological adaptations and buoyancy of marine animals. Dr. Allen Robinson, a theoretical Oceanographer from Harvard University, U. S. A., who had been sponsored for work at the Tata Institute of Fundamental Research gave talks and held discussions on his specialised field of research at Bombay and other Centres.
3. At the invitation the F. A. O. Dr. Panikkar, Director, Indian Programme of International Indian Ocean Expedition participated in the meeting of Advisory Committee for Marine Resources Research of Food & Agriculture Organization at Rome—January 28 to February 2, 1963. He also attended the meeting of SCOR at Halifax, Canada—April 4-9, 1963, which was held at the Bedford Institute of Oceanography.