

The John Murray Expedition

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THE late Sir John Murray, whose name will ever be associated with the *Challenger* Expedition, left for scientific purposes certain funds, which have been allowed to accumulate since his death. He desired that these funds should be used for a scientific expedition, a sequel to the *Challenger*, and such an expedition has now been arranged by his children, who are also his trustees. In seeking to carry out their father's intentions, they sought the advice of oceanographers of all countries as to its venue and objects. The responses were most gratifying, but many of the proposals were beyond the means at the disposal of the trustees, while others represented sections of research already in progress. All the replies were submitted to Drs. E. J. Allen and W. T. Calman, the writer acting on behalf of the trustees.

Three practical proposals of areas for the research of an expedition emerged, namely, off the north-west coast of South America, the Indian Ocean and the Red Sea. It was felt that the last-named, an enclosed sea of more than 1,000 fathoms with a sill to the south of less than 100 fathoms, presented peculiar opportunities for intensive and continued research, but that this should be based on Ghardaga, the newly erected Egyptian marine station off the Gulf of Suez, rather than attacked by an isolated expedition. In all three seas, a knowledge of the bottom fauna and conditions was emphasised. In addition, the two oceans present problems of oceanic circulation of considerable complexity and of wide interest.

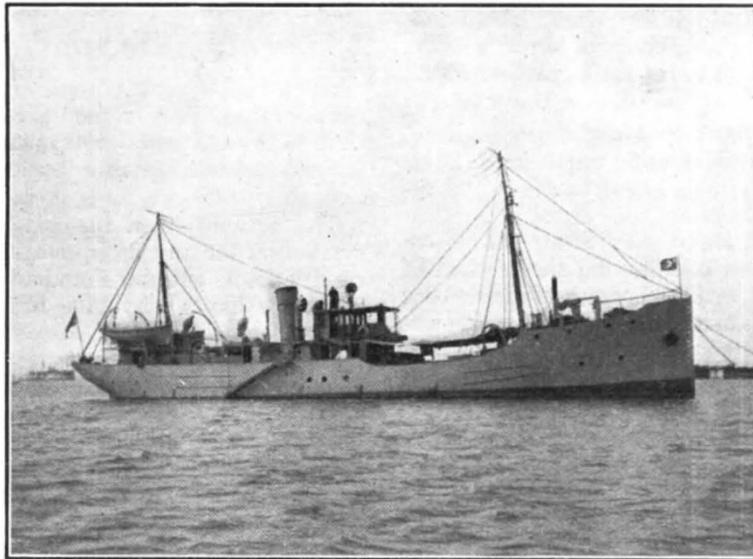
On consideration and inquiry, the difficulties of arranging a west American expedition proved insuperable, so that the referee's choice fell on the Indian Ocean, which had been suggested in several memoranda. One of the latter had been presented by Col. Seymour Sewell, director of the Indian Zoological Survey and formerly surgeon-naturalist on the *Investigator*, and he was invited to lead the expedition. The further plans have been worked out by a committee including representatives of the Admiralty, the British Museum, the

Royal Society and the trustees of Sir John Murray, in co-operation with Col. Sewell. The Committee consists of Mr. J. C. Murray (chairman and treasurer), Vice-Admiral Sir H. P. Douglas, Capt. J. A. Edgell (hydrographer to the Admiralty), Dr. C. Tate Regan (British Museum), Prof. G. I. Taylor (Royal Society), Drs. E. J. Allen, W. T. Calman and Stanley Kemp and Prof. J. Stanley Gardiner (secretary).

It would have gratified Sir John Murray to know that the Indian Ocean has been selected, since this ocean was deliberately omitted from the route of H.M.S. *Challenger*, the Indian Government having undertaken to carry out its exploration. The whole area proved too large for the elaborate and detailed research demanded to-day,

so that the operations of the expedition are to be confined to the Arabian Sea, which is bounded to the south-east by the Maldivian and Chagos ridge and to the south by the latitude which passes through the Seychelles. This area feeds the Red Sea to the north-west and the shallow Persian Gulf to the north, and its conditions to some degree are simplified by its continuous land-boundary

to the north and east. Its deep sea life has never been collected save by the I.M.S. *Investigator* and then only by spasmodic observations and a few trawlings near the Indian coast. The *Valdivia* traversed the southern part of the area on her great cruise and the *Dana* crossed it on her way home. Lately, the Admiralty has taken serial water samples in and off the Gulf of Aden, and much attention has been paid for many years to the water movements by the Marine Division of the Meteorological Office. H.M.S. *Sealark* spent the season of 1905-6 amongst the islands and submerged banks to the south, visiting in turn the Chagos Archipelago, Mauritius and Seychelles, besides most of the smaller islands and banks. Her investigations were mainly concerned with coral formations, their growth and decay, the deep sea being studied mainly by soundings. Even to-day, except on certain steamer routes, the



Barki, Alexandria

FIG. 1. The *Mabahiss*, for the John Murray Expedition of 1933-34.

depths are little known. The greatest charted is 2,930 fathoms, and the average depth about 2,500 fathoms, with openings to the south of 2,000 fathoms between Seychelles and Chagos and perhaps between Chagos and Maldives. With this topography the question of water circulation from the surface to the bottom is naturally a subject of particular interest.

Great difficulty was experienced in obtaining a suitable ship of the trawler type for the expedition. Any vessel would have to be fitted with sonic sounding apparatus and few proved to be suitable. The best available vessel appeared to be the *Mabahiss*, which was built for scientific work by the Egyptian Government in 1929. The Committee placed its dilemma before Egypt, King Fuad being well known for his interest in oceanography, and at the same time pointing out the desirability of an Egyptian scientific expedition down the Red Sea. In reply the Egyptian Government most generously proffered the loan of the *Mabahiss* for the winter of 1933-34, the Committee to equip her with echo and other necessary scientific gear. This friendly action will be most deeply appreciated by science, the international appeal of which is thus recognised.

A further plan is to use the *Mabahiss* in 1934-35 for an Egyptian exploration of the Red Sea, the same scientific methods to be followed in both expeditions so that results will be strictly comparable. The Red Sea expedition will give a worthy start to the Ghardaga Marine Laboratory of the University of Cairo, which, possessing deep water and tropical conditions in its immediate vicinity and being of easy access from Europe, bids fair to become of great value to science.

According to the present plans, the *Mabahiss* will be commissioned at Alexandria and sail on September 1. She will be commanded by Capt. Mackenzie, formerly of the S.S. *Discovery*. Lieut.-Commr. Farquharson, who has been seconded for the expedition, is to take charge of the echo sounding and other survey work. On his side, Col. Sewell will be accompanied by four biologists, two of whom will specialise on the physico-chemical side and two on the ecological. The officers and crew will be Egyptian, and there will be two research students from the University of Cairo. After anchoring for a night at Ghardaga, the *Mabahiss* will run a depth section down the Red Sea to the Gulf of Aden, where several weeks will be occupied in the investigations of its depths, bottom fauna and circulation. While a continuous graph of the surface temperature will be taken on board the *Mabahiss*, the surface water samples, collected not only by the *Mabahiss* but also by certain liners, will be sent to the University of Cairo for analyses. The deeper water layers, however, will be investigated on board the *Mabahiss* by rapid methods, and it is hoped that thereby estimations of hydrogen ion concentration, oxygen, phosphates, nitrogen compounds and silica or some of these may be so quickly available that they will be of help in the planning of future work.

So soon as the north-east monsoon has become established, the *Mabahiss* will proceed to run a series of parallel lines of soundings between India and Ceylon and the African coast, unless the results obtained determine otherwise. In any event, there will be a special cruise in the Gulf of Oman for comparison of its conditions with those of the Gulf of Aden, and this will be followed by a cruise down the Maldives, where Major Glennie of the Indian Survey will take a series of pendulum observations across the bank with the object of determining the depth of the foundations on which its coral reefs are built. On all cruises, stations will be established at intervals for serial temperature observations and to obtain water samples from the surface to the bottom. In certain regions, the deposits should be of particular interest, and they will be collected by sounding leads and conical dredges. It is suggested that the blue mud off South Arabia may well be of especial interest, as also the green sand (glauconite), which in places is found from 50 fathoms to more than 1,000 fathoms, and the conditions of formation of which are uncertain.

The investigation of the deep sea biology, to the understanding of which all observations, physical, chemical and topographical, will be applied, is to be especially concentrated in the Gulfs of Aden and Oman and off the East African coast. Otter and Agassiz trawls and dredges of standard sizes will be regularly employed down to 1,000 fathoms, as well as the Petersen grab. Quantitative estimations of the bottom may not be possible, but it is hoped that the fauna will be adequately represented in collections and to a considerable degree determined in depth zones. The 'mud line' at about 100 fathoms, so named by Sir John Murray, is of especial interest off the Arabian coast, which, in spite of a high water temperature and an apparently suitable topography, is almost devoid of coral reefs. In connexion therewith, the shallower coastal waters may be investigated, a motor launch being carried for this work. It is hoped also that transparency observations may be possible. Plankton as such is not an object of study since the collections obtained by the *Discovery*, *Dana* and other vessels are sufficient to tax the energies of systematic workers for twenty to fifty years. On the *Mabahiss* it will be collected mainly in connexion with the investigation of the water layers and movements, but mid-water nets will be employed for the examination of the fish and other swimming life.

It is impossible to lay down beforehand detailed plans of the John Murray expedition or indeed of any future marine exploratory expedition. The coming of echo sounding allowing all depths to be read as a ship proceeds on her course, the determination of temperature sections and the invention of rapid chemical methods to be applied on ship-board to water samples from the surface to the sea floor, have altered the planning of all future marine expeditions, the course of which will undoubtedly be determined by the results obtained.