the larger ultra-violet image to a thin cloud layer of carbon dioxide crystals which exists at a height of about 100 km. in the Martian atmosphere due to the temperature at this height being about 100° K. This layer would be capable of scattering ultra-violet light, but is transparent to red light, and thus accounts for Wright's observations.

Dr. Menzel then referred to the scarcity of water and the absence of oxygen in the Martian atmosphere. He considers that the polar caps consist of a very thin layer of ice crystals, perhaps only a fraction of an inch thick. During the long Martian summer the polar cap evaporates by sublimation without melting, and the actual surface temperature in the area of perpetual daylight may rise to about 20° C., the corresponding winter temperatures ranging from about -30° C. to -90° C. The atmosphere is usually very clear, but thin clouds have been observed to form in the late afternoon, and disappear during the early morning shortly after sunrise. These clouds are probably composed of fine ice crystals. An observer on Mars would see a deep blue sky with violet-coloured clouds forming at sunset.

Dr. Menzel concluded by referring briefly to the possibility of the existence of life on the planet. He considers that while the existence of higher animal types of life similar to terrestrial forms is unlikely, it is possible, as G. P. Kuiper has previously noted, that some simpler forms of vegetation, such as lichens, may do so. This would account for the seasonal change in colour observed in certain dark Martian surface features.

Space can be found here for mention of only a few of the many interesting points raised by the subsequent speakers. Dr. E. Opik considered that owing to infra-red absorption, the temperature of the carbon dioxide cirrus must be nearer that of the Martian surface (190° K.) than the postulated 100° K. required for its formation. Dr. Menzel agreed that this seemed an objection, but pointed out it might also apply to temperature problems in the earth's atmosphere. Dr. H. H. Poole and others raised the question of the possible origin of repulsive electric fields on the moon. Friction between the dust particles and the moon's surface was suggested, but an attractive, not a repulsive, force would be produced in this way. It was finally decided that a repulsive force could only be produced by both the particles and the moon's surface becoming positively charged through the emission of photo-electrons. Several speakers doubted the meteoric theory of the formation of the craters on observational grounds, and also maintained that the seas present the appearance more of extensive basaltic lava flows, rather than of presumably featureless dust surfaces.

Prof. W. M. H. Greaves raised the problem of the absence of free oxygen from other planetary atmospheres. Prof. Poole considered that for the major planets this is due to the fact that these planets have been able to retain hydrogen, and that for Mars and Venus it is caused by the absence of water. Dr. Menzel stated later, however, that he is not convinced that water does not occur on Venus, and he attributed the negative spectroscopic evidence to the occurrence of water as hail in a convective atmosphere. He pointed out that Lyot's observations on the polarization of the light from Venus seems to indicate that the clouds are composed of water, and mentioned that further work on this problem is being undertaken at the Lick Observatory.

Mr. Hoyle considered that the absence of free oxygen in the original atmosphere would not prevent the formation of an ionosphere. He further maintained that Tammann's theory must be rejected, because it would have supplied too much oxygen; and hence the theory really proved that no water was present in the original atmosphere, and that all the hydrogen contained in the existing oceans has been captured later by the earth from space, the oxygen required to form water being derived from the atmospheric carbon dioxide.

THE WORK OF THE MOTOR YACHT MANIHINE

By N. B. MARSHALL

Dept. of Zoology, British Museum (Natural History)

SINCE the summer of 1947, Major H. W. Hall, owner of the motor yacht *Manihine*, has placed this vessel at the frequent disposal of the British Museum (Natural History) for the purpose of marine biological investigations. In British waters work has been almost entirely confined to the English Channel, more particularly to the lesser-known eastern half. Besides adding to the national collections, these cruises over a period of four years have done much to increase our knowledge of the composition of the bottom fauna and summer plankton of the eastern Channel. Samples of this plankton have been made available to the Marine Biological Laboratory at Plymouth, while from time to time work has been undertaken for the Fisheries Laboratory, Lowestoft.

During the winter of 1948-49, the *Manihine* was concerned with a hydrological and biological survey of the little explored Gulf of Aqaba in the northern Red Sea. Reports of this survey are now ready for publication. It is planned to extend this work during the coming winter to the Sudanese Red Sea. The biological work will mainly consist of routine plankton hauls, trawling and dredging (if the character of the sea floor permits), fishing by line and collections along the coral reefs. As in the earlier survey of the Gulf of Aqaba, observations will be made on surface and sub-surface temperatures and salinities. Records from a deep-water bathythermograph will also be taken.

It may reasonably be expected that the results of the forthcoming work in the Sudanese area, together with those obtained earlier in the Gulf of Aqaba, will add considerably to our knowledge and understanding of the marine fauna of the Red Sea. In particular, it is hoped to learn something of the nature and extent of the deep-water fauna, which is at present not well known. There are, for example, records of only three species of bathypelagic fishes from the Red Sea. How far the shallow sill at the southern end may act as a barrier to the immigration of bathypelagic forms has yet to be determined.

It is the problem of barriers and the possible limitation of genetic interchange between Red Sea and Indian Ocean forms which makes a study of the fauna particularly interesting. The Red Sea is, geologically speaking, a relatively young sea. Its present connexion with the Indian Ocean, from which the greater part of its fauna has been derived, is thought to be about nine to ten million years old.

To-day the entrance from the Indian Ocean is by way of the narrow Straits of Bab El-Mendeb, inside which lies a shallow sill having a maximum depth of about 100 metres. Climatic conditions and the basin-like profile of the Red Sea are the predominating factors controlling the hydrological conditions, salinities and temperatures being generally higher than those in the Gulf of Aden, while, in contrast to the open ocean, there is no great difference of temperature between the surface and the bottom layers of water. These physical features may well mean that the Red Sea fauna is (and has been) isolated to a considerable degree, this having favoured the evolution of new forms. There are certainly good indications from earlier work and the survey in the Gulf of Aqaba that the Red Sea contains a considerable number of indigenous sub-species and species. There is therefore the expectation that continued study of the fauna of the Red Sea and detailed comparison with that of the Indian Ocean will not only indicate something of the extent and direction of evolution but will also permit some correlation with the time factor.

OBITUARIES

Sir Alexander Rodger, O.B.E.

THE death of Sir Alexander Rodger on September 30 last at the age of seventy-five brings to an end a fine career in the best traditions of forestry work.

Rodger was educated at Blair Lodge School and from there passed into the Royal Engineering College, Coopers Hill, in 1895. He obtained a diploma in forestry three years later and went out to Burma, where he served until 1911. In the latter year he was appointed instructor at the Forest College, Dehra Dun, and forest economist in the new Research Institute which had been inaugurated by Lord Curzon in 1907. He returned to Burma in 1913, and during the First World War was deputy controller for timber supplies under the Munitions Board, having charge of the large shipments of timber that went from Rangoon for India and the Middle East. He received the O.B.E. in recognition of his good work.

Rodger acted as conservator of forests in Tenasserim during 1920-22 and then was sent home in charge of the Burma exhibit to be erected at the British Empire Exhibition at Wembley. As will be remembered, the Burma exhibit became one of the principle objects of interest at that great Exhibition.

After some leave at home, Rodger returned to India as president of the Forest Research Institute and College at Dehra Dun early in 1925. In the following year he was appointed inspector-general of forests to the Government of India, this being the first time these two posts were held by one man. As a result of the fine work done by the new Research Institute during the First World War, at its close the Government of India had sanctioned the construction of a very much larger Institute and new buildings, and these were opened by the Viceroy of India in November 1920, Rodger at that time receiving the honour of a knighthood.

Among official publications for which he was responsible Rodger wrote "The Handbook of the

Forest Products of Burma" and also undertook the publication of the second edition of Lace's "List of Trees and Shrubs of Burma". He retired from the Indian Forest Service in 1930 and served as a member of the Forestry Commission in Great Britain during 1932-39 and acted as external examiner in forestry at the University of Edinburgh during 1931-35.

Rodger will be long remembered in Burma, as he did great work for the forests of that country; he will be equally well remembered at the Forest Institute at Dehra Dun, where his enthusiasm was an inspiration to all those who worked there with him and under him.

E. P. STEBBING

Commander Vernon Edwards

VERNON EDWARDS died suddenly on September 22 at the age of fifty-nine. He was educated at Weymouth College, where he distinguished himself at athletics, particularly at Rugby football, and, coming from an old naval family, was himself intended for the Navy. However, he did not enter the Service until 1914, when he was gazetted a paymaster sub-lieutenant R.N.R. and served with the Sixth Light Cruiser Squadron throughout the First World War in the North Sea and Mediterranean, and afterwards in the Baltic. On demobilization Edwards found some difficulty in settling down in civilian life, and among other things he tried farming.

By a fortunate chance, while staying with relatives in Sussex, he met the late Dr. F. A. Bather, then keeper of geology in the British Museum (Natural History), who was much taken by the coloured toys, mostly animals, which Edwards made in his spare time. Bather at this time had a scheme for making 'cut-out' restorations of extinct animals, mostly dinosaurs, for distribution to local museums, and Edwards was asked to carry out the work. The scheme was not a very successful one from Dr. Bather's point of view, but it started Edwards on his career. From cut-outs of other people's restorations he quickly passed to original models of his own, and in these he was extremely successful for, although almost entirely self-taught both in art and anatomy, he had the remarkable gift of making 'dry bones live', at the same time taking the utmost pains to ensure accuracy. The first models were mostly of dinosaurs and Tertiary mammals; but in 1931 he was asked to make a series of dioramas for the fossil fish gallery in the British Museum (Natural History). There were eight of these and they were most effective. Thereafter dioramas and restoration-scenes became his chief work, while at the same time he extended his field to include historical subjects. Apart from the large series of his palaeontological works in the British Museum (Natural History) and the historical dioramas in the Tottenham Museum, examples of Edwards's work have been acquired by museums all over the world. Recalled to the Navy in 1939, he served throughout the Second World War as Commander (S.) at sea in the North Sea and Mediterranean, and afterward, ashore in Ceylon, Mauritius and East Africa; but the heavy work put a great strain on him, and although he continued his modelling after the War he suffered from increasing ill-health.

Edwards was a cheerful, generous, kindly man, without a trace of malice in his make-up, and he will be greatly missed by his friends in scientific and other circles. He is survived by his wife and a married daughter.

E. I. W.