

Adequate photographic apparatus and a dark room are provided.

The ship is well supplied with apparatus for taking observations while under way. Two sets of echo-sounding gear, for shallow and deep water, have kindly been lent by the Admiralty, and a distance thermometer, designed to give a continuous record of surface temperature, has been fitted. The Knudsen full-speed water-bottle will provide water-samples at some distance below the surface, and it is hoped that a new piece of apparatus, designed by Mr. A. C. Hardy, will furnish a continuous record of the more important organisms in the plankton.

The *Discovery* is not equipped with harpoon guns of the commercial type, but will carry smaller patterns, with which it is expected that Cetacea up to 25 feet in length can be obtained. Observations on living whales will be made whenever possible, and it is hoped that valuable information on their migrations will result from marking experiments. The form of mark has been adopted after repeated tests on the shooting-range with a target made of whale blubber, and after practice on living whales made by Prof. Hjort and a member of the *Discovery* staff who accompanied him. The mark is similar in form to a large drawing-pin, with three barbs on the shank, and is made of annealed cast-iron and silver-plated. The pin is 2½ inches in length and the disc nearly 2 inches in breadth, with a number stamped on it, together with an inscription offering a reward for return to the Colonial Office. Posters and leaflets are being circulated to all the whaling stations of the world giving instructions for the return of the marks, together with the required information. The mark is placed on the end of a light wooden shaft, and is fired from an ordinary 12-bore gun. With this apparatus good practice has been made at ranges up to 70 yards, and the marks embed themselves well even

with the target at an oblique angle. The pin is not long enough to penetrate the blubber, and the operation of marking is thought to be quite painless. It is feared that the *Discovery* may be too slow and unhandy to mark whales in any considerable number, but whale-marking will form a large part of the work of a small auxiliary vessel, of high speed and built on the lines of a whale-catcher, which is now under construction.

Geographical exploration is not included in the programme of the expedition, but it is hoped that the echo-sounding gear will provide valuable data in Antarctic waters, and every effort will be made to improve our knowledge of the coast-line and to survey harbours frequented by the whaling community. The second officer of the ship is a qualified surveyor, whose services have been lent by the Admiralty.

Work will begin in the Gulf of Guinea, which is thought to be the northern limit of migration of southern whales. Observations will be made on the plankton and hydrography of this region, and the whaling stations on the West African coast will be visited. After touching at Cape Town a course will be laid for South Georgia *via* Tristan da Cunha and the Falkland Islands. On reaching South Georgia a close survey will be made of the whaling grounds, and, as at present arranged, in January 1926 the ship will make a passage to the South Shetlands by way of the South Sandwich group, proceeding still farther south to the Neumayr Channel if ice conditions are favourable. In March a return will be made to South Georgia, a line of stations being made between Graham Land and Cape Horn if weather permits. A fresh survey of the whaling grounds is then contemplated, and later in the year, during the Antarctic winter, the ship will possibly return to the African coast. Operations in the second year will depend largely upon the results obtained during the first.

Obituary.

M. CAMILLE FLAMMARION.

THE death of Camille Flammarion at the age of eighty-three years removes from the world of astronomy one of its greatest ornaments, and one of the most picturesque figures in French scientific circles generally. It is difficult to contemplate astronomy in France without the guiding hand of its beloved "maître," whose "élèves" are counted in all branches of society in all lands.

Camille Flammarion might be described as the apostle of popular astronomy. His numerous literary works had for object primarily the popularisation of astronomical study in all its manifold branches, and it is upon the record of success achieved by those works that his reputation as a scientist should stand or fall. Throughout his life this was a passion with him, kept constantly in view, and meeting with extraordinary success in the birth of the Société Astronomique de France in 1887. This notable Society, recognised by the Republic ten years later as being of public utility, now comprises thousands of members of all nationalities, united by a common love of the sky.

Flammarion was not content to spread abroad the gospel of astronomy by book and pamphlet. He

believed in the practical application of his theories for the spread of a universal knowledge of the sky. Although he was not openly impatient of the restraint imposed on the professional astronomer by the routine of the national observatories, which exist chiefly for the many problems involved in the determination of time and position, it is common knowledge that this branch of astronomy appealed to him very little. His interest lay principally in the discussion of the physical facts observed through the telescope, a much more picturesque branch of the science. He was frankly proud of the scientific independence of his observatory at Juvisy and its freedom from official restraints and controls.

With most modern observatories nowadays devoting special attention to the study of the physical and vital constitution of the celestial bodies, astrophysics has definitely taken its place alongside mathematical astronomy, and it is not going too far to claim that this extension of activity is due in large measure to the demand which arose from the interest created by Flammarion in his efforts towards what the French call the "vulgarisation" of astronomy.

In the year 1882 an unknown admirer, M. Méret,

conveyed to Flammarion, *regium donum*, the beautiful estate and chateau at Juvisy, a few miles south of Paris, where he has since made his home. Here he installed and equipped a magnificent astronomical observatory, to which in later years he added a meteorological and climatological station which is under partial subvention from the French Ministry of Agriculture,—the only climatological station in France, as Flammarion himself boasted, established in direct connexion with the physical study of the sun.

At Juvisy, in the most charming surroundings, the weather is studied in extraordinarily minute detail. The astronomical observatory is thrown open to the eager student of the sky, and competent amateur observers are encouraged to undertake serious observational study there,—perfect instrumental equipment combining very happily with a perfect position, deep in the wooded country and yet within sight of Paris, whose upstanding wonders, the Eiffel Tower and the domes of Les Invalides and the Panthéon, are visible from the observatory terrace.

It was my privilege to visit M. and Mme. Flammarion at Juvisy in the summer of 1914, just before the outbreak of War, and the memory of that experience will not readily be effaced. Conversationally, M. Flammarion was a man of few words, a characteristic not uncommon among very prolific and highly imaginative writers. During a conference of French-speaking astronomical societies which lasted three whole days he rarely joined in the debates, notwithstanding that the subjects discussed were nearest his heart, and that none was present better qualified to deal with them. Once in Flammarion's presence it was obvious that there must be no bandying of empty compliments; no presumption upon a short acquaintance; no departure from the utmost gravity; no congratulations upon good fortune, be they ever so sincere and free from envy.

It must have been a strange scene as the leonine Flammarion, gravid with thought, conducted us round his beautiful and artistic home; through the inscribed monumental gateway opening out of the seventh of the great national roads of France; along corridors with the names of great astronomers and philosophers in ornamental writing on the friezes, and into rooms with the signs of the zodiac and other literary and scientific emblems brilliantly emblazoned on the ceilings or carved on the fittings; introducing us unostentatiously to his treasures with a minimum of words and much less than the usual amount of gesture. Probably to another visitor silence might have been more impressive than actual words, but to me, familiar with that brilliant literary style and fecund imagination which never failed in any of his works, Flammarion's grave taciturnity and his deceptive air of languid indifference were distinctly disappointing, offering great contrast to the eager vivacity of Mme. Flammarion. Subsequent private correspondence with Flammarion has demonstrated the imperfect justice of those impressions, revealing a warm and sympathetic nature which a brief acquaintance refused to discover in him personally.

Whilst Flammarion was a man of many activities, the facts of his astronomical life are few and simple. Born in 1842, his first acquaintance with astronomy dated back to the annular eclipse of the sun on October 9,

1847. At fifteen years of age he was apprenticed to an engraver, and a year later wrote a MS. of 500 pages entitled "Cosmologie universelle," from which later emerged his "World before the Creation of Man." In 1858 he entered the Paris Observatory as a computer, but found under the austere rule of the great Le Verrier little play for his fertile imagination. Leaving the Observatory in 1862, he was immediately welcomed by the Bureau des Longitudes, where he was engaged for three years, presumably in computing work. At the age of twenty-one we find him editing the scientific review *Cosmos*, and in 1864 he commenced the publication of his "Annuaire astronomique," an almanac and astronomical review of unique type, which has now appeared regularly for sixty years. In 1867, Flammarion was recalled to the Paris Observatory by Le Verrier, and placed in charge of one of the largest telescopes for the measurement of double stars. In 1887, Flammarion's review *L'Astronomie* became merged in the monthly bulletin of the Société Astronomique de France, and it is only a few years ago that the original name was restored.

In June 1922, Flammarion's eightieth birthday was commemorated by an immense meeting of his admirers in the great hall of the Sorbonne, Prince Bonaparte presiding in the presence of M. Painlevé. Shortly afterwards Flammarion received one of the greatest honours France has to bestow on a living subject: a commandership of the Legion of Honour.

WILLIAM PORTHOUSE.

THE death on May 26 of Lieut.-Commander Henry Edward O'Neill, R.N., removes one of the last survivors of the pioneer explorers of tropical Africa. Born in 1848, he entered the Navy in 1862 and first saw service in the operations for the suppression of the slave trade on the east coast of Africa. Soon after his appointment in 1879 as British Consul at Mozambique, O'Neill began a series of important explorations between the coast and Lake Nyassa and in the valley of the Shiré river. In five years he completed more than a dozen important journeys and discovered Lakes Amaramba and Chiuta and a new route from Blantyre to the coast. His careful observations of the position of Blantyre made it for long the best fixed position in that part of Africa. In 1885 he was awarded the Patron's medal of the Royal Geographical Society. He was associated with Captain (now Sir Frederick) Lugard in his early work against the slave raiders, and in 1888 distinguished himself in the defence of Karonga, on Lake Nyassa. On his health giving way he was compelled to leave Africa. For a time he was consul at Leghorn and at Rouen, and he retired from the service in 1899. His publications were mainly in the Proceedings of the Royal Geographical Society.

WE regret to announce the following deaths:

Mr. T. S. Brandegee, honorary curator of the herbarium of the University of California, on April 7, aged eighty-two years.

Prof. Heinrich Müller-Breslau, professor of statics and building construction at the Technical High School of Charlottenburg—Berlin since 1888, and a fellow of the Berlin Academy of Sciences, on April 23, aged seventy-three years.