It is to be noted that since the radiation from the coil is symmetrical about its plane, a second minimum will be obtained after a rotation of 180° from the first. With the beacon making one revolution per minute, therefore, a line bearing is obtainable in the above manner every half-minute. To fix the position of a receiving station it is necessary to obtain line bearings from two or more beacons. Since the timing process mentioned above is but an intermediate step in taking a bearing, it is convenient to provide a stop-watch or chronograph for the purpose, with a dial specially engraved in degrees and points of the compass.

An application of the principle of reversibility in direction-finding makes it evident that the performance of a rotating loop beacon transmitter can be largely predicted from the results and experience obtained with receiving loop direction-finders. Thus, a rotating loop beacon when erected on the same site as the direction-finder will give observations at a distant receiver which will be subject to the same type of local error and night variations, for example, as the bearings observed on the direction-finder when the distant receiving aerial is used for transmission. I have confirmed these deductions in the investigation during the past two or three years, of the performance of a rotating beacon erected at Fort Monckton, near Gosport. In order to ascertain the trustworthiness of this type of rotating beacon as an aid to marine navigation, a number of tests were carried out in ships crossing the English Channel between Southampton and Havre, and Southampton and Jersey. Using the ship's ordinary wireless receiver, observations of the bearing of the beacon were made at intervals during each trip and compared with the bearing as given by the captain of the ship.

As a result of tests conducted on these lines, it was found that in the majority of cases the estimated and observed bearings agreed to within from 2° to 4°. Signs of night effects in the shape of indistinct signal minima and wandering bearings were observed at ranges exceeding 60 miles. In many cases at night and during misty weather when visibility was very poor, the ship was navigated by dead reckoning, and in these circumstances it was frequently considered that the bearing obtained from the rotating beacon was the more accurate. Some of the test runs made between Southampton and Jersey were carried out in a ship fitted with a direction-finder of the Marconi Bellini-Tosi type, and the opportunity was thus provided of comparing the two systems of obtaining wireless bearings under actual sea-going conditions. The observations carried out in this manner showed that in the majority of cases the bearings obtained with the direction-finder and from the rotating beacon agreed to within 5°. In some cases, however, due probably to the pitching and rolling of the ship, the accuracy of the direction-finding bearing was inferior to that obtained from the rotating beacon.

As a result of the success of the experiments carried out with the Gosport station, a more permanent type of rotating loop beacon transmitter was installed at Orfordness and put into operation in June 1929. During the few months that this station has been working, a considerable number of reports have been received from various ships giving the results of observations made on transmissions from the beacon. These reports show that the inauguration of this beacon service has been very well received by the mercantile marine. With the ordinary type of ship's receiver adjusted for continuous wave reception, accurate wireless bearings are obtainable at distances of 50–100 miles. Ships fitted with a more elaborate receiver have reported good and consistent bearing observations up to ranges of 250 miles. At such long ranges, however, it is possible that the observed bearings may be subject to night errors in a manner similar to that observed in wireless direction-finding under the same conditions.

From the similarity of performance of the two systems of direction-finding, it would be expected that the elimination of the horizontal components of the transmitting loop would be of advantage in eliminating or reducing the magnitude of night errors or effects observed when using the rotating beacon. A theoretical analysis of the case has shown this deduction to be justified, and experiments are now in progress towards the development of a rotating beacon transmitter with an aerial system of which only the vertical members are active in producing radiation of electromagnetic waves. If these experiments lead to successful results, it is probable that rotating beacons can be erected with a trustworthy working range of the order of 500 miles, supplying wireless bearings at any time or season with an accuracy which is adequate for both aerial and marine navigation.

Obituary.

SIR WILLIAM MCCORMICK, G.B.E., F.R.S.

FEW if any of the men interested in education since the days of the War have been better known to the vice-chancellors and treasurers of the universities of Great Britain than the late Sir William McCormick. None has had so complete a knowledge of their financial difficulties and of the disastrous effects on educational efficiency of their want of means, and no one has done more to help than he, by his sympathetic treatment of the problems placed before him, his wise advice based on his long experience, and his cordial appreciation of the value of the efforts made to fit the universities for their task, whether it be that of advancing knowledge, or of educating the students that fill their lecture rooms and laboratories. To all, his death on Mar. 22 means a very heavy loss.

McCormick was born on April 29, 1859, and educated at the Universities of Glasgow, Göttingen, and Marburg. For a short time he lectured on mathematics, but the study of the English language and literature soon attracted him, and he became, and continued to the end, a serious student of Chaucer.

After holding various lectureships on English at Glasgow, he was appointed professor of English in University College, Dundee, and then later, when the Carnegie Trust for the Universities of Scotland was established, he was chosen as its first secretary.

But at this time new universities and university colleges were being established in England and Wales, and the question of State assistance to these became urgent. A Treasury Committee, of which McCormick was a member, was set up to deal with this. At a later date (1909) the Committee was transferred to the Education Office and he was made chairman. In 1916 the Committee was again transferred to the Treasury as the University Grants Committee and Sir William remained chairman until his death. The Committee was "to inquire into the Financial Needs of University Education in the United Kingdom, and to advise the Government as to the application of any grants that may be made by Parliament towards meeting them".

Figures perhaps give the clearest account of the magnitude of this work. The recurrent grants made by Parliament are as follows: 1913–14, £361,623; 1919–20, £889,000; 1930–31, £1,800,000. Between these last two periods, Oxford and Cambridge were added to the bodies receiving grants.

The following words of a letter from Mr. G. H. A. Wilson, Master of Clare and member of Parliament for the University of Cambridge, of which he was Treasurer, give some indication of McCormick's method and of the value of his help:

"By the death of Sir William McCormick the University of Cambridge has lost a sympathetic friend and a wise counsellor. As head of the University Grants Committee of the Treasury, he always gave the greatest help and most valuable advice to the University in the many questions which were involved when the grant from the Treasury to the University was made.

"The fears which had been expressed that the receipt of a Government grant might involve undue interference in the affairs of the University by a Government Department proved, under the wise and helpful guidance of Sir William McCormick, to be quite baseless. Whilst prepared at all times to give advice when sought, he always maintained that the University should be left with the greatest possible freedom to manage its own affairs. He was ever willing to meet suggestions as to the forms in which the accounts of the University might be modified to meet the special conditions existing at the University without departing from the necessity that those accounts should present a clear and accurate statement of University finance suitable for the needs of the Treasury."

To quote some words written since his death by one who, in earlier years, was his assistant in much of this work: "His constant sympathy and wise counsel were always given with that peculiar charm that distinguished his personality. The thing I enjoy saying of him most—and I say it with complete sincerity—is that if there was anything I did which was worthy, the credit and more than the credit was accorded to me; if I made mistakes (and there were plenty) he shouldered at once the entire blame. That is the sort of thing that makes a junior worship a chief."

Meanwhile, important changes were in progress; the War had brought home to Great Britain the national importance of scientific research. In May 1915 the Presidents of the Boards of Trade and of Education received a deputation from the Royal Society and other learned societies urging "Government assistance for scientific research for industrial purposes, the establishment of closer relations between manufacturers and scientific workers and teachers, and the establishment of a National Chemical Advisory Committee for these purposes". McCormick had been a member of a small Committee appointed by Mr. Pease, President of the Board of Education, earlier in the year, which was responsible for the scheme ultimately adopted. The Presidents replied to the deputation that the Government proposed to establish machinery with wider powers than those suggested by the memorialists, and a week later, when introducing the Board of Education estimates, Lord Gainford (then Mr. Joseph Pease) announced the impending appointment of an Advisory Council for the supervision and encouragement of scientific research, particularly in relation to industry. McCormick became chairman of the Council of eight members, only one of whom—Sir Richard Threlfall—is still with us. Its first meeting took place on Aug. 17, 1915. The order establishing the Council was signed by Mr. Henderson, who on the change of Government had taken Mr. Pease's place at the Board of Education.

Even before the change, however, further discussions with the Government had taken place, and in these Sir William had borne a full share. The Council had at first been instituted, for reasons of convenience, under the ægis of the Board of Education, but it had been decided—as one of the last acts of Mr. Asquith when Prime Minister—that it should be established as a separate department under the Lord President of the Council, with its own offices. This was announced in December 1916 by Lord Crewe, then Lord President.

The first duty of the Advisory Council was to form a scheme or programme for its own guidance in recommending proposals for research, and for the guidance of the Committee of Council in allocating such State funds as were available, while to finance the work a grant of a million pounds was made, to be expended in accordance with these directions. McCormick was present at the interview with the Chancellor at which the grant was made, and in his humorous way described the need and the discussions he had had with manufacturers when planning how best to meet that need. "When people are starving," he said, "it is no use going to them with the Bible in one hand without a loaf of bread in the other."

To form a scheme was no easy task. A Council of seven distinguished men of science, all of them fellows of the Royal Society, with a professor of English literature as chairman, set to organise under the pressure of a great war the application of science to industry. The Council was fortunate

both in its chairman and its secretary; the reports of the last fourteen years give a record of its work; this is not the opportunity to attempt any detailed account. Individual effort has been hitherto the basis of success of an English manufacturer, who has ever been an individualist. It was clear at the start that grants to individual manufacturers would not accomplish the aims of the Council. Co-operation in research was a new idea; at the same time, if it could be arranged, it was the one plan which seemed really hopeful, and thus research associations came into being, and in numerous cases have proved, by the work already done, the foresight of those to whom their existence is due, and the wisdom of the chairman who, for the past fourteen years, has guided the Council responsible for the supervision and approval of their work.

How wise he was, with what skill and tact he guided that work, is known to all who were privileged to serve under him on the Council. He has set it, it is true, on the right track, but the chairman himself, with his determination to go forward, along the path mapped out with so much thought and care, his realisation of the importance of its task, and his confidence that in the end success would come, will be greatly missed.

McCormick was not a scientific man, but he has done more for science than many a professor in the subject, and it was a cause of no small pleasure to his friends—not least to the president and council of the Royal Society themselves—when some two years since the president was able to announce the recommendation of the Council, a recommendation unanimously approved, that it was desirable "in the interest of the advancement of Natural Knowledge" that he should be elected a fellow of the Royal Society under the special statute defining such elections. Can we describe him better than the words of his own Chaucer:

A knyght ther was and that a worthy man,
That fro the tyme that he first bigan
To riden out, he loved chivalrie,
Trouthe and honour, fredom and curteisie.

He never yet no vileynye ne sayde,
In al his lyf, unto no maner wight.
He was a verray parfit, gentil knyght.

R. T. G.

PROF. W. ROBINSON.

PROF. WILFRED ROBINSON, professor of botany at University College, Aberystwyth, died on Mar. 7 after several months of ill-health. He was born at Hull in 1884 and early became interested in botany, for his father, J. F. Robinson, a schoolmaster, was author of the "Flora of the East Riding of Yorkshire". He entered University College, Nottingham, and took his London B.Sc. (Hons.) in botany. His first post was science master at Penketh Friends' School, Warrington. In 1912 he was awarded a research studentship at the Victoria University and became successively Platt scholar in botany, lecturer in botany, and assistant to the professor of cryptogamic botany, and then, in 1916, senior lecturer. He was appointed to the chair at Aberystwyth in 1926.

Robinson was a botanist of wide interests, keen in the field and careful in the laboratory. During the War he worked on the microscopic cell-wall characteristics of mechanical strains in timber, a matter of importance in the construction of aeroplane propellors. His main interests for some time, however, were in plant pathology, and he visited the United States in 1924 on behalf of the Cotton Research Association to investigate the diseases of the cotton plant. Several of his researches dealt with the physiology of fungi but, on going to Aberystwyth, he began to study the physiology of seaweeds and the life-histories of some of the less common genera of the neighbourhood.

With such wide interests and a natural flair for teaching, Robinson had an inspiring influence on his students and it is a great loss to cryptogamic botany that he was not spared long enough to enjoy the results of his industry and influence. He took an active part in British Association matters and was recorder of Section K (Botany) until a few weeks ago.

DR. ARCHIBALD RODERICK FEE died on Feb. 23 of septicæmia and broncho-pneumonia, following the extraction of a tooth on Feb. 15. His death deprives the subjects of experimental physiology and experimental biology of an active and devoted worker. Dr. Fee was only twenty-four years of age at the time of his death, and his home was in West Burnaby, British Columbia. He was a man of outstanding personality and possessed remarkable energy and great personal charm. He came to England at the age of twenty with a degree from the University of British Columbia, and had already been engaged there in work for the Board of Fisheries which took him into uncharted waters of north-western Canada. He was a pupil in Great Britain of the late Prof. E. H. Starling, who, like all his colleagues, had the highest opinion of Fee's ability and promise. Dr. Fee, at the time of his death, held a Beit Memorial Research Fellowship.

WE regret to announce the following deaths:

Dr. Henry Faulds, an authority on the finger-print system of detecting criminals, and author of "Dactylography", on Mar. 19, aged eighty-six years.

Prof. Augustine Henry, formerly professor of forestry at University College, Dublin, on Mar. 23, aged seventy-two years.

Dr. J. Y. Mackay, principal and formerly professor of anatomy at University College, Dundee, on Mar. 30, aged seventy years.

Dr. J. W. Robertson, C.M.G., first Commissioner of Agriculture and Dairying for the Dominion of Canada, and a pioneer of agricultural education in Canada, on Mar. 19, aged seventy-two years.

Prof. E. G. R. Waters, professor of Romance languages in the University of Oxford, and an authority on British Micro-Lepidoptera, on Mar. 23, aged thirty-nine years.