problem of existence in creatures so well equipped mentally as living anthropoids are. For the production of man a different apprenticeship was needed to sharpen the wits and quicken the higher manifestations of intellect—a more open veldt country where competition was keener between swiftness and stealth, and where adroitness of thinking and movement played a preponderating rôle in the preservation of the species. Darwin has said, "no country in the world abounds in a greater degree with dangerous beasts than Southern Africa," and, in my opinion, Southern Africa, by providing a vast open country with occasional wooded belts and a relative scarcity of water, together with a fierce and bitter mammalian competition, furnished a laboratory such as was essential to this penultimate phase of human evolution.

In Southern Africa, where climatic conditions appear to have fluctuated little since Cretaceous times, and where ample dolomitic formations have provided innumerable refuges during life, and burial-places after death, for our troglodytic forefathers, we may confidently anticipate many complementary discoveries concerning this period in our evolution.

In conclusion, I desire to place on record my indebtedness to Miss Salmons, Prof. Young, and Mr. Campbell, without whose aid the discovery would not have been made; to Mr. Len Richardson for providing the photographs; to Dr. Laing and my laboratory staff for their willing assistance; and particularly to Mr. H. Le Helloco, student demonstrator in the Anatomy Department, who has prepared the illustrations for this preliminary statement.

Biographical Byways.[1]

By Sir ARTHUR SCHUSTER, F.R.S.

6. S. P. LANGLEY (1831–1906).

LANGLEY'S invention of the bolometer, and his pioneer work in the construction of the flying machine, are achievements sufficiently great to ensure a reputation which will outweigh the recollection of defects due to an exaggerated consciousness of dignity, accompanied by a marked inability to see the humorous side of things. I first met Langley on the occasion of the total solar eclipse in August 1878, when he established an observing station on the top of Pike's Peak in order to obtain, if possible, a measure of the thermal radiation of the solar corona. Unfortunately, he suffered severely from mountain sickness, and had to be carried down before the day of the eclipse.

In the following year, Langley visited England and expressed to me the desire to become acquainted with Clerk Maxwell. I was working at the Cavendish Laboratory at the time, and was able to assure him that Maxwell would be interested to meet him as he had, in my presence, referred in very eulogistic terms to a method proposed by Langley to eliminate the personal equation in transit observations. Clerk Maxwell was just then editing Cavendish's scientific manuscripts, and conscientiously repeated every experiment that was described in them. He was specially interested in the method which Cavendish had devised for estimating the relative intensities of two electric currents, by sending the currents through his body and comparing the muscular contraction felt on interrupting the currents: "Every man his own galvanometer," as Maxwell expressed it. When Langley arrived, I took him to the room where Maxwell stood in his shirt sleeves with each hand in a basin filled with water through which the current was laid. Enthusiastic about the unexpected accuracy of the experiment, and assuming that every scientific man was equally interested, he tried to persuade Langley to take off his coat and have a try. This was too much for Langley's dignity; he did not even make an effort to conceal his anger, and on leaving the laboratory he turned round and said to me: "When an English man of science comes to the United States we do not treat him like that." I explained that, had he only had a little patience and entered into the spirit of Maxwell's experiment, the outcome of his visit would have been more satisfactory.

As an experimenter Langley takes a high rank, though the numerical results he derived were sometimes based on calculations that were not entirely free from defects. This led him occasionally to an optimistic judgment of their accuracy. In sending out an assistant to repeat his measurement of the so-called solar constant, which expresses the total solar radiation in certain units, his final words to him were: "Remember that the nearer your result approaches the number 3, the higher will be my opinion of the accuracy of your observations." The assistant, who since then has himself attained a high position among American men of science, fortunately was a man of independent judgment and skilful both in taking and reducing his observations, with the result that the number 3 is now altogether discredited.

[1] Continued from p. 163.

Obituary.

DR. J. M. ELLIS MCTAGGART.

THE news of the sudden death of Dr. McTaggart on January 18, at the early age of fifty-eight, came as a great shock to his numerous colleagues and friends both in Cambridge and throughout Great Britain. He had, indeed, resigned his lectureship in Trinity College, Cambridge, more than a year ago in order to devote more time to literary work; but he went on giving some of the courses of lectures he had been accustomed to give, and his interest in everything that pertained to the University continued to be as keen as ever. His Friday evening lectures, open to students of all schools, have been for many years past a Cambridge institution; and various stories are related of his acuteness, resource, and ready wit in endeavouring to initiate the *profanum vulgus* in the problems of metaphysics. In the affairs of his College and in those of the University he took a leading and conspicuous part, bringing to bear upon every issue a fearless independence of judgment, which won for him the

respect and esteem even of those to whom he was most opposed in opinion. In politics he was strongly conservative, although here again he never allowed himself to be fettered by party ties but pursued a path distinctly his own.

McTaggart was a born metaphysician. Even as a promising and favourite pupil of J. M. Wilson at Clifton, he is said to have displayed dialectical skill; and, on entering Trinity College, Cambridge, he began a brilliant career as an undergraduate, taking his degree as alone in the first class in the Moral Sciences Tripos of 1888. In 1891 he was elected a fellow of Trinity, having submitted as a dissertation the substance of what now forms the first four chapters of the book he published in 1896 (dedicated "to Miss Frances Power Cobbe, with much gratitude"), entitled "Studies in Hegelian Dialectic." There followed in 1901 "Studies in Hegelian Cosmology." An early draft of the last chapter on "The Further Determination of the Absolute" had been previously printed, in 1894, for "private circulation only"; and in the preface to this pamphlet the author characteristically observed: "I hoped that an attempt to explain my position to a few of my teachers and fellow-students might produce criticisms or refutations which should be profitable either in improving or preventing any further work on my part." Still another book on Hegel—"A Commentary on Hegel's Logic"—appeared in 1910. Here we are told that Hegel had been the chief object of McTaggart's life for twenty-one years, and he expresses his conviction that Hegel had penetrated further into the true nature of reality than any philosopher either before or after him. A more popular work, "Some Dogmas of Religion," saw the light in 1906; in it many novel views were propounded and they elicited no small amount of discussion. Lastly, in 1921, McTaggart published the first volume of what was evidently intended to be his *magnum opus*, on "The Nature of Existence." It is understood that he has left the manuscript of the remaining volume in a condition that will enable it to be put into print, so that we shall fortunately not be deprived of the outcome of his maturest reflection.

To indicate the distinctive features of McTaggart's speculation in a few words is scarcely possible. In the "Commentary" mentioned above he stated his belief that the next task of philosophy will be to make a fresh investigation of the nature of reality "by a dialectic method substantially, though not entirely, the same as Hegel's"; and, in his last book, he attempted to show how that task is to be fulfilled. His method differs from Hegel's principally in neither accepting a *triadic* division of categories nor the partial falsehood of the lower categories. In the first part of his system, that dealing with the general nature of the existent, he admitted only two empirical premises—that "something exists" and that "what exists is differentiated"—and the rest, he claimed, is entirely *a priori*; in the second part, the results obtained in the first part were to be applied to the facts which empirical observation reveals, or appears to reveal.

McTaggart's idealism was not of the epistemological type; it did not rest, that is to say, upon any assumed dependence of the object known upon the knowing subject; it was what he was in the habit of calling ontological idealism, as based upon the ground that nothing exists but spirit. Spirituality he defined as the quality of having content, such content being the content of one or more selves; and he held that the only existent realities are selves, groups of selves, and parts of selves. Among these selves there might conceivably be one self whose volitions had the appearance of influencing the rest of the universe so profoundly that he would properly be called a god; but McTaggart could find no evidence which would make his existence probable. Indeed, if the universe consist of a system of selves, and if that system be a unity which possesses spiritual significance and value, there would be, he urged, no need of a directing mind to account for the traces of order in it. In any case, if the universe be a society of selves, it cannot *be* a self; and, therefore, the *Absolute* cannot be God. Time, according to McTaggart, is an appearance which will ultimately merge into the timeless or the eternal. Finite selves will go on existing after death until they reach the end of the time series. They cannot be said to be immortal in the ordinary sense, but their lives will not really end, although their unendingness cannot be an unending duration in time.

G. DAWES HICKS.

MR. C. H. WORDINGHAM.

MR. CHARLES HENRY WORDINGHAM, who died on January 28 at the age of fifty-eight years, was well known as an electrical engineer. He was born at Twickenham in 1866, and was educated at King's College School and at King's College, London. He served his apprenticeship under Dr. John Hopkinson. He then joined the United Telephone Company, where his work consisted mainly in assisting with the erection of telephone exchanges. From 1889 to 1892 he was an engineer at the Grosvenor Gallery Generating Station of the London Electric Supply Corporation, where he was associated with Dr. Ferranti and Mr. Partridge in carrying out many of the pioneering experiments which led the way to such important developments. During this period also he was head of the meter testing department and devised methods of testing switches and fuses which were very useful in practical work. In 1892 he again became an assistant to Dr. Hopkinson and supervised the erection of the electric lighting stations at Manchester and Whitehaven. In 1894 he became chief engineer to the electricity works of the Manchester Corporation, and for the next seven years devoted himself whole-heartedly to developing the station.

In these early days many installations were laid down most carelessly, and the material employed was unsuitable. Wordingham established a testing department at the works and insisted that all the switches, fuses and other material used by his consumers should pass a standard test. He encountered great opposition at the start, but ultimately the manufacturers saw that it was to their advantage to have their devices tested. During his stay in Manchester he superintended the conversion of some 100 miles of tramways from horse to electric traction, and equipped 38 miles of new tramway.

Wordingham left Manchester in 1901 to practise as a