amount of material assistance as well. A good deal of helpful interest was shown also by the staff of Gordon College and by private residents in Khartoum.

To an observer with some experience of pre-war eclipse expeditions from Great Britain, remarkable features of the recent eclipse were the growth in size and elaboration of the instruments used, and the lavish scale of expenditure of some expeditions. As everyone who tries it soon discovers, to make a scientific instrument work well in the open air, exactly at a given time, under conditions which cannot be reproduced beforehand, and perhaps in an extreme climate too, is far more difficult than to use it in an ordinary laboratory. Increased complexity of eclipse instruments seems inevitable, as problems and techniques develop, and in consequence the demands upon eclipse observers can now be sometimes rather severe. One result, already apparent, is that the ratio of observers to instruments, sometimes less than unity before the War, is tending to increase to two or three or more, while, as already noticed, the time allowed for preparation on site is tending to get longer.

The other point is of more local significance. British expeditions are at present financed chiefly by Government grants from the Royal Society, made on the recommendation of the Joint Permanent Eclipse Committee of the Royal Society and the Royal Astronomical Society. These grants are very limited in amount and are quite inadequate when more than one expedition is proposed. It is no longer possible to look to private individuals for subsidies, while British universities in general have no funds from which any appreciable contribution can be made. At the recent eclipse the Greenwich parties were paid for by the Admiralty, but even with this included, British expenditure amounted to only about one per cent of the reputed American expenditure. The Joint Permanent Eclipse Committee does excellent work within its means, and it is not necessary that British eclipse funds should be increased a hundred-fold—nor indeed is it likely that with such an increase the results would be related linearly to expenditure—but it is suggested that some means should be found of financing eclipse expeditions from Great Britain more liberally, especially now that radio astronomers are in the field as well as the traditional optical observers.

[1] Stratton, F. J. M., *Nature*, **169**, 259 (1952).

SANTIAGO RAMÓN Y CAJAL (1852–1934)

PROBABLY the greatest neurohistologist of his generation, Santiago Ramón y Cajal, son of a surgeon, was born in Petilla de Aragon a century ago, on May 1, 1852. After obtaining from the University of Zaragoza at the age of twenty-one a licence to practise medicine, he saw military service with the army medical corps in Cuba. In 1879 he was appointed director of the medical museum at Zaragoza, in 1883 professor of anatomy at Valencia, and in 1887 professor of histology and pathological anatomy at Barcelona. Five years later he was called to the corresponding chair at Madrid, from which he retired in 1922. For many years he was in charge of the Madrid Institute, which bears his name. His "Trabajos del Laboratorio de Investigaciones biológicas de la Universitad de Madrid" was influential in making known to the world the work of Spanish men of science.

In 1889 Ramón y Cajal improved Golgi's chrome-silver stain, which he applied to the whole nervous system and which led to his doctrine of the neurones. Using a photographic technique, he showed that all nerve cells are discrete units and that the cells of the grey matter are not organized as a network, as had previously been assumed. His name has become attached to some six staining methods, to the olfactory area, to the commissural nucleus, and to the horizontal cells of the cortex. Among his other classic contributions to neurology may be mentioned his discovery of the optic chiasma and of the innervation of the retina; his elucidation of the histology of degeneration and regeneration of nerve tissue; his modernization of the study of gliomata; and his pioneer use of colour photography. Shortly before his death on October 17, 1934, Ramón y Cajal reviewed and re-edited his first work on the neurone. He supervised the translation of his most important books, and his "Histology of the Nervous System in Man and Vertebrates" remains to this day the most complete and accurate account of the microscopic anatomy of the nervous system.

Ramón y Cajal's interests were wide. He was a talented artist, and his extra-professional writings, such as his "Charlas de café" (1920), reflect his philosophic bent, his humanity, and his Latin pessimism. He sought no honours, but regarded his election as a foreign member of the Royal Society of London and his Nobel Prize for Medicine and Physiology, which he shared with Golgi in 1906, as a tribute to Spanish scientific research.

A long obituary notice of Ramón y Cajal appeared in *Nature* of December 8, 1934, p. 871, contributed by "C. S. S.", initials which are easily recognized as being those of one of the 'immortals' of physiology who himself died but a short time ago.

OBITUARIES

Sir Charles Sherrington, O.M., G.B.E., F.R.S.

SIR CHARLES SHERRINGTON, formerly Waynflete professor of physiology in the University of Oxford, and president during 1920–25 of the Royal Society, died on March 4 at the age of ninety-four. Among his many distinctions may be mentioned the Copley Medal (1927) and a Royal Medal (1905) of the Royal Society and the Nobel Prize for Medicine and Physiology in 1932 (with Prof. E. D. Adrian); he was an honorary or foreign member of many learned societies throughout the world.

We print below some appreciations which we have received.

MORE than forty years ago Sherrington published the Silliman Lectures he had given at Yale under the title "The Integrative Action of the Nervous System", and if he had published nothing after this he would still deserve to be reckoned one of the great physiologists. He gave us a new outlook on the nervous system by analysing its operations into their simplest elements and showing how these elements are welded together. The spinal reflex is taken as the starting point, and as Sherrington's chapters succeed one another the mechanism of sense organs and nerve

fibres and central connexions is gradually transformed into a living organization responsible for the most elaborate behaviour of the individual. His book is the more compelling because Sherrington's singular genius is stamped on every page of it—his tricks of prose, his epigrammatic constructions and his pregnant imagery. He has so much to tell us that he cannot be read lightly, but there is no book on physiology which is so well worth reading.

To all but physiologists his fame will rest more on the Gifford Lectures, "Man on his Nature", written more than thirty years later, when he had retired from the chair at Oxford with every distinction which a scientist can gain. This book, with its general theme, gives more scope for his wide learning and tolerant humanity. It is a worthy memorial to his many-sided understanding of Nature.

His scientific work is, of course, his greatest achievement. He discovered the sensory apparatus of the muscles, he worked out the detail and the general plan of the hind limb reflexes, he showed that the inhibition of the muscles which oppose a movement is as important as the excitation of those that promote it, he analysed the features which distinguish conduction in the reflex arc from conduction in the nerve fibre, giving a picture of the spinal mechanism in terms of neurones and synapses which remains the basis of all current research. His work continued long after the publication of the "Integrative Action" and was constantly justifying the principles he had laid down. His laboratory at Oxford became the leading centre for research on the central nervous system: the list of his collaborators includes the most distinguished names in neurological research, and there was never a time when it could be said that new techniques and new ideas had left him behind.

In fact, Sherrington's understanding of Nature was based on first-hand inquiry, on fifty years of hard work in the laboratory, on acute observation and astonishing technical skill. But although he had to contend with the distractions of administration and high scientific office he never lost sight of the wood for the trees. Even in his most technical discussion he would startle us by a vivid pictorial analogy with a hint of wider horizons.

Without his poetry and philosophy Sherrington's scientific work would have lost much that made it so illuminating, and without his experience of scientific discovery his insight into the patterns of medieval thought could never have gone so deep. He could not have realized so clearly the problems which faced Fernel in the sixteenth century if he had not himself faced the problems of Nature and found a twentieth-century solution. But whatever he had written or discovered, he would have charmed his contemporaries and his juniors by his courtesy and genuine modesty and friendliness, as well as by the range of his ideas and his great stores of personal reminiscence.

His shorter poems reveal the qualities which made him so well loved. They will no doubt become the material for future dissertations in the literary schools, for they contain real treasures in a little room, furnished in a style no longer in fashion but made acceptable by the care which has gone to the furnishing. The same qualities of sympathetic understanding and the same powers of lively description stand out in his writings of people and events, his obituary notice of Ramón y Cajal or the letter published in *Nature* of February 21, 1948, p. 266, about his journey to Lewes in 1894 to give the newly discovered antitoxin to a small boy desperately ill with diphtheria. Here he is writing less formally, and one has a vivid picture of Sherrington as he used to talk, to a charmed group of listeners in the Combination Room or later in the bedroom at Eastbourne, where so many came to draw encouragement from his wisdom and charity.

In his long life he had enlarged the bounds of natural knowledge and he had shown how our ideas of the natural world have come to their present shape. He was too honest and too humble to produce any solution of ultimate problems; but he had set us all an example of how to accept our life, and we have lost one who was admired for himself as well as for his science.

E. D. Adrian

Trinity College,
Cambridge.

In speaking of his early days at Caius College, Sherrington once told me that Hering's idea of two fundamental opposite processes, anabolism and catabolism, held a strong position among his contemporaries. He gave the impression that this notion also had influenced his own thinking and experimentation, apart from stimulating a permanent interest in the physiology of vision. Not until very recently has it become fully appreciated how well Sherrington's own concepts of two truly antagonistic processes of central excitation and central inhibition have stood the test of time and become classical by the only applicable criterion, that of being alive, because they were founded on experimentation matured into far-reaching insight. To Sherrington, central excitation and inhibition were two active processes, both of which displayed similar properties with regard to spatial summation and facilitation, adding up algebraically on the motoneurone as if of opposite sign. Elaboration of these and a number of other sound and fundamental concepts in a very difficult field ranks as high among his many achievements as his three greatest experimental contributions, all of which were concerned with posture and locomotion: reciprocal innervation, the studies on muscle sense organs including their reflex effects, and decerebrate rigidity. His gift for discovery was never more beautifully displayed than when he proved the muscle spindle to be a sensory end-organ, discovered the complex reflexes from the muscle which govern locomotion and posture, and, finally, integrated all this new information into a structure of knowledge in which these reflexes, reciprocal innervation, decerebrate rigidity and several other facts of reflexology fell into their right places as pieces of one puzzle.

Sherrington was a great teacher, not *ex cathedra* because his mind was too intricate and held too many reservations to be at its best in pronouncement and simplification. His mind was always searching and wondering, approaching its subject from new angles. His gift as a teacher was that of genius: inspiration, shared generously in intercourse with the young. When perceiving genuine appreciation and sympathy, Sherrington allowed his vivid imagination free play and supported it by a wealth of information from his boundless stock of knowledge of facts, people and incidents collected from a life that had—or so it seemed—experienced everything from the beginning of the modern scientific age. The remarkable visual detail in everything he told engraved it upon one's memory while one was waiting for the amused chuckle and quick upward jerk of the head