

chief ambition while at Oxford was to bring forestry into line with the other main scientific departments of the University and to obtain for it that recognition which its growing importance deserved. He therefore set to work to collect funds for the endowment of a permanent chair of forestry, and his appeal met with a sympathetic response from various sources, both official and private. He had the satisfaction, not long after the conclusion of the War, of seeing the realisation of his dreams, for a permanent professorship of forestry was constituted in 1919, and in the same year a statute was passed placing forestry among the degree subjects until then it had ranked as a diploma subject only. He finally laid down the reins of office on January 1, 1920 when he was succeeded by one of his old pupils.

Schlich was an honorary fellow of St. John's College, Oxford. He was elected a fellow of the Royal Society in 1901, and was created K.C.I.E. in 1909. His best-known work is his "Manual of Forestry," in five volumes, of which three were written by himself and two by his former colleague, the late W. R. Fisher. Among his other publications may be mentioned "Afforestation in Great Britain and Ireland," "Forestry in the United Kingdom," and a large number of papers, reports, and other writings. He was a member of the Forestry Sub-Committee of the Reconstruction Committee which was appointed in 1916 and issued its final report in 1918. He held the office of president of the Royal English Arboricultural Society in 1913-14, and was on the governing council of the Empire Forestry Association at the time of his death. In spite of his advanced age, he retained his mental vigour unimpaired until the end, and worked hard at the revision of his "Manual of Forestry" after retiring from his post at Oxford; he brought out new editions of vol. 1 in 1922 and vol. 3 in 1925. He was married twice, and is survived by a widow, a son, and four daughters.

R. S. TROUP.

PROF. ANDREW GRAY, F.R.S.

THE many old students of emeritus Professor Andrew Gray, some of whom are scattered all over the world, will be sorry to hear of his death. His strong personality, ability as a teacher, and unwearying patience in explaining difficulties, must have endeared his memory to many thousands of students. There are few men who worked harder or have left a greater record of work. His life was a full and a happy one, and his sympathy with the early struggles of young men considerably lightened his onerous duties as a professor. He belonged to the diminishing band of mathematical physicists, and he once told the present writer that what he called the "Laodicean" attitude of many scientists towards mathematical physics was seriously discouraging research in this direction. In a letter some years ago, written when revising his "Absolute Measurements," he complained of feeling tired, but added that he must finish his work for *ἔρχεται νύξ*. The night has now come, and he sleeps well who toiled during many years to advance our knowledge of Nature.

Born in 1847 at Lochgelly, in Fifeshire, Gray began his mathematical studies in the subscription school at the time of the Indian Mutiny. His text-book was "Practical Mathematics," by John Davidson. Modern

educationists might consider the book a collection of mathematical scraps, but Gray often spoke of the intense interest it excited in the boys. By means of a measured base line, 10,110 feet long, they could measure the distance of Nelson's monument on the Calton Hill at Edinburgh, the lighthouse on the island of Inchkeith, the Martello Tower at Leith Harbour, North Berwick Law, and so on. The solutions of such problems had an interest that no mere diagrams with their letters A, B, C . . . could ever give.

At the University of Glasgow, Gray studied very hard and gained many honours. He once told the writer the reason why he did not obtain more. On one or two occasions he had to leave a fortnight before the end of the term in order to assist in farming operations at home. On one occasion this probably lost him the gold medal which is given to the best student in the senior Greek class. He ever put duty before personal ambition. He graduated as M.A. with honours in mathematics and natural philosophy. Gray was an excellent classical scholar, and in his later years he derived much pleasure from reading Latin and Greek poetry. Like his friend Prof. Chrystal, he was a great admirer of Schiller's poems and knew many of them by heart. His Greek testament was his constant companion.

Gray was private secretary and assistant to Sir William Thomson (Lord Kelvin) from 1875 until 1880, and official assistant to him from 1880 until 1884. About this time electric lighting was gradually coming into use, and electrical measurements became of practical importance. Gray wrote a series of elementary papers on the subject for NATURE, which attracted considerable attention. They formed the nucleus of his treatise on "Absolute Measurements in Electricity and Magnetism."

To be an assistant to Lord Kelvin was not an easy post. Having many interests which took him away from home, his assistant could never tell before the lecture what aspect of the subject the professor was going to discuss or what apparatus he would want. He kept all his staff busy with his work and their individuality was apt to be submerged. In 1883 Gray published the first volume of "Absolute Measurements," which has been a great help to many. Kelvin told him that he ought not to have published it so long as he was his assistant. Nowadays this would be an impossible attitude for a professor to take up. No one, however, had a higher opinion of Kelvin's abilities than Gray, or more revered his memory.

In 1884 Gray was appointed to the chair of physics in the newly founded University College of North Wales. Amongst his new colleagues were Henry Jones, the distinguished philosopher, James J. Dobbie, later the principal of the Government Laboratory, and George Ballard Mathews, a mathematician possessed of rare gifts, with whom he co-operated in writing the well-known "Treatise on Bessel Functions." While in Wales he took the leading part in the foundation of the County School for Girls in Bangor, and championed the cause of the higher education of women. At this time he was also an enthusiastic mountaineer, and made weekly excursions with some of his colleagues into the Welsh hills.

On the death of Lord Kelvin in 1907, Gray was

installed as his successor to the Glasgow professorship. He delivered the University Oration in memory of Kelvin. This he later expanded in his book called "The Scientific Work of Lord Kelvin." In this book he gives an excellent account of the life and manifold activities of his famous predecessor.

Gray planned the present Natural Philosophy Institute of the University of Glasgow, a task which absorbed all his energies for several years. The Institute was opened eighteen years ago by the King and Queen, then Prince and Princess of Wales. He also took a leading part in arranging for the comfort of the students, a subject barely considered by the professors of fifty years ago.

Of Gray's literary work we can only mention his "Treatise on Magnetism and Electricity" (1898), "Dynamics, and Properties of Matter" (1901), which was translated into German by Prof. Auerbach, "A Treatise on Dynamics" (1911), in conjunction with his son, Dr. J. G. Gray, and "Gyrostatics and Rotational Motion" (1919). This last treatise stands as a monument to the vigour and industry of the author, and also to his thorough understanding of the fundamental principles. In 1921 he published a revised edition of his "Absolute Measurements." The work was practically rewritten and involved an immense amount of labour. The early edition was found to be a great help by those who determined our electrical standards at the National Physical Laboratory. The late Dr. Rosa also, of the U.S. Bureau of Standards, Washington, much appreciated his formulæ and constructed an electro-dynamometer to Gray's instructions, which was found most useful.

Gray communicated many papers and gave several lectures before learned societies. In particular, the writer remembers the sixth Kelvin lecture he gave to the Institution of Electrical Engineers. He showed the gyrostatic apparatus Kelvin used in his lectures, and explained clearly the dynamical principles which they illustrated. He also obtained complete solutions of, and generalised, some of Kelvin's theorems. In his opinion, the teaching of dynamics and gyrostatics was badly neglected in nearly every university, and in many cases the old Newtonian philosophy had become a byword. Young mathematicians and physicists revelled in discussing relativity and quanta: the former possibly leading to higher orders of relativity and the latter to fruitless metaphysics. He did not mind these metaphysical discussions, provided the speakers had a sound knowledge of rotational dynamics, but he was afraid that few of them had.

Prof. Gray was very happy in his home life. He is survived by his widow, three sons, and four daughters. There was an interesting family gathering when he and his wife celebrated their golden wedding five years ago. He was glad when his second son James gave up engineering and followed in his footsteps; a decision which has since been justified by the excellent work he has done in gyrostatics and his appointment as professor of applied physics in the University of Glasgow. His two youngest daughters are well known in musical circles in Glasgow.

Gray was a strong swimmer, and when he was at Bangor he rarely missed his morning bathe in the Menai Straits. In his later years he loved to spend his

vacations in the Perthshire Highlands, where golden eagles are still to be seen holding their own in the struggle for existence. He always stood with deep reverence before the great problems of the soul and the destiny of man. What he said of Kelvin we can also say of him: "He believed that Nature, which he had sought all his life to know and understand, showed everywhere the handiwork of an infinite and beneficent intelligence, and he had faith that in the end all that appeared dark and perplexing would stand forth in fulness of light." ALEXANDER RUSSELL.

DR. CHARLES F. SONNTAG.

By the sudden death of Dr. Sonntag on October 10—only two days before the thirty-eighth anniversary of his birth—the Zoological Society of London has lost a Prosector who by temperament and enthusiasm for patient anatomical investigation had ideal qualifications for this office. At University College, where since 1922 he had acted as a part-time demonstrator of anatomy, Sonntag endeared himself to students and colleagues by loyal service and geniality, and to a wider circle by the lucidity and interest of his public lectures on the evolution of man.

Dr. Sonntag was born in Glasgow, his father being a naturalised Swiss and his mother Scottish. He was educated in the University of Edinburgh, where he took the M.D. degree with honours in 1912. After a varied experience of hospital work he received a Commission in the Royal Army Medical Corps when War broke out. On active service at Salonika he had the misfortune to contract phthisis and was invalided home. When convalescent he resumed work at the Red Cross Clinic in London and afterwards (1917-1919) in the Special Military Orthopædic Hospital at Shepherd's Bush. There he attracted the attention of Prof. Wood Jones, who recommended him to apply for the vacant prosectorship of the Zoological Society.

Although Sonntag had been interested in zoology from boyhood and had attained distinction in anatomy as a medical student, he really began his serious apprenticeship to anatomical research in 1919, when he was elected to the prosectorship. The distinctive quality of his service to the Zoological Society and University College has been aptly described in the *Times* of October 12 in these words: "Sonntag was an indefatigable worker, apparently with no interest in life except dissection and the encouragement of other dissectors." In spite of his ill-health and physical weakness his intense enthusiasm sustained him during the brief six years of his career as an anatomist, which produced an enormous output of original observations in the Proceedings of the Zoological Society. For four years he contented himself with recording facts, apparently without any definite aim in view. But the discipline of preparing (in 1923) his book on "The Morphology and Evolution of the Apes and Man" seems to have shaped his purpose. In 1924 and 1925 he marshalled the evidence he had been accumulating since 1919 on the comparative anatomy of the tongue; and at the summer meeting of the Anatomical Society last July he gave a masterly exposition of his investigations, carefully building up his argument that certain easily observed features of the tongue could be used as trust-