

used trichromatic colorimeter in the English-speaking countries.

A trichromatic colorimeter, though the fundamental instrument for colour measurement, gives results which depend to an appreciable extent on the colour vision of the observer. To minimize these variations, it has to employ a small visual field, which is a disadvantage for industrial or commercial applications. To meet this 'difficulty', Donaldson designed an instrument on the same lines as his trichromatic colorimeter but with three additional matching colours, making six in all, which when calibrated and used in the proper way gives results characteristic of the C.I.E. 'standard observer', unaffected by any but very gross visual abnormality of the actual user. It can be used with a large matching field, giving much greater precision than the small field of the trichromatic instrument. This colorimeter has proved most valuable in work at the National Physical Laboratory and has recently been made available commercially.

For many purposes, particularly in a standards laboratory, a colorimeter in which the eye of a human observer is replaced by a photo-cell or other detector of light is of great value. It not only avoids fatigue of observing staff but also gives results which are not limited in precision by visual sensitivity or affected by visual abnormalities. The physical detecting system must, of course, be arranged to evaluate light in exactly the same way as the accepted 'standard observer'. There are several ways of doing this—by filters or by templates fitted in a spectrometer, the filters or templates being made in relation to the spectral response of the photocell so as to give the required resultant spectral response for the combination. Donaldson designed a template colorimeter before the Second World War but, unfortunately, before it could be constructed the war-time claims on workshop facilities caused abandonment of the project until the return of peace. Other template colorimeters were developed commercially in the meantime; but none of these is capable of the highest class of work. Donaldson's instrument was designed with that end in view. It was constructed after the War and appears to provide a complete solution to

the problems of exact physical colorimetry and heterochromatic photometry.

In addition to the foregoing, Donaldson was responsible personally or in a supervisory capacity for the design and development of numerous instruments and devices required for use in the National Physical Laboratory, such as photoelectric spectrophotometers for the visual and ultra-violet ranges, comparators for the calibration of hæmoglobin test-tubes, double monochromators with single optical train, and so on, including, in collaboration with Stiles, the design of the multiple spectroscopic colorimeter now under construction for the forthcoming redetermination of the properties of the 'standard observer'.

At the invitation of the Medical Research Council he collaborated with a team of pathologists and biochemists in setting up a system of standardized colour tests for hæmoglobin determinations. He was responsible for the investigation of the relation between the oxygen-carrying capacity of hæmoglobin with its iron content and spectral absorption. His results, obtained from an analysis of blood samples from representative groups of male and female subjects, have established a norm for the hæmoglobin content of human blood which is now the standard by which all test apparatus is calibrated.

Donaldson's scientific abilities were recognized a few months ago by his special promotion to the grade of senior principal scientific officer. His personal gifts were rewarded by the respect and affection of all his colleagues; modest and unassuming himself, he had a keen sense of humour and an understanding for the failings of others. His tastes were simple and he had a true Scotsman's delight in a game of golf. His sudden death has robbed his colleagues and many friends of one who merited their affection and esteem.

L. A. SAYCE

WE regret to announce the following deaths:

Dr. Herbert E. Ives, member of the U.S. National Academy of Sciences, formerly of the Bell Telephone Laboratories, aged seventy-one.

Dr. T. W. Lumsden, director of cancer research in the London Hospital, 1930-42, aged seventy-eight.

NEWS and VIEWS

P. P. E. Roux (1853-1933)

BORN at Confolens, Charente, a century ago, on December 17, 1853, Pierre Paul Émile Roux began his medical studies at Clermont-Ferrand, where he attracted the attention of Émile Duclaux, whom he was to succeed as director of the Pasteur Institute at Paris in 1904. His friendship with Pasteur began in 1878, when he started working in the old laboratory of the École Normale Supérieure. Like his master, Roux possessed a real genius for finding brilliant men and drawing out their best qualities. Self-effacing and hating publicity, he gave many of his most enduring contributions to the world under the name of a colleague. He amplified Pasteur's work on attenuation, chicken cholera, vaccination of sheep and cattle against anthrax, and rabies. In collaboration with Elie Metchnikoff, he succeeded in inoculating anthropoid apes with syphilis, and introduced the prophylactic use of calomel ointment. In 1888, Alexandre Yersin and he isolated the diphtheria

toxin by passing a culture through a porcelain filter, thus paving the way for Emil von Behring's discovery of the antitoxin. Roux's announcement in 1894 at the International Congress of Medicine in Budapest that the antitoxin possesses both prophylactic and therapeutic value caused a sensation in medical and lay circles. As a teacher, Roux was lucid, concise and graphic, and pupils from all over the world attended his bacteriology courses. His numerous scientific honours included the foreign membership of the Royal Society in 1913 and the Copley Medal in 1917. Though in his later years everyone knew the tall, gaunt, ascetic man with the hollow cheeks and sallow complexion, who occupied the most honoured place in the world of bacteriology, few really knew him well. A sufferer from chronic pulmonary tuberculosis for thirty years, Roux died on November 3, 1933. His obituary in *Figaro* had been written by his colleague, Albert Calmette who died a few days before him.