

condition (c). The final saturations of the colours, however, are very seldom greater than those of the original, and are usually considerably less.

Why, then, can trichromatic reproductions be so acceptable? The answer lies very largely in the fact that they are scarcely ever seen alongside the original scenes, and the quality of the reproduction is judged against a mental conception of what the scene probably looked like. But scenes vary tremendously in their colour qualities, and particularly so in colour saturation, according, for example, to the type of lighting and the atmospheric conditions. Moreover, colour reproductions are generally viewed under conditions very different from those of the original scene, and this introduces a number of complicating subjective effects, which depend on the size, brightness and surface both of the picture and its surroundings.

Of colour reproduction, it must be said that accurate methods are impracticable, and practicable methods are inaccurate; and some may be inclined to add that all methods are too expensive. But the urge to 'fix the images of Nature' is just as insistent as it was a century ago, and there are some signs that the early trickles of hope are at last becoming the full floods of success.

<sup>1</sup> Neugebauer, H. E. J., *Z. tech. Phys.*, **36**, 22 (1937).

<sup>2</sup> Hardy, A. C., and Wurzburg, F. L., *J. Opt. Soc. Amer.*, **33**, 300 (1943).

<sup>3</sup> Clapper, F. R., and Yule, J. A. C., *J. Opt. Soc. Amer.*, **43**, 600 (1953).

## OBITUARIES

Prof. K. N. Bahl

KARM NARAYAN BAHL, who died at Lucknow on April 21 in his sixty-fourth year, was one of the great leaders in Indian zoology, and his work is known and admired throughout the world.

He was born on February 14, 1891, at Multan, in the Punjab, and educated at the Government College, Lahore, where he graduated B.Sc. in 1911 and M.Sc. (first class) in 1913, when he was also awarded the MacLagan Gold Medal. As soon as he had taken his B.Sc. he began his university teaching career by becoming demonstrator and assistant professor at Lahore; in 1914 he was appointed professor at the St. John's College, Agra, and in 1916 at the Muir Central College, Allahabad. His first research was on the ant-like spiders of the family Attidae; but then he turned to the study of the Indian earthworms and very soon made the outstanding discovery of a new type of nephridium. In 1919 he published the first of a series of important papers on earthworm anatomy which appeared during the next thirty years in the *Quarterly Journal of Microscopical Science*; in this first one he described three distinct kinds of nephridia—septal, pharyngeal and integumentary—which he found in the worm *Pheretima posthuma*. It was the septal nephridia which presented such an interesting novelty, for they opened not to the outside of the body, as in all other such organs, but into the intestine; he called them an enteronephric system and made the suggestion, which in later years he strongly supported by experiment, that they were an adaptation for the conservation of moisture in a dry climate. He then visited England to work for two years under Prof. Goodrich at Oxford, where he was awarded the D.Phil. for further studies on *Pheretima*, in which he worked out the blood-vascular system and the development of the entero-

nephric organs. His earlier discovery had in the meantime won him the D.Sc. of the University of the Punjab. On returning to India in 1921 he was made reader in zoology in the University of Lucknow and two years later became professor; here he did the greater part of his work, remaining in the chair until he retired and was appointed vice-chancellor of the University of Patna in 1951. Many more studies in earthworm anatomy, reproduction and development followed; in these he described enteronephric systems in a number of other genera and, jointly with Dr. M. B. Lal, showed the existence of a 'hepato-pancreatic' gland, with a hepatic portal system, in worms of the genus *Eutyphoeus*. His morphological work was not, however, confined to earthworms; he produced, in the *Records of the Indian Museum*, an outstanding monograph on the skull of *Varanus monitor* with its associated muscles, blood-vessels and nerves. He was awarded the D.Sc. of Oxford in 1938, and in 1942 received the Joy Gobind Law Memorial Gold Medal of the Asiatic Society of Bengal.

Bahl's leadership will continue to be felt in India and the East for many years to come through that excellent series of *Indian Zoological Memoirs* which he initiated and edited. Since he wrote the first on *Pheretima*, seven others, by different authors, have dealt in turn with selected types of the Indian fauna; they are the oriental counterparts of the well-known *Liverpool M.B.C. Memoirs* which have played so important a part in the training of English zoologists. In the words of a review which appeared in *Nature* some years ago, "zoologists in India owe a debt of gratitude to Prof. Bahl to whose enthusiasm this series of manuals is due". The debt will grow and extend through many countries as these memoirs become more widely used; there could be no better memorial to Bahl than this series of volumes. On his retirement he was made a research professor at Lucknow, but his sense of duty then compelled him to accept a pressing invitation to become vice-chancellor of Patna University; here his heavy duties proved too much for him and in 1952 he suffered a breakdown in health from which he never completely recovered. Our sympathy goes to his wife, three sons and a daughter who survive him.

A. C. HARDY

Dr. R. S. Clay

REGINALD STANLEY CLAY died on April 10, after a short illness; he was eighty-five.

Dr. Clay's interests were many and various. He was educated at Tollington Park College and St. John's College, Cambridge, becoming a Wrangler in 1892. His first professional appointment was as physics master at Mill Hill School, and in 1897 he became head of the Physics Department at Birkbeck College. In 1900 he was appointed principal of the Wandsworth Technical College and in 1902 was invited to become the principal of the Northern Polytechnic. There he found ample scope for the exercise of his professional qualifications and administrative ability, which, with his power of winning the sympathetic co-operation of his staff and the respect of his students, enabled him, during his twenty-nine years of office, to make the Institute more widely known and to bring it to a high degree of efficiency. In 1931 he retired, to the regret of all who had been associated with him either as colleagues or students.

During 1907–11 Dr. Clay was the secretary for the Association of Technical Institutions, and in 1936 he joined the board of directors of the United Kingdom Optical Co. at Mill Hill, with happy results for the firm. From 1942 he served the Company as technical consultant on many problems. He was a founder fellow of the Institute of Physics (1918), served on its Board during 1920–33, and in recent years helped to promote the education and training of laboratory technicians. For many years he did admirable work for the *Journal of Scientific Instruments*, was at one time chairman of the Advisory Committee and was himself a frequent contributor.

Throughout his life, Dr. Clay's chief interest and hobby lay in optics. He was a member of the Council of the Optical Society and its president in 1927. Having been a Fellow of the Royal Microscopical Society for some years, he became its president in 1937 and was made an honorary Fellow shortly before his death. He was also a member of the Physical Society, in the activities of which he took a keen interest.

In 1911 Dr. Clay published a "Treatise on Practical Light" which remained the standard text-book for many years. It describes many ingenious pieces of apparatus for demonstrating optical principles. He gathered a unique collection of microscopes, containing an almost complete series from 1670 to 1850. This collection, bearing his name, is now in the Museum of the History of Science, in Oxford, and is described in detail in a book published in collaboration with T. H. Court in 1932, on the "History of the Microscope"; this remains the standard work on the subject.

From 1904 to the end of his life he was closely associated with what is now the National Council for

Domestic Studies, being its first treasurer and chairman of the Examination Board. During thirty-seven years he was only absent from the chair on three occasions, and he personally signed nearly thirty thousand certificates. He was particularly interested in training girls in a scientific approach to home life. One of Dr. Clay's major interests was the North London Collegiate School for Girls, now at Canons Park, where he became a governor, representing the Worshipful Company of Clothworkers, in 1929, and chairman of the governors from 1938 until his death.

During both World Wars, Dr. Clay played a part in supplying the Services with optical instruments, and during the second he was attached to the Admiralty Establishment at Teddington, acting as liaison officer between it and various aircraft depots.

On retiring from the Northern Polytechnic, he took an active interest in the Islington Antiquarian and Historical Society, becoming its president in 1948. His interests also extended to the Organ Club, the Newcomen Society, the British Society for the History of Science and the Cactus and Succulent Society. For many years he was an honorary member of the British Acetylene Association.

Dr. Clay married Theodora Tilley, and in 1947 they celebrated their golden wedding.

Dr. Clay's great gifts were consecrated to great ends. He sought to help others and to make life easier and happier for them. He had the power of inspiring respect and affection in others by his cheerful and friendly personality. To all who genuinely sought his guidance he gave freely of his time and knowledge, and he leavened his many activities with a graciousness that endeared him to all.

W. L. DOUGHTY

## NEWS and VIEWS

### G. S. Ohm (1787–1854)

THE German physicist, Georg Simon Ohm, whose name is immortalized in the ohm, Ohm's law and the ohmmeter, died a century ago, on July 7, 1854. Son of a master locksmith, he was born at Erlangen in Bavaria on March 16, 1787, and entered the local University at the age of sixteen, but left after eighteen months because of lack of means. After holding teaching posts in Switzerland, he returned to Erlangen in 1811, graduated and taught as *Privatdozent*. In 1817 he was appointed professor of mathematics at the Jesuit's *Gymnasium* in Cologne, where by means of experiments made with great skill and care, though with poor and deficient apparatus, he established his law of the theory of the voltaic current, which he published at Berlin in 1827 under the title "Die galvanische Kette mathematisch bearbeitet". Ohm's law, which to-day is regarded as a commonplace, was far in advance of its time, and its announcement fell on deaf ears. Deeply hurt, Ohm resigned his post and led a precarious existence until after many petitions addressed to the King of Bavaria he was made professor of mathematics at the Nuremberg Polytechnic in 1833. The Royal Society of London was the first to appreciate his work, awarding him its Copley Medal in 1841 and in the following year electing him a foreign member. In 1843 Ohm announced his law on the production of complex tones by the composition of simple

vibrations. In 1852 he became professor of physics at the High School in Munich, where he died of apoplexy two years later. Small in stature, feeble in body, simple in taste, he never married and lived solely for his work.

### Geography at University College, Leicester:

Prof. Patrick W. Bryan

PROF. PATRICK W. BRYAN retires from the chair of geography and the vice-principalship of University College, Leicester, at the end of the present session, and has been appointed the first professor emeritus of the College. He received his early training in geography and economics at the London School of Economics under the late Sir Halford Mackinder; early in his career he spent a year at the University of Chicago, where he came under the influence of the school of geography then developing—the 'human ecology' school. The advanced text-book on North America, which was the joint work of the late Prof. Rodwell Jones and Prof. Bryan, was the first in the now well-known Methuen series, and his studies on the corn belt in particular illustrate Bryan's meticulous attention to relevant detail. He will always be associated with the development of the concept of the 'cultural landscape', elaborated in his book "Man's Adaptation of Nature". He was criticized by some for seeking an easy correlation between the features of the landscape and present