Atomic and Electronic Vibrations

The greater part of the symposium is devoted to the observation of optical properties and their interpretation in terms of atomic and electronic vibrations.

Precision measurements are included in six papers, of which two by Krishnan (R. S.) (pp. 25–32 and 45–57) report observations of the second-order Raman spectrum and its variation over a wide range of temperature. Ten distinct second-order lines have frequencies corresponding with infra-red absorption maxima, and five of them are octaves of the frequencies assigned in the Raman theory to lattice vibrations. It is difficult to attach any real significance to the proposed interpretation of the Raman spectra, when Krishnan persists in associating the octave of the fundamental Raman frequency 1332 cm.$^{-1}$ with the steepest point in the curved line joining an infra-red absorption maximum with the adjacent minimum —an arbitrary proceeding already condemned by Sutherland[9]. On the purely experimental side, however, it is to be noted that a recent communication in *Nature*[10] by Krishnan reports the complete resolution of the Raman lines, which in the symposium appear only as minute 'steps' on a continuous faint background.

Four papers by Ramanathan (pp. 130–161) describe infra-red, visible, and ultra-violet absorption properties of a large number of diamonds, and demonstrate that it is not possible to draw a definite line of demarcation between Type I and Type II diamonds from observations on infra-red absorption near 8 μ and ultra-violet absorption near 2250 A.

Descriptive accounts of the luminescence exhibited by diamonds under various stimuli occupy no fewer than five papers, and Ramachandran (pp. 81–94) outlines a semi-quantitative theory of the luminescence due to X-ray excitation. In a short review it is possible to do no more than indicate some of the effects described and discussed in papers by Rendall (pp. 168–175), Chandrasekharan (pp. 182–197), Ramachandran and Chandrasekharan (pp. 176–181); they include the blue and yellow fluorescence patterns, phosphorescence which persists for a short time after cutting off the exciting radiation, thermoluminescence observed on heating to 270° C., and the deactivation effect of radiation of wave-length longer than 4200 A., which causes a 'flash' emission of visible light. In the last of the papers listed above, Ramachandran and Chandrasekharan bring some evidence in support of their suggestion that luminescence effects are due to 'forbidden' electronic transitions.

Conclusion

The symposium includes also papers by Ramaseshan (pp. 104–113) on the Faraday effect and by Achyuthan (pp. 162–167) on photoconductivity, both largely experimental.

Many of the experimental data recorded in this substantial volume of about 200 pages, illustrated by many plates and drawings, are of great interest, actual or potential. The attempted interpretation of these data, however, in terms of the Raman theories, cannot be convincing unless the criticisms already made by workers outside the Bangalore Institute are answered in full and in such a way as to satisfy the critics. Instead, the Bangalore workers would sometimes seem to turn to fresh experimental approaches in the search for further support for their theories, leaving the original criticisms unanswered. The inevitable result is that full recognition is withheld from what is obviously an enthusiastic and hard-working research team, engaged on a problem of great interest and importance.

W. H. TAYLOR

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[4] (Second Symposium) *Proc. Indian Acad. Sci.*, **24**, A, 1 (1946).
[5] Symposium on the Quantum Theory of X-Ray Reflection, etc., *Proc. Indian Acad. Sci.*, **14**, 317 (1941).
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[9] Krishnan, R. S., and Ramanathan, K. G.; and Sutherland, G. B. B. M., *Nature*, **157**, 45, 582 (1946).
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OBITUARIES

Sir Almroth Wright, K.B.E., C.B., F.R.S.

ALMROTH EDWARD WRIGHT was born in Yorkshire in 1861, the second son of the Rev. C. H. H. Wright, a distinguished Ulster divine, by his wife Ebba, daughter of Nils Almroth, governor of the Swedish Royal Mint. He was educated at first in Germany and France and then privately in Belfast before going up to Trinity College, Dublin, where he graduated B.A. in 1882 and M.B., B.Ch. in 1883, proceeding to the M.D. degree in 1889. After working at the Universities of Leipzig, Strasburg and Marburg, he returned to England to become demonstrator in pathology in the University of Cambridge, where he took the B.A. degree in 1888. In 1889 he became demonstrator in physiology in the University of Sydney, returning three years later to become professor of pathology at the Army Medical School at Netley, where he remained until 1902.

Following up the tentative essays of Pasteur, Haffkine and Pfeiffer, Wright originated in 1896 the system of anti-typhoid inoculation. The results of this prophylactic measure in South Africa and India were so striking that before the outbreak of the First World War it had been made standard practice in the British Army. In 1898 Wright went to India as a member of the Plague Commission. In 1902, following differences with the War Office about anti-typhoid inoculation, he resigned his professorship at Netley and became pathologist to St. Mary's Hospital, London. Here he founded the Inoculation Department, of which he was the first principal. Here, too, he originated the system of therapeutic inoculation for bacterial infections (vaccine therapy) and numerous methods for measuring the protective substances in the blood, notably the opsonic index. He held also a professorship of experimental pathology in the University of London.

In 1914 Wright published the results of his investigations into the incidence, prevention and treatment of pneumonia among the natives employed in the South African mines.

During the First World War, Wright served as consulting physician to the British Forces in France, and devoted himself to studying the immunology of wound infections and to combating the ravages of gas gangrene. This was his last great research.

By 1925, all Wright's important contributions to bacteriology and immunology had been made. He worked as assiduously and devotedly as ever, but in unpropitious circumstances. All the problems sus-

ceptible of solution by the methods which Wright had devised and of which he was an acknowledged master had been solved, and the questions awaiting solution could be attacked only by new methods and a new approach. Moreover, the team which he had trained, inspired and led, and which had contributed in no small measure to his triumphs, had disintegrated: some had turned from immunology to other subjects; some had sought greater scope and brighter prospects elsewhere. Other pupils and assistants he had, but times had changed, and they lacked the faith and industry of their predecessors; and, having set their hands to the plough, sooner or later turned back.

In these circumstances, Wright tended to direct his attention more and more to philosophy and, in particular, to logic. The subject had always fascinated him and, as early as 1895, he had contributed to *Brain* a paper "On the Nature of the Physiological Element in Emotion". This contribution he afterwards had reprinted to "demonstrate that some of the problems treated of in this Book have been actively simmering in my mind for at least fifty years". He determined, then, now that opportunity offered, to produce a book of technique for the abstract thinker which should do for him what his book "The Technique of the Teat and the Capillary Glass Tube" had done for the laboratory worker. He felt the inadequacy of formal logic and the sterile ratiocinations of the Schoolmen, of which he says: "And if we were dealing with a syllogism, there would in every case be something which rendered it non-coercive—I am thinking of the fact that we are never in a syllogism given convincing evidence that the major and minor premises can be safely accepted". He proposed to supplement syllogistic induction by a series of criteria of truth, which could be applied to logical propositions as the crucial experiment is applied to physical phenomena. This project, in the course of time, assumed many forms and underwent many vicissitudes, to emerge finally as "Alethetropic Logic, or the Logic which searches for Truth", of which the preliminary volume, "Prolegomena to the Logic which searches for Truth", had appeared in 1941. To this book, which Wright regarded as his *magnum opus*, he was putting the finishing touches: in fact, he was working upon it within a few hours of his death on April 30.

What manner of man was Wright? His intellect, naturally commanding, had, by wide reading, extensive travel and profound reflexion, become a precision instrument of the finest quality. It absorbed and assimilated with equal facility science, literature, law and philosophy, and made him, without apparent effort, a brilliant public speaker and a delightful conversationalist. His place as a pioneer worker and original thinker is assured. But he used his great gifts naturally and without ostentation, so that no one, were he never so young or so unsophisticated, was ever abashed or discomfited in his presence. In controversy, although he loved it, he was not at his best; and gave sometimes a totally erroneous impression of his character and intelligence. On matters of principle he was steadfast and unyielding, but in argument he often appeared elusive and even disingenuous, so that such verbal engagements were usually unsatisfactory and indecisive.

The outstanding trait in Wright's character was his kindliness. No one ever appealed to him in vain for help of any kind, and many were the beneficiaries of his secret munificence. The sight of suffering always affected him profoundly, and this compassion was a spur that ever urged him on. Other endearing traits he had in plenty: great personal charm and an impish sense of humour, unwearying patience and a temper either naturally equable or under complete control, undaunted pertinacity and an equanimity which neither failure nor success could shake.

It is customary, when writing of a great man, to say that we shall never see his like again; but this is literally true of Almroth Wright, for while heredity might play its part in producing his peer, the environment, in which alone so bold, fearless and uncompromising a spirit could flourish and attain full stature, has passed away. R. T. MUMMERY

Prof. Heinrich Kayser, For.Mem.R.S.

WAR conditions led to the fact that the death of Heinrich Kayser on October 14, 1940, at Bonn at the age of eighty-seven passed unnoticed in Great Britain.

Born at Bingen on March 16, 1853, Kayser was educated at the Sophieen Gymnasium in Berlin and at the University of Strassburg under Kundt; there one of his fellow students was Röntgen. He took his doctorate at Berlin and became an assistant to Helmholtz in 1879. He was introduced to spectroscopy in 1880 by Hagen, one of his fellow assistants, and at once became drawn to the subject, publishing his "Lehrbuch der Spektralanalyse" in 1883. In 1885 he was appointed to the Technische Hochschule in Hanover, where he had as his colleague Runge, and as assistant Paschen. The nine years at Hanover, before he succeeded Hertz at Bonn, were very fruitful in tables of the spectra of the different elements, of which the best known was the photographic map and table of wave-lengths for the spectrum of the iron arc from 2500 to 6600 A., published in collaboration with Runge.

The work on which Kayser spent most of his twenty-five years at Bonn—his life-work—was the "Handbuch der Spectroscopie", of which the sixth volume came out in 1912. It was a stupendous undertaking, a compendium of all that was known in spectroscopy. The subject had grown so much while the work was in progress that the proposed volume on astrophysical applications got squeezed out, and two supplementary volumes were needed and brought out with the aid of Konen and others after Kayser had passed the age of eighty. Other valuable contributions in his later years included a "Tabelle der Hauptlinien der Linienspektren aller Elemente"; but the "Handbuch" remains as his monument.

Kayser's wide knowledge of languages was a great help to him in his work and was combined with a passion for travel, in part inherited from his parents. He was one of the founders of the International Solar Union in 1904 and attended its meetings regularly; he was the genial host at Bonn for the meeting in 1913. Though he was one of the first to be co-opted, when that became possible, on to a commission of the International Astronomical Union, that of Standard Wave-lengths, he never attended its meetings. He was elected a foreign member of the Royal Society in 1911 and was present and spoke at the two hundred and fiftieth anniversary gathering in 1912; of this meeting he said in his autobiography, written at the age of eighty-three: "Uberall zeigt sich als alteingewurzelt Tradition, Reichtum, Macht; und das wirkt mehr als alle Reden".

F. J. M. STRATTON