

The Raman Jubilee Volume

THE November issue (Vol. 8, No. 5) of the *Proceedings of the Indian Academy of Sciences* has been published as a Jubilee Volume in commemoration of the Fiftieth Birthday of Sir C. V. Raman, and the completion of ten years of research on the Raman Effect. It is a unique publication being the first of its kind undertaken to honour an Indian Scientist, and is a great tribute to the work of this leader of scientific renaissance in India of the last quarter of a century. As indicated in the *Prefatory note to the special number*, very short notice, in fact a bare three months' time, was given to the several contributors while it is usual to plan at least a year ahead on such occasions. That in spite of this short notice there should have been such a ready and generous response from several men of science of diverse countries, which makes this volume a truly international effort, is ample testimony to the fundamental and comprehensive character of the scientific work of Sir C. V. Raman and his large school of workers.

The Raman Jubilee Volume is limited to original papers on the Raman Effect, light-scattering and related topics, being by far the best-known field of investigations of Sir C. V. Raman. The volume opens with a portrait and a brief life-sketch of the great leader of science in India. The contributions, thirty-eight in all and running over to more than 300 pages, touch upon every aspect of light-scattering and Raman Effect and indicate, as is anticipated by J. H. Hibben in his paper on *A Statistical Analysis of Trends in Research on the Raman Effect*, a wide and sustained interest in the subject in all countries, and an extensive range of problems which come within its scope.

Of the five publications on classical light-scattering, the short and suggestive paper on *Thermal Dependence of Elasticity in Solids* is contributed by Léon Brillouin. Closely related to the latter is the paper by L. Sibaiya on *Scattering of Light in a Rochelle Salt Crystal*, in which he reports the Brillouin components corresponding to the longitudinal Debye waves in this crystal and correlates the observed shifts with its elastic constants. In his paper on *Light-scattering in Anisotropic Media* Hans Mueller develops an extension of his theory of Brillouin

scattering of light to optically anisotropic media and obtains remarkable confirmation of his conclusions from Krishnan's data for scattering in graphite sol under the influence of a magnetic field. R. S. Krishnan reverts to the problem of *The Anomalous Depolarisation of Light-scattering in Optical Glasses* and presents quantitative results based on photographic photometry demonstrating the existence of the *Krishnan Effect* in them. V. S. Vrkljan contributes a paper on "*Theoretische Bemerkungen Zum R. S. Krishnan's Reziprozitätsgesetz der Kolloid-Optik*".

Of the 26 papers on the Raman Effect, ten are contributed from the laboratory of K. W. F. Kohlrausch who is in no small measure responsible for the rapid progress of the subject during the past ten years. In the series of publications emerging from his school entitled "*Studien Zum Raman-Effekt*", contributions 89-95 appear in this volume. "*Mitteilung 89: Aethylenoxyd*" by K. W. F. Kohlrausch and A. W. Reitz gives the results of measurements of Raman spectrum of ethylene oxide and its polarisation characters and a detailed critical discussion of the results of various authors for ethylene oxide and cyclopropane. "*Mitteilung 90: Parasubstituiertes Acetophenon*" is by L. Kahovec and J. Wagner. "*Mitteilung 91: Asymmetrisches Phthalyl-Chlorid*" is by L. Kahovec, in which the author investigates the possibilities of attributing a C=O frequency of high value to an asymmetrical form of phthalyl chloride. In "*Mitteilung 92: Das Ramanspektrum des dimeren Ketens*", K. W. F. Kohlrausch and R. Skrabal have investigated the spectra of dimeric ketones corresponding to the diketo-form in cyclobutan-1-3-dion and found that the conclusions of the English authors regarding the existence of the dimeric ketones in monoenolic form are not supported by Raman measurements. Kohlrausch and Sabathy present the results of their investigation on the Raman spectra of *Cyclobutan-1, 2-dicarbonsäuren und Abkömmlinge* in *Mitteilung 93* and O. Ballaus deals with the spectra of *Tetroläure und Ester* in *Mitteilung 94*. From a detailed investigation of the spectra of mononitroparaffins, especially with reference to the doubling of the line 1380, Pendl, Reitz and Sabathy (*Mitteilung 95: Stickstoffkörper XII; Nitrogruppe*)

arrive at a tentative conclusion that the nitro-group probably exists in two different forms in these compounds. Among other papers on organic compounds, S. Mizushima and Y. Morino indicate by the calculation of normal vibrations as well as by the study of isotopic effect on the *Raman Spectra and Molecular Configurations of Solid Ethylene Dihalides* that practically all the molecules in the solid state in these compounds exist in the *trans*-form. In a paper entitled *Sullo Spettro Raman Di Alcuni Idrocarburi Paraffinici* Bonino and Ansidei have studied a large number of hydrocarbons and discussed the results in relation to their chain frequencies. Murti and Seshadri have investigated the influence of solvents on the carbonyl frequency of coumarin in their paper on *Raman Effect and Chemical Constitution, Part I. Coumarin*. A critical review which will stimulate further work on the subject, is given by W. Rogie Angus in his paper on *Raman Spectra of Terpenes*.

There is a group of five interesting articles on inorganic compounds appearing in this volume. Mme. Marié Freymann and Réne Freymann have contributed a paper on *Spectres Raman et Spectres D'Absorption Infrarouge de Composés ou L'Azote est Tetracoordonné* in which they have shown that the NH frequency, like that of OH, becomes smaller and diffuse in solids and concentrated solutions of compounds in which nitrogen is tetra-co-ordinated. In the paper on *Raman Spectra of Volatile Fluorides*, D. M. Yost has calculated the force constants, entropies and heat capacities of the halides of B, P, As, C and Si and shown that the Raman spectra have proved extremely useful in solving many problems in Chemistry. In a study on the *Effet Raman et Structure des Composés AX⁵: Pentachlorure de Phosphore et Homologues* Moureu, Magat and Wetroff conclude that these compounds have a pyramidal structure with a trigonal base in the liquid state, and in the solid, they have a structure AX⁴⁺ X⁻, in which X⁻ plays a different role from the four other X⁺. P. G. N. Nayar has given a useful *Chart of the Raman Bands of Water in Crystals* of many substances, which will be helpful in understanding the structure of bound water. The remarkable changes depending upon the influence of temperature on the vibrational and lattice Raman lines in sodium nitrate crystals form the subject-matter of a paper on the

Scattering of Light in Sodium Nitrate Crystals by T. M. K. Nedungadi.

Another aspect of the application of the Raman spectra to the elucidation of the nature of liquid state is undertaken by B. D. Saxena in his paper on the *Depolarisation of Unmodified Light-Scattering in Liquids* and he has shown by careful experiments that contrary to the work of earlier authors, normal liquids like benzene and carbon disulphide show a definite depolarisation of the unmodified scattering. Closely related to the above subject is a paper on the *Low Frequency Raman Lines in Organic Crystals* by C. S. Venkateswaran.

An important line of work which is bound to assume great importance in future investigations is the theoretical interpretation of the Raman lines and their intensities in terms of molecular models. The increasing application of group theory to problems of this nature is brought out in a paper by Bhagavantam on the *Interpretation of Raman Spectra in Crystals: Anhydrite and Gypsum* and in another by Venkatarayudu on *Normal Frequency of the Diamond Lattice*. A different method of approach towards the same problem is adopted by O. Burkard in his paper on *Durchrechnung Einigen Ausgewählter Molekül-Modelle*, in calculating the frequencies, mode of vibration and energy distribution for the plane-vibration of valence oscillations depending on the model constants. Equally profitable is the *Relation between the Force Constant, the Inter-Nuclear Distance, and the Dissociation Energy of a Diatomic Linkage* derived by G. B. B. M. Sutherland, in interpreting the Raman measurements of simple compounds. The use of mechanical models in elucidating the vibrations of molecules is illustrated in a paper on *Eigenschwingungen Mechanischer Molekülmodelle. IV. Der Viererring* by F. Trenkler. The influence of multiple scattering of light on the intensity of the Raman lines is theoretically derived by Kastler in his paper on the *Raman Effect and Multiple Scattering of Light*.

Four papers in the volume bear on problems related to scattering of light and three on supersonics. In their paper on *Directional Variations in the Absorption and the Fluorescence of the Chrysene Molecule*, K. S. Krishnan and P. K. Seshan show

that when the incident light vibrations are along the normal to the molecular plane there is hardly any absorption and that only vibrations in the plane are absorbed. P. Jordan has contributed an interesting article *Über Biologische Wirkungen Ultravioletter Lichtquanten*, in which he shows that a phenomenon akin to Raman effect is taking place in the interaction of light and matter in biological media. In his theoretical paper on *Some Remarks on Reciprocity*, Max Born presents in a very general form, the difficulties which theoretical physics encounters when dealing with the nature of light and ultimate particles. An attempt to examine the diminution of optical anisotropy of molecules of a liquid due to the influence of neighbouring molecules is made by B. S. Madhava Rao and K. Venkatachala Iyengar in their mathematical paper on *An Inequality Concerning Lattice Sums*. Of the three papers on supersonics,

N. S. Nagendra Nath gives a theoretical treatment of the *Diffraction of Light by Supersonic Waves*, in which he points out an extreme case where one can get closed expressions for the intensities of diffraction orders. E. Hiedemann and K. Osterhammel have a paper on *Untersuchung von Schallamplituden-Feldern Mittels Einer Methode der Isochromaten*, in which a method of colour photography is described for the demonstration and the determination of energy distribution of sound field with white light. In his paper on the *Dispersion of Ultrasonic Velocity in Liquids*, R. Bär reports failure to observe any dispersion of velocities in benzene and water for a range of frequencies 7.5 and 52.5 MHz.

The volume is priced at Rs. 6 or 10sh. per copy.

B. S. M.
C. S. V.

The Central Board of Irrigation in India

THE recent publication of the Central Board, *Annual Report for the year 1936-37*, not only gives the public an idea about the work that the Board is carrying on, but shows what different provinces of India are doing by way of research on problems of Irrigation. The Board provides facilities for workers from different provinces to meet together once a year and to compare notes. As its President Mr. G. M. Ross said in one of these meetings, "This annual meeting affords a splendid opportunity for Irrigation Engineers from various parts of the country who are particularly interested in research, to discuss both formally and informally, the many problems that beset irrigation engineers not only in India, but in other irrigating countries of the world. By constructive criticism of the various experiments in progress in these provinces which have Research Stations and discussion of other problems of common interest, we are afforded the best possible means of applying the combined knowledge and experience available in the country to those problems which are so important to the many million engaged in cultivation aided by irrigation. You are aware that India has a much greater area under irrigation than any other

country in the world and in fact, it is equal to the total area irrigated by the next five leading countries including America".

Of the various subjects discussed in the Research Officers' meeting of the Board, the following appear to be of all-India importance:—

- (1) The Role of Reservoirs in River Flood Control.
- (2) Meandering of Rivers.

Discussion on these two subjects seems to have lead nowhere. It is true very little information is available about them but that is no reason why efforts should not be made to study these problems. Much of the prosperity of the country depends on flood control. During recent years we have witnessed catastrophic floods all over the country and thousands of lives and hundreds of villages have been washed. It is time that something substantial is done to increase our knowledge about these two subjects so that we can grapple the problem more effectively. A River Commission on an all-India basis is what is called for—where engineers from different provinces and a few scientists may sit together and devise means to combat the evil.