Meetings

POLARIZATION IN WASHINGTON

OPTICAL SOCIETY MEETING REPORTED

The fact that we live in a sea of partially plane-polarized light was emphasized by several speakers at the meeting of the Optical Society of America held in Washington, D. C., on March 1–3. Reference was made to the well-known fact that the blue sky is partially polarized, and it was noted in passing that the plane of polarization can be detected by the common bee, who uses this natural sky compass in guiding himself on his frequent trips between his honey and his home. Some lesser-known facts were revealed, such as that polarization effects are encountered in the light from tungsten-filament lamps, and in such common laboratory devices as photocells and infrared spectrometers. Ways to ensure the *de*polarization of light were reviewed by Bruce H. Billings in his invited paper on involuntary polarization and depolarizers, and he went on to discuss the application of polarization optics in such practical items as narrow pass-band interference filters.

The startling fact that the light from some stars is partially plane-polarized was discovered in 1948 by Hiltner and Hall in the course of observations carried out to confirm a polarization effect predicted by Chandrasekhar to occur at certain times in eclipsing binary stars. The present state of the understanding of this challenging phenomenon was discussed by its co-discoverer, John S. Hall, now at the Naval Observatory, who has been one of the principal workers in this new field. He uses sophisticated instrumentation—the starlight passes through a rotating polarizer and falls on a photo-multiplier tube, and a cathode ray oscilloscope presentation is studied for flicker effects. In an attempt to account for the polarization of starlight it has been noted that higher degrees of polarization—sometimes as much as 8%—are associated with stars that exhibit the space reddening which results from selective scattering by interstellar dust. Therefore it has been suggested that the polarization may be due to scattering by needle-shaped particles in interstellar space, which are oriented by magnetic fields whose origin is as yet unspecified. However, Dr. Hall stated that the recent discovery that the bluest star known shows 3½% polarization casts doubt on this space-scattering hypothesis of the origin of the polarization of starlight.

The leading paper in the polarization symposium was what the speaker, Edwin H. Land, called a "25-year progress report" on his continuing development of synthetic sheet polarizers. He referred to his early awakening of interest in this subject, when as a student at Harvard in 1926 he read of the attempts of Herapath and others to grow large plates of dichroic crystalline materials. The impracticability of this approach seemed so evident that he turned to another possibility, that of using dichroic micro-crystals so small that they could not be resolved by the eye, and giving them all the same space orientation. If this could be done successfully, then it should be possible to make polarizing sheets of any size desired. Dr. Land showed his first successful polarizer, a little plate less than an inch wide, in which the orientation of the micro-crystals was effected through the use of a large electromagnet. He then went on to the "25 years later" situation, and exhibited large sheets of the highly efficient type of synthetic polarizer which is identified by most people as "Polaroid." These present-day polarizers are of an entirely different nature from the early microcrystalline type. They are now made by orienting a plastic sheet such as polyvinyl alcohol and then absorbing iodine solution in the sheet. Iodine is the dichroic agent, and the orientation is brought about by stretching the plastic. Dr. Land actually prepared a sample of this "Type H" polarizing sheet in front of the audience, in the space of just a minute or two. He discussed, in technical terms, the properties of polarizers which are important to the experimental scientist and the instrument designer. He then went on to mention a few of the many applications of synthetic polarizers, some of which, such as glare-reducing sun glasses and three-dimensional pictures, are already well known. In conclusion, he mentioned the great benefit which could be obtained in the reduction of highway accidents at night by the use of polarized headlights, and showed data which revealed that this system has been proven to be both a theoretical and a practical possibility. The automobile industry has acknowledged the scientific and engineering success of the polarized headlight system; its adoption appears to wait only on public demand.

In a contributed paper which followed the symposium of invited papers on polarizers, Cutler D. West and R. Clark Jones of the Polaroid Corporation presented calculations and curves regarding the optimum type of polarizer for use as a light modulator in photoelectric optical systems. Sheet polarizers can be obtained in various area-concentrations of the dichromophore, to which correspond varying degrees of transmission by a single layer and of extinction by two "crossed" layers. It would ordinarily be thought that the most efficient polarizer is one which suppresses the unwanted polarized component most effectively, but they showed that for certain practical uses better results would be given by a polarizer that would popularly be regarded as being much poorer—that is, one which transmits several per cent of light of the unwanted polarization.

The final paper on polarized light was presented by Wallace R. Brode of the Bureau of Standards, and was devoted principally to the phenomenon of optical rotation by chemical compounds. He stated that curves in which optical rotation is plotted against wave length may be quite as revealing regarding molecular structure as are the ordinary spectrophotometric curves. It seems that the former tool has never achieved the popularity, in this country, that has been accorded spectrophotometry and, later, tracer techniques, in the unravelling of the structure of organic molecules.

The second subject which received major attention at this Optical Society meeting was physiological optics or, more particularly, the physical and physiological aspects of the mechanism of vision. The subject was keynoted by the Ives Medal address given by the 1951 recipient of the Frederic Ives Medal, Brian O'Brien of the University of Rochester. He spoke on the subject, "Vision and Resolution in the Retina," and gave an admirably concise and factual review of the present, unsettled status of the physiological basis for foveal resolution. Experiments conducted at Rochester using microwave analogues: 3.2 centimeter klystron-generated electromagnetic waves and large models of retinal cones made from polystyrene froth, made possible a somewhat indirect but very convincing check of O'Brien's explanation of the Stiles and Crawford effect, and covered both the geometrical and the physical optics aspects of the situation. Experiments

using rapid-flash illumination in studying visual acuity versus brightness functions were also reported, as were morphological studies of animal retinas in which fast-freezing techniques are employed to avoid distortion or destruction of the rod-and-cone structure of the retinas.

During the remainder of the morning session, the listeners were given the privilege of hearing four additional experts on vision speak along the lines of their major interest. Samuel A. Talbot of the Johns Hopkins University School of Medicine reviewed the current theories of retinal color mechanisms, and put forward an integrated explanation. H. K. Hartline of the Johns Hopkins University described his experiments on the activity of single optic nerve fibers as they relate to the problem of visual resolution, and J. M. Otero, Director of the Institute of Optics of Madrid, Spain, spoke on "State of Accommodation and Other Factors Affecting Visual Performance". In the final paper, George Wald of Harvard University proposed a new field of research activity: *biochemical optics*. He has successfully elucidated the cycle between rhodopsin ("visual purple"), its bleaching by light to retinene, its transformation to vitamin A, and its reconversion to rhodopsin; the part played by the colorless protein opsin was described. This very cogent explanation of some of the heretofore unanswered questions regarding dark adaptation seems to provide a most appropriate keystone for the new structure of biochemical optics. It is hoped that all five of these excellent papers will appear in a subsequent issue of the Journal of the Optical Society of America, so that this wealth of systematized information will be made readily available to all.

Other activities of the three-day meeting included the presentation of some sixty contributed papers, in several of the many fields which lie within the broad coverage of the Optical Society. We felt fortunate in being one of the first scientific organizations to honor the 50th anniversary of the founding of the National Bureau of Standards. Actually, the date of the signing of the organic act which established the Bureau was March 3, so our meeting was admirably timed. A half day was spent in visiting laboratories at the Bureau which are concerned with optical work, and at the informal dinner a commemorative scroll was presented by the President of the Optical Society to the Director of the Bureau, E. U. Condon, who responded appropriately and wittily. E. C. Crittenden, Emeritus Associate Director of the Bureau of Standards and a Past President of the Optical Society, spoke at the dinner on the early work in optics at the Bureau.

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MEETINGS TO BE HELD

SYMPOSIA TO BE HELD AT ILLINOIS TECH

A pair of three-day meetings sponsored by Armour Research Foundation of the Illinois Institute of Technology will be held next June at the Sheraton Hotel in Chicago. The first, scheduled to meet from June 11 to 13, will be a symposium on analysis and metallography of titanium and will feature panel discussion on instrumental analysis, gases in titanium, chemical methods, and metallography. Julian Glasser is program chairman for the titanium meeting. A second symposium, on surfaces, will meet June 14–16, and will also involve panel sessions where audience participation in discussion will be encouraged. Program chairmen for the surfaces symposium (the fourth annual meeting of its kind to be sponsored by the Foundation) are Charles F. Tufts and Walter C. McCrone. A display of instruments is planned.

6TH CANADIAN PHYSICISTS CONGRESS

The Canadian Association of Physicists is having its Sixth Annual Congress in Montreal, May 31st–June 2nd, with McGill University and the University of Montreal acting as joint hosts. The Association is the only physicists' organization in Canada which is open to anyone having the required standards of education and actively carrying out work in physical science. This year's program, in addition to the usual contributed papers and social events, will include a symposium on semi-conductors, a symposium on nuclear physics, and a discussion on the employment of physicists in a national emergency. Advance programs will appear in the April issue of the Canadian Association of Physicists Bulletin and will also be available from The Secretary, Canadian Association of Physicists, Box 51, Station F, Toronto, Canada.

SOCIETY FOR APPLIED SPECTROSCOPY

The sixth annual meeting of the Society for Applied Spectroscopy will be held May 25th and 26th at the Socony-Vacuum Training Center, 63 Park Row, New York City. The program for the first day of the meeting will consist of a symposium on standardization in spectrochemical procedures, while the second day's program will feature two sessions of contributed papers on the general subjects, "Applied Spectroscopy" and "New Instrumental Developments". There will also be an exhibition of spectroscopic equipment.

INDUSTRIAL RESEARCH

The Second Annual Conference on Industrial Research, to be held June 11–15 at Columbia University in New York City, will concern personnel and communications in research. Sessions on the training and efficient use of research workers and on the internal and external communication of laboratory results will feature the program. The emphasis of last year's Conference was on costs, budgeting, and economics of industrial research; the Conference *Proceedings* for 1950 are available through the Columbia University Press.

COLLOQUIUM OF COLLEGE PHYSICISTS

The Colloquium of College Physicists will have its next sessions on June 13–16 at the University of Iowa. The program will feature research lectures on low velocity electron beams, physical behavior of high polymers, semiconduction, acoustics, and mass spectrometry. One afternoon will be occupied with special studies of undergraduate laboratory instruction, both advanced and elementary, and an exhibit of new experimental and nonexperimental teaching is scheduled for which prizes are to be awarded. G. Gamow of George Washington University will give a series of four lectures, two on the origin and evolution of the universe and two on the physics of living matter.

MEETINGS ON HEAT AND APPLIED MECHANICS

Stanford University will play host for the fourth annual meeting of the Heat Transfer and Fluid Mechanics Institute (June 20th to 22nd) and for an Applied Mechanics Conference, sponsored by the West Coast Committee of the Applied Mechanics Division of the American Society of Mechanical Engineers (June 22nd and 23rd). While both meetings will be run independently, the dates have been arranged to overlap by one day in order to provide greater variety of sessions and exchange between the two groups.