

example, for methyl di(2-chloroethyl)amine $pK_a = 6.1^4$).

A fuller account, including a description of the cytological effects produced by these compounds in tumour tissue and normal organs, the influence of diet upon response, the further correlation of biological activity with chemical and physical characters, and the clinical effects of selected compounds, will be published later jointly with others. The investigation has been supported by generous grants made to the Royal Cancer Hospital by the British Empire Cancer Campaign, the Jane Coffin Childs Memorial Fund for Medical Research, the Anna Fuller Fund, and the Division of Research Grants of the U.S. Public Health Service, and was conducted during the tenure by one of the authors (W. C. J. R.) of a Sir Halley Stewart Fellowship. It is a pleasure to acknowledge the assistance provided by Mr. J. L. Everett in the preparation of some of the compounds described.

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³ Ross, S. D., *J. Amer. Chem. Soc.*, **69**, 2982 (1947).

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OPHTHALMIC OPTICS

ON November 3, the master of the Worshipful Company of Spectacle Makers, Alderman Sir Frank Newson-Smith, opened a two-day optical convention which was held in the Apothecaries' Company's Hall, London, to mark the fiftieth anniversary of the inauguration of the Company's examinations. During this time, 116 examinations have been held and 4,200 diplomas issued, so that at the present time the services of a useful nucleus of trained opticians is available for the administration of the Health Service Act.

The Spectacle Makers' Company is an old City guild with a charter dating from 1629, which with supplementary ordinances gave control over persons practising the craft throughout Great Britain. These powers were at first rigorously applied; but by the end of the nineteenth century had fallen into disuse. A class of ophthalmic optician had been growing which petitioned the Company about 1898 to associate itself with the training and examination of opticians. The convention just held affords ample evidence that the Company is very much alive, particularly at the present time, to the encouragement of the sciences of spectacle and visual optics.

Papers presented and discussed were: (1) The Need of Research and the Means of Meeting it (A. J. Philpot); (2) Optical Theory and Ophthalmic Lenses (W. Swaine); (3) Nomography Applied to Optical Calculations (A. G. Bennett); (4) Some Applications of the Slit Lamp (H. C. Binstead); (5) Binocular Vision (Lord Charnwood); (6) Binocular Vision (Dr. W. D. Wright); (7) Routines and Techniques (C. S. Flick); (8) The Causes of Faulty Refraction (Prof. H. Hartridge); (9) The Physical Interpretation of the Spectral Sensitivity Curve of the Eye (Dr. W. S. Stiles). It is expected that these papers will be bound together in a commemorative volume.

It may be that the successful convention just held, coinciding as it does with the emergence of a profession attending to the visual requirements of the nation, marks the start of an era in which opticians

will take a greater part in scientific advancement. Mr. Philpot pointed out that ophthalmic optics is concerned with a nicely balanced mixture of fundamental and applied study, visual problems and spectacle production. While small firms may not be able to finance a special research worker, it should be possible to engage the services of a scientific worker who through education, background and experience could serve as an interpreter and liaison officer between his own organisation and the external research field. The possibility of co-operative research was emphasized. On the visual side, it may be advisable for the optical community to provide bursaries for postgraduate research workers and to provide machinery to effect the absorption of such within the community.

Prof. L. C. Martin presided over the session devoted to the discussion of optical theory and lens calculations. Mr. Swaine, from his experience as examiner to the Company, urged the more direct application of basic fundamental theory not only by candidates for the examinations but also by those who had qualified. He pointed out that it is possible to write down immediately formulæ, involving successive addition or multiplication only, which describe most of the more complicated actions of accommodation, convergence and retinal image size when the eyes are aided by lenses or instruments. Mr. A. G. Bennett gave a valuable summary of nomographic methods generally and their application to ophthalmic and other lenses. A nomogram to solve the problem of contact lens design was described. Of particular interest was a composite circular and elliptic nomogram—four nomograms on one framework—designed to solve the laborious calculation of prismatic effect at decentred points of astigmatic thin lens systems.

Mr. H. H. Emsley, an examiner to the Company, presided over a session to discuss binocular vision. Lord Charnwood commenced with a review of fusion and suppression theories of stereoscopic vision. With his paper he presented a set of eight stereograms with which self-experimentation could be made in order to test descriptions and deductions which a theory of stereopsis must explain. Some of these are: single binocular vision can obtain provided retinal disparity is not too great, when it will be seen that the images glide into fusion; fusion of disparate images is more difficult if disparity is such as to contradict other clues. Suppression of stereopsis can occur without suppression of images, and occurs when the stereopsis runs counter to preconceived convictions—such suppression causes discomfort. The role of the mind in choosing an interpretation which fits best the other evidence, changing from one interpretation to another at will, was emphasized. An explanation was suggested whereby stereopsis is attained by a process of integration of successive disparities too small to cause physiological diplopia.

Dr. W. D. Wright took up an intentionally provocative thesis criticizing the theory that stereopsis arises from retinal disparity. The rapid drop of visual acuity with distance from the fovea suggests that the peripheral parts of the retina contribute little to stereoscopy from disparate points. It does impart to the eyes a pointer-like action ('visual fingers') by the fovea which, combined with an elementary foveal fusion and with the assistance of the muscle movements, through mental integration, serves to complete the solidity impression.

Mr. H. C. Binstead showed the development of the slit lamp from Gullstrand through Fincham's design

to its applications for the examination of the iridic angle, depth of the anterior chamber, depth of lesions in the eye media and the ingenious Ronne colloidometer for measuring the albumen content of the aqueous. Mr. C. S. Flick set the question: Do routines and techniques for the measurement of refractive error matter? A set of four typical routines included one which was typically American—a twenty-one point technique with standardized analysis—which led to extensive discussion.

Prof. H. Hartridge provided a fascinating introductory study of the development of X-ray techniques for determining the actual length of the living eye (Rushton, Sorsby and O'Connor) and the Goldmann-Hagen modification for measuring refraction. This led to the development of the main topic of his lecture, the cause of refractive error. Five or six theories were passed under review to explain the normal tendency of eyes so commonly hypermetropic at birth to settle down to an approximate emmetropic condition. The X-ray technique should serve to separate the roles of axial length and of optical refraction, which hitherto was not possible.

Dr. W. S. Stiles reviewed the physics of light absorption (including finer adjustments introduced by quantum considerations) and the bleaching of visual purple. Three curves of corrected means effected a simultaneous comparison of absorption coefficients and photosensitivity of visual purple solutions and the subjective spectral sensitivity of the dark-adapted parafoveal retina. The maxima at 500 m μ all agreed; but further study is needed in order to explain the differences towards the violet side, where there appears an absorption band at about 360 m μ . The curves agree very well on the red side of the maximum, especially as regards linearity and gradient, for which a rough theory giving a good fit of gradient was elaborated. A comparison of spectral sensitivity curves of the parafoveal rod vision and of the foveal cone vision shows, besides the Purkinje shift, a significant gradient difference on the red side of the maximum. This will require explanation in any future photochemical theory of vision.

WILLIAM SWAINE

ELASTICITY OF WOOD AND PLYWOOD

SPECIAL REPORT No. 7, issued by the Forest Products Research Laboratory (London: H.M. Stationery Office, 1948. 2s. net), summarizes the available information on a piece of important research undertaken on the "Elasticity of Wood and Plywood". The work and results embodied in the report are said to be mainly for the designer and the research worker. The forest officer might also have been included, since on the work of the silviculturist all 'wood' of the future, whatsoever its type, may be said to depend, with the exhaustion of Nature's resources.

The theory of wood elasticity rests on the assumption that the gross material possesses three perpendicular planes of elastic symmetry, and that it is perfectly elastic and homogeneous. A point which needs emphasis at the outset is that wood is actually only an approximation to this ideal material. The longitudinal tangential surface (the surface generated by a line parallel to the axis of the tree and moving along the growth rings) is not plane, but

roughly cylindrical. The other two principal surfaces, the longitudinal-radial (defined by the axis of the tree and the medullary rays) and the tangential-radial, are more truly plane; but even in these cases there will be some deviation owing to local irregularities in the growth of the tree. This is where the silviculturist comes in. "The extent to which any actual specimen departs from the ideal material will depend not only on the regularity of the growth but also on the position of the specimen in the tree."

The report is intended chiefly as a summary of knowledge known, but it contains a number of new results, some obtained in America and Australia during the Second World War, here published for the first time. The first part of the report is entitled the "Elastic Constants of Wood"; it deals with the measurement of the nine independent elastic constants of wood and the effect on them of factors such as temperature, moisture content and grain angle. The second part deals with the elastic constants of plywood. The manner in which they are related to the form of construction of the plywood and to the elastic constants of the wood from which the plywood is made is explained.

Under the heading of "The Properties of Plywood Plates and Cylinders", the third part deals with the frequency of vibration, the buckling and deflexion of plywood plates and the buckling of plywood cylinders.

INTERNATIONAL SCIENTIFIC FILM ASSOCIATION SECOND ANNUAL CONGRESS

THE most important outcome of the annual congress of the International Scientific Film Association held in London during October 4-11, 1948, has been the formation of a number of international commissions to pursue in detail the programme of work agreed in general by the member countries for the coming year. Before discussing this programme, a few words on the Association's history may not be out of place.

The International Scientific Film Association was inaugurated last year in Paris, largely as a direct result of the initiative of the British and French Scientific Film Associations. The preliminary work of these two organisations, the first contact of which at the end of the War revealed many common interests, resulted in the assembly last year of representatives from twenty-two countries to discuss and agree to the formation of this international organisation to further the interests of the scientific film. Unesco, recognizing the scientific film as an important aid in the dissemination of knowledge, showed a benevolent interest in the new Association, the maintenance of which was demonstrated by the attendance again of a Unesco observer at this year's Congress.

Some twenty-five countries had accepted the invitation to the second Congress, and the number of those who finally managed to send delegates fell little short of this figure, some unfortunately failing to overcome the many obstacles with which post-war travelling is beset.

The honour of organising this year's congress was given to Great Britain, and its Scientific Film Association, assisted by financial aid from the British Film Institute, rose worthily to the occasion. A very