DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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SEE FROM p. 12 OF THIS ISSUE THE CORRESPONDANCE ABOUT THE SITES OF OUR 1979 and 1981 IRGCVD INTERNATIONAL SYMPOSIA

LITERATURE SURVEY

Cone interactions at high flicker frequencies : Evidence for cone latency differences? by B.A. DRUM (Department of Ophthalmology, George Washington University, Washington, D.C. 20037, USA) J. opt. Soc. Amer. 67/11, 1601-1603, 1977.

The role of chromatic adaptation in spectral sensitivity narrowing was investigated comparing flicker thresholds versus frequency functions under diverse adaptation conditions. Red flicker thresholds were measured on red and green backgrounds, green flicker thresholds on red and green and yellow flicker thresholds on red, green and yellow backgrounds. Any threshold differences between homochromatic and heterochromatic background conditions could be taken as evidence for interaction between R and G cones. The results were as follows : spectral sensitivities measured by a constant CFF criterion are much narrower at high frequencies than at low frequencies. Neutralizing the chromatic adaptation produced by the test stimulus eliminates this effect. The proposed explanation of spectral narrowing is that R and G cone responses cancel each other at certain frequencies. because of wavelength dependent latency differences. Ingeborg Schmidt.

The effect of rod activity on large field colour matching, by P.W. TREZONA (National Physical Laboratory, Teddington, England) Color, Research and Application 1/2, 95-101, 1976.

Whereas the additivity principle can be applied for a 2° field fairly safely, this is not true of a 10° field. Deviations have been shown to apply specifically to the blue matching stimulus. The reason is the presence of rod activity in all fields subtending more than 2°. To equate the rod activity an extra matching stimulus is required resulting in a tetrachromatic color match. A two luminance level, convergent technique is applied. The tetrachromatic match obeys the additivity principle under conditions where the trichromatic does not. - Ingeborg Schmidt.

Scotopic luminosity function and color-mixture data, by H.B. TILTON (Department of Physics, University of Arizona, Tucson, Arizona 85721, USA), J. opt. Soc. Amer. 67/11, 1494-1501, 1977.

An analysis shows that the scotopic luminosity function is intimately related to color data over the entire visible spectrum indicating that rods play a central role in normal color vision. Relationship between the scotopic luminosity function and 1) the hue sensation 2) the CIE chromaticity diagram and 3) the Brindley isochrome data are presented. The results are not readily explainable in terms of the trichromatic theory. - Ingeborg Schmidt.

Chromatic two-pulse resolution with and without luminance transients, by R.W. BOWEN, D.T. LINDSEY and V.C. SMITH (Department of Psychology, Loyola University of Chicago, Chicago, Illinois 60626 and Eye Research Laboratories, The University of Chicago, Chicago, Illinois, 60637, USA), J. opt. Soc. Amer. 67/11, 1501-1507, 1977.

Homochromatic pulse pairs of various wavelengths in the range from 504 to 620 nm were presented either as chromatic luminance increments or decrements from an achromatic background field (luminance transients) or as chromatic pulses equated in luminance by flicker photometry to an achromatic field (hue substitution stimuli). The experiments investigate the two-pulse threshold-th minimum interpulse interval required for an observer to perceive two flashes. Two-pulse thresholds determined for homochromatic pulses presented as luminance transients are invariant with wavelength. Wavelength does affect two-pulse temporal resolution if chromatic pulses are presented in hue substitution. For relatively long pulses the wavelength effect resembles trichromatic saturation discrimination with poorest temporal resolution at 570 nm. For shorter pulses temporal resolution for hue substitution stimuli appears related to saturation discrimination under conditions of artificial tritanopia (such as generated by brief pulses). Under conditions of hue substitution, short wavelengths pulses yield good temporal resolution. - Ingeborg Schmidt.

Perception of hue re-examined : an analytical consideration of color-oddity test results, by A.C. LITTLE and R. GAINES (University of California at Berkeley and University of California at Los Angeles, USA), Perceptual and Motor Skills 45/3, Part I, 795-804, 1977.

The paper represents an analysis of responses to Munsell hues of more than 100 subjects, four age groups of children and two adult comparison groups. They obviously were normal trichromats. A Munsell color oddity test was used. The mean error rates were compared with Munsell hue distribution on seven linear and non-linear transformations of the CIE chromaticity diagram to uniform chromatic systems. According to the theoretical construction of the Munsell Color System the spacing of the 10 hues is in perceptually equal intervals : the error

responses to all hues at constant chroma should be equal. The results show that hue intervals are not equal : red and green have the smallest intervals and largest errors and yellow and yellow-red the largest intervals and smallest error rate. The hue effect can be explained by irregularities in Munsell hue spacing. A modified test known as the Gaines-Little Hue Discrimination Test could enable better evaluation of hue discrimination ability (see also R. Gaines, Daltoniana No. 29 p. 7) - Ingeborg Schmidt.

Visual response time to colored stimuli in peripheral retina : evidence for binocular summation, by R.F. HAINES (Man-Vehicle Systems Research Division, Ames Research Center - NASA Moffet Field, California, USA) Amer. J. Optom. 54/6, 387-398, 1977.

Response time (RT) experiments were performed for red, green and white flashed stimuli of 45' angular subtense. The stimuli appeared unexpectedlyin time and place of five oblique meridians within 0° to 50° from the fovea. The subjects were 6 males between 18 and 22 years of age. All had normal visual fields, normal visual acuity and normal color vision. The subjects were dark adapted. Binocular RT was significantly shorter than monocular RT. The differences depend upon excentricity of the stimulus from the fovea and the meridian tested. Relatively large meridional differences appear due to the degree to which the images fall on corresponding retinal areas. - Ingeborg Schmidt.

Color vision and brightness discrimination in 2 month old infants, by D. PEEPLES and D. TELLER (U. Wash., Seattle), Science, 189 (4208), 1102-1103, 1975.

In a study with 2 2-mo-old female infants, a red or white bar, embedded in a white screen, was systematically varied in intensity. Ss consistently located and stared at the white bar unless it closely matched the screen in intensity. They also stared at all intensities of the red bar, presumptively including the red-white brightness match. It is conluded that all of the neural elements necessary for at least dichromatic color vision, and for remarkably sensitive brightness discrimination, are present in 2-mo-old human infants, and conversely that any elements of the system which are not yet present are not necessary for these visual functions. -Patrice M. Dunn.

Developmental pseudocyananopsia : Ontogenetic change in human color vision, by M.H. BORNSTEIN (Dept. of Psychology, Princeton University, Princeton, New Jersey 08540, USA), Amer. J. Optom. 54/7, 464-469, 1977.

Psychophysiological measures indicate that man's perception of short wavelength (blue) radiation continually diminishes from birth until death. The essay represents a review of 1) the course of growth of the intraocular structures from a developmental point of view 2) psychophysical measures of color vision

over the life span and 3) the practical and experimental significance of the pseudocyananopsia in infance and senescence. - Ingeborg Schmidt.

Trait analysis of colour discrimination and intellectual development, by JIN ONG (1441 Fourth ave, Oakland, California 94606, USA) Austral. J. Optom. 59, 54-56, 1976.

Difference and relationship between colour discrimination developmental data derived from the 100-Hue test by Verriest (J. opt. Soc. Amer. 53, 185, 1963) and intellectual growth and decline curve derived from the Army Alpha test by Jones and Conrad (Genet. Psychol. Mongr. 13, 223, 1933) were statistically evaluated. Since the results showed significant relationship (0.77) but no significant difference, the curve of colour discrimination from the 100 Hue test may be interpreted mainly as a developmental curve of intelligence. - Ingeborg Schmidt.

A report form for colour vision tests, by J.A. ALEXANDER (Department of Optometry, University of New South Wales, P.O. Box 1, Kensington, NSW 2033, Australia), Austr. J. Optom. 59, 234-238, 1976.

The principles which guided the evolution of the report form were as follows. 1) The report is usually directed to non-specialists. 2) The colour vision requirements of specific occupations are often difficult to quantify; within an occupation there may be areas where colour deficiency is not a handicap. 3) The report should indicate how the individual is likely to perform in each of the following three areas (a) simple identification of colours (colour recognition) (b) detection of the presence of a red warning signal (sensitivity to red light) (c) the ability to distinguish between small colour differences (hue discrimination). 4) Once the type and extent of the defect has been determined, recommendations can be made which however are intended only as a guide. Suggested recommendation categories for some commonly encountered combinations are presented in a table. - Ingeborg Schmidt.

Electrophysiological techniques for studying visual function in man : A historical overview, by L.A. RIGGS (Hunter Laboratory of Psychology, Brown University, Providence, Rhode Island 02912, USA) J. opt. Soc. Amer. 67/11, 1451-1457, 1977.

Electrophysiological methods permit among others to measure the responses (including color vision) of animals, human infants and clinical patients who are incapable of adequate verbal responding. Of special interest to our readers may be the visually evoked cortical potentials (VECP) in response to flashes of monochromatic light and a spectral sensitivity curve derived from these records of an infant, from an unpublished paper by M.V. Dobson (doctoral dissertation Brown University 1975). - Ingeborg Schmidt.

Psychophysical application of human electroretinography, by J.C. ARMINGTON (Northeastern University, Boston, Mass. 02115, USA), J. opt. Soc. Amer. 67/11, 1458-1464, 1977.

The current status of electroretinography is reviewed considering response waveform, recording techniques and data analysis. Several examples of electroretinal data have psychophysical significance are presented, e.g. the relationship of the ERG amplitude to the energy of color stimuli under different conditions of color adaptation. - Ingeborg Schmidt.

Steady-state evoked potentials, by D. REGAN (Department of Communication, University of Keele, Staffordshire ST5 5BG, England) J. opt. Soc. Amer. 67/11, 1475-1489.

The advantages of steady-state evoked potentials (EP) in specific situations are shown, including speed in assessing sensory functions in normal and sick infants, in sick adults (e.g. multiple sclerosis, and in animals, monitoring certain activities of sensory pathways that do not intrude into conscious perception, objective measurements at very high suprathreshold levels and rapidly assessing sensory functions when a large number of subjects must be tested or lengthy experiments are precluded. Among others the application of the EP to measurement of the spectral sensitiviteis of the eye in normal and color-blind(deuteranopic) subjects and theoretical implications of the results are reviewed. - Ingeborg Schmidt.

Pupillomotor spectral sensitivity in normals and colour defectives, by A. HEDIN (Dept. of Ophthal., Karolinska Inst., Stockholm, Sweden), Acta ophthal., suppl. 137, Scriptor, Copenhagen, 1978. 83 p., 35 fig., 225 ref.

The author measured in 5 normal trichromats, 2 protanomals, 2 protanopes, 2 deuteranomals, 1 extreme deuteranomal and 2 deuteranopes 1) the absolute threshold psycho-physical energetical spectral sensitivity curve for a 42' foveal stimulus (50% of the frequency-of-seeing curves) 2) the objective energetical spectral sensitivity curve from the consensual pupil reaction (stated with an infrared television system) to a 1° foveal stimulus, rod intrusion being eliminated by testing at the cone plateau of the dark adaptation curve (criterion response in the mid-range of the recorded responses).

All absolute threshold curves agree with the literature data, with reduced long wavelength sensitivities in the protans and only minor changes in the deutans.

The pupillar spectral sensitivity curves showed in the normals a prominent blue hump and irregularities around 600 nm. The protans showed reduced sensitivities for the long wavelengths, as in the psychophysical experiment. The deuteranomals showed only a shift in spectral sensitivity towards longer wavelengths, but the sensitivities of the deutranopes were distinctly reduced in the mid spectral region. The conclusion of the author is that the pupillomotor spectral sensitivity is the sum of the (weighted) cone responses. - Guy Verriest.

On the incidence of unilateral and bilateral colour blindness in heterozygous females, by K. FEIG and H.H. REPERS (Institut für Humangenetik, Albertstrasse 11, D-7800 Freiburg i. Br., Federal Republic of Germany), Hum. Genet. 41, 313-323, 1978.

During a school survey of 5565 boys using Ishihara plates 435 (7.8%) were found to have a defective colour vision. Of these 303 were reexamined with an anomaloscope; 2.06% were found to have a protan defect and 5.75% a deutan defect. Of all 303 mothers both eyes were investigated separately with the Ishihara and Velhagen plates and with the anomaloscope. Of these 17 were found to be colour defective themselves (13 deuteranomals; 2 deuteranopes; 1 protanomal and 1 protanope). It is stated that no fathers or sons of these 17 women were seen with normal colour vision (but no numbers of tested versus non-tested are given). A further 8 women gave a normal equation on the anomaloscope but made a considerable larger number of errors - as compared with males with normal colour vision - with pseudo-isochromatic plates.

Three of these 8 women had either unaffected sons or an unaffected father and therefore the authors believe that this is evidence for the expression of the heterozygous state in 8 of the (303-17=) 286 heterozygous mothers.

The other most important observation of the authors is that in none of the 303 mothers is there any difference between the right and the left eye using the psuedo-isochromatic plates and the anomaloscope. They conclude from this that in man retina mosaics, if they occur, appear to be very similar in both eyes. - L.N. Went.

Linkage between the loci for benign (Becker-type) X-borne muscular dystrophy and deutan colour blindness, by R. SKINNER, Ch. SMITH and Alan E.H. EMERY (Univ. Dept. of Human Genetics, Western General Hospital, Edinburgh, Scotland), J. of Medical Genetics 11, 317-320, 1974.

In two families, in which benign Becker type X-linked muscular dystrophy and colour blindness of undetermined type are segregating, linkage analysis using the lod score method gives an estimate of 0.23 for the recombination fraction with 95% confidence limits of 0.13 to 0.43. In view of the authors this confirms the linkage relationships. If this is correct these results indicate that the Becker and Duchenne types of X-linked muscular dystrophy are not allelic, since the loci for Duchenne muscular dystrophy and colour blindness are not within measurable distance of each other (Emery, 1966). - E.A. Klasen/L.N. Went.

A comparison of psychophysical and VECP increment threshold functions of a rod monochromat, by R.L. KLINGAMAN (Division of Visual Sciences, Pennsylvania College of Optometry, 1200 W Godfrey Ave, Philadelphia, Pa. 19141, USA), Invest. Ophthalm. 16/9, 870-873, 1977.

The visual-evoked cortical potentials (VECP) were studied on a 26 year old woman who fitted the classic pattern of a rod monochromat. The results indicate that as the background level approached 1,000 scotopic trolands the VECP began to decrease

and it was unrecordable above 2,000 scotopic td. It was concluded that the drop in the VECP amplitude at high background luminances is a reflection of the saturation of the rod system. Moreover, the VECP appears to be a sensitive correlate of the psychophysical data. - Ingeborg Schmidt.

Spectral colour discriminating capacity in glaucoma (in Russian, English summary), by V.N. MARINCHEV (All-Union Research Institute on Eye Diseases of the Ministry of Health Preservation SSSR), Vestn. oftalm. No. 4, 12-14, 1977.

Color discrimination thresholds were established on a 2° field on six spectral regions (665nm, 595nm, 585nm, 535nm, 475nm and 455nm) using an ACP type spectroanomaloscope. The thresholds were established on 37 clinically healthy persons, 35 to 70 years of age, and on 146 eyes of 122 glaucomatous patients. The latter showed a characteristic rise of thresholds at both ends of the spectrum, red of 665nm and blue-violet of 475-455nm, whereas the thresholds in the green (535nm) were normal. The thresholds were increased already in the initial stage of the disease and continued to rise with the progress of glaucoma. The author concludes that in glaucomatous patients it is sufficient to examine color discrimination at both ends of the spectrum. This may be useful not only for evaluation of the compensation of the intraocular pressure but also for the prognosis of the disease. - Ingeborg Schmidt.

The nature of the colour retention deficit in Down's syndrome, by J. SIMSON and N. WETHERLICK (Mencap House, Leeds, England), J. of Men. Defic. Res. 19 (2), 97-100, 1975.

Discusses an earlier author-conducted study where it was shown that Down's syndrome children showed a deficit in short-term retention of color information not shown by matched controls; the experiments were conducted in good daylight illumination. In a replication of that study, using 148 Ss from the original study in blue weak artificial light, retention of green, red, and purple was much improved but the other colors were not affected. Implications of the finding are considered for theories of color vision, short-term retention, and educational technology. - Patrice M. Dunn.

Hue discrimination and light sources, by P.R. BOYCE and R.H. SIMONS (Electricity Council Research Center, Capenhurst and Research and Engineering Laboratories, Thorn Lighting, Enfield) Lighting Research and Technology, 9/3, 125-140, 1977.

The influence of lamp type, illuminance and subject's age and experience on the performance of the Farnsworth-Munsell 100 Hue test was examined. Judging by the error scores on an artificial daylight nearest to illuminant C, on 800 lx, the subjects were normal trichromats except probably some of the group of the old with scores 4 to 94. The larger CIE gamut area or the higher the color rendering index of the lamp type better the performance. The effect of illuminance was comparatively small. The only significant effect was an improvement in performance at higher

illuminances for the older age group (55 years and older). This group consistently produced much worse performances than the young (30 years or less) and middle age groups. Experience was not found to be a significant factor. In a discussion F.F.J. Clarke mentions that the results would not be valid for protanomalous observers. He also suggests to consider all three dimensions of colour space in the analysis. -Ingeborg Schmidt.

Colour vision requirements in Government Departments, by L.F. GARNER (Queensland Institute of Technology, George Str., Brisbane, 4000, Australia), Austr. J. Optom. 59, 369-375, 1976.

A review of some requirements of State and Federal Government departments concerning certain standards of colour perception as part of the vision requirements for entry to their particular department. The review is based on a survey conducted in 1975. - Ingeborg Schmidt.

ARVO, Sarasota, Florida, April 25-29, 1977. Supplement to Invest. Ophthal. April 1977, 178 pp.

Among the abstracts of the papers reported on the spring meeting of the Association for Research in Vision and Ophthalmology (ARVO) of greatest interest to the readers of "Daltoniana" are those on "Retina" (Session III ane IV), "Visual Psychophysics" (session II, VIII and IX) and among those on "Electrophysiology" the papers on "Color Coding" (session IV). - Ingeborg Schmidt.

PAPERS READ AT THE XIVth ISCERG SYMPOSIUM

(Louisville, Kent, 10th-15th may 1976)

ERG test of the functioning of the blue cone system in color-normal and tritanopic observers, by P. PADMOS & H. JASPERS FAYER.

With the aid of the ERG-vector voltmeter system, and using an intense yellow background illuminantion, it is possible to objectively measure the spectral sensitivity of the blue cone system in colour-normal observers (Norren & Padmos, 1973). A standard procedure is developed for routinely testing the functioning of the blue system in the retinas of tritanopic observers. Thus it can be established whether tritanopia is caused by retinal absence of the blue cone system, or that the cause for tritanopia is a dysfunction of more centrally located parts of the visual pathway.

Spectral sensitivity of local electroretinogram components, by D. VAN NORREN & W.S. BARON.

The local electroretinogram (LERG) monitored with a microelectrode from a macaque monkey's fovea is dominated by the positive late receptor potential (LRP). In addition, two other components can be distinguished : the transient b-wave with a negative polarity and a negative dc component with a somewhat

longer latency than the receptor potential. Spectral sensitivity derived from 10-30 μV criterion responses was obtained for the LRP and the b-wave. With a 4000 td white background present that suppressed rod responses, the LRP sensitivity showed a broad single peaked curve similar to the V(λ) function but the function for the b-wave had an elevated sensitivity at both extremes of the spectrum. Since human psychophysical spectral sensitivity measured with similar conditions resembles the b-wave function, these findings indicate that interaction between (spectrally) different cone systems, reflected by this spectral sensitivity, is not present at the receptor level, but is manifest more centrally in the visual system.

Influence of stimulus duration and area on the spectral luminosity function as determined by sensory and VECP measurements, by E. ZRENNER.

Spectral luminosity functions were determined by measuring the radiation power of monochromatic test lights of 2° and 10° in diameter during exposure to white light of 10,000 td. Criteria were (a) the achromatic threshold, (b) the chromatic threshold, (c) a small constant amplitude in the visually evoked cortical potential (VECP).

With a test light duration of 10 ms the achromatic threshold exhibited a spectral luminosity function similar in shape to the CIE V(λ)-curve, except for a slightly increased sensitivity in the shortwave region of the spectrum. Using the chromatic threshold as index, a general loss of sensitivity was found, i.e. a small (0.1 log unit) photochromatic interval in the longwave and a large (0.5 log unit) photochromatic interval in the middle and short-wave region of the spectrum relative to the achromatic threshold sensitivity. The spectral luminosity function obtained using the VECP threshold amplitude criterion as index was different from that using sensory criteria and exhibited an increased sensitivity near 600 nm and a loss in the green part of the spectrum.

With a test light duration of 400 mn no photochromatic interval was observed; both the sensory and the VECP luminosity function exhibited an increased sensitivity in the longwave and in the shortwave part of the spectrum, resulting in a three-peak function.

Use of the VECP amplitude criterion allows the measurement of sensitivity at certain values above the sensory threshold, therefore exhibiting "supra-threshold" spectral luminosity functions.

The VER psychophysical testing in optic neuritis, by N.R. GALLOWAY & C. BARBER.

A series of patients has been studied with the aim of relating the clinical signs and symptoms seen in optic neuritis to the changes in various components of the VER. In particular the colour vision, using the Farnsworth 100-hue test, the visual acuity, the visual fields and the appearance of the optic discs have been correlated with the latency changes. The results

show that both the VER and the Farnsworth 100 hue test are sensitive indices of a previous attack of optic neuritis, although absolute values are found to be of less use than comparative values from the two eyes.

A chromaticity diagram for defects in color vision, by R.D. GUNKEL & J. KOLLARITS.

An instrument is described for the measuring and plotting of color thresholds. A chromaticity circle is proposed as being more suitable and convenient than the conventional modified triangle for color designation, and particularly useful for describing defects in color vision, both as a function of degree and of spectral range.

A minute area of the color circle is enlarged and projected as a uniform field on a ground glass screen. The neutral area is first located and saturation is slowly increased in a given direction until the subject can establish a noticeable difference and name the color. Multiple color thresholds are determined to delineate the neutral area or defect.

Advantages of this method of color testing area (1) Both hue and saturation are depicted on a card outlining the entire defect; (2) Central vision and good acuity are not required; and (3) The test is easily administered by non-skilled personnel.

PAPERS READ AT THE XVth ISCERG SYMPOSIUM

(Ghent, 20th-23th june 1977)

Retinal effect of chronic exposure to light of different wave lengths, by Th. LAWWILL R.S. CROCKETT and Gl. CURRIER.

The effect upon the retina of exposure to large fields of bright, visible light has been evaluated. The thresholds for retinal damage for 4 hour exposures in Rhesus monkeys has been established for white light, laser lines of 514.5 nm, 488 nm, 457.9 nm and 590 nm. The damage has been evaluated by ophthalmoscopy, electroretinography and light and electron microscopy. The shortest wavelength (457.9 nm) light is more effective in causing damage, particularly histological damage, which is spread throughout the fundus and throughout the retinal layers. Functional damage shown by the electroretinogram follows a different action spectrum without the increased effect in the blue. There appears to be more than one mechanism for retinal damage in chronic light exposure, and at least one mechanisms is not solely dependent upon the visual pigment and the pigment epithelium. Thresholds for permanent damage appear to be within 1 or 2 log units of light levels encountered in normal visual experience. More recent data shows that damage is additive over at least 24 hours in that exposures given 1 hour a day for 4 days have a threshold similar to those given 4 hours in 1 day. If this damage is truly additive, there is much more significance to light levels closer to everyday viewing.

Transient tritanopia at the ERG level, by D. VAN NORREN and J.M. VALETON.

When a yellow adapting light is turned off, the detection threshold for a blue test flash increases. Apparently, during the first few seconds after extinction of the background the blue cone mechanism is subject to inhibition from long wavelength sensitive mechanisms. This phenomenon, called transient tritanopia, has been observed with psychophysical methods. We repeated the experiment using the ERG b wave as an indicator of retinal sensitivity. To avoid rod responses we measured spectral sensitivity functions on the cone plateau, thus 6-10 min after recovery from an intense white bleach. From these spectral sensitivity functions we conclude that transient tritanopia is present at the b-wave level, and that therefore the inhibition of blue cones must take place at a very early level in the visual system.

Responses of the blue cone system in phakic and aphakic eyes, by M. YOKOYAMA, T. YOSHIDA and Y. UJI.

Electrical responses of the blue cone system were recorded from phakic and aphakic human eyes. The comparison was made on patients with one normal eye and one aphakic eye, or made on patients with cataractous and postoperatively aphakic eyes. The photopic ERG responses were averaged with time-locked scanning method, using 16 monochromatic lights of equal energy (1.6 W/m^2). The activity of the blue cone system was isolated by adaptation to a bright yellow light that contains all wavelengths longer than 500 nm. The peak responses at 440 nm were found to have almost the same amplitudes around 10 µV in aphakic eyes regardless of the age, but to reveal considerable or strong reduction in phakic eyes, according to the ageing. Under moderate grade of yellow light adaptation, the plot of spectral responses showed two peaks at 440 nm and 560 nm; the former is the maximum of the B system and the latter may be combine the R and G systems. The ratio between them (400/560) clearly raised after lens extraction. The bluish sensation which is frequently complained by the patients operated on cataract will be well interpreted with the results obtained here.

PAPER TO BE READ AT THE ICO MEETING

(Madrid, 10th-17th september 1978)

Night myopia, night presbyopia and color discrimination, by L. RONCHI.

Dioptric changes occuring as adapting luminance drops to mesopic levels are found to run parallel to the deterioration of color discrimination. This is found by comparing the response to the City University Colour Vision Test to that obtained with a modified Badal. Intercept and (negative) slope of individual best fits are found to be correlated with observer's age. Purkinje shift and decreased depth-of-focus under natural mydriasis seem to be relevant factors.

ANNOUNCEMENTS

COLOUR MEASUREMENTS AND ITS APPLICATION

London, 3rd-4th oct. 1978

This conference is organized by the Materials and Testing Group and by the Optical Group of the The Institute of Physics in association with the Colour Gp GB, the UV Spectrometry Group and the Association Internationale de la Couleur (AIC). It will be held at the City University Oliver Thompson Lecture Theatre in London. The papers will be : WHAT IS COLOUR AND HOW IS IT MEASURED (R.W.G. Hunt), ILLUMINATION AND COLOUR RENDERING (M.B. Halstead), COLOUR AND THE EYE (R. Fletcher), COLOUR STANDARDS (F. Malkin), SOURCES OF ERROR IN INSTRUMENTAL COLORIMETRY (F.J. Clarke), FLUORESCENCE (H. Terstiege), COLOUR DIFFERENCES MEASUREMENTS (K. McLaren), COLOUR IN PIGMENTS (S.E. Orchard), COLOUR IN TELEVISION (W.N. Spronson), COLOUR IN PHOTOGRAPHY (D. Boxall), COLOUR IN PRINTING (C.A. Butler), MEASUREMENT OF WHITENESS (D.J. McConnell), COLOUR IN FOOD (J.B. Hutchings), NEW DEVELOPMENTS IN COLOUR MEASUREMENT (M.R. Pointer).

CONFERENCE SECRETARY : R.H. Lewin, Fulmer Research Institute, STOKE POGES, Bucks., England.

CORRESPONDANCE OF THE GENERAL SECRETARY ABOUT THE SITES OF THE FIFTH AND SIXTH INTERNATIONAL IRGCVD SYMPOSIA

Site of the fifth (1979) international IRGCVD symposium

As already announced on page 9 of the June issue of Daltoniana the 5th Symposium of the IRGCVD will be held from June 26th to 28th 1979 in London. However due to the short time available for the organisation, the cost of holding the Symposium at City University with accommodation in central London hotels has been found to be too great. The Symposium has now been arranged at St. Mary's College, Strawberry Hill near Richmond-upon-Thames. Strawberry Hill College is about 10 miles from central London and an equal distance from Heathrow Airport. The college is built around a small Gothic mansion, previously the home of the 18thcentury politician and statesman Horace Walpole. The college stands in its own grounds and accommodation is available in student halls of residence. There are also a small number of hotels in Richmond. There are many historic houses and places of interest nearby, including Hampton Court Palace and Kew Gardens. It may also be possible to arrange a visit to the National Physical Laboratory in Teddington. In conjunction with the Symposium a further one day postgraduate

meeting for a limited members of participants will be held on June 29th at Moorfields Eye Hospital; speakers at this meeting will be from Moorfields and from the Institute of Ophthalmology.

I have also other news concerning this symposium :

a) we got excellent invited speakers for the already announded three special themes : H. Sperling for "Neuro-Anatomy of colour vision processes"; Professor W.S. Stiles for "Colour vision at high luminances"; Vivianne C. Smith for "Colour vision in relation to the other visual functions in clinical ophthalmology";

b) the Proceedings of our 4th international IRGCVD symposium in Parma are now in press as vol. 19 of "Modern Problems in Ophthalmology" published by S. Karger AG in Basel; but we all had so much difficulties with this house, especially concerning the so few available pages and the so excessive costs for the excess pages, that our directorial committee accepted that I should contact Adam Hilger Ltd. in Bristol, already the publisher of the AIC congresses. Our new publisher will give us a total amount of 450 free pages (instead of 300), while the price of the proceedings volume to be included in the symposium fee will be only about 40 U.S. dollars. - Guy Verriest.

Site of the sixth (1981) international IRGCVD symposium

From a letter, dated 6 June 1978, of Prof. C.J. Bartelson, president of the Association Internationale de la Couleur (AIC) :

Dear Dr. Verriest :

As you may know, the AIC at its last Congress in Troy, New York, voted to held the fourth AIC Congress in Berlin in 1981. Plans have now been laid for that meeting and my purpose in writing to you is to convey some of that information together with some thoughts relating to the relationship between AIC and the International Research Group on Colour Vision Deficiencies.

The AIC Congress, Color 81, will be held at the Congress Center in Berlin on 20 to 25 septehber 1981. Secretary-general of the Congress is Professor Manfred Richter. Dr. Heinz Terstiege is Organizing Chairman and Dr. Andreas Brockes is Program Chairman.

It is my hope that we shall be able to enhance the attendance of visual physiologists at the meeting. I believe there are two ways in which this can be done. One is to provide a program with sufficient interest to physiologists. The organizing committee of the Deutscher Verband Farbe, host of Color 81, has been made aware of this need and I am sure will do their utmost to offer a program that should be interesting to physiologists. The second way in which the meeting might be made more attractive

than in past years is to schedule the IRGCVD conference somewhere reasonably nearby either just before or just after the AIC Congress. In that regard, I have had the opportunity to talk with Dr. Lakowski during the past year and understand that there is a good possibility that such an arrangement may result from your deliberations.

I hope that this can be the case. We enjoyed a broad base of participation at Stockholm and to some extent at York also. However, our last meeting at Troy was notable for its lack of participation by physiologists. Certainly, that was the result of a number of factors. However, I should be very keen to change those factors and see an enhanced relationship between our two groups in the future; beginning with the Berlin Congress. Perhaps it would be worthwhile to consider coordinating publication of announcements of both meetings so that they appear in the same journals and have broad distribution. In any event, I think it is important that we try to coordinate our respective efforts in an effort to bring the two organizations closer together. I would be most interested in your thoughts on this matter...

From Verriest's answer, dated 19 June 1978, to Prof. C.J. Bartelson :

Dear Mr. Bartelson,

I received your letter of 6th june and was already previously informed a bit about these matters by my correspondence with Dr. Lakowski.

I completely agree that the 1981 IRGCVD symposium has to be held in Berlin just before or just after the AIC Congress Color 81, all the more the IRGCVD is a "daughter organism" of the AIC and all the more Prof. Manfred Richter has always been an active member of our group.

The only difficulties are that it is a custom in our group that the site of the next symposium is decided by a vote of the general assembly during the preceeding symposium (thus the site for 1981 has to be decided during our 1979 symposium in London), and that till now we always met in end june, as this period seemed the most convenient one for our american members.

But I'm sure that Prof. Richter, Dr. Lakowski and I self will then convince the directorial committee and the assembly, especially because the conjunction of both meetings should very beneficial for our group.

From a letter, dated 22 june 1978, of Prof. M. Richter, general secretary of the AIC Congres Color 81 Berlin :

Dear Dr. Verriest,

... I am writing today officially. As the IRGCVD is affiliated to the AIC, I have to draw your attention to the fact that the 4th AIC Color Meeting will be held at Berlin, on 20 to 25 september 1981. I have been charged to propose you that the 1981 meeting of IRGCVD may be organized in close connection to

the AIC Congress. We think that by this way a deepening of the relations between the diverse branches of Color Science could be reached, in professional as well as in personal respects.

To enable a direct connection to the AIC Congress, it seems advantageous to have the IRGCVD Meeting immediately in the week before or after the AIC Congress in Berlin. I feel the same week would not be so recommandable because of overlapping, but in the case of a well-timed agreement, even this seems not impossible. The necessary helps in organizing could be carried out by my staff and myself...

From a second letter, dated 7 july 1978, of Prof. M. Richter

Dear Dr. Verriest,

Thank you very much for your letter of June, 28th, 1978... I am glad to hear that you personally agree to an IRGCVD meeting 1981 at Berlin, but I understand well that you must have the agreement of the other members; I have, however, no doubt that this will happen.

My colleagues and I feel that the week before the AIC : Congress would be preferable. In this case it would be useful to have the IRGCVD Meeting in the last days of that week, perhaps including saturday, so that a vacuum time is avoided for those participants who want to attend the AIC Congress (and we would be glad when a great deal of them will do so). The AIC Congress events will begin at Sunday, 20th September.

FIFTH SYMPOSIUM OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

STRAWBERRY HILL near LONDON(UK), 26th - 28th JUNE 1979

PRELIMINARY INSCRIPTION FORM

(to be detached from one of the 1978 issues of Daltoniana and to be returned before 31st january 1979 to Dr. G. VERRIEST, Dienst Oogheelkunde, Akademisch Ziekenhuis, De Pintelaan 135, B-9000 Ghent, Belgium).

The special themes of this symposium will be :
1. Neuro-anatomy of colour vision processes.
2. Colour vision at high luminances.
3. Colour vision in relation to the other visual functions in clinical ophthalmology.

Free papers will be accepted (methods of examination of central and peripheral colour vision, congenital and acquired defects, genetics of colour vision, practical aspects etc.)

All papers must be written in good English.
Furthermore the authors are asked :
a) to send before 1st March 1979 two copies of a summary of at most 200 words to Dr. G. VERRIEST;
b) to insert for their oral presentation slides with (English) text intended to render the subject more understandable for the non-English-speaking people;
c) to remit before the end of the symposium the manuscript to be printed in the Proceedings.

PAPER

AUTHOR(S) : .....
.....

TITLE : .....
.....
.....

THEME : 1 2 3 free

WANTED DURATION OF ORAL PRESENTATION :
5 min 10 min 15 min

For further information concerning the scientifical programme contact Dr. G. VERRIEST; for the other matters contact Mrs. Jennifer BIRCH, 5, Stuart Grove, TEDDINGTON Middx TW11 8RR, England.

(only for not members) Please inscribe me as member of the International Research Group on Colour Vision Deficiencies.

(name)
(full address)