

Inter-Society Color Council *News*

Number 368

July/August

1997

IN THIS ISSUE

368

Obituary - W. David Wright	1
CIE Contribution to Color Technology 1931-1987 ...	2
ISCC 1997 Annual Meeting Schedule	6
In This Issue Of CR&A	7
Fifth Color Imaging Conference	8
SheLyn and HunterLab Sign Agreement	8
DCC June Meeting Minutes	8
ASTM Mini Symposium	9
CORM Conference	9
AATCC.....	9
Color News From Around The World	10
ASTM Committee E-12 Meets in St Louis	12
FSCT 75th Annual Meeting	13
CAUS	14
Sale	15
Richard S. Hunter Institute	16
Office Closing	16
Gentle Reminder	16
Calendar	16
Jobs Wanted	19
Officers, Directors, Member Bodies, Sustaining Members, ISCC Office	Back Page

WORLD LOSES A GREAT COLORIST, WILLIAM DAVID WRIGHT

In response to the announcement of the passing of W. David Wright, on 4 June 1997, the Board of Directors, Member Bodies and Individual Members of the Inter-Society Color Council wish to extend their deepest sympathies to the family of W. David Wright and to our sister organization, The Colour Group of Great Britain, with whom Dr. Wright invested so much of his life.

No other single individual has been so influential in the formation of strong international associations among color scientists and technologists. From his earliest work on human color matching functions to his work on quantifying the colors of works of art and the Colour Museum, established by the Colour Group, he has always been one of the most active color scientists in setting directions and forging progress in the field of color science. Indeed, W. D. Wright, an honorary member of the Inter-Society Color Council, is a recipient of both of the ISCC's most prestigious awards, the Macbeth award, given for specific contribution to the field of color and the Godlove award, given in recognition of a long term history of contributions to color science and technology.

He is remembered for his warm, affable manner of dealing with both senior and junior scientists and technologists. He was always willing to contribute a little something to encourage the career or activity of anyone who was willing to approach him. I am reminded of the first of his "Twelve Columns About Colour" that were published first in the journal *Color Research & Application* and later in a booklet which he had published privately. In that first column titled, "The Leaders We Have Lost", he reminisced about the individuals who had been influential in his own studies and activities in color science. Today, we must add his name to the list that included such notables as, Helmholtz, Hering, Troland, Guild, Judd, Evans, and Grum. W. D. Wright was always one to look to the future for new interest, new ideas, new challenges. In Dr. Wright's own words, "...So we must go forward with

(Continued→)

all of the energy, enthusiasm and excitement which *David Wright* displayed in himself. As we mourn for our friends, new concepts and new challenges lie ahead for us to answer".

*For the Inter-Society Color Council
Danny C. Rich, Secretary
12, June 1997*

The following verse from "A Psalm of Life" by American Poet Henry Wadsworth Longfellow is sent to ISCC News by Harry Hammond III.

"Lives of great men all remind us
We can make our lives sublime,
And departing leave behind us
Footprints on the sands of time."

THE CIE CONTRIBUTION TO COLOUR TECHNOLOGY, 1931 TO 1987

W. D. WRIGHT

ABSTRACT

The Commission Internationale de l'Eclairage has been the International authority in the field of colour measurement ever since the colour-matching functions of the CIE Observer were standardised by the Commission in 1931. A supplementary set of functions were standardised in 1964 to meet the requirements of large-area colour matching. This paper examines the widespread use which industry has made of these functions, for example, in the specifications of coloured light signals, in the formulation of dye and pigment recipes, the transformation of the CIE System carried out by American television engineers to conform to colour television circuitry, and, most recently, in information coding in computer graphics. Colour-difference formulae and the description of colour

appearance still present problems, but the use of the CIE system as a remarkable industrial tool seems likely to continue for many years to come.

1. HOW DID THE CIE FIRST BECOME INVOLVED WITH COLORIMETRY IN 1931?

To answer this question we have to go back to the pre-history of the CIE, back, in fact, to 1900 when a paper on "The Photometry of Gas Mantles" was presented at an International Gas Congress held during the Paris Exhibition of 1900. The discussion which followed this paper provided the stimulus for the formation of the Commission Internationale de Photometrie, with the measurement of light as its main concern. By 1913 it was recognised that illuminating engineering embraced a much wider range of activities than photometry and a new Commission, the Commission Internationale de l'Eclairage, was founded to replace the CIP [1].

Because of the 1914-18 war, no meeting of the CIE could take place until 1921, followed by a further meeting in 1924. Yet at both these meetings photometry was still the dominant subject of discussion and the two main resolutions to be passed at the 1924 meeting were both photometric. One of these recommended the adoption of the "black body" radiator as the primary standard of light and the other the adoption of a table of values defining the relative visibility function, as it was then called, the values being those given in a paper by K. S. Gibson from the Bureau of Standards in the United States [2]. This function in effect defined the standard photometric observer, being based on seven investigations, six American and one Japanese.

By 1924, therefore, the CIE had clearly established its authority in the field of photometry, but this authority certainly did not extend to the subject of colorimetry. Industrial colorimetry dates back at least to 1887 when J. W.

Lovibond first described his Tintometer, a subtractive colorimeter using a series of red (actually magenta), yellow and blue glass filters of varying density [3]. This instrument blazed the trail for commercial colour measurement, especially as applied to foodstuffs, drink and chemicals. In the United States, a Colorimetry Division had been set up at the Bureau of Standards by 1913 with I. G. Priest as the Chief of the Division. Colorimetric activity in the U. S. was given a further boost in 1922 by the publication of the Report of a Colorimetry Committee set up by the Optical Society of America under the chairmanship of a very distinguished psychologist, L. T. Troland, with Priest as the other leading member of the Committee [4]. This report included the OSA Color Excitation Curves, or color-matching functions as we would now call them, based on colour-mixture experiments carried out some 30 years earlier by König in Germany and by Abney in England. These OSA Curves were used quite extensively by colorimetrists in the United States up to 1931, and no doubt if the International Commission for Optics had been in existence then, this would have been the body favoured by the Optical Society of America to define the international standard observer for colorimetry.

The National Physical Laboratory in England also treated colorimetry as a branch of optics and not of photometry, and it was in their Optics Department that J. Guild did his outstanding colour research and the development of his colour measuring instruments. In keeping with this outlook, nearly all Guild's 'colour' paper of 1920's were published in the Transactions of the Optical Society in London.

Nevertheless, it was the CIE in 1924 that took the initiative to set up a Colorimetry Study Committee, almost certainly at Priest's instigation. Yet if no other body was around to tackle the job, and if the CIE were prepared to accept international responsibility for colorimetry, what could be better. The next move took place at the 1928

Session of the CIE, when a meeting on colorimetry was held, although its business was completed in half-an-hour! That, however, was not the whole story, as a Signal Glass Committee which the CIE had set up in 1927, was very active indeed at the 1928 Session, as vividly described by Holmes [5]. In effect, the Signals Committee gave notice to the Colorimetry Committee to get on with the job of defining a standard system of colour measurement so that they could get on with their job of specifying the colours of traffic signals.

How the Colorimetry Committee completed its task by 1931 has been described elsewhere [6] and need not be repeated here except to say that the 1931 Standard Observer was based on the mean results of colour-matching experiments carried out by Guild and by myself. Once Guild recognised that our two sets of data were in very close agreement, he moved very fast indeed to combine our mean colorimetric data with the 1924 standard visibility function in a form that could be used to define the standard for colour measurement [7]. After much discussion between Guild and Priest, an agreed set of resolutions were presented to the Colorimetry Committee at the 1931 CIE Sessions, defining, first, the colour-mixture curves of the standard observer and second, a set of colour-matching functions for use in technical colorimetry. And so, by the adoption of these resolutions, the CIE became the leading international authority in the field of colour measurement, completing a chain of events that began with gas mantles in 1900, was urged on its way by the Signals Committee, and finished with the harmonious accord between Priest and Guild in 1931 [8a].

2. HOW DOES CIE COLORIMETRY WORK?

The CIE system of colour measurement is a trichromatic system based on experimental red-green-blue colour mixture data and on the laws of additive colour mixture. The colour-

mixture curves of the 1931 Standard Observer were expressed in terms of the spectral primaries of wavelengths 700.0nm, 546.1nm and 435.8nm, but for use in technical colorimetry the mixture curves were transformed to an all-positive set of colour-matching functions in terms of the CIE reference primaries (X), (Y) and (Z). These primaries are not physically realisable stimuli since they lie outside the spectrum locus in the chromaticity chart, but they may be visualised as supersaturated red, green and blue stimuli.

The colour-matching functions are fundamental to CIE colorimetry because they enable the specification of a colour to be calculated from its spectral composition. They are also fundamental in the sense that the functions must be related to the spectral sensitivity curves of the three retinal receptor processes responsible for trichromatic colour matching, but the CIE system is based solely on experimental colour-mixture data and not at all on any particular theory of the colour vision process.

In CIE colorimetry a colour is specified by its tristimulus values X, Y and Z, which give the amounts of the three reference primaries required in an additive mixture to match the colour. However, it is often more convenient to specify a colour by its chromaticity co-ordinates x, y and z, which give the relative amounts of the reference primaries required in the match, where $x = X/(X + Y + Z)$, etc. Thus a surface colour is usually specified by its chromaticity co-ordinates x, and y (only two co-ordinates are necessary, since $x + y + z = 1.0$) and by its luminance factor or percentage reflectance. Colours can then be plotted on the CIE chromaticity chart, a two dimensional diagram which is a direct descendant of Maxwell's colour triangle.

In 1964 the CIE took the further step of standardising a second set of colour-matching functions to define the 1964 Standard Observer. The 1931 Observer

was based on observations made with colorimeters using field sizes subtending 2° which ensured that the matches were made with foveal cone vision. A second set of functions were needed for use in industries such as the textile industry where large samples have to be matched, and a major new investigation was undertaken by W. S. Stiles at the National Physical Laboratory to meet this need. His trichromator was designed so that matches could be made for 10° fields and his results, together with those obtained for similar conditions by Speranskaya in Russia, provided the data for the 1964 10° Observer [8b]. This 10° System is used in essentially the same way as the 2° System.

3. HOW WELL HAS CIE COLORIMETRY WORKED?

3.1 Coloured light signals

The first and most direct application of the 1931 System was in the specification of coloured light signals. As Holmes has described [5], the Signals Committee of the CIE were ready with their specifications once the 1931 System had been adopted, so that the 1931 chromaticity chart soon became the internationally recognised chart on which signal colours were specified. They were not, however, specified just as single points on the chart; instead, areas on the chart were defined within which the colour of the signal had to be located. This was almost certainly the first example of the chromaticity chart being used to define colour tolerances.

A rather different use of the chart was demonstrated in the experiments carried out by Holmes himself on the recognition of signal light colours [9]. Using a colour mixer which could show any ordinary signal colour as a point source, Holmes was able to plot the percentage recognition contours on the chromaticity chart for the colours named as red, yellow, green, blue, white and purple. Not only was this a very important investigation for the signal colour experts, but it was also of

(Continued→)

great interest to colorimetrists in general as an example of the chromaticity chart being used to specify the subjective appearance of colours. Because the observing conditions were specified, this was a legitimate use of the chart.

3.2 Dye and pigment formulation

One of the most important industrial applications of CIE colorimetry has been in the calculation of a dye or pigment mixture to match a consumer's sample. As K. McLaren, in his recent book on "The Colour Science of Dyes and Pigments", has written at the end of the chapter on Computer Match Prediction: "This is, unquestionably, the most impressive achievement of the method of colour measurement envisaged by Maxwell in the middle of the last century and brought to fruition by the pioneers who, in 1931, created the CIE system" [10]. Colorimetrists, though, cannot claim all the credit, as a vital ingredient in the computer programme is the Kubelka-Munk theory of colorant mixtures in terms of the absorption and scattering properties of the component dyes or pigments.

The colorant recipe that emerges from the computer programme will in general lead to a product that has a spectral reflectance curve that differs to a greater or less degree from that of the costumer's sample, depending on the choice of dyes or pigments used in the calculation. Although, therefore, the sample and the product may be a colour match under one illuminant, that is, they are a metameric pair, the match will not hold under another illuminant. To reduce this effect, metamerism must be kept to a minimum, and this in turn means that some method of defining an index of metamerism has to be agreed. This problem was referred to the CIE Colorimetry Committee and in 1972 the Committee were able to recommend a method of specifying an 'illuminant' index of metamerism. This provides a good indication of the match breakdown that occurs between a metameric pair of samples when the illuminant is changed [8c].

The dye and pigment industries, along with many other industries, have also needed an agreed formula for specifying colour tolerances. Unfortunately, the representation of colour differences is far from uniform in the CIE x, y chromaticity chart, but all attempts which the CIE Colorimetry Committee have made to develop an ideal uniform colour space have so far failed. However, because of the urgent need to reach a decision and as an interim measure, the Committee decided in 1976 to recommend two alternative uniform colour spaces known as CIELUV colour space and CIELAB colour space [8d]. CIELUV space is a linear transformation of XYZ space and has proved to be the preferred space for those technologies concerned with the additive mixture of coloured lights, such as colour television. On the other hand, CIELAB space, a non-linear transformation of XYZ space, has proved more acceptable in the subtractive-mixture industries, such as the dye and pigment industries.

3.3 Colour television

CIE colorimetry really came into its own with the advent of colour television. To confirm this, it is only necessary to study two massive special "Colour Television" issues of the Proceedings of the American Institute of Radio Engineers for October, 1951, and for January, 1954. The 1951 issue includes a masterly paper by W.T. Wintringham on "Color Television and Colorimetry" [11], while in the 1954 issue the colorimetric aspects of the American NTSC system of colour television are analysed in great depth in a number of papers, all in terms of the CIE system.

To take just one example, a paper by P.W. Howells on "The Concept of Transmission Primaries in Color Television" [12] distinguishes between the physically realisable red, green and blue phosphors which make up the mosaic of the image screen of the television receiver - these are the receiver primaries - and the transmitted

signals which represent the amounts of a new set of primaries - the transmission primaries. Howells' paper includes a diagram of CIE colour space in which the transmission and receiver primaries are defined by two sets of axes radiating from the origin of the diagram. As Howells explains, the transformation of colour data from one set of primary axes to another is simply the algebraic process of transformation of co-ordinates, the amounts of the new set of primaries being related to the old set by three linear equations. This is straight trichromatic colorimetry and describes exactly the type of transformation that the CIE carried out when transforming the colour-mixture curves of the 1931 Standard Observer expressed in terms of the spectral primaries into the CIE Standard Colour-Matching Functions expressed in terms of the non-physical (X), (Y) and (Z) primaries.

As Loughren of the Hazeltine Corporation wrote in the 1954 I.R.E. Proceedings: "The technique of visual color measurement, or colorimetry, which is based on the three-fold nature of color vision, has been brought to a high state of perfection and is available for the use of the color television engineers," [13]. Well done, CIE!

3.4 Computer graphics

To come right up-to-date-, a new explosion of interest in colorimetry has occurred in the field of visplay display units and in computer graphics. CIE colorimetry is again featured strongly in these new developments, as demonstrated in a special issue of Color Research and Application (Volume 11, Supplement 1986) devoted to papers on "Color in Computer Generated Displays". Reference to just one paper must suffice, namely that by Taylor and Murch on "The Effective Use of Color in Visual Displays: Text and Graphics Applications" which illustrates the almost endless range of applications in these displays [14].

This paper also provides evidence of one of the less satisfactory features of

CIE colorimetry, or more strictly, of CIE photometry. For a good many years now, it has been recognised that the luminance of a highly coloured light source does not correlate well with its subjective brightness, and similarly, that the luminance factor of a highly coloured surface does not correlate well with its subjective lightness. This discrepancy seems to be particularly noticeable and disconcerting with self-luminous images such as video displays, and Taylor and Murch report, for example, that the luminance of a red video colour needs to be only about half that of a video white to be a subjective brightness match. They then go on to say: "Further studies are needed, but work continues towards development of a display-based colorimetry in which the measurement of light bears a meaningful relationship to its visual appearance".

This raises very searching questions and is a real challenge to the CIE. One solution would be to detach heterochromatic photometry from colorimetry and to devise a new scale for the subjective brightness of self-luminous saturated colours. Colour appearance, in fact, is exercising the minds of many colour scientists and Edwin Land virtually dismissed colorimetry out of hand because it did not correlate well with colour appearance [15].

4. WILL CIE COLORIMETRY STILL BE IN USE IN 2031?

As we have seen, the CIE became the international authority for colorimetry almost by accident in 1931, but its authority grew as the CIE system was applied successfully in one industrial process after another. Now a rather different problem is facing the CIE as our biological colleagues search for a colorimetric system more directly related to the physiology of the visual process. R. M. Boynton, for example, has recently proposed such a system based on the retinal cone receptor excitations [16].

It seems likely, though, that the official CIE recommendations as published in CIE Publication No. 15.2 "Colorimetry", 2nd. Ed., will survive for some years to come. And as Holmes has surmised: "Can we look forward to new perspectives from the next generation of lighting scientists and technologists? Whatever they may find, it will surely be described in terms of the CIE 1931 Trichromatic System." [5]

REFERENCES

- [1] WALSH, J.W.T.: History of the International Commission on Illumination, CIE publication no. 9, 1963.
- [2] GIBSON, K.S.: The relative visibility function, CIE Proceedings 1924, pp. 232-238, 1926.
- [3] LOVIBOND, J.W. : The tintometer - a new instrument for the analysis, synthesis, matching, and measurement of colour, J. Soc. Dyers and Colourists 3, pp. 186-212, 1887.
- [4] TROLAND, L.T.: Report of Committee on Colorimetry for 1920-21, J. Opt. Soc. Am. And Rev. Sci. Instr., 6, pp. 527-596, 1922.
- [5] HOLMES, J.G.: Coloured light signals of the 1930's and 1980's, Proc. Sym. Golden Jubilee of Colour in the CIE, pp. 78-97, Soc. Dyers and Colourists, Bradford, 1981.
- [6] WRIGHT, W.D.: The historical and experimental background to the 1931 CIE system of colorimetry, Proc. Sym. Golden Jubilee of Colour in the CIE, pp. 3-18, Soc. Dyers and Colourists, Bradford, 1981.
- [7] GUILD, J.: The colorimetric properties of the spectrum, Phil. Trans. Roy. Soc. Lond. Ser. A, 230, pp.149-187, 1931.
- [8] WYSZECKI, G and STILES. W.S.: Color Science, 2nd. Ed., Wiley, New York, 1982.
- (a) 3.3.3 (i) The CIE 1931 standard observer, pp. 133-140.
- (b) 3.3.3 (ii) The CIE 1964 standard observer, pp. 140-143.
- (c) 3.3.10 CIE metamerism index for change in illuminant, pp. 169-173.
- (d) 3.3.9 CIE uniform color spaces and color-difference formulae, pp. 164-169.
- [9] HOLMES, J.G. : The recognition of coloured light signals, Trans. Illum. Eng. Soc, London, 6, pp. 71-94, 1941.
- [10] McLAREN, K. : The Colour Science of Dyes and Pigments, 2nd Ed., Hilger, Bristol, 1986.
- [11] WINTRINGHAM, W.T. : Color television and colorimetry, Proc. IRE 39, pp. 1135-1172, 1951.
- [12] HOWELLS, P.W.: The concept of transmission primaries in color television, Proc. IRE 42, pp. 134-138, 1954.
- [13] LOUGHREN, A.V.: Psychophysical and electrical foundations of color television, Proc. IRE 42, pp. 9-11, 1954.
- [14] TAYLOR, J.M. and MURCH, C.M.: The effective use of color in visual displays; text and graphics applications, Color Res. Appl. 11, Supp. 1986, pp. S3-S10, 1986.
- [15] LAND, E.H.: Color vision and the natural image. Part I, Proc. Nat. Acad. Sci. 45, pp. 115-129, 1959.
- [16] BOYNTON, R.M.: A system of photometry and colorimetry based on cone excitations, Color Res. Appl. 11, pp. 244-252, 1986.

This article is a reprint of the first invited paper presented by W.D Wright, at the 21st session of CIE, Venice Italy, 17-25, June 1987, and is printed here with the permission of CIE.

ISCC CAD/RETEC ANNUAL MEETING 1997

Sunday September 14, 1997

ISCC Annual Meeting

8:00	Registration Opens
9:00	Continental Breakfast
9:30-11:30	Education Committee
11:30-1:00	Member Body Lunch
1:00-2:00	Project Committee 51
2:00-3:00	Interest Group III-Art, Design & Psychology
3:00-3:30	Break
3:30-5:00	Interest Group III-Art, Design & Psychology
5:00-6:30	Poster Session & ISCC Reception

Monday September 15, 1997

ISCC Annual Meeting

8:00-10:30	Interest Group II-Industrial Applications of Color
10:30-11:00	Break
11:00-11:30	IMG Group
11:30-1:00	Business Meeting and Award Luncheon
1:00-1:30	Newcomers Meeting
1:30-3:00	Interest Group I-Fundamental & Applied Color Research
3:00-3:30	Break
3:30-4:30	Interest Group I-Fundamental & Applied Color Research

Both ISCC/CAD

6:00-7:30	Reception (Camden Yards) followed by Baseball Game - Baltimore vs. Cleveland
-----------	--

Tuesday September 16, 1997

CAD/RETEC

7:00	Breakfast Moderator-Ralph Stanzola, Industrial Color Technology
8:00	Roger Reineker & Joseph Fay, Ciba Geigy Coloration of Non- Olefin Plastics & Fibers with High Performance Organic Pigments
8:30	Robert Lee & Robert Gray Great Lakes Chemical Corporation Pigment and Light Stabilizer Interactions in Polyolefins
9:00	Kevin Loughrey, Minolta Corporation Reproducibility of Inter-Instrument Agreement of Color Measuring Instruments: The "Ideal" World vs. the "Practical World"

9:30	Break- Sponsored by: Penn Research
10:00	Instrumental Break Out Tutorials (3 groups-X's, Y's, Z's)
11:30	Lunch-Awards Ceremony Moderator: Robert Trinklein, Teknor Color
1:00	Steven Goldstein, BASF Comparison of Colorants & Stabilizers in Metallocene Resins vs. Non-Metallocene Resins
1:30	Donald Home, AtoHass Americas "Weatherable" High Gloss Black Automotive Exterior Trim Material: A Comparison
2:00	Chun Lee & Ramesh Shroff, Millenium Petrochemical Effect of Elongational (Extensional) Viscosity on the TiO ₂ Dispersion of Highly Loaded (50-70%) White Concentrates
3:00	Break
3:30	Instrumental Break Out Tutorials (3 groups-X's, Y's, Z's)

Wednesday September 17, 1997

CAD/RETEC

7:00	Breakfast
8:00	Lynn Bente, Keystone Aniline Corp. A systematic Study of Non-Migratory Brilliant Transparent Coloration of TPF Resins
8:30	Rodney Williams, Eastman Chemical Co. Nine Leadership Issues for Success with Teams
9:30	Break
10:00	Instrumental Break Out Tutorials (3 groups-X's, Y's, Z's)
11:30	Lunch Moderator: Selby Brannon, Plasticolors
1:00	Michael Yu, Cabot Corporation The Ideal Carbon Black for Fine Denier Fiber Usage
1:30	Gunther Hahn & Melke Buskies-Keup, Goldschmidt Chemical New Dispersing Waxes for Polyolefin Colour Concentrates
2:00	David Spooner, rhoMetrics Associates & Jack Ladson, Estée Lauder Co. Color Measurement Errors Resulting from Instrument Flash Source Induced Transient Photochromism

Note: Subject and/or Speakers subject to change

COLOR RESEARCH AND APPLICATION IN THIS ISSUE - August 1997

In 1986, with the Fall issue a new column was initiated in this journal. Talking about Color... Professor W. David Wright wrote most of the columns, but over the years, several other color authorities have also contributed columns on a wide variety of topics. In this issue, Rolf Kuehni is Talking about Color... and Consciousness. Do not miss it.

Moving on to the articles, this month the first article is from the field of color vision. We are all familiar with demonstrations of induction or simultaneous contrast, i.e., the change in appearance of a visual stimulus when other stimuli are present in the visual field or scene. In "Brightness Induction in a Chromatic Center-Achromatic Surround Configuration," M.J. Luque, P. Capilla, A. Felipe, and J.M. Artigas report on experiments studying the brightness changes induced in red and green test stimuli by an achromatic surround. They contrast the results that they found with a nulling method to those of a heterochromatic brightness matching method.

In the next article, Yoshinobu Nayatani, Hiroaki Sobagaki, Kenjiro Hashimoto, and Tadashi Yano report on "Field Trials of a Nonlinear Color-Appearance Model." In these field trials, three sets of chromatic-adaptation data from different experiments, one by the Research Committee of the Color Science Association of Japan, one by Breneman, and the third by McCann *et al.*, are used to evaluate the predictive ability of the nonlinear color-appearance model developed by Nayatani *et al.* It was necessary to introduce into the model a new term, which the authors called the effective adaptation coefficient or a_{\min} , to account for the effect of incomplete adaptation.

Following the work of the previous article, Yoshinobu Nayatani describes "A Simple Estimation Method for Effective Adaptation Coefficient."

While the previous article introduces the effective adaptation coefficient, the method it uses to compute the term is rather tedious. Thus, users would appreciate a simpler method for estimating the effective adaptation coefficient. Therefore in this article, Nayatani proposes two other possible methods for determining the value of the effective adaptation coefficient. He then compares estimates of the coefficient obtained by all three methods.

From color vision, then color-appearance modeling, we move to color rendering. Whether we are talking about photographs, television pictures, or the appearance of people in the office where one works, the complexion color of humans has been one of the important colors evaluated. If your co-worker looks pale, is it the lighting or the health of the worker? In 1959, Sanders studied the lighting required to make human complexions appear attractive and then developed and published the chromaticity coordinates of the "preferred complexion of Caucasian woman." After that, the sets of test color patches that were designed for specifying color rendering properties of light sources, included a sample of "Caucasian woman complexion." In the Japan Industrial Standard JIS Z 8726, a Japanese woman had not been studied until now. In "Preferred Japanese Complexion Color Under Illumination," Tadashi Yano and Kenjiro Hashimoto determine the chromaticity coordinates of the optimum color of the Japanese woman complexion. These results could possibly be used as representative of "Preferred Complexion of Oriental Woman" in the revision of the test-color samples being discussed by the CIE technical committee TC 1-33 on color rendering.

The last two articles in this issue are from the field of color measurement. One describes a technique for absolute diffuse spectral reflectance factor measurement, and the second is an error propagation analysis in measurement. First, we have "Rapid Absolute Diffuse Spectral Reflectance Factor Measurements Using a Silicene-

Photodiode Array" by Chang-Soon Kim and Hong-Jin Kong. By using an array of silicon photodiodes, the measurement time to obtain absolute diffuse reflectance factors from 380 to 780 nanometers for a white standard reference material was reduced to a few seconds. The effects of sphere port openings and the wall thickness at the sample port were also taken into account to increase accuracy in this procedure.

Whether we are doing color measurements or color-image acquisition, we always get data in one form, then through various mathematical calculations transform it into many other forms. A simple example is when we measure reflectance at visible wavelengths, then calculate the CIE tristimulus values. We take these operations for granted, and assume that the method of transformation will not affect accuracy of the answer. In the final article, "Error Propagation Analysis in Color Measurement and Imaging," Peter D. Burns and Roy S. Berns examine how mathematical manipulations (linear, matrix, and nonlinear transformations) influence the mean, variance, and covariance of color measurements and color images.

Ellen C. Carter
Editor

Color, Research and Application



THE FIFTH COLOR IMAGING CONFERENCE:

**COLOR SCIENCE, SYSTEMS
AND APPLICATIONS**
November 17-20, 1997
The Radisson Resort
Scottsdale, Arizona

The Color Imaging Conference has become the premier technical conference for scientists, technologists and engineers working in the areas of color science and systems and their application to color imaging. 1997 marks the fifth year of this topical, annual conference with a significant growth in overall participation as well as an increase in the professional disciplines represented. The conference is international in nature. In 1996 one third of the participants came from outside the United States and Canada.

As the Color Imaging Conference has grown and matured, the focal areas have expanded. Professional disciplines represented range from psychophysics, optical physics, image processing, color science, graphic arts, systems engineering and applications as well as hardware and software development. The focus of the conference is color-color as a critical element of the research and application efforts of this segment of the professional community.

While color science continues to be a fundamental component, an increasing number of presentations have focused on the application of color in a variety of emerging areas including printing, display, graphics, and imaging science. This application focus led to the coining of a new term "Color Engineering" which has become the general descriptor for the work of many of the conference participants. Beyond representing all areas of color imaging, this year's conference will expand into the areas of color on the web and color in motion imaging in particular and computer science in

general.

As in the past, this year's conference will feature a comprehensive series of tutorials on both basic and advanced topics in color science, measurement, imaging, technology, image processing. Tutorials are planned on 11 different topics, from "Fundamentals of Colorimetry" to "Color in Motion Imaging and Multimedia".

Special Feature of the Program

The program will include keynote presentations by noted experts in the color imaging field. In addition, the CIE is planning to conduct a Color Expert Symposium immediately following the conference and the International Color Committee (ICC) is planning a working group meeting in conjunction with the conference.

Inter-Society Color Council is one of the cooperating societies of the Color Imaging Conference.

For more information contact:

Society For Imaging & Technology
7003 Kilworth Lane
Springfield, VA 22151
tel: 703-642-9090
fax: 703-642-9094
Or
Society for Information Display
1526 Brookhollow Drive, Ste 82
Santa Anna, CA 92705-5421
tel: 714-545-1526
fax: 714-545-1547

SHELYN AND HUNTERLAB SIGN AGREEMENT

SheLyn Inc. and HunterLab announce the signing of a long-term agreement on April 15, 1997. The agreement will combine the specialties of each company, focusing on the improvement of every aspect of color management in the textile and apparel

industry.

Each company brings years of experience in color management to the textile industry. HunterLab has been designing and manufacturing laboratory, on-line, and portable color instrumentation. In 1952, Mr. Richard S. Hunter, after leaving Gardner Laboratory, Inc. started his own company.

SheLyn is a software and consulting company in color technology, primarily in the textile industry. Founders of the company, Roland Connelly and Robert Willis had long time experience at Burlington Industries.

The first fruit of this collaboration is already on the market, Easy Match® Textiles, a Windows 95, 32-bit quality control and formulation system, consisting of software by SheLyn and instrumentation by HunterLab.

With this new agreement, the textile industry has sixty-five years of experience to call upon for solutions to its difficult color and appearance problems.

Gultekin Celikiz
Editor, ISCC News

DETROIT COLOUR COUNCIL

Minutes of the June 10, 1997 Conference

The Panel at the Dearborn Inn featured five outstanding speakers. The conference covered color measurement and tolerancing, as well as material specific issues. It was followed by demonstrations by six instrument manufacturers. The speakers were: Danny Rich, Datacolor, who talked about color measuring instrument designs, applications and potential problems. Roy Berns, RIT Munsell Color Science Lab., reviewed changes over the last 23 years that make instrumental tolerancing feasible. Roy also sought some support for RIT's Industrial Color Difference Consortium. Mary Killoran, PPG, gave a very interesting talk on

instrumental color assessment. She included several examples of single versus multiple readings and the subsequent consequences. Bill Longley, consultant, talked about the difficulties in the automotive industry of trying to measure different polymer systems to the same standard. For instance, you can't measure an ABS part or plaque against a polypropylene standard. The difference in the index of refraction between the two, invalidates the readings. Once an acceptable visual color match is achieved, a working standard should be prepared. Bill also demonstrated his preference of using hue (H) and chroma (C) instead of $L^*a^*b^*$, and using CMC equation in place of CIELAB. Our final speaker was Roland Connelly, SheLyn, Inc., who discussed the measurement of various types of textile samples. His focus was on techniques for proper sample presentation. A lively question and answer session followed.

The Detroit Colour Council's next meeting is September 23, at the Doubletree Hotel, Troy, MI. The topic, "Color Shifting Pigments," will be presented by Jerry Droll, Flex Corp.. For meeting information/reservation please contact: Jim King, 248-583-8276.

Jim Keiser

ASTM MINI SYMPOSIUM

There will be a mini symposium on January 13, 1998 in San Diego, CA on Color Instrumentation and Color Difference Scales as related to the Coatings Industry. If any one is interested in participating please send the title of your talk to Romesh Kumar. The length of the presentation should be no longer than 30 minutes.

Romesh Kumar
Hoechst Celanese Corp.
500 Washington Street
Coventry, RI 02816
Tel: 401-823-2161
Fax: 401-823-2750
email: kumarl@coventl.hcc.com

COUNCIL FOR OPTICAL RADIATION MEASUREMENTS (CORM)

The Council for Optical Radiation Measurement (CORM) of the United States and the Ultra Violet Spectrometry Group (UVSG) of the United Kingdom are co-sponsoring the Third Oxford Conference on Optical Spectrometry at Royal Holloway College of the University of London (Egham, Surrey) from 28 June to 2 July 1998.

The four day conference has been divided into three major sections:

- 1) Measurement Techniques and Standards
- 2) Color and Reflectance Measurements (including a session on fluorescence colorimetry)
- 3) Instrumentation and Applications

The fourth day will be scheduled visits to the National Physical Laboratory (optional but suggested).

While abstracts for oral presentations are due 1 August 1997, poster papers are still invited.

Format: The Conference format is morning and evening sessions with afternoons free for conferee interaction, sightseeing, and social events. Poster sessions will run in the afternoons.

Exhibits: There will be small exhibits by manufacturers of instruments and software related to optical spectrometry. Companies wishing to exhibit should contact Dr. Mary Barnard at address below.

Housing: Conferees will be housed on campus. Conference fees include room, full board, and the Tuesday banquet. At the conferee's option, at off-site hotels and inns are available but must be arranged by the conferee.

Proceedings: Edited proceedings

will be published by Elsevier Publishing Co. As special issue of Analytical Chimica Acta. Conferees will receive a complimentary copy of the proceedings.

Fees: The fee for the four day conference including room and board but exclusive of airfare is £595.

A Second Announcement will be available at the end of July 1997.

The previous two Oxford Conferences have been highly successful, with the published proceedings being frequently cited in the optical spectroscopy literature.

For further information, please contact:

In Western Hemisphere

Dr. Art Springsteen
U.S. Coordinator, 3rd Oxford Conf.
c/o Labsphere Inc.
P.O. Box 70
North Sutton, NH 03260-0070
United States
tel: 603-927-4266 x2129
fax: 603-927-4694
email: art_spring@labsphere.com
or arty1166@aol.com

In Europe/Asia

Dr. Mary Barnard
Coordinator, 3rd Oxford Conf.
C/o The Pines Consultancy
The Pines, Larch Avenue
Ascot, Berkshire SL5 OAW
United Kingdom
Tel: 011-44-1344-21485
Fax: 011-44-1344-21485

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

Research Triangle Park, NC - AATCC officials announced the election of Nelson E. Houser as president of the American Association of
(Continued→)

Textile Chemists and Colorists for 1997. Mr. Houser was installed with other AATCC officers at the Association's Annual Meeting.

Mr. Houser is vice-president of technical development, Burlington Chemical Co., Burlington, NC. He holds a BS in textile chemistry from NC State University. He has served in various technical and management positions with dye and chemical suppliers and wet processors.

Mr. Houser has been an active member for 32 years, first joining as a student. On the national level, he has served on the Henry E. Millson Award Committee for Invention, Executive Committee on Research and Technical Committee on Research. Since 1992 he has been chairman of the Publications Committee and a member of the Executive Committee of the Council. He is also a member of the Advertising Board, Subjects and Speakers Bureau and the Textile Education, Harold C. Chapin Award and Olney Medal Award Committees.

AATCC officials also announce the election of John A. Darsey Jr., J. Nolan Etters, Phillip C. Hilton, Robert K. Lattie and Francis X. Shuletsky as regional vice-presidents.

Founded in 1921, AATCC is the world's largest technical and scientific society devoted to the advancement of textile chemistry. The association, which is headquartered in Research Triangle Park, NC, has some 7000 individual and 285 corporate members in the United States and internationally.

Susan H. Keese
Editorial Director



COLOR NEWS FROM AROUND THE WORLD

NEWS FROM DOWN UNDER

Colour Society of Australia announces a conference entitled "COLOUR For Life",

26 - 29 September 1997

Perth, Western Australia
Conference Themes:

Colour and Survival: This theme will cover colour in food and as well as colour and survival in the natural world. The high point will be the Eating Seminar.

Colour and the Environment: This is a broad based theme which covers landscaping and gardens, architecture and the built in environment. The highpoint will be a visit to the Wilflower Festival and Botanical garden and bushland in Kings Park overlooking Perth. Guest speaker Sally Osborne will give a presentation on selecting colours which work in harmony with the environment and the need for regional colour palettes. Contributed papers will address colour in the city or country environment, heritage colours and colour choices taken from natural surroundings.

Colour, Culture and Communication: This theme is slanted toward the behavioural science and the arts. Guest speaker John Hutchings will give a presentation on colour in folklore. Contributed papers will cover aspects of colour in various cultural settings and segments of the arts or focus on colour as a means of communication.

KEYNOTE SPEAKERS

Dr. Kingsley Dixon is Assistant Director (Plant Science) of the Kings Park and Botanical Garden (see *Wildflower Festival* for more details). His presentation on the Conference

Saturday Afternoon will cover aspects of colour and survival in the natural world.

John Hutchings is a Fellow of the Institute of Physics, and a Fellow of the Institute of Food Science and Technology (UK). From 1954 to 1988 Mr. Hutchings was employed in various posts within the food industry. For much of the latter part of this period he was based at Unilever Research, Colworth House, Bedford, England working both in research and with the companies. Since 1988 he has been an independent lecturer and consultant in the fields of colour and appearance. Mr. Hutchings is the author of the book, "Food Colour and Appearance". Since 1975 he has studied colour and appearance in biological nature and is now writing up results of an international survey into the part played by colour and appearance in folklore and tradition. He will be conducting the Eating Seminar to be held on the Conference Friday and giving a presentation on the Conference Saturday dealing with colour in folklore.

Sally Osborne's work is in conjunction with ARKishop Architects at Byron Bay, N.S.W., where her husband Graham, is one of the principal architects. As the name suggests, they specialize in ecologically sustainable architecture and draw on the expertise of like minded specialists in the Byron area.

Sally's presentation on Monday will cover her approach to exterior and interior colour design. She works in harmony with the environment and the architecture and makes colour decisions at the designing stage so that space, light and colour can become part of the architectural concept. Ms. Osborne is currently working on two ECO projects, which have fortuitously contrasting light quality, climate and vegetation and which offer comparative analysis for her MVA which she is undertaking at Griffith University, in Brisbane. These projects utilize local timbers, local (rammed) earths and call for environmentally based colour, both externally and internally.

The Environmental Interpretive Centre - Ebor project, is in the New England highlands of NSW near Armidale (high cold country) and the Couran Cove Resort, Cultural, Interpretive and Research Centre - South Stradbroke Island (near Surfers Paradise), is hot and subtropical with strong bleaching light. Both projects aim to include an environmental colour display. Ms. Osborne is hoping that significantly different colour choices support the environmental differences. These findings will affirm the need for regional colour palettes.

EATING SEMINAR: The Eating Seminar will be held on the Friday evening of the Conference. In conjunction with a specially prepared menu, this event's speaker, John Hutchings will be talking about a variety of topics relating to the way in which colour contributes to our enjoyment of food.

Format: The talk will be divided into four short presentations, concluding with an overview and discussion at the end of the evening.

Welcoming drinks: Drinks will be served at 6:00pm and John will begin his presentation by discussing colour in wine and the use of colour in slang and non-slang terms.

Entree: Delegates will be seated in the Pines restaurant at 7:00pm for the commencement of the main meal. John will speak on food colour with regard to population differences, the halo effect (the transfer of images from environment to food) and the problems and styles of food packaging. Following the talk, the entree, which has been selected to demonstrate the use of colour in food, will be served.

Main course: The main course will be preceded by a talk on food presentation and the effect that the decor of the eating environment has on enjoyment of the food. The main course has been selected to demonstrate the variation of shape and texture in food, and skill in serving will be demonstrated in relation to the design of the food on the plate.

Desert: Desert has been chosen to

suitably conclude the special menu and John will be discussing food pigments - what food colourings have been used in the past, which of the pigments have been found to be detrimental to our health, how we use food colouring to survive, and what foods have been fashionable in the past. The presentation will conclude at 10:00pm with the serving of coffee.

The Venue: The Eating Seminar will be held in the Pines Restaurant at the Claremont Conference Centre. In keeping with the ambiance of the Centre's fully restored, heritage building, the Pines provides an elegant setting with a distinctive old world charm. Special thanks go to the Chef, John O'Conner, for the contribution of his time and expertise in the selection of the menu.

THE WILDFLOWER FESTIVAL: Delegates visiting the Wildflower Festival on the Sunday of the Conference will see Australia's largest and most varied display of wildflowers and native plants. The excursion will:

- allow delegates to leisurely view the variety of exhibits at the Festival which include:
 - landscaped wildflower display
 - native orchid display
 - the Plant Science and Micropropagation unit's Science and Micropropagation Unit's *Science in the Bush* and *Living Collections* exhibit
 - displays by tertiary institutions, craft groups and associations like the Botanical Artists Group
 - conduct delegates on a one hour walking tour through the Botanical Garden and adjacent bushland accompanied by experienced and knowledgeable guides.

The Kings' Park and Botanical Garden has long been recognised as a centre for horticultural research and plant breeding and this year the park has been invited to be one of 733 exhibits in the Chelsea Flower Show in Britain. This event which is held in May, is the first event of English social season and attracts around 170,000 visitors, about 10,000 from outside of

UK.

The Assistant Director (plant Science), of Kings Park and Botanical Garden, Dr. Kingsley Dixon will be giving a presentation on the Conference Saturday. His talk will cover aspects of colour in the natural world. Dr. Dixon is part of a research team comprising senior botanists and ecologists whose work specialises in understanding the treats to species, sampling genetic diversity, securing "off-site" collections of endangered species, revegetation of bushland, restoration of species and undertaking biological research into the flora of Western Australia.

WORKSHOPS: Two workshops are planned for the Conference. They are:

1) Awareness and Perception of Colour

The exercises will heighten awareness of colour schemes in natural objects and demonstrate how powerfully we respond to personal colour preferences.

2) Language of Colour

The exercises will demonstrate how we describe colours and communicate messages through the use of colour.

REGISTRATION

The cost to members of the Colour Society of Australia is \$280.00 for the full three day conference, with non members paying an additional amount of \$40.00. There is an \$80.00 discount for student members, with student non members paying an additional 20.00.

The full conference fee will entitle delegates to attend the full lecture program, workshops and market. Morning and afternoon teas and lunch at the conference centre are included in the fee. The conference fee also includes entry to the Wildflower Festival, but not morning tea; there will be a refreshment tent in the Festival area where delegates will be able to buy tea, coffee, cakes, etc.

ACCOMMODATION

Cottesloe Beach Chalets

These chalets are located right on the beach. Whilst they don't have the view (or the price tag) they are excellent,

(Continued→)

clean accommodation, close to the venue and provides the best morning or evening walking venue in the world - The Indian Ocean!

The chalets sleep 5 (one double and 3 single), so can be shared, or if you prefer you can have one for the whole family. They are two levels and are great if you want to entertain on your evenings off from the Conference. They are fully self contained with a full kitchen and all the necessities of life. They are conducive to a relaxed, and pleasant holiday at one of the best locations in WA.

Cost: Standard Chalet
\$94.50/night
Shared with 3 others
\$23.65 per person

The Colour Society will make your booking for you, and will organise transport to and from the Conference Centre.

For guaranteed place, registrations must be received by **12 August, 1997**. Registration will be confirmed by mail provided form and payment are received by **Tuesday 12 August 1997**. Cancellations will only be accepted if received in writing by **Friday 1997** and a \$30.00 service fee will be deducted from your refund. There will be no refund for cancellations made after **19 September 1997**.

For information Fax/Phone:
(08)9272-5283
email: perfgap@ozemail.com.au
<http://www.ozemail.com.au/~perfgap>

Renée du Bruin

ASTM COMMITTEE E12 ON APPEARANCE MEETS IN ST. LOUIS

ASTM Committee E12 on Appearance met on June 18-20, 1997 at the Adams Mark Hotel in St. Louis, MO. This Committee is chaired by Norbert L. Johnson and develops and maintains standard test methods, practices and guides that deal with all aspects of the color and appearance of materials and displays. Members of E12 make up the ASTM delegation to the ISCC.

ASTM Committees consist of technical and administrative subcommittees. It is in the 12 technical subcommittees of E12 that standards development takes place. Each of the technical subcommittees is concerned with a different aspect of appearance. Although the main work of an E12 subcommittee is to develop standards, the subcommittee may stimulate and/or sponsor research in its areas of interest. For example, the members of Subcommittee E12.12 on Metallic and Pearlescent Colors have taken an active role in research activities involving the visual evaluation and measurement of metallic and pearlescent colors. As part of this research, a specialized lighting booth was developed (and since commercialized) for viewing metallic and pearlescent samples. A subcommittee may also liaise with other organizations, such as the CIE or ISO. The 12 subcommittees are:

E12.01 on Terminology chaired by John S. Setchell

E12.02 on Colorimetry and Spectrophotometry chaired by Jack Ladson

E12.03 on Geometry chaired by Larry E. Steenhoek

E12.04 on Color and Appearance Analysis chaired by Danny C. Rich

E12.05 on Fluorescence chaired by David M. Burns

E12.06 on Appearance of Displays

chaired by Jonathan E. Hardis

E12.07 on Color Order Systems chaired by Robert T. Marcus

E12.08 on High Visibility Materials for Individual Safety chaired by Gary M. Lesley

E12.10 on Retroreflection chaired by Dennis Couzin

E12.11 on Visual Methods chaired by W. Nick Hale

E12.12 on Metallic and Pearlescent Colors chaired by Allan B. J. Rodrigues

E12.13 on Photoluminescent Safety Markings chaired by Marina Batzke

Meetings of the Committee are scheduled twice a year, usually in January and in June. All of the subcommittees had meetings scheduled in St. Louis, although one had to be canceled. Most of the work of E12 is conducted through the mail. The semi-annual meetings are used to form the consensus needed to issue a standard, discuss the needs for new standards and to revise existing standards so that they remain current and useful. Subcommittees may meet more often than semi-annually, if the need exists.

E12 is also responsible for a compilation of ASTM Standards on Color and Appearance Measurement. 5th edition of this book of standards is available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, tel: 610-832-9500.

Committee E12 Secretary Yvonne Barnes reported action taken for the following three items:

1. Next E12 meeting will be held Jan. 14-16, 1998, San Diego, CA.

2. Effect of reflectance geometry notation change in all ASTM documents to that of ISO 5/1 1984 will be evaluated. For example, reflectance factor for 45° incidence and 0° view would be expressed as R(45,0).

3. Proposed change in the name of the committee from "Appearance" to "Color and Appearance" is to be considered.

For more information on ASTM Committee E12, please contact Ms. Bode Buckley at ASTM Headquarters, 610-832-9740. *Dr. Robert T. Marcus*

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Futurist Daniel Burrus to Present Keynote Address at FSCT 75th Annual Meeting, Nov. 3-5, 1997.

Celebrating 75 years as the premier technical organization in the coatings industry, the Federation of Societies for Coatings Technology is planning for ICE97 - to be held on Nov. 3-5, 1997 at the Georgia World Congress Center, in Atlanta, GA. Combining the organization's 75th Annual Meeting, ICE97 will open with a Keynote Address by Daniel Burrus, one of the nation's leading science and technology forecasters.

In keeping with the theme "75 years... Tradition... Discovery... Opportunity," ICE97 will offer attendees insights into the coatings industry as it moves into the future - previewing innovative technologies and solutions to current challenges.

1997 Keynote Address

During his Keynote Address on Monday, Nov. 3, Mr. Burrus will demonstrate how recent innovations in science and technology have provided us with a "new" set of tools to work with to greatly increase productivity and efficiency in all areas. Knowing what these tools are, and how to apply them creatively is rapidly becoming a matter of business survival and a key to personal gain. His presentation, "Futureview®: A new Look", is designed to offer valuable insight into present and future applications of recent advances, enabling attendees to positively influence the future plans. Using down-to-earth technology, insight and humor, Mr. Burrus provides an informative, provocative and fascinating look at the impact of scientific innovations on how we will live and work in the near

future. Areas of emphasis include: Going Beyond Your Competition; Your Creative Edge; and Teaching the Future Today.

Daniel Burrus is Founder and President of Burrus Research Associates, a research and consulting firm that specializes in global innovations in science and technology, their creative application and future impact.

This is his second engagement with the FSCT; Mr. Burrus was Keynote Speaker at the Federation's Annual Meeting in 1994 in New Orleans.

Annual Meeting Highlights

Highlights of the year's Technical program include:

Roon Award Competition Papers

International Papers reflecting the global audience of ICE97, papers are presented from international industry experts. These papers often report on technologies which may affect the global marketplace or detail some of the latest technical advances outside of North America.

APJ/Voss Award Competitions Papers: Papers that are developed and presented by the Societies' technical committees. Their work dealing with the research, development, manufacture or application of the industry's products or raw materials entering into their preparation.

Women in Coatings Roundtable: Entitled, "Coatings 2000: Women Leading into the New Century", this panel discussion will feature female leaders of the coatings industry addressing a timely topic - the role of women in the paint and coatings industry, both now and in the future.

Technical Focus Lecture: Kicks off the technical portion of the Annual Meeting technical program. The Lecturer is chosen by the Chairs of several FSCT Committees, for on-going work in critical technical areas.

Mattiolo Memorial Lecture: The Lecturer is an individual who has made outstanding contributions to science, technology, and engineering, related to the coatings industry.

The federation of Societies for Coatings Technology is pleased to announce that Dr. Ray A. Dickie, Corporate Technical Specialist in the Chemical and Physical Sciences Laboratory at Ford Motor Company, Dearborn, MI has been named Technical Editor of the Journal of Coatings Technology. He will also serve as Chair of the JCT Editorial Review Board.

Dr. Dickie graduated from the University of North Dakota with a BS in Chemistry. He earned his Ph.D. in Physical Chemistry at the University of Wisconsin and did post-doctoral research at the University of Glasgow and Stanford Research Institute. He joined Ford Motor Company in 1968.

Dr. Dickie's research interests center on the chemistry of the polymer-metal interface and related areas of surface coating technology and adhesive bonding. The interfacial chemistry of corrosion-induced adhesion failure has been an area of special interest.



THE COLOR ASSOCIATION OF THE UNITED STATES (CAUS)

CAUS workshop: Color Preview on Spring and Summer 1999 on Thursday, August 21 from noon to 1pm. Cuttings on the fashion forecasts available at that time. Call for reservations.

Fashion without borders is an underlying theme for the Spring and Summer 1999 color forecast, according to the CAUS Women's Committee. Cross-cultural mixing will in the future create quirky clashes inspired by fashions from streets and cities around the world. Featured color groupings include: North America's offbeat bright tones; South America's blues and greens; Africa's spice oranges and browns; Asia's pinks and reds; Australia's warm neutrals in camel hues; and Europe's dark grays and neutrals. Members of the Women's Committee: *Monika Tilley, chair, Monika Tilley Ltd; Eleanor Douglas, Eleanor Douglas Analyst; Roseann Forde, E.I. DuPont de Nemours & Co.; Sally Jenkyn Jones, Forstmann; Deanna Littell, Kasper, Inc.; Michaelv Leva; Elaine Monroe, Elaine Monroe Associates; Natalie Perr, Natalie Perr Associates; June Roche, Milliken & Co.; and Carol Zimmerman, Merkle Newman Hartly.*

Première Vision: 2 Views

Monika Tilley reports on the Première Vision Color for Spring and Summer 1998

The colors suggested by 73 committee members have been enlarged and reflect the current multi-trends in fashion. They are arranged by groups of color with each group having two color inspirations:

- Yellow/dark brown; contains the warm tones for next summer's ethnic interpretations.

- Pink/rust: contrasts bluish pinks

with warm red and deep rusts.

- Green/turquoise: combines dark loden and khaki with cool aqua and turquoise-tonal, hard-edged sport colors with summer pastels.

- Lilac/blue: ranges from pastel to reddish blue tones-an advanced concept

- Neutrals: composed of two shades of beige, white and gray. They are either a story by themselves or in combination help tone down the other colors.

[CAUS editor's note: We are pleased to have Monika's report on Première Vision. Monika, who is chair of the CAUS Women's Committee and a designer of textiles and sportswear, covers Paris' Première Vision exhibition twice a year.]

Natalie Perr Reports

After years of neutrals taking a back seat to color, whites, ecrus, straw, almond, grays, camel, cool and warm beiges, khaki, navy and black have again become bestsellers.

The mills reported that whites/ neutrals are the number two selling color range of women's accounts and the number one range selling to menswear markets. The range of yellows through warm browns was the lead seller to women's manufacturers and the number two in menswear.

Best selling colors in womenswear: 1. Sugared almond; 2. golden yellow; 3. navy; 4. sand. In menswear; 1. sand; 2. caramel; 3. henna; 4. navy. In childrenswear, the most important range of colors was the reds and the pinks followed by the greens and the turquoises.

[CAUS editor's note: Natalie Perr, principal of Natalie Perr Associates and member of the CAUS Women's Committee, gives further insights on Première Vision.]

New York City's Women's Fall 1997 Collections

This year the shows took a new turn, as many of the designers decided against showing in the tents and opted for indoor venues across the street from

Bryant Park. There was only one tent in the park this year, instead of the usual three.

We covered 15 of the shows in 6 days. Some of the highlights of the week included the following:

- On the high end, Gianfranco Ferré showed clean lines and contemporary shapes in warm, full textured materials like mohair, cool crepe and leather. His use of color was precise and deep, with brown, plum, and dark reds such as wine, as well as matte white and vegetable greens and yellows combined with black.

- On the flip side was the always-outrageous Betsey Johnson whose show included Viking helmets and silver foil tube tops. Betsey had some beautiful georgette peasant dresses and chiffon sheaths in periwinkle, mauve, and eggplant. She also had chocolate-colored crochet coats and velvet, fur and leatherette pieces in bark, sienna and caramel. There are plenty of Asian-influenced embroidery and tattoo looks in violet and scarlet.

- Continuing on the Asian theme was the queen of embroidery, Vivienne Tam. Her collection was studded with the usual flowery embroidered sheer dresses and tops in lilacs, wines and chocolate. On the whole it was a rather dark mix of shiny and matte black suits and dresses as well as some brightly patterned skirt sets and other more neutral wears in sweater sets.

- Mary McFadden was in a Russian mode with "Le Ba de Hermitage," a collection of an ornate reinterpretation of the Boyar costumes, Tartar women's dresses and coronation robes. She used various shades of purples, reds and gold. Her signature pleats were evident and looked stunning mixed with the multi-colored patterned dresses, skirts and evening looks, all with lots of jewelry.

- Japanese designer Yeohlee was inspired by nomads. Her lambswool and metallic sheer-silk was a contrast

to the sweater knits in yak hair, embossed wool in grains of rice patterns, and abstract zebra prints. Colors included gold, moss, gray, maroon and ash.

- Diesel and Spooky shows took the 80's revival literally with super tight dark denim and brights, and plenty of stretch Lycra® and studded looks. The London punk look of the early 80's was screamingly clear. The hair was as spiky as the shoes in both of these shows.

-David McKenna, Director of Membership.

Intern Projects at the Association

From Sweden... Notes on Slate Blue, Golden Yellow, Gold & Red

Slate blue is probably the all time bestseller in Sweden. Traditional Swedish clothing in this color, along with yellows and reds, is what a Swede would associate with summer's flowers and sky, and summer is sacred in Sweden.

Yellow is a difficult clothing shade in Sweden. Swedes consider themselves too pale to wear it. But as a color in prints for home furnishings, it looks well.

Swedes do not usually wear red. It is considered an overpowering color that draws attention to the person wearing it. The people of Sweden are generally speaking shy, and there is also a Nordic saying called "the Law of the Jante," which means not to try to stand out, to be better than somebody else.

Red is tolerated in home furnishing textiles and houses are traditionally painted in a brownish red, "Falu Red," a pigment from the copper mines.

Gold like red is too pushy for Swedes and is also considered slightly tasteless and vulgar.

-Mathilda Tham, Swedish designer and CAUS Spring Intern

Miami's South Beach Aqua & Pink

My Project is based on the hotels and apartments of old Miami Beach with their combinations of flat and curved walls, use of glass block, circular windows and metal railing.

I think it's wonderful to have such a riot of color erupt all over Miami's South Beach. I should imagine that to be able to go there and soak up all that color would be among many designers' dreams.

-Joanna Marie Violaris, Central Saint Martins, London, and CAUS Spring Intern

The 69th Oscars: Winning Gown Colors

The Project shows five of the gowns with the best colors seen at the 69th Academy Awards.

We chose Jodie Foster, who wore an Armani in Silvery gray; Claire Danes in a powder blue Narcisco Rodriguez; Nicole Kidman in a chartreuse green Dior; Faye Dunaway in a red Armani, and Sigourney Weaver, who wore a plum Narcisco Rodriguez.

-Emanuela Carvaho, Brazilian fashion stylist and CAUS Spring Intern.

Exhibitions

"Driving Fashion: Automotive Fabrics of the 1950's" will be parked at the Museum at FIT from June 24 through October 4. Curated by Graduate students of FIT's Master of Arts program in Museum Studies and Gallery and Reatil Art Administration, "Driving Fashion" casts a scholarly view on one of the most popular of American icons. The exhibition showcases car upholstery and how it functions as a link between the automotive industry and the world of fashion. It celebrates a textile form that has never before been exhibited on its own and explores the impact of women on automotive styling.

"Objects of Desire the Modern Still Life," at the Museum of Modern Art

until August 26. A thought provoking show that features all the movements in modern art of the 20th Century as seen through still lifes. Featured in the show are "The World as Perceptual Field, :I" an exploration of Cubism; "Real Fictions," another look at Dada; and "The Mechanisms of Consumer Culture," Pop Art Revisited.

"Is the Future Now? Gaetano Pesce: Material Explorations," at Material Connexion™ (4 Columbus Avenue) features multicolored resins - soft and hard, translucent and opaque - that Pesce has explored for use in wall and roofing tiles and unbreakable doors.

CAUS Web Site

CAUS web site should be in place in the next couple of months. Our primary objective is to reach out to a global audience. As the oldest forecasting organization in the US (founded in 1915), the Association has brought fashion information to a wider and wider public over the years, even reaching the consumer directly. From fusion cooking to the hegemony of the automotive green, CAUS staff follows the cultural color flow.

CAUS Staff
The Color Association of the United States
409 West 44th Street
New York, NY 10036
212-582-6884

SALE!!

If any ISCC members are interested in receiving the COLOR RESEARCH & APPLICATION at a greatly reduced rate, please contact Cynthia J. Sturke, ISCC Office Manager directly and she will send you a special form to submit for a subscription. ISCC members may receive the journal for \$85 (North America) or \$115 (outside North America). To receive this discount rate you have to be currently a member of ISCC.

THE RICHARD S. HUNTER COLOR INSTITUTE

Reston Virginia, May 23, 1997 - Philip Hunter, President of Hunter Associates Laboratory, Inc. announced today the creation of the Richard S. Hunter Color Institute, the first organization to have the goal of providing commercial education and training of industrial color professionals around the world.

The Institute, named to honor the memory of Richard S. Hunter, is located in Reston, VA and will further his life's work of providing practical color education. Mr. Hunter, well known as a prominent scientist, was creator of the L,a,b color system and devoted much of his time to color and appearance education. He was also a successful business man. In 1982 he capped his educational career by establishing the Richard S. Hunter Professorship of Color Science, Appearance and Technology, and endowed chair at the Rochester Institute of Technology.

Now Philip Hunter has taken the next step in meeting the expanding needs of industry for color education by creating the Richard S. Hunter Color Institute to expand and improve upon the functional courses first taught by Richard Hunter. The Institute will be an independent entity devoted exclusively to fulfilling the color education needs of industry. It will also offer courses and seminars in conjunction with HunterLab and other organizations.

The first of these cooperative efforts is in the planning stages - an educational symposium this fall in partnership with the National Coil Coaters Association for their employees and vendors. The Institute is presently developing a comprehensive education program which will include recognized experts in the field of color and coating. Recognizing that the need for quality color education is worldwide, the Institute has already begun collaboration with the Colour Society of Australia through Harvey Gough, an experienced educator in Asia. Joint presentations in Australia as well as the rest of Asia are anticipated.

The Institute's world-wide programs are expected to include:

- Industry specific training sessions for personnel working in the fields of Coatings, Chemicals, Plastics, Food, Paint, Paper and Textiles
- Initial or continuing education for all levels of personnel in Color and Appearance Science
- Partnerships with various trade and professional Associations to provide non-commercial educational classes to meet specific member needs
- Active membership and participation in major industrial and standards organizations
- Developing educational training aids such as video tapes and CD ROM
- The Richard S. Hunter Color Institute Fellow award

program to encourage and recognize innovation in the field of color.

Phil Hunter has appointed Jane Hersey, long-time HunterLab Associate, former teacher and administrator to be Executive Director of the Color Institute. Elizabeth Hunter, Richard Hunter's widow, will be a director of the Institute.

For more information, or to put your name on the mailing list, contact the Institute by mail at:

11654 Plaza America Drive, Suite 211
Reston, VA 20190
Tel: 703-834-2212
Fax: 703-471-7408
email: rshci@hunterlab.com

PLEASE NOTE

**THAT THE ISCC OFFICE WILL BE CLOSED
FROM AUGUST 6 THROUGH AUGUST 15!**

**IF YOU HAVE URGENT ISCC BUSINESS YOU
MAY CALL DR. ELLEN CARTER AT 703-527-
6003**

GENTLE REMINDER!

All appropriate information submitted to this *NEWS* publication is the full and complete responsibility of the sender.

This publication and the ISCC assumes no responsibility for information changes and inaccuracies.

Thanks,
The Editor

C A L E N D A R

Please send information on Member Body and other organization meetings involving color and appearance functions with dates, places, and information source to:

Cynthia Sturke
ISCC Office Manager
11491 Sunset Hills Rd.
Reston, VA 20190

tel: 703-318-0263
fax: 703-318-0514
email: iscc@compuserve.com

1997

SANCI - CIE International Conference on Lighting in Developing Countries, Sept 1-3, International Conference Centre, Durban, South Africa, Info: CIE Central Bureau; email: ciecb@ping.at, or mail Keselgasse 27, A-1030, Vienna, Austria

ISCC & SPE ANNUAL MEETING, Sept. 14-17; *Inter-Society Color Council and Appearance Division of Society of Plastic Engineers*, Marriot Inner Harbor Hotel, Baltimore, MD; Info: Gary Beebe, tel: 215-785-8497

HFES 41st ANNUAL MEETING, Sept. 22-26; *Human Factors and Ergonomic Society*, Albuquerque, NM, Info: HFES, P.O. Box 1369, Santa Monica, CA 90406-1369; tel: 310-394-1811; fax: 310-394-2410; email: 72133.147@compuserve.com; internet: <http://hfes.org>

DETROIT COLOUR COUNCIL, Sept. 23; "Color shifting Pigments," will be presented by Jerry Droll, Flex Corp., Doubletree Hotel, Troy, MI.; Info: Jim King; tel: 248-583-8276

Colour for Life Conference, Sept. 26-29 *The Colour Society of Australia*, Info: Renée du Bruin, Performance Gap, P.O.Box 207, Maylands WA 6051; tel/fax: (08)-9272-5283, email perfgap@ozemail.com.au

AATCC INTERNATIONAL CONFERENCE AND EXHIBITION; SEPT. 28-OCT.1, *American Association of Textile Chemists and Colorists*, Marriot Marquis, Atlanta, GA; Info: AATCC, tel: 919-549-8141

OSA ANNUAL MEETING, Oct 11-19, *Optical Society of America*, Long Beach, CA, Info: OSA, tel: 202-223-0920; fax: 202-416-6100

CIE LED WORKSHOP AND SYMPOSIUM, Oct. 22-25; Standard Methods for Specifying and Measuring LED Characteristics, CIE Central Bureau, Vienna, Austria, Info: email: ciecb@ping.at or mail Kegelgasse 27, A-1030 Vienna, Austria.

IS&T 13th INTERNATIONAL CONGRESS, Nov. 2-7 *Society for Imaging Science and Technology*, Advances in Nonimpact Printing Technologies; Sheraton Seattle Hotel, Seattle, WA; Info: IS&T Conference Manager; 7003 Kilworth Lane, Springfield, VA 22151; tel: 703-642-9090; fax: 703-642-9094; email: info@imaging.org.

FSCT INTERNATIONAL COATINGS EXPO (ICE), Nov. 3-5; *Federation of Societies for Coatings Technology*, Georgia World Convention Center, Atlanta, GA; Info: tel: 610-940-6777; fax: 610-940-0292.

CMG FALL INTERNATIONAL CONFERENCE, NOV. 9-11, *Color Marketing Group*; Francis Weston Hotel, San Francisco, CA; Info: CMG, 5904 Richmond Highway, Suite 408 Alexandria, VA 22303; tel: 703-329-8500; email: colorcmg@erols.com.

THE COLORS OF INVENTION, Nov. 13-16, *The Gerome and Dorothy Lemelson Center for the Study of Invention and Innovation*, Smithsonian Institute, Washington, DC 20560

IS&T/SID FIFTH COLOR IMAGING CONFERENCE, Nov 16-19; *Society for Imaging Science and Technology/ Society for Information Display*; Transforms and Transportability of Color, Radisson Resort, Scottsdale, AZ Info: IS&T Conference Manager, 7003 Kilworth Lane, Springfield, VA 22151; Tel: 703-642-9090, Fax: 703-642-9094; email: info@imaging.org; internet: <http://www.imaging.org>.

2nd CIE EXPERT SYMPOSIUM ON COLOUR STANDARDS FOR IMAGING TECHNOLOGY; Nov. 20-21, Scottsdale, AZ, USA; Info: CIE Central Bureau, email: ciecb@ping.at or mail Kegelgasse 27, A-1030, Vienna, Austria

1998

ASTM COMMITTEE D-1, Jan 11-14, *Paint & Related Coatings, Materials and Applications*, Sheraton Harbor Island, San Diego, CA; Info: Scott Orthey; Tel: 610-832-9717; email: sorthey@astm.org.

ASTM MINI SYMPOSIUM, Jan. 13, Color Instrumentation and Color Difference Scales (as related to the Coatings Industry), San Diego, CA; Info: Romesh Kumar, email: kumarl@coventl.hcc.com

ISCC WILLIMSBURG CONFERENCE, Feb. 22-24; Color and Design: 21st Century Technology and Creativity; *Inter-Society Color Council*; Info: Wade Thompson, Tel: 417-882-2553.

CMG SPRING INTERNATIONAL CONFERENCE April 19-21, *Color Marketing Group*, The Broadmoor, Colorado Springs, CO. Info: CMG, 5904 Richmond Hwy, Suite 408, Alexandria, VA 22303; Tel: 703-329-8500; Fax: 703-329-0155 email: colorcmg@erols.com.

TAGA 98-50TH ANNIVERSARY CELEBRATION Apr. 26-29, *Technical Association of the Graphic Arts*; Marriot Lincolnshire Resort, Chicago, IL Info: Karen Lawrence, Tel: 716-475-7470.

SID 98, May 17-22, *Society for Information Display*, Anaheim, CA; Info: Lauren Kinsey, SID, 1526 Brookhollow Drive, Suite 82, Santa Ana, CA 92705; Tel: 714-545-1526; Fax: 714-545-1547; email: socforinfodisplay@mcimail.com.

ASTM COMMITTEE D-1, June 7-10; *Paint and Related Coatings, Materials and Applications*, Omni Inner Harbor, Baltimore, MD, Info: Scott Orthey, Tel: 610-832-9717; Fax: 610-832-9555; email: sorthey@astm.org.

(Continued→)

ASTM E-12 COMMITTEE ON APPEARANCE June 16-18, St. Louis, MO: Info: Bode Buckley; Tel: 610-832-9740; Fax: 610-832-1547

AATCC INTERNATIONAL CONFERENCE AND EXHIBITION, Sept. 22-25, *American Association of Textile Chemists and Colorists*; Marriot, Philadelphia, PA; Info: AATCC, Tel: 919-549-8141

ISCC & OSA ANNUAL MEETING; Oct. 2-4, *Inter-Society Color Council*, Oct 3-8, *Optical Society of America*, Baltimore Convention Center, Baltimore, MD; Info: OSA Tel: 202-223-0920; Fax: 202-416-6100.

COLOR BETWEEN ART & SCIENCE, Oct. 8-11, Radisson SAS Scandinavian Hotel, Oslo, Norway, Info: Anne Lise Stenseth; Tel: +47-22112190; Fax: +41-22361144, International Conference Service, Holberg Plass 3A, N-0166 Oslo, Norway

CMG FALL INTERNATIONAL CONFERENCE, Oct. 4-6, *Color Marketing Group*; Le Centre Sheraton Hotel Montreal, Montreal Quebec, Canada, Info: CMG, 5904 Richmond Hwy., Suite 408, Alexandria, VA 22303, Tel: 703-329-8500; Fax: 703-329-0155; email: colorcmg@erol.com.

1999

ASTM COMMITTEE D-1, Jan. 26-27 *Paint and Related Coatings, Materials and Applications*; Peabody, Memphis, TN. Info: Scott Orthey; Tel: 610-832-9717; email: sorthey@astm.org.

ISCC WILLIAMSBURG CONFERENCE, Feb.21-23, 2nd Panchromatic Conference; Color in its Surround; Info: Dr. Cynthia Brewer; Tel: 814-865-5072

ISCC & TAGA ANNUAL MEETING; May 5-7; *Inter-Society Color Council*; May 2-5 *Technical Association of the Graphics Arts*; Vancouver, B.C., Canada, Westin Bay Shore Hotel, B.C., Canada, Info: Bob Chung, Tel: 716-475-2722; Fax: 716-475-7063

ASTM COMMITTEE D-1, June 26-30, *Paint and Related Coatings, Materials and Applications*, Omni Rosen Hotel, Orlando, FL; Info: Scott Orthey; Tel: 610-832-9717; Fax: 610-832-9555 email: sorthey@astm.org.

SID 99 May, California, *Society for Information Display*; Info: Lauren Kinsey. SID, 1526 Brookhollow Drive, Suite 82, Santa Ana, CA 92705 Tel: 714-545-1526, Fax: 714-545-1547; email: socforinfodisplay@mcimail.com.

OSA ANNUAL MEETING: Santa Clara, CA; *Optical Society of America*, Tel: 202-223-0920; Fax: 202-416-6100

AATCC, INTERNATIONAL CONFERENCE AND EXHIBITION, Oct. 12-15, *American Association of Textile Chemists and Colorists*, Convention Center, Charlotte, NC, Info: AATCC, Tel:919-549-8141.

2000

ASTM COMMITTEE D-1; *Paint and Related Coatings, Materials and Applications*, Jan. 23-26, Hyatt Regency Hotel, New Orleans, LA; Info: Scott Orthey, Tel: 610-832-9717; Fax: 610-832-9555; email: sorthey@astm.org.

SID 2000, May, Toronto, Ontario, Canada, Inf: Lauren Kinsey, SID, 1526 Brookhollow Drive, Suite 82, Santa Ana, CA 92705, Tel: 714-545-1526; Fax: 714-545-1547; email: socforinfodisplay@mcimail.com

ASTM COMMITTEE D-1, June 11-14, *Paint and Related Coatings, Materials Applications*; John Ascaguns Nuggent, Reno NV., Info: Scott Orthey, Tel: 610-832-9717; Fax: 610-832-9555; email: sorthey@astm.org.

OSA 2000, Oct. 1-6, Annual Meeting; *Optical Society of America*, Hyatt Regency, Chicago, IL; Info: OSA, Tel: 202-223-0920; Fax: 202-416-6100.

AATCC INTERNATIONAL CONFERENCE AND EXHIBITION, Oct. 1-4, *American Association of Textile Chemists and colorists*, Marriott World Center, Orlando, FL, Info: AATCC; Tel: 919-549-8141.

2001

AATCC INTERNATIONAL CONFERENCE AND EXHIBITION, Oct. 7-10, *American Association of Textile Chemists and Colorists*, Sheraton Hotel, Boston, MA, Info: AATCC Tel: 919-549-8141



J O B S W A N T E D !



This Section is intended to help ISCC members that are in need of, and are looking for employment. Here is an opportunity to use the resources at hand. There is no charge for this service. However the restrictions are as follows:

1. This service is for ISCC members' use only.
2. No more than 50 words may be used to describe yourself.
(Not including name address and/or telephone number).
3. If you are using a P.O. Box, you must supply a complete address.
4. No Agency representing member(s) is allowed.
5. Neither the ISCC News nor the editors are responsible for any errors.
6. You must advise us in writing when you have obtained employment.

We hope this new section will be of value to you, the ISCC member. If you have any suggestions/criticisms, please send them to the editor. Let's make this work!

SEEKING EMPLOYEMENT IN R&D POSITION IN COLOR

PhD (expected, 1997) Color Vision, MS Biophysics, BS Biomedical Engineering. Highly motivated, adaptable and dependable individual seeking R&D position. Interdisciplinary background and research experience in color color vision, biomedical instrumentation, colorimetry, photometry and reflectometry. Working knowledge of computer graphics, image analysis/processing, mathematical modelling. Computer and statistics skills include Pascal, C C++, Matlab, Assembly, S, SAS, Steplt.

Jun Xu

The University of Chicago, Visual Science Center
939 E. 57th Street, Chicago IL 60637
Tel: 773-702-1987, Fax: 773-702-4442
email: junxu@midway.uchicago.edu

SEEKING EMPLOYMENT IN COLOR REPRODUCTION INDUSTRY OR HUMAN FACTORS.

PhD in visual psychophysics. Detailed knowledge of color vision, colorimetry, human psychophysics, color testing and calibration procedures, and statistics. Broad knowledge of pattern recognition and image processing. Familiarity with signal processing and systems analysis. Knowledge of optics, electronics, and mathematical modeling.

SHUANG WU

Schepens Eye Research Institute
20 Staniford Street
Boston, MA 02114
TEL: 617/ 723-6078 Ext.590
FAX: 617/ 523-3463
e-mail: shuangwu@vision.eri.harvard.edu

SEEKING EMPLOYMENT RELATED TO COLORATION

Noted Bulgarian color and light expert, returning from visiting scholarship in Japan, seeks short or long term employment in the West. Thirty years' extensive and varied experience in visual and instrumental color measurement in many systems. Capable in research, teaching, program development, quality control. Multilingual.

Assoc. Prof. Dr. Todor Kehlbarov
BG-1000 Sofia, P.O. Box 1089
Bulgaria
Phone/Fax 011 359 2 88 05 97
US Contact: Dr. F. W. Billmeyer, Jr.
Phone/Fax 01 518 377 9511

SUSTAINING MEMBERS

Labsphere Hunter Associates Laboratory, Inc. BYK-Gardner

ISCC MEMBER-BODIES

American Association of Textile Chemists and Colorists (AATCC)	Graphic Arts Technical Foundation (GATF)
American Society for Testing and Materials (ASTM)	Human Factors & Ergonomics Society (HFES)
American Society for Photogrammetry and Remote Sensing (ASPRS)	Illuminating Engineering Society of North America (IESNA)
The Color Association of the United States, Inc. (CAUS)	National Association of Printing Ink Manufacturers (NAPIM)
Color Marketing Group (CMG)	Optical Society of America (OSA)
Color Pigments Manufacturers Association (CPMA)	Society for Information Display (SID)
Council on Optical Radiation Measurements (CORM)	Society of Plastics Engineers, Color & Appearance Division
Detroit Colour Council (DCC)	Society for Imaging Science and Technology (IS&T)
Federation of Societies for Coatings Technology (FSCT)	Technical Association of the Graphic Arts (TAGA)
Gemological Institute of America (GIA)	Technical Association of the Pulp and Paper Industry (TAPPI)

OFFICERS 1996-1998

Position	Name	Address	email	Telephone	Fax
President	Dr. Ellen C. Carter	2509 N. Urah Street, Arlington, VA 22207	ecarter@capaccess.org	703-527-6003	
Pres. Elect	Dr. Michael H. Brill	David Sarnoff Research Ctr, CN 5300, Princeton, NJ 08543	mbrill@sarnoff.com	609-734-3037	609-734-2662
Secretary	Dr. Danny C. Rich	Datacolor Int., 5 Princess Rd., Lawrenceville, NJ 08648	dannyrich@compuserve.com	609-895-7427	609-895-7461
Treasurer	Mr. Hugh S. Fairman	334 Springbrook Trail, Sparta, NJ 07871		201-729-7278	201-729-7278
Past-Prs.	Mr. Roland L. Connelly	Shel.Lyn, Inc., 1108 Greccade Street, Greensboro, NC 27408	roland@shelyn.com	910-274-1963	910-274-1971

LIST OF DIRECTORS

1994-1997

Mr. Michael A. Hammel	Hammel and Company 3782 Bonny Rigg Trail Roswell, GA 30075	http://www.hammelco.com mahammel@hammelco.com	770-587-5120	770-587-5128
Mr. Richard W. Riffel	Hunter Assoc. Lab. 11491 Sunset Hills Rd, Reston, VA 20190	rriffel@hunterlab.com	703-471-6870	703-471-4237
Mr. William S. Vogel	204 Four Lakes Drive, Easley, SC 29642		864-277-8977	

1995-1998

Dr. Cynthia A. Brewer	PSU Dept. of Geography, University Park, PA 16802	cbrewer@essc.psu.edu	814-865-5072	814-863-7943
Dr. Mark Fairchild	RIT Munsell C.S. Lab., P.O. Box 9887 Rochester, NY 14623	mdfpph@grace.rit.edu	716-475-2784	716-475-5988
Prof. Wade Thompson	1910 East Cardinal St., Springfield, MO 65804	wst255@nic.smsu.edu	417-882-2553	417-883-5830

1996-1999

Dr. Helen H. Epps	University of Georgia, 300 Dawson Hall, Athens GA 30602	hepps@hestia.fes.uga.edu	706-542-4913	706-542-4862
Mr. James R. Keiser	DuPont Automotive Products, Detroit Colour Council 945 Stephenson Hwy, Troy MI 48007-2802	keiserjr@sptyv4.dnet.dupont.com	810-583-8345	810-583-8316
Mr. Jack Ladson	17329 Mc Duff Ave., Olney MD 20832	jaladson@bell.atlantic.net	301-774-7464	301-774-5260

ISCC OFFICE

Web Site-<http://www.iscc.org>

Cynthia Sturke 11491 Sunset Hills Rd. Reston, VA 20190 iscc@compuserve.com 703-318-0263 703-318-0514

ISCC NEWS EDITOR: Gultekin (Tek) Celikiz

Send material for newsletter to:
Prof. Gultekin Celikiz, Editor, ISCC News
1309 Paper Mill Rd, Erdenheim, PA 19038-7025

Tel: 215-836-5729
Fax: 215-836-0448
E-mail: celikizg@hardy.texsci.edu

Publications Committee

Gultekin Celikiz-Chairman
Paula S. Alessi
Michael A. Hammel
Richard W. Riffel

Please note: the deadline for submission of material is the 1st of each even numbered month. Material received after the 1st may not be printed until the following issue.
All submissions must be in English.