Inter-Society Color Council *News*

Special 75th Anniversary Issue

Issues 421-422 Contents

- Please Mark Your Calendars -
ISCC Special Topics Conference
February 22-23, 2007

May/Jun - July/Aug 2006

Past President Joanne Zwinkles with current president Rob Buckley

President's Column

As I sit down to write my first column for the newsletter since becoming ISCC President, I find myself thinking both of the past of the ISCC and of its future. There is the recent past—the Annual Meeting and the Symposium that we co-hosted with the Canadian National Committee of the CIE, celebrating the twin 75th Anniversaries of the ISCC and the CIE 1931 Observer. And there is the less recent past with the rich history of the ISCC, captured on the CD that Ellen Carter and Cynthia Sturke compiled and that was distributed at the Annual Meeting.

We all have stories to tell about the ISCC and how it has touched and influenced our professional life in color. My first encounter with the ISCC was by way of the Proceedings of the 1971 Williamsburg Conference on Optimum Color Reproduction, which I studied while a graduate student writing a thesis on color gamut compression at MIT. When I went to Xerox after graduating from MIT, my first mentor was Warren "Dusty" Rhodes, already one of the grand old men of color, co-chair of the 1971 Williamsburg Conference and a Past President of the ISCC—his term was 1966 to 1968. It is an honor for me to follow in his footsteps and in the footsteps of so many others.

What we have all had in common has been a professional interest, and often a personal passion, for color in whatever form it takes and however it might occur in the world around us. The ISCC is a community that brings together like-minded people with the same enthusiasm for color. The Council is unique in that its members are a mix of people with industrial, scientific and artistic backgrounds—sometimes more than one—who

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want to talk about color in all its aspects. In this lie the two strengths of the ISCC: the spirit of community and the scope of its members' interests in color.

The sense of community that the ISCC has fostered is a distinguishing characteristic of the Council—one that we can look to build on in the future. The Web and the networking tools that have emerged in just the last few years now present opportunities for this community to express itself and interact in new ways that I expect to see emerge over the next few years. These interactions will support one of our aims in the Council: promoting communications between technically oriented specialists in color and creative workers in art, design and education.

The other great strength of the ISCC is the scope of interests in color that it brings together under one umbrella, covering color in art, science and industry. While there are members and member bodies that focus on color in diverse areas such as design, textiles, paints, plastics, printing inks, displays, graphic arts and digital imaging, the Council is the one place where specialists in all these areas can come together and share interests across the boundaries between their specialties.

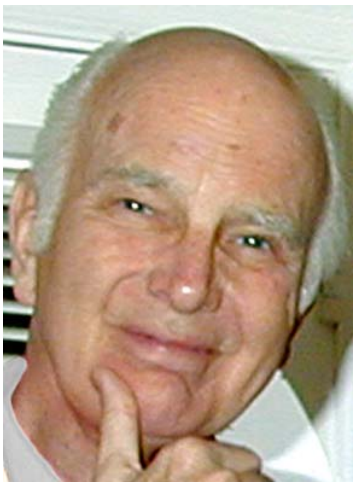
The Council serves as a link between these diverse areas of color, making it possible for work in one to enrich the application and enjoyment of color in another. If you believe as I do that interesting things happen at boundaries, then the Council is well positioned for an interesting future, building on the energy, enthusiasm and dedication of its members.

I am looking forward to the next two years and to working with you to realize the potential we all see as members of the Inter-Society Color Council.

Robert Buckley
Xerox Corporation

ISCC current president Rob Buckley (front left) and six past presidents attend ISCC 75th Anniversary Meeting. Top row from left, Danny Rich, Roland Connelly, Mike Brill, Paula Alessi; front row, Joanne Zwinkels and Ellen Carter

William A. Thornton, Jr. (1923-2006)



Dr. William A. Thornton, Jr., 82, of Jackson, NJ, the 1979 U.S. national "Inventor of the Year," who discovered the "Prime Colors" of human vision, died May 25, 2006 of complications following a stroke.

Born June 16, 1923, in Orchard Park NY, Bill served in Europe during World War II as a Captain of the US Army Air Corps., engaged in weather analysis and forecasting. He then obtained a formal education that included three degrees in Physics: a BS from the University of Buffalo in 1948, and an MS (1949) and PhD (1951) from Yale. He resided in Cranford NJ from 1957 to 2004 and in Jackson NJ from 2004 to 2006. Most of his career was spent at Westinghouse Lamp Divisions (Bloomfield, NJ), but in 1983 he founded Prime Color Inc., and later Prime-Color Lighting, Inc. and Prime-Color Optics, Inc.

Bill is most widely known for his discovery, at Westinghouse, that three wavelengths (which he called "prime-color wavelengths") are particularly important for human vision. The prime-color wavelengths—at about 450, 530, and 610 nm—are the wavelengths for which the following efficiency property holds if they are used for additive primaries (e.g., in a television): No more than one watt of a prime-color primary is needed to match one watt of any other wavelength. Also, the prime-color wavelengths are those at which unit-power monochromatic lights induce the largest tristimulus gamut (volume of the parallelepiped spanned by the tristimulus vectors of these lights). Finally, the zero-crossings of metameric-black reflectances tend to cluster about the prime-color wavelengths. Bill used these properties to design fluorescent lamps having high watt-efficiency, good color-rendering capability, and a minimum of metamerism.

By introducing a new class of products (three-band lamps with power concentrations at the prime-color wavelengths), Bill caused a huge company (and actually a whole industry) to change its product focus. His lamp designs made ground-breaking use of rare-earth phosphors, and found a place in several large-scale re-lamping plans. For these efforts, Westinghouse awarded Bill its highest honor, the Order of Merit, in 1978. His basic patents on prime-color lamps also earned him the 1979 Inventor of the Year Award from the Association for Advancement of Invention and Innovation. (For that award, his patents were chosen above 60,000 issuing US patents that year.)

Besides lamp design, Bill applied his prime-color insights to patent protective glasses that transmit light only near the prime-color wavelengths. He also brought the prime-color ideas to bear on fundamental vision theory. In retirement, he founded Prime-Color, Inc., developing and manufacturing state-of-the-art spectro-radiometers and illumination meters based on his continuing research. An ambassador of color research world-wide, Bill built and delivered the first spectro-radiometer to the People's Republic of China in 1993 and contributed to continuing color research at the University of Nebraska. Numerous refereed articles document his achievements in these regards. (All told, Bill had at least 44 patents and about 100 published papers.)

One of his later achievements deserves some note. In a three-part paper he published in Color Research and Application (1992), Bill voiced many criticisms of the CIE colorimetry system. One of these criticism sprang from his experimental observation that the usual linear-algebra transformation between primary sets (as given by Grassmann's laws) does not predict color matches made by humans. That challenge was the source of a continuing industrial inquiry, culminating in the formation of CIE Technical Committee TC1-56 (Improved Colour Matching Functions) to study the problem. All of color technology depends on resolving Bill's challenge.

Despite not being an academic, Bill was a true champion of education in the field of lighting and color. Many fundamental articles in JOSA, followed by many in Color Research and Application, were part of his sustained effort to raise the consciousness of the color-science community. Another part of this effort was a column he wrote for Lighting Design and Application. A less visible part was his personal enthusiasm and clarity in engaging in dialogue with others in his field. He did so as well as or better than any university professor we have known in the field. And of course, Bill served the educational objectives of the ISCC well as a Board-of-Directors member and as the Chair of Project Committee 49.

Those of us who attended meetings with Bill will remember his genial invitations to intense dialogue; e.g., "Let's meet at that clambake and discuss the issue," and "Let's get a group together and chew the rag." He never turned down a discussion, and never gave up when someone had not yet seen his point of view. In at least one case, he responded to a disagreeing point of view by inviting the correspondent (MHB) to deliver a formal rebuttal to the Illuminating Engineering Society. This kind of generosity is rare anywhere.

A life-long lover of music, Bill played clarinet, string bass, tenor and alto saxophone and sang with many barbershop quartets and choral groups, finally with the Jackson Civic Chorus and the Metedeconk Lakes Chorus of Jackson NJ.

Predeceased by his wife, the former Jeanne Marie Schwarzmeier, (1923-1985), Bill is survived by his friend Marcia Schoolmaster; by his sister Joanne Tolson; by his four children, Debora L. Thornton (Ridgefield, CT), Melissa L. Thornton (Trumbull, CT), William A. Thornton III (Sherborn, MA), and Jeffrey F. Thornton (Millington, NJ); and by five grandchildren.

Michael H. Brill and Hugh S. Fairman

Past- President's Column

It is with mixed emotions that I write this column for the first Newsletter since I have completed my two-year term as President of the ISCC. It has been a hectic two years with many highs and a few lows. The lows have been the sad passing of some long-standing eminent members, including Eugene Allen, Fred Billmeyer and Bill Thornton. There have also been some incredible highs. I have gained a much greater appreciation and respect for the many members that actively contribute to this organization and volunteer their time and expertise. I feel that I am extremely fortunate to be part of an organization where so many of its members become lifelong friends. Some of the notable moments include meeting Terry Godlove, son of I.H. Godlove, who generously established the Godlove endowment fund to provide a cash prize with the ISCC Godlove Award. It was my pleasure to bestow the inaugural cash award at the 2005 ISCC Annual Meeting to Alan Robertson, my colleague and mentor from NRC. When I joined the NRC, it was Alan who first extolled the benefits of joining the ISCC and I fondly recall him introducing me to Paula Alessi and Peter Kaiser who Co-Chaired the 1986 ISCC Annual meeting in Toronto. Since then I have been richly rewarded by my continued and increasing level of involvement with the ISCC – as a participant, a presenter, an Interest Group Chair and a member of the Board of Directors.

During the past two years as President, I have had the great privilege and enjoyment of working closely with several highly-dedicated individuals, including the members of the Board, Standing and Project Committees and our Office Manager, Cynthia Sturke. I am also indebted to Mike Henry, my Co-Chair of the Cleveland meeting, who put together a highly interactive Special Symposium on Automotive Color and Appearance Issues and taught me the value of elevator ride – poster pitches. In 2005, I also thoroughly enjoyed my involvement in the Special Topics Conference on Color and Design held in New York City and Chaired by Professor Meg Miele. As one of the judges of the Student's Poster competition, I was greatly impressed not only by the quality of their color research but also by their infectious enthusiasm. Finally, I would have to say that the highlight of my term of office was hosting the 2006 annual meeting in Ottawa at the National Research Council. These week-long jubilee events included a highly successful Special Symposium on 75 Years of the CIE Standard Colorimetric Observer, chaired by Rob Buckley, and a commemorative CD, prepared by Ellen Carter and Cynthia Sturke, that captures the past and present of the ISCC and provides an invaluable resource for the future.

I also want to specially thank my predecessor, Danny Rich, for his kind and capable mentorship in carrying out the role of ISCC President. I hope that I will be pass on this same level of knowledge to my successor, Rob Buckley and that he will enjoy success and personal satisfaction in this role. In closing, I want to thank the full ISCC membership for having given me this opportunity and, in a small way, helping this wonderful organization to prosper and grow.

Joanne Zwinkels, National Research Council

Call For Papers

A Special ISCC Topics Conference on Industrial Color Challenges

The Inter-Society Color Council (ISCC) and the American Association of Textile Chemists and Colorists (AATCC) will sponsor a Special Topics Conference on "Industrial Color Challenges." The conference will be held February 22-23, 2007 at the Hilton University Place in Charlotte, North Carolina.

The two-day conference will consist of 30-minute presentations and panel discussions. Presentations will cover all facets of industrial color technology. The program will include talks on "Color Formulation Anomalies" by Sy Commanday, "Color Difference Metrics" by David Hinks and "Digital Color Communication" by "Ann Laidlaw. Two lunches, morning and afternoon breaks and a Thursday evening reception are included in the registration fee. During the reception, there will be tabletop displays of various aspects of color technology. The registration fee is $475 for ISCC and AATCC members and $710 for nonmembers. The registration fee will be waived for speakers.

Abstracts for contributed papers should be mailed, faxed or emailed to the attention of Ms. Kim Nicholson, AATCC, P.O. Box 12215, Research Triangle Park, NC 27709; 919-549-8933 (fax); nicholk@aatcc.org (email). Suggested topics for abstracts include color and marketing, multiangle color measurement, colorant legislation and safety, the conditions for proper visual analysis and the benefits of quantitative color assessment. The deadline for abstracts is August 11, 2006.

ISCC Welcomes New Members

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Meeting Report: the ISCC 2006 Annual Meeting, May 14-15

Under Ottawa's gray skies, Canada's Tulip Festival provided a fittingly colorful welcome to the capital city as the ISCC assembled for its 2006 annual meeting on Sunday morning, May 14. Marking the 75th anniversary of its founding in 1931, the Council convened in the venerable National Research Council building that opened just one year later.

First on the agenda was a meeting of Project Committee 54, Colors of Maximum Contrast. Committee Chair Hugh Fairman gave a brief status of this project, which is a re-examination of the findings of an early 1960s ISCC project. Both projects sought to find a sequential set of colors maximally different from each other and non-confusable by color deficient observers. The committee has proposed a set of 22 colors. Dr. Brill proposed using a new three-dimensional criterion to insure the effectiveness of the set for all three types of color deficient vision. His concept is a set of 216 quantum cubes in an LMS space. An algorithm would be applied to each of the 22 colors to verify that no two reside in the same cube. Fairman plans to call a subsequent meeting.

Next, the Education Committee, which promotes the development of color education tools, provided a forum for RIT's Mark Fairchild to present the ideas behind The Color Curiosity Shop. This is a project to make color science fun for young people, to satisfy their curiosity about color and to inspire them to enter a scientific field. A key resource is the website whyiscolor.org, an outgrowth of the popular "Ask a Color Scientist" feature that has been on RIT's webpage for the Munsell Color Science Laboratory. Its centerpiece promises to be a matrix of Q&A modules spanning eight specific disciplines and eight age levels. Dr. Fairchild has found many sponsors and collaborators for this endeavor, but he is looking for more. He encouraged all to visit the website to provide feedback. Dr. Fairchild also explained another new project, the High-Dynamic-Range (HDR) Photographic Survey, and illustrated "the future of digital imaging" with a technique for constructing HDR photographs.

Sunday afternoon was devoted to Interest Group III, the session chaired by Georgia Kalivas from the Fashion Institute of Technology with assistance from Michael Brill. M. Ronnier Luo from the University of Leeds began with "Applying Colour Science in Colour Design." Dr. Luo explained how color science-based tools are being more widely used by designers in such fields as textiles, paint, interior design and graphic arts. Visualization software can provide realistic product simulation, allowing the designer to experiment with various palettes. Selected colors can then be easily communicated in terms of a color order system. Dr. Luo then described how computers can aid in the evaluation of color pairs for degree of harmony and for emotional response. Descriptors such as warm-cool, modern-classical and hard-soft were applied to these colors to create a "color emotion space." Fairly good correlation was found among observers from several different countries when 2400 color pairs were used to evaluate harmony, preference and emotion.

Sharon McFadden from Defence R&D Canada talked about "Using Colour to Transmit Information on Electronic Displays." She stressed that the requirements for color coding are much different than those for imaging. In applications such as radar screens, what is most important is that the colors be conspicuous, consistent over time and space, and intuitive. Focal colors must be well-defined for clear communication; chromatic induction from the background and the effects of different illumination conditions must be considered. When done well, color coding can enhance perceptibility; when done poorly, it can cause a loss of information.

Stephen Gritt, the Chief Conservator at the National Gallery of Canada illustrated a "Brief History of Artists' Colors" with many examples from the Gallery. He discussed conservation issues related to the aging of materials and the choice of pigments in the development of artists' palettes from the 14th to the 19th centuries. He also nominated the French painter Eugene Delacroix to an ISCC Hall of Fame for his remarkable use of color.

2006 Macbeth Award recipient David Brainard from the University of Pennsylvania spoke on "Bayesian Models of Color Appearance." Dr. Brainard uses color constancy as a basis for a Bayesian approach to an explanation of how context affects color appearance. Experiments where observers adjust a color patch to look achromatic provide the data for an algorithm that estimates illuminant spectra and compares images to predicted ones. This approach provides a reasonable fit of the data, but only if the Bayesian prior for illumination is broader than daylight.

Professor Kalivas closed the session with "Getting Brighter: Coloring More Sustainably" in which she suggested that the effect on the environment be considered when selecting colorants and coloring processes. She recommended the use of "natural" materials such as those used in the clay-dyed fibers from Earth Creations, but cautioned that "natural" is not always better and "green" processes are sometimes difficult to discern. Renewable resources are the key to sustainability.

On Monday morning ISCC President Joanne Zwinkels welcomed the attendees and then introduced the Interest Group II session which Milt Hardt of Color Communications, Inc. moderated in the absence of session chair Jerald Dimas, also from CCI. Danny Rich of Sun Chemical led off with a continuation of the paper Dave Wyble presented at the 2005 Special Topics Conference. Data from a 2004 program at RIT was used to compare the performance of four benchtop and four handheld integrating sphere spectrocolorimeters. Measurements on ceramic tiles, sintered PTFE and ink applied to paper by a precision gravure

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press showed that the larger instruments outperformed the smaller ones. Portable instruments correlated as well with each other as they did with the benchtops. Inter-instrument agreement was significantly better with the ceramic tile data than the gravure ink measurments. The best agreement was found between two units from the same manufacturer. The data suggest that instrument-specimen interaction can degrade field performance.

Jaime Gomez of Equitech described a rugged probe developed at his company that can reliably transmit transmission or reflection data fiber-optically to a spectrophotometer. The probe can withstand even the pressure and temperature in plastic extruders to provide real-time color data for quality control. The technology is also useful for paint and ink production.

David Battle from GretagMacbeth presented "Reliable Digital Workflow" on the technology of instrument profiling. This type of profiling is used to recalibrate color measuring instruments bringing them into closer agreement. (It is unrelated to color management profiling in the ICC sense.) GretagMacbeth's Netprofiler™ software uses ceramic tiles to perform a QC check, recalibrate and compensate for temperature to greatly improve inter-instrument agreement. Recent enhancements to this software include allowing specular included or excluded measurement and a gloss calibration to compensate for aging spheres.

Chuck McLellan from Datacolor then listed the pros and cons of profiling in "To Profile or Not to Profile: The User's Question." Profile-based correction is good at adjusting for wavelength scale, bandwidth, gain and certain non-linearities. It is not good at correcting for deviations caused by such things as noise, stray light, alignment, dirty optics or degraded light sources. If an instrument's performance is very good, nothing should be done; if very bad, it should be fixed, not profiled. A responsible test plan should be carefully followed to determine when a software correction through profiling is appropriate.

Frank Koger from X-Rite offered "On-line, Non-contact Color Management Solutions." Non-contact color measurement saves labor, time, downtime, destruction of material and reduces human error. It has recently become much more affordable and now allows measurement from as far away as five feet. There remains a need for a mid-priced device, more accurate than $5,000 colorimeters yet easier to integrate than the $25,000 or more instruments.

Randy Snavely from Ciba spoke on "The New Realities of Color Measurement and Visualization." New tools are available to meet the challenges of global sourcing and color matching. One such tool is multi-flux color matching software available on the internet at matchmycolor.com. This independent service has many sponsors and offers various solutions from design through production for color matching, feasibility and formulation. There are currently over 800 pigments in its database. Other useful tools include instrument profiling and visualization software such as Colorviz Indigo which can include pearl and metallic effects.

On Monday afternoon, Interest Group I, chaired by Milt Hardt, began its session with Michael Brill's provocative examination of color standards, "Ten Commandments for Standardized Model Making." Inspired by Calvin McCamy's 1985 paper "Ten Commandments for Color Order Systems," Dr. Brill uses his commandments to question certain aspects of CIECAM02 and other CIE standards. For example, Commandment 1, "Before making the model decide clearly what question you intend to answer" takes aim at the CIE Color Rendering Index which cannot exceed that of a blackbody, all of which have the same CRI. He concedes that the CIE has not done badly overall but suggests that new precepts and safeguards are needed now that computation is readily implemented.

Joanne Zwinkels presented work from the NRC Canada on "Standardized Procedures for Improving Absolute Color Measurements." Development of complex colorants, increased globalization and higher color appearance standards have created a need for improved color measurement. National reference instruments such as the reflectometers and spectrophotometers at the NRC are designed for the highest accuracy and the lowest uncertainty, 0.2-0.3%, for absolute color measurement. This uncertainty is limited not only by non-idealities in the requisite transfer standards and instruments, but also by less well-known sources of error such as the light trapped in the recess between the sample and the sphere. The NRC has developed correction methods for this and other error sources that can be applied in a stepwise fashion, characterizing the transfer instrument. Dr. Zwinkels emphasized that traceability to an absolute scale is crucial, as is validation with reference standards.

Maria Nadal, from the National Institute of Standards and Technology, reported on "Recent Developments of the NIST Five-Axis Goniospectrometer." NIST wants this instrument to be the ultimate in non-fluorescent color measurement, including 0º/45º and sphere measurements as well as the complete bidirectional reflectance distribution function (BRDF). It will be used primarily for research into such things as scattering mechanisms. This goniometer has shown good agreement with NIST's standard reference instrument, STARR, as validation work continues. A goal of this project is the establishment of a BDRF database for select materials like effect pigments.

Metameric colors have different spectra but match exactly under a specific illuminant. A true metameric pair of colors is difficult to achieve; but near matches, called paramers, are common. Before an index of metamerism can be calculated, one of the spectra must be adjusted to achieve a match. Zhaojian Li, a graduate student at RIT, described several possible adjustments in "Comparison of Methods of Parameric Decomposition for Evaluating Metamerism." Li used three calculation methods to correct over 1,100 parameric pairs and compared the results to Kubelka-Munk theory. He discovered that using CIE color matching functions as a basis was inferior to two alternative schemes.

David Wyble of RIT discussed the value of the ASTM standard practice E2214 as a performance metric in his talk "Comparison of Methods for verifying the Accuracy of Color-Measuring Instruments." Measurements were made using eight commercial spectrophotometers in 2004 as part of a larger project at the Munsell Color Science Laboratory. BCRA neutral tiles were used to evaluate photometric linearity by plotting the CIE Y measured against high accuracy Y, and seeing how the slope deviates from 1.0. Inflection points from scanning rare earth standards were used to calculate wavelength accuracy. It is recommended that accuracy be assessed by analyzing radiometric scales and wavelength separately. In general the instruments performed well, but better correlation is needed.

In the mid-1970s a big push for retroreflective highway markings and signage led to decreased auto accidents. Color standards for these materials, which employ glass spheres or prisms in a paint, were mandated by the U.S. in 1993, but NIST's Cameron Miller reported that it is still difficult to quantify "The Color of Retroreflective Markings." The University of Iowa and NIST have experimented with different ways to measure the color of retroreflective yellow highway paints under both daytime and nighttime viewing conditions. Daytime measurements were made with a 0º/45º geometry while nighttime measurements used a 30 meter geometry with diffuse and retroreflective light. Dr. Miller noted that portable instruments were found that correlated well with the reference standard.

Joanne Zwinkels closed the meeting by announcing that the next meeting of the ISCC will be a Special Topics Conference on "Industrial Color Challenges" co-sponsored by the AATCC, February 23-24, 2007 in Charlotte, NC.

Stephen Glasscock
Hallmark Cards, Inc.

IS&T Letter to ISCC

Joanne Zwinkels
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May 5, 2006

To the President, Officers, Directors, and Members of the Inter-Society Color Council:

On behalf of the Society for Imaging Science and Technology, its members and Board of Directors, I would like to congratulate the Inter-Society Color Council on the occasion of its 75th anniversary and take the time to note the importance of the CIE 1931 Standard Colorimetric Observer, also celebrating its 75th Anniversary.

As a Member Body of the ISCC, IS&T has enjoyed a close relationship with the Council. We have benefited from our collaboration and cooperation over the years and look forward to future endeavors of mutual interest that promote the art and science of color.

May ISCC continue to serve the color community for many years to come.

Best regards,

Suzanne E. Grinnan
Executive Director

Color in Science, Art and Industry
The Inter-Society Color Council's 75th Anniversary CD

This special CD, written and compiled by Ellen C. Carter and Cynthia Sturke, can be yours along with a special commemorative 75th Anniversary Pin for only $30. The CD contains two items: a slide show "Faces of the ISCC" and the document *Color in Science, Art and Industry: The Inter-Society Color Council.*

The document covers the ISCC through the years in words and pictures. It has information about the membership, leadership, meetings and conferences, projects, and awards. Part 2 "The ISCC Today" discusses the office, communications such as the ISCC *News,* the website, and *Color Research and Application.* Part 2 also has the Constitution, Bylaws, and Standing Rules with Appendices.

If you missed this year's Jubilee Week festivities, Chapter 10 includes: ISCC President's Welcome, Annual Meeting Abstracts, Program and Abstracts for the Expert Symposium and program for CIE Division 1 Meetings.

The final section is on the people of the ISCC including brief and not so brief biographical sketches of almost 100 members past and present.

Order your very own copy of the commemorative CD today from Cynthia Sturke at the ISCC office.

Symposium Report: 75 Years of the CIE Standard Colorimetric Observer

Sandwiched between the ISCC Meeting and the CIE Division 1 meetings in Ottawa, the ISCC and the CIE held a joint symposium entitled 75 years of the CIE Standard Colorimetric Observer. It was a gala week celebrating the 75th Anniversaries of the ISCC and the birthday of the Standard Observer. Food, friendship, and discussion abounded. On Monday evening, May15, a wine and cheese welcome reception at the Sheraton Ottawa Hotel kicked off the symposium. On Tuesday evening the events of the day were discussed during a dinner at the hotel.

The historic National Research Council Sussex Building in downtown Ottawa was the site for all the technical sessions of the symposium. The facilities were excellent and in keeping with the historic celebration.

We began with the with the focus of the Symposium - the CIE Standard Colorimetric Observer in a session chaired by Michael Pointer from the National Physical Laboratory in Great Britain. Dr. Françoise Viénot presented the "Origins and history of the standard observers." Then Dr. Michael Brill discussed "Open problems on the validity of Grassmann's Laws." He discussed how Grassmann's Laws can fail, and then asked how serious are these failures. His talk generated much discussion afterward including comments from Dr. Roy Berns, Dr. R. W. G. Hunt, Dr. Logvinenko, and Dr. John Barbur. This discussion spilled over into the break between sessions.

The second session, which was on Color Matching Functions, was chaired by Janos Schanda. Andrew Stockman presented an invited paper that he co-authored with Lindsay Sharpe, entitled "Physiologically-based colour matching functions." For anyone who has been awaiting the work of CIE TC 1-32, this was an excellent presentation on how the color matching functions were measured. Following this invited lecture were four presentations. In "Colour matching based on fundamental spectral sensitivity functions," Peter Csuti of Pannon University (which used to be the University of Veszprem) discussed how RGB – LED visual and instrumental color match do not agree. Then he showed a proposal from TC 1-36 that gives better results. Dr. Yasuhisa Nakano presented a new method for measuring observer matching functions. In "Individual difference of color matching functions and its cause" he reported on several experiments that he and his co-authors Y Nakayasu, H. Morita, K. Suehara, J. Kohda, and T. Yano have conducted using very bright stimuli. In particular they looked at observer variability in the short wavelength region. In a presentation entitled "Test of the transformation of primary space: forward- and inverse-matrix methods," Boris Oicherman presented for his co-authors M. Ronnier Luo, and Alan Robertson that in most cases the transformations assumed for colorimetry do not hold. He gave many instances in literature where this had already been reported, but then stated that the remaining open question is to determine the practical consequences of the individual non-additivity. Jay M. Enoch concluded this session with a delightful retrospect on what it was like doing "Studies on colorimetry, the Stiles-Crawford effects I & II and fiber optic properties in the laboratory of W. S. Stiles at the NPL, Teddington" from the point of view of a person who was there.

In the session on Instruments and Standards, chaired by Ronnie Luo, Janos Schanda, presented "CIE recommendations and standards on colorimetry, what next?" During this presentation the audience was treated with great historic photos, and a detailed overview of the past 25 years: including external factors, new light sources CFLs and LEDs advanced techniques, CIEDE2000, CIECAM02, cognitive color, colors of signal lights, evaluation of daylight simulators, color management and encoding. Then Janos described the new directions and challenged the group with a list of short term tasks: 1) better color matching functions, 2) metamerism and multi spectral imaging, 3) unification of color difference metric, 4) daylight illuminants and sources, indoor and outdoor, 5) color acceptability metric for light source colour rendering, 6) test the CMFs build on cone fundamentals 7) better description of LED colors, 8) determine the limits of Grassmann's laws, (the limits of tristimulus colorimetry), and 9) build a color appearance colorimetry (CAC). He ended with a vision of the future that included a unified physiologically-based color vision model that describes cone fundamentals.

The remaining presentations in this session reported on either new instrumentation or new methods. "A new method for calibrating colorimeters" by Maria Luisa Rastello was inspired by the work of CIE 2-16 trying to find a procedure for calibrating a colorimeter. She prepared a new least squares formulation with element wise weighted factors and associated uncertainties. George Eppeldauer (with Yoshi Ohno as a co-author) preported on the "Development of the NIST detector-based color temperature scale." A "Full 3D BSDF spectroradiometer" was described in the paper by F. Leloupe T. DeWaele, P. Hansalaer, and M. Pointer, which P. Hansalaer presented. A. Chimienti, P. Grattoni, R. Nerino, G. Pettiti, M. L. Rastello and M Spertino's work on "An active vision system for 3D surface colour measurements" was presented by Dr. Rastello.

Session 4, Temporal and Spatial Issues, chaired by Hirohisa Yaguchi contained two papers. First, "Spatial and chromatic properties of negative afterimages" presented by L. Beke with co-authors D. Györe, A. Lénárt, P. Bodrogi described three experiments. Then an "Additive colour mixing model based on human color vision" was discussed by Takako Nonaka, Morimasa Matsuda, and Tomohiro Hase. They propose a method for the modeling of pattern of sample color images via human color vision. The characteristics of the color signals were expressed as spectrum elements of a Fourier coefficient. The characteristics of human color vision were formulated by a Gaussian low-pass filter, the relational model of human vision, and looking at the sample images with mixed colors.

The first afternoon of the symposium ended with a paper by the symposium chair Alan Robertson. He treated us to a real-world application of the use of the standard observer in "The Colour of the Canadian Flag." He explained the work of the NRC (our hosts for the meeting) in meeting the directive to standardize the formulation of the flag colors.

The topics of second day of the symposium were directed to uses of the standard observer. Dr. Robert W. G. Hunt gave an invited lecture on "CIE colour appearance models: Their past and future." Just as early papers on the first day had, this presentation got the audience to participate in discussions after the presentation. Next, Mark Fairchild discussed "Color appearance in image displays." After presenting the historical evolution which goes from xyz, to CIELAB, to CIECAM97s to CIECAM02, he commented that these are still dealing with simple stimuli, background, and surround. Where do we go from here? Color appearance, spatial vision, temporal vision combined all lead to image appearance modeling, giving ICAM - an example framework. Then he described recent research on the topics of high dynamic range (HDR) psychophysics, HDR accuracy, perceived gamuts, surround, noise adaptation, orthogonal opponency and ongoing projects concerned with image size, improved HDR, HDR survey, gamuts and brilliance, spectral adaptation, CIECAM02 ΔE, transformability of primaries, observer metamerism thorugh Monte Carlo simulation based on Nimeroff's mean-covariance system, surround color – using a macular pigment filter, and the curiosity shop. Image appearance modeling is a natural extension of color appearance modeling and is enabled by recent technology. He ended commenting that there are many questions of fundamental importance that remain to be explored. However, with such a long list of work and challenges, there was no time for questions.

The final paper in this session was given by L. Beke. "Color appearance of aged observers" was a report of research by Gabor Kutas, Youngshin Kwak, Peter Bodrogi, Du-Sik Park, Seong Deok Lee, Heul-Keun Choh, and Chang-Yeuong Kim. The aim of this work is to explore the effects on aging on the factors of the color balance (white point), chroma perception, unique hues, and preferred hues.

Color Appearance was such a big topic that it covered two sessions. The first session described above was chaired by Todd Newman. The following session was chaired by Francoise Viénot. In this session Thomy Nilsson discussed "Standards for color legibility;" Ken Sagawa presented work by himself, Takizawa, Tatsuo Saito, and Toshikazu Doi on "Scaling of comfort for a colored scene and development of a colour comfort meter," and Nana Itoh reported on the research that she and Ken Sagawa had done on the "Span of color similarities of the low vision."

Joanne Zwinkels chaired the 8th Session which was on Color Differences. This session had 5 papers. First, M. Ronnier Luo presented "Colour difference formulae past, present and future." He described how all the newer equations (CMC, BFD, LCD, CIE94, and CIEDE2000) are modifications of CIELAB and don't have associated color spaces. He went on to say that we'd like to find a new uniform color space. DIN99 is a possibility, but people are also looking at CAM02-SCD. Researchers would hope to use the potential new space for both large and small color differences. They would like to have hue constancy, illuminant, luminance, background surround, etc. and use the space for the evaluation of images. This is no small challenge.

The next presentation in this session was by Wendy Davis. In "Evaluation of color difference formulae for color rendering metrics" she asked, should a new color rendering (or quality) metric use ΔE_{00} to calculate color differences? She reported on users hesitations in implementing $\Delta E_{00,}$ and a three-term method of calculating ΔE_{00} proposed by Jim Nobbs in 2002 that allows the user to avoid some of the complications of the added rotational term found in the published implementation of CIEDE2000. She also described a color quality metric that is under development. We may hear much more about these topics because during the CIE Division 1 meeting, which followed this expert symposium, a new TC was formed on a related topic.

Joanna Marguier presented work that she had done with Sabine Süsstrunk on "Color matching functions for a perceptually uniform RGB space." In this work they looked at ways to keep hue constant when manipulating images. Zoltan Jakab and Klara Wenzel were "Looking for potential indicators of human tetrachromacy."

John Barbur concluded this session with a lecture on "Establishing the statistical limits of "normal" chromatic sensitivity." The study on which he reported on was research by Marisa Rodriguez-Camona, Alister Harlow, and himself. The purpose of the study was to establish color safe limits within occupational environments.

Session 9 was on Color Management. Robert Buckley reported on "Color management and the CIE: A virtual roundtable." A roundtable was held before this symposium, with Robert Buckley, Geoff Woolfe, Jack Holm, and Craig Revie as participants. Dr. Buckley reported on the roundtable at this session. In short, it was a discussion of what was needed for better color management and how the CIE could contribute. Some of the list of ways the CIE could help included: 1) an updated International Lighting Vocabulary, 2) chromatic adaptation, 3) human visual system adaptation to dynamic range: a) how best to measure dynamic range (global and local adaptation), b) adaptation to dynamic range, and c) appearance of colors brighter than the adapted white, and 4) color rendering and re-rendering: a) preferred reproduction, and b) subjective evaluation methods. There were other suggestions, but please forgive this reporter for not taking sufficient notes to report on them. This session generated much discussion from the group at large.

The culminating session was "The 75 Years - Where Do we go from here? Sharon McFadden, director of Division 1 organized the session. However, Todd Newman, director of Division 8 and Teresa Goodman director of Division 2 were also present. The session was an open discussion involv-

Continued on page 10

Continued from page 9

ing all the attendees of the symposium. Many topics were were suggested such as: gonio measurements, psychophysics issues, standard materials, the colorimetry and design of products with special groups of people such as the elderly and those with low vision. The group was excited about the two outcomes from TC 1.36 on Fundamental Chromaticity Diagram with Physiologically Significant Axes. One outcome is the TC report itself, the other is that there could be some improvement for colorimetry from the knowledge that can be added to the discrimination model. We should enter in our total knowledge what vision scientist can detect. Others added even more issues: more colorimetry done spectrally; the issue of illuminants in color management - the need for a definition of illuminant which is reasonable, practical and realizable. We need a realizable daylight. Thus, the symposium ended with much energy and excitement for the future.

Ellen C. Carter

AIC Chairman José Luis Caivano's Letter Read at May Expert Symposium

Buenos Aires, May 11, 2006

Dear Organizer Committee and Participants
of the ISCC/CIE Expert Symposium
"75 Years of the CIE Standard Colorimetric Observer"

When Paula Alessi reminded me that a symposium was to be held to celebrate the 75th anniversary of the CIE standard observer for colorimetry and the 1931 CIE system, and she asked me to send some words to be read, my first thought was: how much water has flowed under the bridge, and, notwithstanding, what applicability has maintained from what was agreed upon in that 8th Session of the CIE held in Cambridge, where the Committee on Colorimetry gathered at the Trinity College on September 18, 1931. I was born in 1958, so the events of 1931 appear rather far in time. I cannot refer to any direct contact with them, nor can I tell you that I have known personally some of their protagonists; a fact some of the people present now in Ottawa can be proud of. Thus, I looked for some historical references to recall.

I was interested in knowing what was said and published when the 50th anniversary was celebrated in 1981, a date closer to my personal experience in the world of color. A memorial symposium organized by the Colour Group of Great Britain was held at the Imperial College, where William David Wright conducted his experiments. The Society of Dyers and Colourists published the Proceedings. A remarkable and wonderful aspect is that two lecturers of that "Golden Jubilee of Colour in the CIE" are again delivering lectures to celebrate the 75th anniversary in Ottawa: Robert Hunt and Janos Schanda. Also, Michael Pointer was part of the organizing committee of that 1981 symposium, coordinated by John Hutchings, who was the chairman of the Colour Group.

By reading Wright's lecture on "The historical and experimental background to the 1931 CIE system of colorimetry," one can grasp the sensation of those moments in the first three decades of the 20th century that led up to the meeting of 1931, and which today seem to acquire near epic features. In particular, Wright recalls with dramatic glimpses the arguments among researchers of the United States and England to determine which experimental data — the Optical Society of America or the Guild and Wright data— was to be the basis to establish the CIE standard observer for colorimetry. Nowadays those arguments have been set aside, and among other more important things the following trivial issue could be argued: Should this 75th anniversary mark the Diamond Jubilee, as according to American usage, or should it have been celebrated in 1991 on the occasion of the 60th anniversary, according to British usage? Anyway, let us forget this negligible difference. Unfortunately, Wright was not able to celebrate this "American Diamond Jubilee" (he would be 100 years old), but he was alive for the British one.

William David Wright

Another striking coincidence that makes this symposium in Ottawa all the more fascinating is that 1931 was also the year the Inter-Society Color Council was founded. I want to point out that the ISCC served as a model during the discussions previous to the creation of the AIC, the International Color Association. According to the early history of the AIC, when in 1963, during the 15th Session of the CIE in Vienna, the possibility of creating a color association that included several countries was discussed, one of the two models proposed was an European color association in a similar fashion to what the ISCC represented for the United States, while the second option — which prevailed at the end — was to make a truly international association. In 1965, at the meeting in Lucerne, Switzerland, decisive steps were taken for the creation of the AIC, and the ISCC was represented there by Ralph E. Pike and Deane B. Judd.

Two years later, it was Judd, representing the ISCC, who chaired the session when the AIC was founded in Washington DC, June, 21 1967. The United States was the host country of the CIE 16th Session, which was taken as the opportunity to create the AIC. (In passing by, we should remember that Judd also participated actively in the formulation of the 1931 CIE standard observer of colorimetry; as a matter of fact, Wright signals Judd as one of the five "main architects of the 1931 CIE system," (modestly excluding himself). In addition, the AIC adopted the name of Judd to institute its biennial prize in color research.

If we add to these the facts that from the total of 11 AIC presidents until now, two presidents were from the United States (Jim Bartleson and Paula Alessi), that two other US

people have been members of its Executive Committee (Allan Rodrigues and Roy Berns), that seven researchers working in the North America have received the AIC Judd Award (Dorothy Nickerson, Gunter Wyszecki, David MacAdam, Leo Hurvich, Dorothea Jameson, Tarow Indow, and Fred Billmeyer), and that the United States hosted two AIC full congresses and one AIC interim meeting (1977, 2001, and 1980, respectively), we can realize how much the AIC is indebted to the ISCC: the AIC would not be what it is if the ISCC had not existed. For all these reasons, the recognition to the ISCC is enormous and the AIC wishes to fervently adhere to the celebration of its 75 years of life.

I am grateful to my dear friend and mentor as president of the AIC Paula Alessi for reading these lines to you. I regret not being able to be in Ottawa, but I have found some comfort in reading the abstracts of the papers. Due to a certain inclination toward the historical aspects, I found particularly attractive the abstracts by Françoise Viénot, Michael Brill, Ronnier Luo, Alan Robertson, Robert Hunt, and Janos Schanda. But undoubtedly all papers will be of great interest. From the near opposite latitude in the world (Ottawa is 45 degrees North while Buenos Aires is 34 degrees South), I wish you a reassuring and fruitful symposium.

José Luis Caivano
President of the International Color Association

New Imaging Technology to Shed a Realistic Light on Art

Digitally archiving and reproducing artwork as it would be seen in a museum is a mathematical conundrum of light and geometry. To address this problem, the Andrew W. Mellon Foundation has awarded Rochester Institute of Technology and color scientist Roy Berns a grant to develop a practical approach that museum photographers can use to eliminate subjective lighting decisions when imaging artwork.

Museum photographers try to capture the complex interplay between lighting, a painting and an observer in images of a museum's collections, reducing the experience of viewing artwork in real life to a flat image in a book or on a website. Photographer's must make decisions in lighting and viewing angles. "Realistic rendering is often limited by a lack of information about the object's shape and how incidental light is absorbed and scattered at each position on the object," says Berns, the Richard S. Hunter Professor of Color Science, Appearance and Technology in RIT[1]s Munsell Color Science Laboratory in the Chester F. Carlson Center for Imaging Science.

The solution sought during this two-phased project will involve building an instrument to capture the geometric and spectral information of artwork, developing mathematical models to create different viewing experiences of the artwork in a specific environment and to simplify the process and equipment for museum photographers to use on site.

Contact Susan Gawlowicz at 585-475-5061 or smgus@rit.edu for more information.

2006 AIC Interim Meeting

The 2006 AIC Interim Meeting, "Color in Culture and Color in Fashion" will be held October 24-27, 2006 in Johannesburg, South Africa. AIC President, Jose Luis Caivano, reported in early June that about 50 abstracts have been received from delegates and more researchers are getting involved.

The technical program will include invited and contributed papers and poster presentations. The conference topics are color and communication, color meanings and cultural context, color in the architectonic culture, color in the artistic culture, philosophy of color, color information, biological, linguistic & cultural aspects, color psychology and color emotions, color language and symbolism, color in history and history of color, color in education in different cultures, color for lifestyle, health and well-being, color harmony and aesthetics, color in folklore and traditions, color and marketing, color in dress and fashion, color science for fashion designers, color in cosmetics, color in textiles, color in heraldry

For more information, please see the website at www.colourgroupsa.org.za/aic2006/aic_information.php. The abstract submission form is also at the web site.

Detroit Colour Council, March 14 Meeting Highlights

The Detroit Colour Council held its first educational symposium of 2006 on March 14th at DuPont World Headquarters in Troy, Michigan. The DCC president, Larry DePaoli, opened the event by discussing the council's theme for its modular training format for 2006: Achieving "The Look". The modular training program includes four related symposiums that will discuss how manufacturers strive to create value in the materials that they are coloring by adding different colorants and effects to its process. Focusing specifically on automotive interiors, this first event was focusing on design.

The DCC's 2006 Program chair, Cindy Templeman, introduced the evening's speaker, Jeffery Post. Mr. Post is an accomplished designer who has extensive experience in the use of varying materials and textures in automotive interior design. Mr. Post's presentation was entitled, "Get Real: The honesty, beauty and integrity of interior materials, and how their sustainable value will create the product design successes of the future."

The presentation focused on the use of various materials that are designed to create the appearance and feel of quality, value and luxury. Mr. Post explained that the common reaction of a potential auto buyer is "hooked by the exterior, but the interior seals the deal."

Mr. Post also described the need for sustainability. A misconception, he explained, is that sustainability for the purpose of being green, costs money. He warned that a paradigm shift in design, development and manufacturing's attitude toward the value and implementation of a sustainable design is needed for success. For more information, see www.detroitcc.org/march_14_highlights.htm.

Color Research and Application

In This Issue, June 2006

Roberto Daniel Lozano, winner of the 2001 AIC Judd Award contributes the first article in this issue on "A New Approach to Appearance Characterization." In this article, Dr. Lozano proposes a new definition of appearance as a psychophysical property of materials and objects interacting with light being detected, observed and perceived by human beings. In his proposal appearance is composed of three properties, color, cesia, and spatiality. Readers may remember Caivano's articles in this journal on cesia. The first one introducing the concept was published in 1991. But back to Lozano's new definition. Just as color is divided into three attributes lightness, chroma and hue; and cesia is divided in three: luminosity, diffusivity and permeability; so also is spatiality. The spatiality attributes are a little more difficult to describe, but in a nutshell they are color spatiality, one-dimensional parameters, and two-dimensional – most commonly texture.

Our next article takes us to a difficult application of color matching – dental resins. The aesthetics of dental materials is important to more people than care to admit it. Since it was known that observers sometimes disagree with the CIELAB color differences, Yong-Keun Lee and John M. Powers were interested in looking at the newer color difference formulae. However, CIEDE2000 does not have a color space associated with the formula. Thus our next authors report on a study to measure the correlations between the color differences based on the CIELAB and a newer DIN99 uniform chromaticity space. The vectorial movements of the color coordinates of polymerized and thermocycled dental resin composites were followed in the change from the CIE L*a*b* space to the DIN99 space. In "Comparison of CIELAB and DIN99 using Dental Resin" Drs. Lee and Powers conclude that adaptation of a more observer-response relevant uniform color space should be considered after visual confirmation with dental aesthetic materials.

Let's look at memory. There are certain colors such as grass green, sky blue, foliage, human skin, banana, and orange that seem to be embedded in people's memory. But are these colors the same from person to person, especially if the people come from widely different geographic areas? Needless to say, skin color differs from area to area. In a joint study Tünde Tarczali, Du-Sik Park, Peter Bodrogi, and Chang Yeong Kim examine long-term memory when the observers are looking at a color monitor rather than physical samples. In "Long-term Memory Colors of Korean and Hungarian Observers" they found significant differences between the Korean and Hungarian long-term memory colors. They discuss their findings and how these results differ from experiments where physical color samples were used instead of colors on a display.

In 2004 Prasit Cunthasaksiri, Hiroyuki Shinoda, and Mitsuo Ikeda published in this journal a new account of center-surround simultaneous color contrast [Vol 29:255-260]. In that article the authors introduced the phrase "recognized visual space of illumination" or RVSI. The research found that the color inherent in the surround could be recognized as an attribute of the illumination for a space. Thus from the work on that study it was hypothesized that the simultaneous color contrast would not manifest in the light source mode. This hypothesis is the basis of the current study reported by the same authors in the article "Recognized Visual Space of Illumination: No Simultaneous Color Contrast on Light Source Colors." This study shows the limit where the color appearance of the stimulus would be affected from its viewing environment. This has ramifications in the development of color appearance models.

The inter-relationship of colors is intrinsic in art and design. It is also important in many commercial aspects of color marketing. Generally it is thought that if one selects harmonious colors, the effect will be pleasing and positive. Thus color preference, color harmony and color emotion have been linked. In our next article Li-Chen Ou and M. Ronnier Luo present "A Colour Harmony Model for Two-color Combinations." Beside presenting the model and describing the experimental studies that led to that model, their article also discusses several critical issues including the definition of color harmony, the relationship between harmony and pleasantness, and the relationship between harmony and order in color.

A chromatic adaptation transform is a formula usually used to determine what an illuminated color would look like under a different light source. These two colors are called corresponding colors; and the chromatic adaptation transform is often a CAT (its abbreviation). Since the publication of the CIECAT94, numerous other transforms have been proposed or adopted for various situations. In our next article, "Development of Chromatic Adaptation Transforms and Concept for Their Classification," Yoshinobu Nayatani discusses the development of chromatic adaptation transforms, their requirements, and a categorization of the transforms based on these requirements. Then the merits and demerits of each type of transform are discussed. Dr. Nayatani concludes with a proposal for specifying international recommendations of chromatic adaptation transforms.

Our final two articles in this issue deal with color reproduction. First, Binghua Chai, Ningfang Liao, Dazun Zhao, and Weiping Yang report on a study at Beijing Institute of Technology, which investigated the reproduction of media-dependent color appearance between a CRT display as soft-copy and the Natural Color System (NCS) Atlas as hard copy. They realized the data generalization by means of eight sets of error back-propagation neural networks. The results can be applied to computer-aided arts design among other things. The title of their article is "Media-Relative Color Appearance Modeling based on Artificial Neural Networks."

The second article is specific to printing. In recent years various spectral models have been developed to estimate the behavior of color printers. Probably the most used and discussed model in the Yule-Nielsen modification of the

Neugebauer model. In the article in this issue, Philipp Urban and Rolf-Ranier Grigat introduce a simple new method for "Spectral-Based Color Separation using Linear Regression Iteration." In this model a sequence of colorant combinations is constructed that converges to the combination that approximates the desired color. The end test to confirm the result is the smallest root- mean-square error. This model is particularly useful to those users who do not want to use look-up tables.

In our Communications and Comments section we have a note from Manuel Melgosa. He is contributing an "Improvement of CMC upon CIEDE2000 for a New Experimental Dataset." Last year Magine, Jakes, and Noel published "A preliminary comparison of CIE color differences to textile color acceptability using average observers" in this journal [Vol 30:288-294]. Now in this communication, Dr. Melgosa reports on further analyses of the statistical significance of this improvement and the potential causes.

We have two book reviews, a meeting report and announcements about 3 forth coming meetings. First, Lindsay MacDonald reviews the 3rd Edition of *Color and Its Reproduction* by Field . Then Thomas Lemons tells us about the 2nd Edition of the *Light Pollution Handbook* by Narisada and Schreuder. We also have a brief announcement about the 2nd Edition of *CIE publication 97:2005 Guide on the maintenance of indoor electric lighting Systems*.

Phil Green reports on the Gjøvik Color Imaging Symposium which was held in Norway in December 2005. For future meetings, Kenji Uchikawa tells us about the Fourth Asian Conference on Vision. We also have brief announcements about the 7th International Symposium of the Slovenian Colorist Association: Colors of National Symbols to be held in June and the Bolivian Color Congress in September.

Ellen Carter
Editor, Color Research and Application

Sesquicentiennial of the Discovery of Synthetic Dye

1856 was a very good year for William Henry Perkin. It was in that year that he successfully synthesized a dye. Few inventors have achieved success at such a young age. William Henry Perkin was only eighteen years old. He was born on March 12, 1838 and grew up in London East Side. His earliest education was in a private school. When he was 13 he attended the City of London School. At the school he came under the care of Thomas Hall, one of the school masters whose avocation was science. He had the good fortune of living close to the Royal College of Chemistry with an excellent laboratory training. The college enjoyed the support of Prince Albert. He secured the German chemist August Hofmann as its Director. At age fifteen, Perkin entered the Royal College.

The following is an account of his early years which he mentioned in New York City, at a dinner speech during the celebration of the Coa-tar Color Jubilee in 1906: "My father being a builder, hoped that I would follow in his footsteps. When I was between 12 and 13 years of age, a young friend showed me some chemical experiments in crystallization. I saw there was in chemistry, something far beyond the other pursuits with which I had previously been occupied. The possibility of making new discoveries impressed me very much. My choice was fixed and I was determined, if possible, to become a chemist."Hofmann encouraged the students to be creative in the lab. Perkin chose to work with antracene and managed to make mitro- and amino-antracene and eventually obtained chloro- and bromo-antracenes. This gave him invaluable experience that later became useful. His studies included the preparation of dinaphythylguanadine. He published this in the Journal of the Chemical Society.

In mid 1850's quinine was the only know cure for malaria. Quinine was made from the bark of the cinchona tree, a tree that grew only in South America. Quinine was scarce and expensive. Attempts to grow the tree in England failed.

Hofmann thought that quinine could be synthesized in the laboratory from coal tar. Coal tar was a foul smelling waste product of coke production and it was considered a nuisance by British manufacturers. It is now used in the production of dyes, drugs and soap. It was a substance from which chemicals such as benzene, toluene and naphthalene were synthesized.

It was naphthalene that caught Hofmann's eye because one of its derivatives, naphthalidine had a similar chemical formula as that of quinine. Hofmann was right in assuming the synthesization of quinine. However, that was a complicated procedure; it took almost another 100 years to synthesize quinine in the laboratory.

Perkin then decided to work on the synthesization of quinine in his laboratory during Easter vacation of 1856. He failed to synthesize the desired medicine, instead he ended up with a reddish brown precipitate. After purifying the powder, he decided to test the coloring properties of his product. The color that he produced on silk Perkin called Tyrian Purple. He enlisted the help of his brother Thomas Dix and later his father joined the venture by investing his life savings in the formation of Greenford Green Works. Thus, the firm Perkin and Sons was founded.

The dye was soon produced in France and was marketed as "Mauve" and widely used on silk and cotton. The popularity of the dye in France motivated the British dyers. After further tests, a patent was granted. It was the first patent ever for the manufacture of a synthetic dye.

During his lifetime, Perkin received many honors. He died July 14, 1907.

Compiled by Gultekin Celikiz
Editor, ISCC News

Photographs from the 2006 ISCC Annual Meeting and Expert Symposium on Web Site

See the ISCC web site www.iscc.org and go to the "Annual Meeting" pull down menu for the link to a nice collection of photographs from the meetings and events.

CALENDAR

Please send any information on Member-Body and other organization meetings involving color and appearance functions to:

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2006

Jul 5-7 **10th International Conference on Information Visualization - IV06,** University of London, London, UK, Tel.: (Int... +44) 207 815 7476, www.graphicslink.co.uk/IV06/, banisse@lsbu.ac.uk

Aug 26-27 **Gemological Research Conference,** San Diego, California, www.symposium.gia.edu

Aug 27-29 **4th International Gemological Symposium,** San Diego, California, www.symposium.gia.edu

Sept 17- 22 **NIP22: International Congress on Digital Printing Technologies**, IS&T, Hyatt Denver Convention Center Hotel, Denver, Colorado, 703-642-9090, www.imaging.org

Oct 8 -12 **Frontiers in Optics 2006, The 90th OSA Annual Meeting Laser Science XXII**, Rochester Riverside Convention Center, Rochester, New York, 202-223-8130, www.osa.org

Oct 13-17 **Fall International Conference,** Color Marketing Group, Atlanta, GA, 703-329-8500, www.colormarketing.org

Oct 19-20 **CIE Expert Symposium on Visual Appearance,** Paris/France www.mnhn.fr/cievisualappearance

Oct 24-27 **"Colour in Culture and Colour in Fashion," AIC 2006**, Interim Meeting, Misty Hills Country Hotel and Conference Centre, Johannesburg, South Africa, www.colourgroupsa.org.za.

Oct 24-25 **Matching and Control of Metallic and Pearl Colors**, a Detroit Coulor Council course, the Livonia site of Eastern Michigan University, Livonia, MI, Bill Longley, 734-420-4920, wlongley@juno.com, www.detroitcc.org

Oct 31-Nov 2 **AATCC's 2006 International Conference & Exhibition (IC&E),** a co-located event with Megatex, which is co-anchored by the American Textile Machinery Exhibition International 2006 (ATME-I® 2006) and the Industrial Fabrics Association International Expo 2006 (IFAI Expo 2006), Georgia World Congress Center, Atlanta, GA, 919-549-8141, www.aatcc.org

Nov. 1-3 **International Coatings Expo, ICE 2006,** Federation of Societies of Coatings Technology, (FSCT), 610-940-0777 email: fsct@coatingstech.org, www.coatingstech.org

Nov 6-10 **Color Imaging Conference, CIC14,** Society for Imaging Science and Technology (IS&T) and the Society for Information Display (SID), Scottsdale, Arizona, 703-642-9090, www.imaging.org/conferences/cic14/

Nov 14-16 **AATCC Fall Committee Meetings,** Radisson Hotel-RTP, Research Triangle Park, NC, 919-549-8141, www.aatcc.org

2007

Jan 23-25 **ASTM E12, Color and Appearance**, Embassy Suites Hotel; Ft. Lauderdale, FL, www.astm.org

Feb 22-23 **ISCC and AATCC Joint Special Topics Conference on "Industrial Color Chal lenges,"** Hilton University Place in Charlotte, North Carolina, Ms. Kim Nicholson, AATCC, 919-549-8141, nicholk@aatcc.org, 610-832-9585, www.aatcc.org

May 7-11 **Identifying Geospatial Solutions, ASPRS 2007 Annual Conference**, Tampa, FL, (301) 493-0290, www.asprs.org

May 8-11	**"Optical Radiation Consensus Standards and Industry,"** Council for Optical Radiation Measurement Annual Meeting in conjunction with NIST, Gaithersburg, MD, www.corm.org
Jun 27-29	**ASTM E12 Color and Appearance**, Waterside Convention Center; Norfolk, VA, 610-832-9585, www.astm.org
Jul 4-11	**The 26th Session of the CIE,** Beijing, China, www.cie.co.at/news/news76.pdf
Jul 12-14	**AIC 2007 "Color Science for Industry, "Midterm** Meeting of the International Color Association, Hangzhou, China, www.aic07.com

David Brainard accepts 2006 Macbeth award from Rob Buckley during ISCC Annual Banquet

Maria Nadal hands 2006 Nickerson award to Mary McKnight

Publications Available from ISCC Office

Color and Light by Fred W. Billmeyer Jr. & Harry K. Hammond., III. Authorized reprint from: ASTM Manual 17, Copyright 1996, ASTM International, 100 Bar Harbor Dr., W. Conshohocken, PA 19428. $5 ea or 20 copies/$50.00

Demystifying Color by Bob Chung, 11 pages. Discusses and explains ten myths about color. ..... $5 ea or 20 copies/$50.00

Proceedings-9th Congress of the International Colour Association, AIC Color 01 Rochester, Allan Rodrigues, Ed., papers given at technical sessions... ..... $75*

Guide to Material Standards and Their Use in Color Measurement (ISCC TR-2003-1). $50*

*Plus shipping and handling

ISCC 75th Anniversary CD and Pin

This special CD, written and compiled by Ellen C. Carter and Cynthia Sturke, and a special anniversary pin can be yours for $30. The CD contains two items: a slide show "Faces of the ISCC" and the document *Color in Science, Art and Industry: The Inter-Society Color Council*. See page 8 of this newsletter for more information on the contents of the CD. Order the items from Cynthia Sturke at the ISCC office.

Advertising Policy

The ISCC advertising policy for the ISCC News is as follows: Pre-paid color-related advertising will be accepted 30 days in advance of the publishing date. The rates are:

$ 100	**business card-size ad**
$ 250	**1/4 page ad**
$ 500	**1/2 page ad**
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The editor reserves the right to determine the acceptability of the advertising. A 20% discount is available for a yearly contract.

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All submissions must be in English. Please submit materials by the first of each even numbered month. Materials submitted later may be printed in the following issue.

ISCC Sustaining Members

BYK-Gardner USA	www.bykgardner.com	**301-483-6500**
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Color Communications, Inc.	www.ccicolor.com	**773-638-1400**
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DuPont Performance Coatings	www.dupont.com	**248-583-8345**
Flex Products, Inc.	www.colorshift.com	**707-525-7337**
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PPG Industries, Inc.	www.ppg.com	**724-274-3532**

ISCC Member Bodies

American Association of Textile Chemists and Colorists (AATCC)
American Society for Testing and Materials International (ASTM)
American Society for Photogrammetry & Remote Sensing (ASPRS)
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Color Pigments Manufacturing Association (CPMA)
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