Inter-Society Color Council *News*

IN THIS ISSUE

NICKERSON SERVICE AWARD NOMINATIONS REQUESTED

ISCC members are urged to submit names of individuals and evidence of qualification to the committee, Dr. Paul Hoffenberg, Chairman, ACS, P.O. Box 5800, Princeton, NJ, 08543. Other members of the committee are Bonnie Bender, Ed Cairns, Harry Hammond, and Nancy Jo Howard.

The Service award was established by the Board of Directors in 1980 to recognize outstanding, long term contributions toward the objectives of the Council. In 1986, Nickerson was added to the title of the award to honor the memory of one of the founding members who continued to serve the council for the rest of her life.

The first recipient of the award was Dr. Fred Billmeyer in 1983. Next to receive the award were Dorothy Nickerson and Leonard Davidson followed by George Gardner, Harry Hammond and Ruth Johnston-Feller.

If there is someone who, in your view, should be considered for this award please—without contacting the proposed recipient—submit the name together with a statement of his or her long term service. If the award is to be made in 1989, the committee must have this information early in December 1988 so that it may review the nominations and make a recommendation to the board at its winter meeting well before the annual meeting.

Number 316 **November-December 1988**

FROM THE PRESIDENT

In the last issue of this newsletter I began describing the ISCC standing committees and their current chairmen. Any organization is successful in direct proportion to the foresight and efficiency of its board of directors and standing committees. The ISCC had the good fortune to have been founded and led by exceptional individuals who were pioneers in color technology. The Council has grown until it is difficult to be aware of who is doing the work that keeps the Council functioning smoothly.

In the previous article I mentioned the continuing service performed by the Secretary, Terry Commerford and the Treasurer, Philip Hunter. In fact, Terry has just finished putting together a new issue of the Membership Directory with the assistance of your President Elect, Hugh Fairman. This is in addition to preparing minutes for the Board of Directors, keeping in touch with members and corresponding with new members.

Taking the committees in the order that they appear in the By-Laws, I described the Nominating Committee chaired by Past President Allan Rodrigues, the Membership Committee chaired by Nick Hale and the Member-Body Committee chaired by Lou Graham, who is also a past president of the Council.

Another committee that is named early in the By-Laws is the By-Law Committee itself. This is a particularly difficult time to chair this committee because we have reached the point where it is necessary to revise the Constitution, By-Laws and Standing Rules. Down through the years small changes had been tacked into the last two documents. Some of these changes affected other sections in the documents making interpretation difficult, until finally it had become necessary to rewrite several sections to accommodate these changes and also to accommodate the new the Interest Groups and voting representation for the individual members. Anyone who has ever served as an officer or director in an organization where the by-laws and standing rules are being revised will understand at once the tedious job involved.

Jay Rennilson, with the assistance of Nick Hale and Bonnie Swenholt, led the By-Laws Committee through two drafts of the proposed revision, until the press of his own business forced Jay to step down. The chairmanship was accepted this spring by Fred Billmeyer who, with input from Nick Hale, Allan Rodrigues and Hugh Fairman, has produced two more drafts. Fred's services to the Council in the past have been so outstanding that he has been awarded both the Macbeth and the Nickerson Service Awards and made an honorary

member of the Council. It is very gratifying that someone with so much knowledge of the Council and its goals is willing to undertake this task. This is a strictly non-fun job but a very important one.

Once the revised Constitution and By-Laws are approved by the Board of Directors they will be sent to the voting delegates for their study and approval. Then work must begin on the Standing Rules so that all three documents fit neatly together and can guide the Council in the future.

Another major committee is the Problems Committee. This committee and its subcommittees, known as project committees, are the main reason for the Council's existence. Project committees work on significant color problems for the benefit of the color community at large. The ISCC was formed to allow professionals from different fields to cooperate in solving common concerns involving color. In the past these committees have made major contributions to knowledge about color and continue to be the main function of the Council.

President-Elect Hugh Fairman is the chairman of the Problems Committee and led the recent reorganization of the committees. Committees that were not active were disbanded and the remaining committees chose restricted goals that are expected to be reached within two years. These goals can be part of a larger purpose but they assure that the committees achieve definite objectives within a comparatively short time. Currently there are six project committees: #22, Materials for Instrument Calibration, chaired by Danny Rich; #27, Indices for Metamerism, chaired by Past President Allan Rodrigues; #32, Image Technology, chaired by Paula Alessi; # 37, Artist's Materials and Contemporary Art, chaired by Hilton Brown; #44, Regular Rhombohedral Sampling of Uniform Color Spaces, chaired by Chuck Reilly; #45, Psychological Response to Color, chaired by Magenta Yglesias and George Brainard.

Anyone can join these project committees who wants to contribute toward their goals and all ISCC members are welcome to attend as spectators the project committee open sessions that are held during the Annual Meeting. New project committees can be formed whenever there is a group of people who wish to work together on a common project. I want to encourage all ISCC members to bring to Hugh's or my attention any color problem that you believe can be solved through this cooperative approach.

1989 ANNUAL MEETING

The next annual meeting of the ISCC will be held April 9-11 inc.) 1989 at the Ambassador West Hotel in Chicago, Illinois. The meeting will include Interest Groups, workshops, project committee and contributed paper/poster sessions plus a tour of famous Chicago landmarks.

The meeting is being co-sponsored by the Chicago chapter of the American Institute of Architects and the symposium to be held on April 11 on the subject of Color in Architecture. The symposium will feature prominent Architects and Building Product Specialists.

NOTICE

At future ISCC Annual Meetings there will be a bulletin board where notices about job opportunities in the various color fields can be posted and where individuals seeking employment related to color can place their names, addresses and area of expertise.

The Council in no sense recommends either the jobs or the individuals seeking job opportunities. People using the bulletin board must put the information on a 3"x 5" card and post it themselves at the meeting. The ISCC just furnishes the bulletin board for the convenience of its members.

COLOR RESEARCH & APPLICATION
Vol. 13, No. 6, December, 1988

IN THIS ISSUE

Metamerism is the scourge of the industrial colorist. Imagine the interior of a car with perhaps four or five different materials, colored with different colorants, and all supposed to match. Metamerism is unavoidable. How will the various colorations appear under the incandescent illumination of the dome light? Is there even an overlap of the mismatch gamuts of the various coloration systems or is it impossible to obtain a reasonable approximation with combinations from two different coloration systems? This is a complex and wide-ranging industrial problem. Roy Berns, Mark Fairchild, and Michael Beering have investigated this matter for four different coloration systems. Their results are described in *The Quantification of Industrial Illuminant Metamerism: Metameric Mismatch Galaxies.*

The classical computer colorant formulation algorithm employs tristimulus matching. This is not always the most efficient method and under special circumstances may not be sufficient. An example is a formulation for military purposes that need not only match the standard in the visible portion of the spectrum but also in the near-infrared region. Another item from the Munsell Color Science Laboratory, Eric Walowit, Cornelius McCarthy, and Roy Berns, describes in *Spectrophotometric Color Matching Based on Two-constant Kubelka-Munk Theory* a novel algorithm to solve this problem.

In *The Effect of Stimulus Duration on the Luminous Efficiency Function for Brightness* Tohru Tamura, Mitsuo Ikeda, and Keiji Uchikawa show that stimulus duration has a distinctive effect on the shape of the luminous efficiency function as derived by heterochromatic brightness matching. Clearly defined double peaks were obtained with a one second stimulus duration while shorter or longer exposures resulted in less well defined peaks.

In an article in the April 1988 issue (13, pp.106-112) Marcia Finkelstein has shown that the spectral tuning of the opponent channels of the visual system has a spatial dependency. In *Spectral Tuning of Opponent Channels is Temporally Dependent*, the same author shows that the opponent system is also affected by the duration of the exposure to the stimulus.

In 1982 the Project Committee on Indices of Metamerism of the Inter-Society Color Council conducted a survey among industrial colorists concerning their understanding of many aspects of the phenomenon of metamerism. The results of this survey have been analyzed by the committee and the outcome of the analysis is presented by Fred Billmeyer in *Results of ISCC Questionnaire on Metamerism.*

Pairs of colored fields can appear to be in balance or out of balance. This aesthetic question bears on design and art. A rule relating chroma and field size in regard to their balancing effect has been proposed by Albert Munsell in 1905. Robert Morriss and William Dunlap have investigated this problem anew, with additional emphasis on the effect of the background. They report their finding in *Influence of Chroma and Hue on Spatial Balance of Color Pairs.*

In his eighties, Faber Birren continues to elucidate for us the mysteries and histories of color. In *Masters of Harmony* he describes the efforts of three influential personalities at mastering color harmony. *Rolf Kuehni, Editor Color Research & Application*

BERT BASSETT SCHOLARSHIP FUND

Bert Bassett is retiring after fourteen years as executive director of the Graphic Arts Technical Foundation, a tenure distinguished by outstanding service to the graphic arts industry.

In considering how we might honor Bert on the occasion of his retirement, our thoughts turned naturally to his interest in those young people who aspire to careers in the graphic arts and a means of ensuring that they receive the education and training they need to take their places in our businesses. We decided a scholarship in Bert's name—to give the next generation a helping hand—would be a most fitting tribute.

We invite you to join us in establishing the Bert Bassett Scholarship Fund. Each year, awards of $2,000 will be granted through the National Scholarship Trust Fund to promising students preparing for careers in the graphic arts.

To be a part of this tribute to Bert, send a note saying YES, I want to be part of establishing the Bert Bassett Scholarship Fund. Include your name, address and telephone number and the amount you pledge to contribute over your signature. You will be billed later. Your contribution is, of course, tax deductible. Mail to BERT BASSETT SCHOLARSHIP FUND, P.O. Box 11176, Charlotte, NC 28220.

Bert will be presented with the details of the scholarships in a special ceremony during the fall GATF meeting in Bermuda.

SOCIETY FOR INFORMATION DISPLAY

SID 89, The Society for Information Display International Symposium, Seminar and Exhibition will be held May 15-19, 1989 at the Baltimore Convention Center, Baltimore, Maryland. SID was formed in 1962 as a worldwide, interdisciplinary professional society committed to the advancement of information display.

Areas to be Covered

Original papers, not previously published or presented, covering all aspects of information display will be presented at the three-day Symposium, May 16-18. The areas of interest include, but are not restricted to:

Emissive Flat Panels: Plasma, electroluminescent, vacuum fluorescent and other flat cathodoluminescent displays and materials, light-emitting diodes, backlights.

Nonemissive Flat Panels: Liquid-crystal, including active-matrix-addressed liquid crystal, electrochromic, electrophoretic, magneto-optic, electromechanical and ceramic displays and materials.

CRT Displays: CRTs and monitors for entertainment, computer display and specialized applications; flat and miniature CRTs; electron optics including gun and yoke design; CRT materials; high resolution, storage, beam index, high brightness, and multibeam CRTs.

Hardcopy/printers: Ink jet, thermal, electrographic, electrostatic and impact systems; plotters; optical disk/video disk; videotape; electronic photography; facsimile.

Display systems and applications: High-definition TV, digital TV, teleconferencing, display systems, automated crew stations/workstations, displays in expert systems.

Automotive Displays: Display requirements, voice and command I/O for the driver, light control and day/night readability, head-up displays, environmental requirements, comparison of display technologies for automotive needs, use of TV systems for improved driver visibility.

Display Addressing/packaging: "Active" matrices including thin-film transistors and two-terminal devices; multiplexing techniques, ICs for display drivers and controllers; interconnection techniques; glass and plastic processing; ruggedized display fabrication.

Interactive I/O Technology: Interactive displays; input/output devices including touch panel, keyboard and voice-I/O software.

Human Factors: Display viewability; display standards, measurement and characterization; visual perception; choice of color, font.

Large-area Displays: Projection systems including projection CRTs, light valves, lasers, optics and screens; message boards and mosaic displays; simulator displays.

Workstations: Architecture, engines (and specialized processors), storage and storage management, standards, connectivity, applications such as CIM, CAD/CAM, graphics, image processing, OCR software.

Abstract Deadline

The deadline for receipt of abstract and technical summary is December 2, 1988. *(We regret not having received this information in time for inclusion in the last issue of the ISCC News, Editor)*

Late-News Papers

A limited number of late-news papers, reflecting important new developments, will be considered if an abstract and technical summary are received by March 1, 1989. Follow the guidelines and include a statement as to why the paper should be considered as a late-news item. The guidelines may be obtained from Lynne Henderson, Palisades Institute for Research services, Inc., 201 Varick St., Rm. 1140, New York, NY 10014 Tel. No. (212) 620-3375.

Supplementary SID 89 Features

Seminar: Tutorials on display technology and applications, presented by experts in the field of information display, will also be held during SID 89—Monday, May 15 and Friday May 19. Featured will be in-depth presentations on diverse aspects of information display, techniques, and systems.

Exhibits: An expanded exhibit area will feature displays of the latest equipment, components, and accessories by industry from U.S. and overseas. This three-day exhibition runs concurrently with the Symposium and is not to be missed.

Evening Panel Discussions: Lively and informal discussions are held on topics of current interest to the display community.

Author Interviews: These sessions, pioneered by SID, which follow the conclusion of daytime presentations, provide a forum for extended discussions between author and audience. Demonstrations of devices and equipment are encouraged.

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NEWS FROM MEMBER BODIES

Federation of Societies for Coatings Technology

John C. Ballard and Kurt F. Weitz Nominated as 1988-89 Officers

John C. Ballard, Vice-President, Research, Kurfees Coatings, Inc., Louisville, Kentucky, has been nominated for the position of President-Elect of the FSCT. Mr. Ballard, currently Treasurer of the Federation, is a member of the Executive Committee and sits on the Board of Directors. He has served the Federation in various positions. Mr. Ballard, Past-President of the Louisville Society (1976-77), is a graduate of the University of Louisville and has been in the coatings industry for 31 years.

Nominated for the position of Treasurer for the Federation is Kurt F. Weitz, Manager - Technical Support, Indusmin, Division of Falconbridge Limited, Toronto, Ontario, Canada. Mr. Weitz has served on the Executive Committee since 1985 and has been the Toronto Society Representative to the Board of Directors since 1981. In addition, he served on the Room Awards Committee for six years and was a member of the Finance Committee. Mr. Weitz, a Past-President of the Toronto Society (1974-75), graduated from the University of Toronto and has served the coatings industry for 31 years.

The current President-Elect, James E. Geiger, founder and President of Sun Coatings, Inc., Largo, Florida; President of Chemex Chemicals & Coatings Co., Inc., Tampa, Florida; and President and Chairman of the Board of Penn Paints, Inc., Sanford, Florida, will assume the Presidency at the close of the 1988 Annual Meeting, October 21, in Chicago, Illinois. Mr. Geiger, who has served on numerous committees and in many positions for the Federation, is Past-President of the Southern Society (1984-85). He graduated from Northern Illinois University and is a member of the University of southern Mississippi Industrial Advisory Committee. Mr. Geiger has been in the coatings industry for 30 years.

The nominating committee also submitted names of the candidates for Executive Committee and Board of Directors positions. Society Representative Members: Thomas E. Hill, Manager - Technical Service Department, Pratt & Lambert, Inc., Buffalo, New York has been nominated for a three-year term. Richard M. Hille, Marketing Manager, General Paint & Chemical Company, Division of Cotter & Company, Cary, Illinois has been nominated to serve a one-year term to fill the unexpired term of Mr. Weitz. Board of Directors: John J. Oates, retired from Troy Chemical Corporation, Newark, New Jersey and Past-President of the Federation (1977-78) and the New York Society (1961-62) is nominated as Past-President Member, a two year term. George R. Pilcher, Corporate Technical Director, Hanna Chemical Coatings Corporation, a subsidiary of Reliance Universal, Inc., Columbus Ohio, is nominated for Members-At-Large position, a two year term. Also, Patricia Shaw, Technical Director, Davlin Paint Company, Berkeley, California, has been nominated for Board Member-at-Large. American Society for Testing and Materials (ASTM). ASTM Committee E-12 on Appearance of Materials held meetings

immediately following the ISCC Annual Meeting in May in Baltimore. The meetings included a general meeting chaired by J. J. Rennilson, and Executive Subcommittee 12.90 meeting and numerous subcommittee meetings. ISCC News Number 314 (July-August issue) included summaries of many of the subcommittee meetings. Subcommittee E12.07 on Color Order Systems met on May 11, 1988 with 27 members and visitors present. Nick Hale, the subcommittee chairman presided. They reviewed the proposed Standard Practice for Specifying Color Using the OSA-UCS System. A number of modifications will be included in the next draft. To develop a precision and bias statement for the visual method, a series of colors will be circulated among selected members along with an experimental procedure. In its role as the United States' Technical Advisory Group (T.A.G.) to the International Standards Organization Technical Committee 187 (ISO/TC187) on Colour Notations, E12.07 has received an advice from the TC187 Secretariate (Sweden) regarding their desire to have a full committee meeting in 1989. It was decided to invite TC187 to meet in Baltimore, beginning December 4, 1989. They noted that there will be an ISCC Williamsburg Conference on Color Discrimination Psychophysics from November 28 to December 1 which should be of interest to many of the delegates to TC187 from other countries.

New Monograph Offered in Federation Series on Coatings Technology

"Organic Pigments" the eleventh monograph in the continuing series on Coatings Technology was announced in October, 1988. The series is prepared in an attractive 8 x 11 inch format, designed to fit in a three-ring binder. Monographs may be ordered by contacting Meryl Cohen, FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107 at a cost of $5.00 each. The series, when complete, will total approximately 35 booklets and is intended to serve as a valuable teaching and training resource for the industry.

Gemological Institute of America (GIA)

International Gemological Symposium Convenes at GemFest Europe '88. Over 200 gemology researchers and representatives of the jewelry industry converged on Vicenza, Italy, on September 11 for GemFest Europe '88. The international gemological symposium was held in conjunction with the Orogemma trade fair. It was sponsored by the Istituto Gemmologico Mediterraneo (the Italian affiliate of the Gemological Institute of America, which administers GIA home study courses in Italian), and the Vicenza Trade Fair Board. GIA and its U.S. and international Alumni Association chapters were actively involved in the event.

Speakers included Dr. Vincent Manson, GIA Director of Education, Chief Gemologist John Koivula, Raffaele Zancanella, President of I.GEM.M., Zhang Guo Liang from the People's Republic of China, Northern Italy chapter President Luigi Costantini, and Alumni Association Assistant Executive Director Gary Roskin.

GIA Announces the 14th Annual Schuetz Jewelry Design Contest. Rules and entry blanks are now available from the GIA for the 1989 George A. Schuetz Memorial Fund Jewelry Design Contest. The contest is open to everyone, with two winners receiving $500 scholarships for jewelry-related training at the institution of their choice. The two categories are men's jewelry or accessories, and ladies' jewelry featuring colored stones. All designs must be original and not previously exhibited in public or offered for sale. Manufacturability is one of the prime considerations of the judges along with beauty and originality of design, feasibility, and effective use of materials. To receive contest rules and entry blanks, write GIA, Jewelry Manufacturing Arts Department, 1660 Stewart Street, Santa Monica, CA 90404, or call (213) 829-2991, ext. 311. The contest entry deadline is February 28, 1989.

American Association of Textile Chemists and Colorists (AATCC)

Davidson and Hemmendinger to Receive The Millson Award

Two men whose names are synonymous with color measurement have been named co-recipients of The Henry E. Millson Award for Invention. They are Hugh R. Davidson and Henry Hemmendinger, developers 30 years ago of the first successful color matching computer system.

Hugh Davidson was barely out of Lehigh University when he joined the National Defense Research Council to work on antisubmarine warfare systems. In January 1945 he joined an operations research group of the U.S. Navy where he met Henry Hemmendinger, a graduate of Harvard and Princeton, who was working on prosubmarine warfare. Their chance wartime assignment began a relationship that was to continue for the next 25 years. Immediately after the war they both joined General Aniline & Film Corporation where they worked together on general physics problems and where they both became interested in color through I. H. Godlove who was in the same department. At GAF they developed the automatic Tristimulus Integrator which provided for the first time a rapid means of obtaining XYZ values.

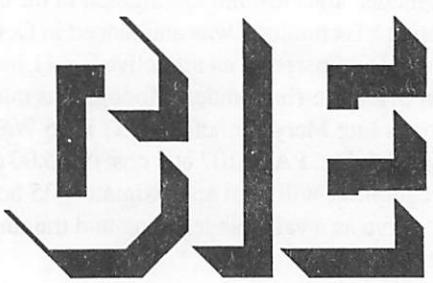
The two men left GAF in 1952 to form their own company, Davidson and Hemmendinger, to do color consulting and color measurement. They painted the first Munsell Book of Color based on the "renotation" specifications adopted by the Optical Society of America in 1943. As important as this work was, it was overshadowed by their collaborative development of the first successful color matching computer system. Based on technologies developed for antisubmarine warfare in 1944, their COMIC (Colorant Mixture Computer) was an analog computer. The first COMIC was delivered in 1958. A digital version of it, called COMIC II, was introduced in 1967. Shortly after their introduction of COMIC II, Davidson and Hemmendinger sold their company to Kollmorgen where it was combined with the Macbeth and Instrument Development Laboratories groups.

In 1972 Davidson established Davidson Colleagues in collaboration with Thelma Roesch to develop color matching software for use first in mini computers and then in the new generation of personal computers. The company has developed several versions of software for use in textiles, paints, plastics, etc. culminating in the recently published ColorMentoR system. Davidson is a member of the AATCC, the ISCC, the FSCT, and the OSA. Hemmendinger became a consultant on colorimetry and spectrophotometry. "My current work," he notes, "is centered on two problems: on providing instrumental color standards to facilitate the use of color specifications as a language of precise communication, and on a study of the practical limits of precision resulting from the color perception variations among normal observers." He is a Fellow of the OSA, a member of the ISCC, ASTM and a member-for-life of the U.S. National Committee of the CIE. The Millson Award for Invention was established in 1979 to recognize outstanding contributions to textile wet processing technology. The award is named for Henry E. Millson, retired head of dyes research for American Cyanamid Co. who also is a noted inventor and was the 1958 recipient of The Olney Medal for Outstanding achievement in textile chemistry. *Summarized from J. of AATCC Sept. 1988*

NEWS FROM OTHER ORGANIZATIONS

CIE 75th Anniversary

A one-day celebration was held at Ettlingen, near Karlsruhe, Germany, Sept. 7, 1988, in recognition of CIE's 75th Anniversary. Among those invited to attend were Harry K. Hammond,III and his wife Pauline. Why Ettlingen? First, it is close to Karlsruhe, where CIE President Prof. Dr. Hans Bodmann heads the Lichttechnisches Institute at the University of Karlsruhe. Second, Ettlingen is a lovely old village that this year is celebrating its 1200th Anniversary! So, with the help of the University, an organizing committee, the German National Committee of the CIE, and twenty-eight sponsoring industrial organizations of the Federal Republic of Germany, a tremendously interesting and enjoyable day was planned with historical and convivial social programs. There were about 170 persons present for the occasion, consisting of the International Officers and Division Members of the CIE, Officers of many National Committees, and representatives of closely connected national and international organizations dealing with light or lighting, such as the American Society for Testing and Materials (ASTM) and the Illuminating Engineering Society of North America (IESNA). Both of these organizations are ISCC Member Bodies. The morning program began with opening remarks and a brief presidential address by Prof. Dr. Bodmann. He pointed out that the origin of the CIE is linked to the increasing use of coal gas lighting for streets and buildings in the 19th century. The development of the electric lamp and means for generating and transmitting electricity are what were responsible for the rapid simultaneous growth of electrical and illuminating engineering. The original CIE statutes (1913) stated: "The purpose of the Commission is to study all questions of concern to the lighting industry and to the associated sciences, and to establish by all appropriate means international cooperation on questions of lighting." This is the basis on which the CIE has grown to be the independent international authority for photometry, colorimetry, lighting and signalling. The CIE is now comprised of 38 member countries and more than 100 Technical Committees organized into seven Divisions. Bodmann called on Prof Dr. K. Rochmann who brought greetings as President of the German National Committee of the CIE. Prof. Dr. S. German, Vice-President of the Physikalische Technische Bundesanstalt (the German Bureau of Standards) spoke on behalf of the President of the Comite International des Poids ie mesures (CIPM), the CIE's oldest liaison organization and the final authority on base units of the Systeme Internationale (metric system), such as the meter, kilogram, and candela. Bodmann then welcomed the representatives of eight international organizations including Prof. Dr. Heinz Terstiege, President of the Association International de la Colour. Our local host, Herr Oberburgermeister Josef Offele, the head of the town of Ettlingen was also introduced. Bodmann recounted that the *candle* has been the CIE symbol for about 25 years. However, it was felt by some that the CIE logo should embrace a more general design because its present scope is so much broader than photometry. The CIE Vice-President for Publications, Robin Aldworth then introduced Ken Scott who unveiled a large flag with the new CIE logo. The flag was a gift of the British National Committee.



The new logo utilizes an important principle of lighting to depict a three-dimensional form by use of light and shadow. John Kaufman, President of the U.S. National Committee, was then called upon to present a gift, namely a set of table flags for each member country. Prof. Dr. J. B. de Boer, CIE President 1979-1983, was then called upon to give an invited address, *The CIE and Human Society* (see published abstract), after which Bodmann commented that there is probably no one else in the room who has made a greater contribution to the development of CIE over the past 50 years. {*Harry Hammond*}

AIC Nominates Officers For 1990-93 Term

The International Colour association (AIC) Executive Committee has announced its slate of candidates for AIC officers for the 1990-93 term. They are: Dr. Alan Robertson (Canada) for President, Dr. Lucia Ronchi (Italy) for Vice-President, Dr. Michael Pointer (Great Britain) for Secrtary/Treasurer and four

executive committee members, Mr. P. Green-Armytagre (Australia), Dr. Antal Nemcsics (Hungary), Mr. L. Oberascher (Austria) and Dr. Allan Rodrigues (USA).

Additional candidates may be nominated if endorsed by at last two other national organizations. Dr. Nemcsics is automatically appointed to the executive committee because the 1993 AIC Quadrennial will be held in Hungary. If there are additional nominations, an election will be held during the AIC Business Meeting in Buenos Aires in March.Many of these candidates are familiar to the ISCC, four are IMGs. Dr. Robertson, currently vice-president of the AIC has served on the ISCC Board of Directors. Dr. Rodrigues is our immediate past-president and AIC Liaison.

National Bureau of Standards Receives a New Name

As a result of the Omnibus Trade and Competitiveness Act, signed into law on August 23, the National Bureau of Standards officially became the National Institute of Standards and Technology (NIST). The new institute retains all the traditional functions and services of NBS and takes on several new assignments designed to boost American Industry in the world marketplace. NIST will work with several new constituencies, including state and local economic development organizations.

Four major new programs are called for by the legislation: the development of regional centers for transfer of manufacturing technology; the creation of a focal point within the federal government to work with and support state and local industrial extension services; the creation of an advanced technology program to support and encourage the rapid commercialization of promising new inventions and technologies; and the creation of a national clearinghouse of information on state and local technology development initiatives. Existing NBS programs will continue under NIST.

Richard W. Harold Honored

Richard Harold, Manager of Educational Services and Advanced Research at Hunterlab, has been named a Fellow and Chartered Colourist of The Society of Dyers and Colourists in Great Britain. Mr. Harold's ongoing dedication to the advancement of color science and technology contributed to his receiving this award.

Mr. Harold holds membership in several other color science organizations: The Detroit Colour Council (DCC), the Inter-Society Color Council, the U.S. National Committee of the CIE, the International Organization of Standardization (ISO), and the Industrial Fabrics Association International (IFAI). His extensive knowledge in the textile industry was instrumental in his election to Chairman of the Color Measurement Committee of the American Association of Textile Chemists and Colorists (AATCC). We want to congratulate Mr. Harold on his dedication to color science and his outstanding achievements.

ROCHESTER INSTITUTE OF TECHNOLOGY (RIT) NAMES CENTER FOR IMAGING SCIENCE FOR CHESTER F. CARLSON

When completed in 1989, the Center for Imaging Science will be the largest academic facility in North America to specialize in the science of how images are formed, recorded and transmitted and will be named for Chester F. Carlson, whose creation of the technology for office copiers revolutionized the business world.

As a young lawyer and physicist living in Queens in the 1930s, Carlson was often frustrated by the costly and time-consuming methods then in existence for copying documents. He theorized that a combination of the phenomena of electrostatics and photoconductivity could be used to produce dry copies of printed materials. On Oct. 22, 1938, he and his assistant produced an image on a zinc plate which he transferred to wax paper, creating the first of what has come to be known as a xerographic copy.

After a long and frustrating attempt to enlist corporate interest—more than 20 companies turned down the idea—his dream was commercialized through The Haloid Company of Rochester, NY. The invention proved so popular that Haloid renamed itself in recognition of its greatest product and is now known as Xerox Corporation.

Until his death in 1968, Carlson also was a lifelong humanitarian and donated substantially to charity while shunning publicity about his donations. He actively supported RIT, visiting the campus several times and joining RIT's Nathaniel Rochester Society. At his death, he left a large bequest to RIT, and his widow, Dorris, continues to support the Institute.

The Chester F. Carlson Center for Imaging Science will be an international resource for the imaging community, containing several laboratories each devoted to a specific area of imaging research, including digital image processing and electronic printing. The facility also contains The Munsell Color Science Laboratory devoted to the study of color science.

CHRONIC HEALTH HAZARDS IN COLORED ART AND CRAFT MATERIALS

The decision on whether or not a product poses a chronic health hazard rests on a series of estimates where information is often incomplete. This has made it particularly difficult for small companies to be certain that they are labeling their products correctly. Chronic health hazards in art and craft materials are of special concern because young children and people in rest homes use these materials. It is also true that the substances found in art and craft supplies are common in other consumer products. ISCC project committee #37, Artists' Materials, composed of artists and art materials manufacturers recognized in 1978 that a way must be found to assure the public that these products were adequately labeled for possible health hazards. Since the ISCC does not write standards, the group established an ASTM subcommittee, D01.57, to write both health and quality labeling standards.

By 1983 the voluntary standard D 4236, Labeling Art Materials for Chronic Health Hazards, was approved, calling for a

toxicological review of all products. The Art & Craft Materials Institute was formed so that companies could band together to hire toxicologists to advise them on labeling, and within two years some 90% of the industry had begun the relabeling process. Meanwhile six states passed laws mandating health labeling and five of these included D 4236. A similar bill including D 4236 passed the U.S. House of Representatives in October.

The Art & Craft Materials Institute employs a primary toxicologist, Woodhall Stopford, M.D., of Duke Medical Center and a board of three other eminent toxicologists to advise him. The Institute's advisory board is composed of Jay M. Arena, M.D., Professor of Pediatrics at Duke University, Tom S. Miya, Ph.D., Dean of the School of Pharmacy at the University of North Carolina and Leonard J. Goldwater, M.D., Professor Emeritus of Occupational Medicine at Duke University. National Artists Equity Association has representatives on the Institute's certifying committee along with representatives of school teachers and administrators. At meetings of this committee the toxicologists detail the reasons for their decisions concerning hazard labeling. Their decisions are difficult and sometimes the requirements change as the results of new studies become available.

There are poisonous substances in very small amounts in almost everything, for instance, arsenic in lettuce and oranges; so it is not enough to analyze a product and find it contains a hazardous substance. Some way must be found to decide what amount of that substance will be harmful if someone were exposed to it over many years. If the health effect is cumulative, as it is with lead and cadmium, it is also neccessary to consider other sources of exposure to that substance. Lead accumulates in the body and since automobile engines add lead to the atmosphere, a smaller exposure to lead paints today might cause an illness than would have been harmful in pre-industrial times.

This has meant that the Institute, in addition to relying on information from government agencies, has to consider current test methods and types and amounts of probable exposure. To my knowledge this is the only industry that has approached these difficult issues in a cooperative fashion. The following infomation comes from those meetings.

Pigments

Manufacturers must submit to Dr. Stopford for review the formulations for all products that were evaluated prior to 1982, and must send him samples of all colors containing cobalt violet. Dr. Stopford has decided to have cobalt violet paints anaylzed for solubility. Cobalt like cadmium is definitely toxic, but it has been accepted in the past that in artists' paints these heavy metals are present in an insoluble form. In other words, they cannot be absorbed and thus cannot harm the human body. Another important cobalt pigment, cobalt blue (PB 28), is approved by the FDA for use on food packaging and in surgical suctures, in spite of containing cobalt and aluminum, because the metals are believed to be present in an insoluble form. Dr. Stopford requires warnings about cobalt or cadmium when they are present in a product in a form that can be absorbed by the human body.

Cobalt Violet has been present in artists' paints in two forms. One form contained arsenic, but it has almost completely disappeared from the market and is not in any paints reviewed by the Institute. The form in common use is cobalt violet phosphate and it is regarded as insoluble, but Dr. Stopford wants to study it more carefully to assure himself that this is true in all cases.

To date solubility has been determined by the British Toys Regulation method or its equivalent; however, a new ASTM D01.57 task group has just been established to work on developing a national consensus test method for determining solubility. If the method proves to be repeatable and reproducible, it will still be necessary to establish the connection between solubility and health hazards through an animal feeding study.

In 1982 Dr. Stopford reviewed artists' cadmium paints and tested the different brands of cadmium pigments for solubility. It was found that: (1) the cadmium pigment manufactured in England was practically insoluble, (2) the cadmium pigment manufactured in this country had a satisfactorily low solubility, but (3) a cadmium manufactured in Japan was very soluble and so presented possible health hazards. Companies within the Institute were forbidden to use this type of cadmium pigment. Finding this range of solubility among versions of the same, supposedly insoluble, pigment when it is manufactured by different companies, made the Institute toxicologists believe it is necessary to examine solubility variation among other pigments containing heavy metals.

The Institute toxicological board has decided to accept the results of a European study on cadmium yellow showing it is a carcinogen, even though the pigment used in the study was not the usual commercial product, because examination showed it had an identical chemical structure. Therefore, cadmium yellow paints must be labeled as a carcinogen. As a precaution all paints containing cadmium pigments must carry the warning statement, "Do not spray apply" since the hazard is from inhalation. Products where users are subjected to dusts also present the hazard. If cadmium paints are heated to extremely high temperatures, the resulting cadmium oxide fumes are definitely hazardous. Cadmium paints are not thought to be absorbed through the skin so they are safe to use in the traditional ways.

Some modern pigments and dyes are manufactured from chemicals that are toxic, but which are converted to harmless forms during the manufacturing process. The question arises whether significant amounts of the toxic chemical might remain in the finished product. Several years ago it was discovered that there were significant amounts of PCB's, which are very hazardous, remaining in certain brands of phthalocyanine pigments. The federal government banned sale of those forms of the pigment in this country, so the pthalocyanine pigments (artists' Thalo Blue and Green) on the market today are safe.

Another example is that benzidine can be found in the benzidine-derived type of direct dyes, and they must be handled with a great deal of care. These particular dark dyes are rapidly

disappearing from the market. There are also dyes based on toluidine and bioavailability studies are needed for these. Most are vat dyes.

It has been questioned whether there may be dangerous free amines in pigments derived from nitroaromatic amines. Pigments of this type include the Arylide Yellows (commonly called Hansa Yellows), some orange (Pigment Orange 36 and Pigment Orange 43) and red (Pigment Red 14, Pigment Red 17 and Pigment Red 194) pigments found in many paint lines. Indications so far are that this is not true, but Dr. Stopford has been pursuing the question and reported a new test for free amines developed by the Dry Color Manufacturing Association (DCMA) which he believes can be used successfully in making these determinations. This test method follows an evaluation of three types of analysis reported by DCMA last year. Companies must test for extractable nitroaromatic amines, as well as metals.

The Arylide yellows (Hansas) are very useful pigments. There are a number of them and they vary in lightfastness. There are seven with lightfastness good enough for use in artists paints and some are to be found in all paint lines. The newer versions of the pigment are especially good for permanence.

Pigment Orange 36, Benzimidazolone Orange HL, is given the highest rating, Lightfastness I, in artists' oil and acrylic paints, and so is Pigment Orange 43, Perinone Orange. When intermixed with white, paints made with these pigments result in higher chroma pale colors than Cadmium Orange does.

Pigment Red 14, Naphthol AS-D, has a Lightfastness II rating in artists' paints and is found in quite a few paint lines. Pigment Red 17, also a Naphthol AS-D, faded excessively in lightfastness tests. It does not meet the requirements of the artists' paints quality standard D 4302, but was assigned a Lightfastness III rating in acrylic paints. It is not even this good in oil paints, but nevertheless can be found in artists' paints. Pigment Red 194, Perinone Red Deep, is a valuable new pigment with a Lightfastness I rating in both oils and acrylics.

Dr. Stopford required that Pigment Red 53, known as Red Lake C, be removed from products or the products must carry warning labels and safe handing instructions by January 1, 1988. Disappearance of this pigment from art materials will not be a loss to the professional artist because Red Lake C fades in a short time. Unfortunately it was found in several manufacturers' paint lines in 1979 during the pigment identification tests sponsored by the Inter-Society Color Council and National Artists Equity.

Pigment Orange 5, known as Dinitraniline Orange, must be removed from products or they must carry the warning statement and safe handing instructions. This pigment has been a valuable addition to artists' paints. It has a Lightfastness II rating.

Questions have now been raised about all the lightfast oranges and many reds. Test methods are now being developed that should show whether or not any, in addition to Pigment Orange 5, actually pose a hazard. Indications at this time are that they do not; however, until the test results are in it is impossible to know whether all are safe, or whether one is safer than another to use. It will be too bad if recent negative publicity in the general press drives the cadmium pigments from the market and then it turns out that the other oranges and reds present equal or more hazards.

Markers and Spray Products

Regarding possible hazards in using markers: A risk assessment has been completed on xylene and up to 40 ppm is considered a safe level of exposure for pregnant women. Xylene can present a hazard to a developing fetus. An Institute study will be done to assess whether or not markers containing xylene can release that much xylene in the air. A health survey of six ad companies using 300 markers a month showed that something was affecting the artists' health; but the artists were exposed to other substances that would cause the same symptoms, and, when tested, the air in the studios did not contain elevated amounts of xylene. Further study showed that spray adhesives were the hazard because the test results showed a correlation between the amount and manner of use of spray adhesives and the health effects.

While this study did not show a hazard from xylene in markers, there is a machine on the market that blows the color out of markers. These machines definitely must carry hazard labels because the amount of xylene released in the air is greatly increased.

Rhodamine B, a coloring agent used in fluorescent and high chroma markers, is an experimental cancer agent at high levels but the risk in markers is minimal since markers contain such a small amount and since Rhodamine B has to be ingested or absorbed to present a hazard; nevertheless, Dr. Stopford is requiring that the Rhodamine B must be listed on the label. He is also developing a method of determining what the exposure is in a working situation. The questions to be answered include: how much Rhodamine B is there per inch of marker line and, assuming that all the Rhodamine B is absorbed, what is someone's exposure over time using a quantity of the markers?

Manufacturers were told that methylene chloride, which is sometimes used in spray products, paint strippers and some markers, must be removed from all children's products; and any adult products that contain a significant amount must carry warning labels. There are still questions about whether it poses a significant hazard; but the toxicologists had decided last year that there were sufficient suspicions to warrent warnings about possible hazards and to get it out of children's products. All companies were required to send the Institute office an affidavit that this has been done and, in the case of those adult materials where there is not a satisfactory substitute, the company must send the Institute office copies of the warning labels.

The main hazard comes from sprays and paint removers that release a great deal more methylene chloride into the air than markers do. Without sufficient ventilation these can cause heart irregularities in people with angina. At very high levels of exposure they can result in nervous system damage and even death. Federal regulations require warnings about adequate

ventilation; but now a government test indicates that methylene chloride may cause cancer, which calls for a different type of warning and indicates that lower exposure may present a danger.

Ironically, one factor that has delayed the substitution of other solvents for methylene chloride in spray products has been that the substitutes are lighter in weight, so the same size spray can weighs less. Companies were afraid that customers would purchase by weight, believing they were getting more for their money.

Ceramics

The first set of tests on emissions from ceramic kilns was performed at the University of North Carolina on bisque (greenware) and glaze firings in both small and large electric kilns using three levels of ventilation. The study recommended that low sulfur clays should be used and all kilns should be ventilated. The amount of carbon monoxide and formaldehyde given off was greater when firing bisque than when firing these glazes; but an exhaust fan, or preferably a hood fan, took care of the problem. In this set of tests the glazes, Duncan E-Z Flow Light Eggnog Ceramic Glaze and Amaco Chrome Green Majolica Gloss Glaze, did not give off detectable metal fumes.

A second set of tests on the emissions from ceramic kilns is planned. This time tests will be conducted on high solubility lead glazes. Tests on decal and luster firings will be delayed until the lead tests are completed.

Lead is considered carcinogenic in all forms. Fifty percent of all glazes contain lead. The Institute's position is that long years of making ceramics, either as a hobby or as a professional potter, is similar to industrial exposure. Dr. Stopford believes that education about proper precautions is effective because background levels of lead in the blood, even with long term high exposure, are not high when people are instructed about ventilation and cleanliness.

The light microscope has been used to examine samples of talc for asbestos and asbestos-like particles. Smaller particles than can be seen with these microscopes have now been shown to cause cancer. The electron microscope can detect these, so a new method of examination using the electron microscope will be developed by the toxicologists.

Masks and Respirators

Dr. Stopford recommended that companies not market cartridge respirators because fit to the user's face is so important. Getting a correct fit is especially difficult for women and almost impossible for men with beards. Companies might be sued if someone purchased a respirator that did not fit properly and later became ill. He did recommend some inexpensive dust masks from 3M that have good fit, but repeated last year's warning that wearing a dust mask could be very dangerous to someone who is using organic solvents. Accumulated dust in the mask can absorb the solvent vapor and concentrate it near the wearer's nose. People must be certain to use the proper mask for the job they are doing.

CALLS FOR PAPERS

Royal Photographic Society Symposium on the Quantification of Images to be held at the University of Cambridge September 18-22, 1989. It is hoped that this theme will embrace the full spectrum of topics from the relatively simple measures of the granularity and modulation transfer function of photographic images, to the more complex assessment and processing of pictorial images. It is expected that 'images' should should be interpreted in its broadest sense to include both photographic and electronic, both analogue and digital, both colour and monochrome. A title and short abstract (200 word) should be submitted as soon as possible. If accepted, authors will be asked to produce a short paper for the Conference Proceedings which will be published as a special issue of the Journal of Photographic Science. Abstract deadline is December 31, 1988. Abstracts or enquiries should be sent to: Dr. M. R. Pointer, Kodak Limited - Research Division, Headstone Drive, Harrow, Middlesex HA1 4TY, England.

1989 ISCC Annual Meeting The poster paper session at last year's annual meeting was such a success that we have decided to repeat it and expand upon the concept at the 1989 meeting in Chicago. The expansion involves a contributed papers session where you, the ISCC general membership, are encouraged to submit contributed papers for either oral or poster presentation. The intent of this contributed papers sessions is to provide a forum for us to share state-of-the-art color information. Whether you are an artist, scientist, industrialist, educator, student or researcher, we want to hear what is new in your area of color. We are asking for both oral and poster presentations to promote verbal as well as written color communication, whichever may be more appropriate for your subject matter. The topics for this contributed papers session are completely open.

Don't miss this opportunity to present the innovative color work that you may be doing on a daily basis. Please send your entries, in the form of a title and abstract, to: Paula J. Alessi, 10 Bay Park, Webster, NY 14580. Please feel free to call Paula at (716) 477-7673 with any questions that you may have.

ISCC Williamsburg Conference "Color Discrimination Psychophysics" to be held on November 28 - December 1, 1989 at Colonial Williamsburg, Virginia. Abstract deadline is February 28, 1989. For Information contact Dr. Roy Berns, Rochester Institute of Technology, P. O. Box 9887, Rochester, New York 14623-0887 or (716) 475-2784.

Symposium on Daylight and Solar Radiation Measurement A symposium covering spectral and broadband measuring methods, instrumentation, calibration and standards, data acquisition, solar radiation and daylighting simulation will be held at Technische Universitat Berlin (West), Germany. The working language of the symposium will be English. Deadline for abstracts is February 15, 1989. Information: Herr Prof. Dr. H. Kasse, Institut fur Lichttechnik der Technischen Universitat Berlin, Einsteinufer 19, D-1000, Berlin 10 GERMANY. Tel.: (030) 314 224 01.

MORPHOGENESIS OF A PROJECT COMMITTEE

We have been asked: How are project committees established?

First: a problem is recognized by one or more individuals. This is very likely to occur during, or as a result of, a meeting of an Interest Group. Next: A small group (from 1 to 5 people usually) try to identify specific projects that will contribute to the solution of that problem. When a project has been identified for which a scope can be defined and objectives, achievable within a period of 1 or 2 years, can be clearly stated, this scope and objectives can be submitted to the board of directors for approval. At the same time, a recommendation for a chairperson and active committee members should be submitted. It is the consensus of the board that it is unlikely that any one individual will be able to effectively chair more than one project committee at a time.

BUENOS AIRES AIC MEETING

Enclosed with this issue of ISCC News is a brochure from Garber Travel on arrangements they offer for the AIC, March 13-17, 1989 meeting in Buenos Aires. Garber comes highly recommended to us and is affiliated with the agency making all AIC Congress arrangements in Buenos Aires. We find their rates competitive and they promise lowest cost connection to New York or Miami from anywhere in the U.S. or Canada. They offer the convenience of "one-stop shopping", including hotel reservations and handling of meeting registrations. They also are arranging attractive optional pre- and post-congress tours to Brazil and Peru.

If you plan to attend the AIC Meeting, note that you can save $50 on registration fees if you register before December 31, 1988. Phone Garber on (800) 225-4570 and they can register you. For additional information on the meeting, including the meeting circular and registration forms, phone Garber directly or you can contact me (313) 483-8245. *Allan B. J. Rodrigues, Past-President & AIC Liaison*

CALENDAR

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

Harry K. Hammond, III
Pacific Scientific Instrument Division
2431 Linden Lane
Silver Spring, MD 20901
(301) 495-7046

1988

AATCC NATIONAL COMMITTEE MEETING, Nov. 15-17
The Doral Inn, New York, New York, Information: Jerry Tew, (919) 549-8141.

1989

ASTM COMMITTEE E12 ON APPEARANCE, Jan. 15-17
Embassy Suites Hotel, 1100 SE 17th St. Ft. Lauderdale South, Florida 33316. Information: Sharon Kauffman, (215) 299-5599.

ASTM COMMITTEE D01 ON PAINT. Jan. 15-18
Embassy Suites Hotel, Ft. Lauderdale South, Florida. Information: David Bradley, (215) 299-5504

AATCC NAT'L COMMITTEE MEETINGS, Feb. 14-16
Hilton at University Place, Charlotte, North Carolina. Information: Jerry Tew, (919) 549-8141.

AIC COLOR 89, Mar. 13-17
Centro Cultural, General San Martin Sarmiento 1551, Buenos Aires, Argentina. Information: Grupo Argentino del Color, Division Optica, INTI, c.c. 157,1650 San Martin (BA), Argentina or Allan Rodrigues, (313) 583-8245.

ISCC ANNUAL MEETING, Apr. 9-11
Chicago, Illinois

AATCC NAT'L COMMITTEE MEETINGS, May 9-11
AATCC Technical Center, Research Triangle Park, North Carolina. Information: Jerry Tew, (919) 549-8141.

ASTM COMMITTEE E12 ON APPEARANCE, May 15-16
National Institute of Standards and Technology, Gaithersburg, Maryland. Information: Sharon Kauffman (215) 299-5599.

SID International Symposium, May 15-19
Society for Information Display Symposium, Seminar, and Exhibition, Baltimore Convention Center, Baltimore, Maryland. Information: Jay Morreale, (212) 620-3371.

FSCT - Federation Spring Week, May 16-19
Seminar on 16th & 17th, Society Officers' meeting on 18th, and Board of Directors' meeting on 19th. Airport Marriot Hotel, Los Angeles, California. Information: (215) 545-1506.

CORM ANNUAL MEETING, May 17-19
National Institute of Standards and Technology, Gaithersburg, Maryland, Information: Norbert Johnson, (612) 733-5939.

WORK WITH DISPLAY UNITS, Sept. 11-14
Second International Scientific Conference, Queen Elizabeth Hotel, Montreal, Canada. Information: Diane Berthelette (514) 288-1551.

ROYAL PHOTOGRAPHIC SOCIETY, Sept. 18-22
Symposium on the Quantification of Images, Clare College, University of Cambridge. Information: Dr. M. R. Pointer, Kodak Ltd, Harrow Middlesex, HA1 4TY England, Tel. 01 427 4380.

CIE INTERIM MEETING, Oct. 2-3
Information: Dr. J. D. Schanda, Central Bureau, A-1030 Vienna, Kegelgasse 27 Austria, or Dr. Jack Hsia (301) 975-2342.

SYMPOSIUM ON DAYLIGHT AND SOLAR RADIATION MEASUREMENT, OCT. 9-11
Technische Universitat Berlin (West), Germany. Information: Herrn Prof. Dr. H.Kaase, Institut fur Lichtechnik der Technischen Universitat Berlin, Einsteinufer 19, D-1000 Berlin 10 GERMANY. (030) 314 224 01.

OPTICS 89, Oct. 15-20
Optical Society of America Annual Meeting, Orlando, Florida. Information: OSA, 1816 Jefferson Place, N.W., Washington, D.C. 20036, (202) 223-0920.

FSCT, Nov. 8-10
Federation of Societies for Coating Technology 67th Annual Meeting and 54th Paint Industries' Show, The Rivergate, New Orleans, Louisiana. Information: (215) 545-1506.

AATCC NAT'L COMMITTEE MEETING, Nov. 14-16
The Doral Inn, New York, New York, Information: Jerry Tew, (919) 549-8141.

ISCC WILLIAMSBURG CONFERENCE, Nov. 28-Dec. 1
"Color Discrimination Psychophysics", Colonial Williamsburg, Virginia. Information: Dr. Roy Berns, (716) 475-2784.

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American Psychological Association (APA)
American Society for Testing and Materials (ASTM)
American Society of Interior Designers (ASID)
American Society for Photogrammetry and Remote Sensing (ASPRS)
The Color Association of the United States, Inc. (CAUS)
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Gemological Institute of America (GIA)
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Illuminating Engineering Society (IES)
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National Association of Printing Ink Manufacturers (NAPIM)
National Paint and Coatings Association, Inc.(NPCA)
Optical Society of America (OSA)
Society for Information Display (SID)
Society of Motion Picture and Television Engineers (SMPTE)
Society for Imaging Science and Technology (SIST)
Technical Association of the Graphic Arts (TAGA)
Technical Association of the Pulp and Paper Industry (TAPPI)

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