

Inter-Society Color Council *News*

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Kumar, Ann Laidlaw, and Joel Pokorny. Guests included Robert Marcus; Mike Hammel; Fred W. Billmeyer, Jr.; Allan Rodrigues and Richard Harold. It was reported that President Alessi is doing well after the birth of her son. Director JoAnn Taylor was intending to attend, but illness in her family prevented her at the last moment.

Since only 7 voting members were present, Ellen Carter held proxy for Michael Brill, Richard Harold held proxy for Philip Hunter and Roland Connelly held proxy for both Paula Alessi and Joann Taylor.

Student Chapters

Bob Chung presented a proposal on the establishment of ISCC student chapters. The ISCC will have much to gain from student chapters, such as an increased student membership base, strengthened interactions among ISCC student members through a student chapter networking mechanism, and help from the student chapters with conference activities like registration and audio visual support. The student chapters will have much to gain as well. As a campus organization, the student chapter can help stimulate interests in color as it relates to many different disciplines from art to science to technology. It was decided that the responsibility of student chapter establishment should fall under the Education Standing Committee with Bob Chung as Chairperson. Bob's plans include overseeing the establishment of the first ISCC student chapter at the Rochester Institute of Technology, asking ISCC members to serve as student chapter advisers, conducting a student paper competition to spark interest in ISCC, having ISCC members address student chapters when they travel, and having student chapters report on their activities at ISCC Annual Meetings. If you have any ideas for these student chapters or for the Education Standing Committee, please contact Bob Chung!

ANSI Z535

Fred Billmeyer brought some business regarding ANSI Z535. This is the Committee on Safety Colors. The ISCC sits on this committee. Belinda Collins, NIST, has requested that the ISCC recommend an additional member. Currently, Fred W. Billmeyer, Jr., Nick Hale and Norb Johnson serve. Fred W. Billmeyer, Jr. recommended that Robert Marcus consider representing the ISCC and Pantone.

STANDING COMMITTEE REPORTS

Publications Committee - Mike Hammel would like to get the

PRESIDENT'S COLUMN

PA

In the spirit of keeping the general ISCC membership informed, I will summarize the ISCC Board of Directors Meeting that took place on Sunday,

January 17, 1993 at the Crown Sterling Suites Hotel in Ft. Lauderdale, Florida in conjunction with the ASTM Committee E-12 meeting. Due to the November 10th birth of my son, it was not possible for me to attend this meeting. I would like to thank President-Elect Roland Connelly, for presiding over the meeting in my absence! I also would like to thank Secretary, Danny Rich for providing me with the meeting minutes so that I could prepare this written summary.

The Officers present at the meeting were Roland Connelly, President-Elect; Hugh Fairman, Past President; and Danny Rich, Secretary. The Directors present were Ellen Carter, Romesh

President's Column, continued

Newsletters out as close as possible to the first of the reporting. Thus, submitted material must be in Mike Hammel's hands by the first of the even numbered months. Last minute inserts in the Newsletter should be avoided. Anyone with submissions to ISCC News should submit materials to Mike Hammel, the Publications Committee Chairperson, and not directly to the printer.

Nominating Committee - Congratulations are extended to the newly elected Directors: Joe Campbell, Robert Marcus and Gary Beebe. We look forward to your 1993-1996 term of office!

Membership Committee - Ann Laidlaw reported that the new application form includes a box for interest group affiliation and changes to the Color research & application fees and dues structure. A postcard is being sent out to the membership to quantify changes to the mailing list. Currently, 900 Newsletters are being printed. Ann, being the active ISCC membership recruiter that she is, would like mailing labels for all non-ISCC members who attended the Princeton Meeting to solicit them for membership.

IMG Member Body - Paul Hoffenberg submitted a written report. He has input and evaluated the results of the 160 surveys sent out by Lou Graham. Paul's intention is to shape the information learned from the surveys into an agenda for the IMG meeting in Newport such that his committee can get as broad and meaningful a participation level as possible. Paul would like to put out an agenda in advance of the meeting structured to be a working meeting (i.e. not a communication-only meeting) where all who attend are encouraged to participate. Paul hopes that this year's IMG meeting can define a set of goals for the IMG and lay a plan and structure for achieving those goals. Since most of us are IMG members, it is in our best interest to give Paul our support and ideas by attending his meeting!

Color Research & Application - Dave Alman documented the ISCC-related communications that have appeared in volume 17 of *Color Research and*

Application as well as those coming early in volume 18. Interest Group and Poster Paper authors from the 1992 ISCC/AIC meeting in Princeton have been approached to submit their papers to *Color Research and Application*. Interest Group and Contributed Papers Chairpersons should be encouraging their authors to publish their presentations in the journal!

Ad-hoc Committee on Executive Staff - Roland Connelly reported that more work needs to be done on clearly identifying the costs associated with establishing an ISCC executive staff position. Roland feels that a permanent staff person will increase the Council's income by providing improved services. Roland will continue to work with the Finance Committee to generate a 5 year budget which will average lean years with fat years to determine affordability.

Problems Committee - Hugh Fairman reported that Project Committee 32, Image Technology, is finishing their bibliography. Project Committee 44 (PC-44), Uniform Color Solid, has had an experiment run for them at RIT. A written report on the experiment must be prepared. Joy Luke has made an extensive survey of the committee's proposed model against other known color order systems. A report will be issued in April. Klaus Witt (BAM in Germany) sent measurements of samples from the DIN color order system to be used to test the spacing. A decision whether to further pursue this topic will be made at the committee meeting in Newport. Current feeling of the Chairperson is that the PC-44 recommended space is no better than other existing spaces. Project Committee 49, Improved Colorimetry, had three activities. All data collected to date is now available on diskette for further study by any interested people, but this availability had not been widely publicized. Joel Pokorny has a graduate student studying the rod contribution in the Thornton data under his low light level conditions. The CIE is going to hold an invitation only symposium, in Vienna, on Improvements in Colorimetry and the Standard Observer. Thornton and

Billmeyer will prepare a paper. The meeting is to cover this and other topics related to basic colorimetry.

ANNUAL MEETINGS

1994 - Detroit, MI - (April 24-26, 1994) The hotel is arranged at a cost of \$90 per night. The hotel is the Marriot in Troy, MI. The meeting is to be co-sponsored with the Detroit Color Council. The ISCC Co-Chairpersons are Jim Keiser and Jim Cave.

1995 - The location will be Greensboro, NC. Roland Connelly will seek a program chair.

1996 - This location is still open. Anyone with suggestions is encouraged to contact President-Elect, Roland Connelly.

WILLIAMSBURG CONFERENCES

1994 - (Feb. 23-25, 1994) Richard Harold reported that the topic will be Fluorescence. The Board meeting will be held on Saturday Feb. 26, 1994 after the meeting. Verbal response to the meeting has been very good. The meeting should be a sell out. The ISCC will publish extended abstracts for the meeting and encourage the authors to submit papers to Color research & application. There will be some limited corporate sponsorship.

1995 - (Feb. 5-8, 1995). The theme is a Panchromatic Conference. Mike Brill will check out the facilities for handicapped attendees.

OLD BUSINESS

The TAGA Proceedings (250 copies) from the recent Williamsburg Conference have been received by the Secretary's office. What should be done with these copies? It was agreed that they would be sold for \$70.00 per issue.

This concludes my summary. If anyone has any questions or concerns, please feel free to contact me by phone at 716-225-4614 or by mail at 24 Guinevere Dr., Rochester, NY 14626.

Paula J. Alessi, President, ISCC

NEW MEMBERS

We are pleased to list the latest members to the ISCC.
Welcome!

Mr. Robert P. Anthony
American Inks & Coatings Corp.
Box 803
Pawling Road
Valley Forge PA 19482
USA

Ms. Gillian Buerger
PaintPlas (1989) Inc.
650 Finley Avenue
Asax ON L1S 6N1
Canada

Mr. Todd D. Danielson
Milliken Chemical
920 Milliken Road
M-401
Spartanburg SC 29304
USA

Mr. Tony Fabrizio
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1845 W. Dartmouth
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Ms. Cynthia Gerus
Uniform Color Company
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Ms. Charla S. Haley
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USA

Mr. Michael C. Haller
M. C. Scientific
806 Gray Street
St. Charles IL 60174
USA

Mr. Richard Harrigan
Fashion Institute of Technology
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Mr. Frank S. Welsh
Architectural Coatings Analysis
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Mr. Tom Yonelunas
GIA Gen Trade Lab
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USA

DR. FRED W. BILLMEYER, JR. PRESENTED THE GODLOVE AWARD

At the Annual Meeting in Newport, Rhode Island, Dr. Fred W. Billmeyer, Jr., was presented with the highest honor the Inter-Society Color Council can bestow, the prestigious Godlove Award.

The Godlove Award was established in 1955 in memory of Dr. I. H. Godlove and is given in recognition of a lifetime of contributions to the color community. Even though Dr. Billmeyer's work relating to color comprises only part of the legacy of his achievements, his contributions to the advancement of knowledge about color and to the dissemination of that knowledge have been outstanding and unique.

Dr. Billmeyer's career related to color divides into six main areas. The one that means the most to him is having directed and mentored more than thirty post-baccalaureate, and many baccalaureate candidates, in the fields of color and polymer science. Other areas of major achievement include establishing and directing The Rensselaer Color Measurement Laboratory, publishing over 275 articles and thirteen books on color and polymers, drafting at least a dozen important and widely used American Society for Testing and Materials (ASTM) national consensus standards, training approximately a thousand students from industry in the principles of color technology, and founding and serving as Editor-in-Chief of the leading color journal in the world, *Color Research and Application*.

Dr. Billmeyer received his Bachelor of Science in chemistry from the California Institute of Technology in 1941 and his Ph. D. in physical chemistry from Cornell University in 1945. From 1945 to 1964, he worked for E. I. du Pont de Nemours & Company and after 1951 was also selected to be Lecturer in High Polymers at the University of Delaware. In 1956, Du Pont purchased two of the G.E. Hardy Spectrophotometers. One of these was located in Dr. Billmeyer's Experimental Station Laboratory in Wilmington, Delaware. In 1960 and 1961, on loan from Du Pont to the Massachusetts Institute of

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Technology, he established and taught courses in polymer science as Visiting Professor in Chemical Engineering.

During these years, he began his work in color by devising a graphical method of calculating CIE color coordinates from Hunter colorimeter readings. He devised color order systems for, and applied color difference measurements to, transparent plastics. He carried out pioneering research on computer color matching, and began publishing a distinguished series of articles on color measurement that continues today. Altogether he has published some 275 technical papers on color and polymer science. The value of these papers is made evident by how extensively they are referenced in the literature. In 1955-57, he wrote the first edition of *Textbook of Polymer Chemistry*. In 1960-61, he revised it under the title *Textbook of Polymer Science* and has continued to update the book through three more editions.

In 1964, he resigned from Du Pont to join Rensselaer Polytechnic Institute (RPI) as Professor of Analytical Chemistry, and soon established a course on color because he had become convinced of the importance of color technology in industry. Within the chemistry department, he established The Rensselaer Color Measurement Laboratory, which was the principal center of color science activity in the United States for twenty years. Here he supervised courses leading to degrees in chemistry with a specialization in color science. Fifteen Doctor of Philosophy, eleven Master of Science and a few Bachelor of Science degrees were awarded. Today these graduates have moved into industry and academia to form a major part of the leadership in color technology.

In The Rensselaer Color Measurement Laboratory, he also directed the work of visiting scientists and postdoctoral research in color. The Laboratory contained traditional as well as the latest in color instrumentation. Dr. Billmeyer also established a series of highly successful continuing education courses on color that were held at the Laboratory during the summers. Over

the twenty years, the courses introduced modern color theory and measurement practices to roughly a thousand individuals from industry, and at the same time put his students in touch with the practical problems in the business world. The courses included the basic Principles of Color Technology, Advances in Color Technology, and (with the assistance of Max Saltzman) Color Technology for Management.

In 1966, John Wiley and Sons published the first edition of *Principles of Color Technology* co-authored by Fred Billmeyer and Max Saltzman. A second edition of this influential book was published in 1981 and it remains the premier textbook in the field. In 1975, he wrote the book *Entering Industry: A Guide to Young Professionals* with R.N. Kelly.

As his retirement approached in the early 1980's, Dr. Billmeyer became

UNIVERSITY CORNER

R.I.T. FORMS FIRST ISCC STUDENT CHAPTER



Students at the Rochester Institute of Technology, in Rochester, N.Y., have recently organized the first student chapter of ISCC.

The goals of this chapter are to become more involved in the world of color outside the classroom, to increase interaction between students and the national ISCC organization, and hopefully to have some fun. The chapter has received club status at R.I.T. and, through the efforts of Bob Chung, has been recognized by the parent chapter.

This inter-disciplinary organization currently has members majoring in color science, imaging science, photographic technology, printing technology, graphic arts, and fine arts photography. The students plan to host workshops and tours of their departments for other members. The group hopes to expand its membership to include students in psychology, chemistry, physics, and computer technologies.

The chapter will present a poster at the 1993 ISCC Conference in Newport, R.I. this month, describing the formation of the chapter and encouraging other colleges and universities to do the same. Many of the chapter's members will be attending the ISCC Conference this

month. Chapter president, Tim Kohler will discuss "A Method of Reducing Metamerism and Increasing Gamut Through the Use of Five or More Colored Inks." Club member Nathan Moroney will present a talk entitled "Color Space Selection for JPEG Image Compression." Tim and Nathan are also the designers of the ISCC Lovibond Golden Amber Beer labels which will be featured at the conference.

This new student chapter is designing a banner, which will illustrate the connection of the group to ISCC as well as its uniqueness as a student chapter. The group hopes to sponsor speakers on campus, workshops, "field trips," and social activities. You'll undoubtedly be hearing more about this and other student chapters of ISCC in future editions of the University Corner.

MORE ABOUT THE UNIVERSITY CORNER...

In previous issues of ISCC News, this column contained only information about RIT and was thus called the "InterR•I•Testing Column". The new name, "University Corner", reflects the *News's* desire to encourage other students involved in color fields to contribute to this column. Anyone wishing to contribute to University Corner, should submit ideas and articles to Karen Rybarczyk, Center for Imaging Science, Rochester Institute of Technology, P.O.Box 9887, Rochester, NY 14623-0887.

Karen Rybarczyk

concerned about the continuation of the color science program at Rensselaer. Despite some encouragement from Richard S. Hunter, the requirements set by the Rensselaer administration made it clear that the necessary support for continuing the program would not be forthcoming, and Dr. Billmeyer began to seek a location where the idea would be received more favorably. This was found at the Rochester Institute of Technology, and a new program was founded there in 1982.

For many years, Dr. Billmeyer had served as Trustee and Secretary to the Munsell Color Foundation, established by the Munsell family to fund studies leading to increased knowledge about color. While the Foundation funded important research, including some at Rensselaer, the directors decided in 1983 that the best use of its funds would be to donate them to assist the new program at R.I.T., which became known as the Munsell Color Science Laboratory.

When Dr. Billmeyer retired in 1984 from Rensselaer, he was named Professor Emeritus. The Color Measurement Laboratory was closed and Fred Billmeyer was able to transfer books, instruments, and visual teaching materials to Rochester for use by the new Munsell Color Science Laboratory, forming the basis for its program of instruction on color. In fact, he contributed much more than supplies to the laboratory's success because Dr. Roy Berns, the Richard S. Hunter Professor currently heading the Munsell Color Science Laboratory, is one of his former doctoral students.

Dr. Billmeyer has been a major figure in the Inter-Society Color Council since the early 1960's. In 1964, he was elected a director. In 1966, he was elected Vice President and, in 1968, he became President of the Council. In 1970, he was elected to the time consuming job of Secretary and remained in that office until 1982. For 12 years, he maintained the ISCC records, corresponded with prospective members, and managed the myriad of details that are necessary in the administration of a national

organization. Currently, the work he did as Secretary is divided among several people.

He encouraged his students, and anyone else he met who had an interest in color, to join the ISCC. Eight of his students have served on the ISCC Board of Directors. One of his former students Paula Alessi, is currently ISCC President, and Dr. Danny Rich, also a former student, is the current ISCC Secretary. Dr. Billmeyer's interest in the ISCC has continued past his retirement. He is active in ISCC Interest Groups; he is currently co-chairman with Dr. William Thornton of Project Committee 49, Improved Colorimetry; and he is a member of Project Committee 44, Uniform Color Solid.

In 1978, the ISCC presented him with the Macbeth Award for recent outstanding accomplishments in the field of color. In 1983 he was awarded the first Nickerson Service Award for his outstanding service to the Council through the years. He has been made an Honorary Member of the Council in further recognition of those years of service.

Dr. Billmeyer was instrumental in interesting John Wiley & Sons in publishing a journal on color. He served as Editor-in-Chief of that journal, *Color Research and Application*, for eleven years, from its founding in 1976 through 1986. He has continued as Founding Editor to assist Mr. Rolf Kuehni and now his former student, Dr. Ellen Carter, who have followed him as Editor-in-Chief. Fred Billmeyer always contributed an extra measure of time and attention to ensure that the journal represents the best in scholarship and has, at the same time, strived to encourage articles from all color fields and from all over the world.

For the first few issues, when submitting authors were not yet familiar with the journal, the editor's job was even more time consuming than it is today. Dr. Billmeyer worked untiringly with authors to put their articles in an appropriate form and to help those for whom English was a second language make their points clearly. Frequently, this required several drafts with Dr.

Billmeyer consulting with the author and editing each one. Few people would make the effort Fred Billmeyer did to assure that a journal exists for the international exchange of information about color. It was his leadership and policies that led to endorsement of *Color Research and Application* by national color organizations from eight countries. The ISCC, representing the United States, was among the first of such Endorsing Societies.

Dr. Billmeyer's active participation through the years in international organizations connected with color was important in making the contacts necessary to create a truly international journal. His work for the Commission Internationale de L'Éclairage (CIE) included studies on calculation of tristimulus values from 1981 through 1984 and on fluorescent measurement from 1975 to 1983, culminating in the publication of CIE Technical Report No. 76 in 1988. In recognition of his many contributions, he has been made a Life Member of the U.S. National Committee of the CIE.

He has also been very active in the International Color Association (AIC). Among other contributions to the AIC, he prepared the Technical Report "Survey of Color Order Systems" in 1985. This was updated to 1986 and, through the generosity of Mr. Faber Birren, made more widely available as the "AIC Annotated Bibliography on Color Order Systems."

Dr. Billmeyer has also made a significant contribution to color through his participation in the American Society for Testing and Materials (ASTM). He joined ASTM in 1971 and is currently serving on Committees D-01 on Paint and Related Materials, D-20 on Plastics, E-12 on Appearance, and E-4 on Road and Paving Materials. His knowledge and experience led to an appointment to the important ASTM Standing Committee on Terminology.

Within each of these committees, he has taken an active part in the subcommittees that do the work necessary to develop national consensus standards. He is active in seven of E-12's eleven subcommittees and his input to

each is significant. He is chairman of Subcommittee E-12.01, Editorial and Terminology, which is revising the important Standard Practice E-284, Terminology of Appearance. If there ever was a thankless, but important task, it is to undertake the revision of technical terms. The ability to communicate ideas depends on use of terms with clearly defined meanings, but since in the past most terms have been used to convey several different concepts, it is difficult to reach a consensus on a specific meaning for each term.

He has served informally as secretary to both Subcommittee E-12.07 on Color Systems and E-12.02 on Spectrophotometry and Colorimetry. In E-12.07 his input has been crucial in developing two national consensus standards on color systems. He has drafted eleven other standards that have been approved and has extensively revised six more. ASTM has recognized his outstanding contributions by presenting him with its Award of Merit, making him a Fellow of the Society.

Dr. Billmeyer is a member of the Phi Kappa Phi and Sigma Xi honor societies. In addition to ASTM, he has been made a Fellow of the American Association for the Advancement of Science, the Optical Society of America, the American Physical Society, and the Society of Plastics Engineers. He is a 50-year member of the American Chemical Society and has served on its delegation to the ISCC. He is a member of the New York Society for Coatings Technology and the Federation for the Societies for Coating Technology, which awarded him the important Armin J. Bruning Award in 1977. He is a former Director and Secretary-Treasurer of the Council for Optical Radiation Measurements. He has been a member of the American Association of Textile Chemists and Colorists and of the Society of Dyers and Colourists of Great Britain. He also was a member of the Colour Group of Great Britain. He has actively encouraged the formation of color societies in other countries.

A list such as the one given above, of

the positions he has held and the organizations to which he belongs, and even of the honors these societies have bestowed on him, does not do justice to Fred Billmeyer's contribution to the field, because the effects of projects initiated by Dr. Billmeyer have spread to affect many industries and individuals. In fact, the trail of benefits and influence from his work extend into many industries that would not, at first, seem related to that work.

As an example, when he headed The Rensselaer Color Measurement Laboratory, he obtained a museum grant to enable his graduate students, Romesh Kumar and Judith O'Brien to analyze and identify the pigments in almost 800 artists' paints. The method, while not new, had been perfected by Max Saltzman, and Romesh's work further demonstrated its viability. The resulting report was of great benefit to artists and conservators, who are responsible for the permanence of paintings, and, furthermore, demonstrated to the art material industry that the identity of the pigments in their paints is not a trade secret. This led companies to agree to label their paints for pigment content

and to cooperate in the development of seven ASTM quality and health safety standards for artists' materials. The ASTM standard on labeling of art materials for chronic health hazards, D-4236, has since been become a national law.

In the final analysis his most important contribution to color is his willingness to take the time and energy to help anyone interested in color. There is no way to estimate the number of people he has introduced to the principles of color technology and personally assisted in every way he could. It is fitting that national organizations honor Dr. Billmeyer. Individuals receive their fundamental knowledge in college, their practical experience on the job, and a large part of their continuing education in organizations such as the ISCC and the others named above. Rare individuals such as Fred Billmeyer provide the knowledge and effort necessary to make these national organizations among the most important vehicles in this country for the dissemination of specialist knowledge.

Joy Turner Luke

NEWS FROM MEMBER BODIES

AATCC ACTIVITY UPDATE



Research Committee RA36 of AATCC met on Thursday, February 11, 1993 in Charlotte, N.C. The meeting was conducted by Mr. Bill Vogel, incoming chair of RA36. The committee reviewed work from the following subcommittees:

Gray Scale for Staining, Gray Scale Video

Test Method 153: *Instrumental Measurement*
Publications
CMC Recommendations
ISO Commitments
Terminology

Additional information regarding RA36 or any AATCC activities may be obtained by contacting the AATCC Technical Center at (919) 549-8141. RA36 will next meet in Warwick, Rhode Island, during the week beginning May 10, 1993. AATCC's next International Conference and Exhibition is scheduled for October 3-6, 1993, in Montreal, Quebec, Canada.

ASTM ANNUAL BOOK OF STANDARDS

ASTM

Regular
readers
of ISCC
News

know that ASTM publishes a number of standards on color and appearance. Many readers, however, are unaware of the multiplicity of standards published by ASTM and the frequency with which they are updated.

Each year ASTM publishes a revised edition of their *Annual Book of ASTM Standards*. This "Book" is in reality a "five-foot" shelf of fifteen separate sections, each of which has from two to nine volumes. The number of volumes including the index volume now total 78! Between 1,500 and 2,000 new and revised standards will be published in the 1993 Book. ASTM publishes a schedule of volume revisions so that the work of publication is spread throughout the year, and members know when to expect the issuance of each revised volume.

The Chairman of Committee E-12 on Appearance, W. N. (Nick) Hale, has been endeavoring to convince ASTM Managers to publish a separate volume of Appearance Standards. This has not happened in 1993. As a step in that direction, however, ASTM has this year transferred the Appearance Standards from Volume 14.02, that included standards on statistical methods, to Volume 6.01. This volume will contain standards for analyzing the chemical, physical, and appearance properties of paint, as well as the standards under the jurisdiction of Committee E-12 on Appearance.

Some years ago, the late Richard Hunter convinced ASTM to publish a separate compilation titled *ASTM Standards on Color and Appearance Measurement*, a third (1991) edition of which is still available. It contains 384 pages that include 70 standards used in appearance analysis for a variety of

products, together with the titles of other standards where color or appearance is involved but their evaluation is not the primary purpose of the standard. It also lists appearance-type standards published by other technical societies.

Each ASTM Standard has a category letter and an identifying number with the year of publication of the present edition. The index includes a listing of standards under key words, as well as a separate numerical listing. If you are looking for a standard on a given subject, consult the key-word index. If someone references a standard only by number, you can find the title by consulting the numerical listing. The numerical listing is particularly useful because the year of latest revision is given with the number.

In addition to being published in at least one volume of the Book of Standards, each standard is also available separately. ASTM accepts telephone orders for standards, and payment may be made by Amex, Master Card or Visa. Telephone 215-299-5585 or fax 215-977-9679.

Harry K. Hammond III

COLOR AND REFLECTANCE MEASUREMENT STANDARDS

"Results of preliminary field tests indicate that the new weight tables for computing color data from spectral measurements perform better than had been anticipated," says Fred Billmeyer, who has been working with Hugh Fairman in the Subcommittee on Spectrophotometry and Colorimetry of ASTM Committee E-12 on Appearance.

The field tests to which Billmeyer refers are being carried out in conjunction with the revision of ASTM Standard E 308, Test Method for Computing the Colors of Objects by Using the CIE System. "The purpose of this standard is to describe how to perform the detailed calculations necessary to provide the ultimate answers for color and color difference measurement," explains Harry Hammond. "In order to compute the color of an object, measurements of its spectral reflectance must be made by using a spectrophotometer. Ideally, the instrument should make measurements for very narrow bands of spectrum at very

frequent intervals. In practice, instruments are designed to make measurements at relatively large intervals and for relatively large bands. In addition, instruments of different manufacturers may use different intervals and have passbands of different width and shape." Some years ago, a long-time member of the Appearance Committee, William Venable, began to address these problems in a paper titled "Accurate Tristimulus Values from Spectral Data." [Color Res. Appl., v 14, p 260 (1989)]. Now Hugh Fairman has computed new tables of weights, taking into account the suggestions of Venable, that will minimize the effects of the differences inherent in spectrophotometers of different manufacture. Another approach might have been to develop instrument design standards that, if adopted by the instrument manufacturers, could eliminate the aforementioned differences. This approach, however, was deemed to be impractical.

A new Task Group on Field Trial of Tristimulus Weighting Factors (E12.02.02), chaired by Hugh Fairman is coordinating the field testing of the new tables. Thirteen members of the committee in different laboratories volunteered to participate in the testing program. Fairman has provided each of them with a diskette that contains the computer program. Each participant is asked to take ten sets of spectral data from his every-day operation and compute the colors represented by using both the old and the new tables. The data obtained from these integrations will reveal the accuracy of performance of the new tables. Fairman has already received about one-third of the data. Ultimately he will have more than 20,000 sets of data for the next meeting of E-12 scheduled for Atlanta in June 1993. The new weight tables have been carefully calculated, and the field tests will indicate precisely how much better they perform than the presently published tables.

At the January 1993 meeting of the Subcommittee, Fairman presented his ideas on "Electronic Interchange of Spectral Data" that resulted in the formation of task group E12.02.01. The goal is to develop a standardized format so

that spectral data can be transmitted from one laboratory to another without requiring transcription to have it readable by a color measuring instrument in another laboratory. At the present time, each manufacturer has his own data storage format; so to send a copy of a data file to another laboratory will likely require a translation, Fairman explained. "It's as if each instrument is speaking a different language and what we are attempting to do is to provide a common language so that instruments can talk to each other."

Fairman says that the standard data format will save untold hours of work for people acquiring data. "They will write a code to translate from the ASTM format to their format and then never have to do it again, provided that everyone adopts the ASTM standard. Ultimately it should become a feature of the machine, 'ASTM STANDARDIZED!'" A simple analogy will illustrate the advantage of the capability, Fairman says. "Suppose that from my New York office I want to specify the color to be used in a building in California. I can send the spectral reflectance of the desired color by wire and you will know instantly the intended color. The transmission standard will be similar to that being used in the medical field to standardize records." Fairman stresses, however, that the subcommittee desires to keep the standard simple. "We just want to be able to read each other's records. We do not need to transmit many kinds of data."

For more information about Standard E 308 contact Fred Billmeyer, 1294 Garner Avenue, Schenectady, New York 12309 (phone or fax 518-377-9511) or Hugh Fairman, 334 Springbrook Trail, Sparta, New Jersey 07871 (phone or fax 201-729-7278). For more information on Electronic Interchange of Spectral Data, contact Fairman.

Although not a World Class Standard like E 308, and not likely to revolutionize the appearance color communication like electronic interchange of spectral data, ASTM Test Method for Light Reflectance of Acoustical Materials by the Integrating Sphere Reflectometer (C 523) is important enough to industry that ASTM members requested it not be

withdrawn until it could be replaced. A new standard was drafted by Keith Walker with help from Fred Billmeyer and now C 523 is in the process of being withdrawn and replaced by E 1447, Standard Test Method for Luminous Reflectance factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

A documentary reflectance standard is very important to the acoustical ceiling tile industry because architects and illuminating engineers need to know the light reflectance of the tile that will be installed in a building. "All three major U.S. manufacturers use it, and smaller manufacturers probably use it too," says Walker, the industry member who requested the revision of the standard. Fred Billmeyer explains that "generally speaking, the thrust in architectural and lighting design is to make the best possible use of the sources of light by keeping the reflectances of ceilings and walls fairly high."

E 1447 does not include many drastic changes, says Billmeyer. Some additions have been made including a terminology section and a section on referenced documents. The most significant change involves the reference white material. For many years it was smoked magnesium oxide. Now it is a pressed powder prepared according to E 259 Practice for Preparation of Reference White Reflectance Standards with their reflectance based on that of the perfectly reflecting, perfectly diffusing ideal white, explains Billmeyer.

E 1447 can be purchased from ASTM Customer Service (215-299-5585).

Harry K. Hammond III

ASTM STANDARDS INTERNATIONAL

Standards International ASTM, one of the world's largest voluntary, full-consensus standards development organizations, is publishing an international newsletter. *ASTM Standards International* will provide the global standards community with the latest scientific and technical information on the standards development activities of ASTM's 131 technical committees. The newsletter, which is free of charge and

will be published periodically, will benefit those in industry, government, and academia by serving as a medium for the exchange of information and ideas. The first issue will be available in English and Spanish. Future editions may be printed in other languages.

Topics of interest will include ASTM's cooperative efforts with other international standards development organizations; international issues of environmental concern, such as radon testing, biodegradability, and recycling; current ASTM standards development activities; information on the newest ASTM publications; and announcements of ASTM meetings and Standards Technology Training Courses.

The first issue coincides with a nontechnical seminar to be held June 8, 1993 in Mexico City. The seminar will focus on the ASTM standardization system as it relates to international trade. It will encourage international participation in ASTM's technical committee work and increase awareness of ASTM standards, related publications, and their international availability. For more information on the seminar, contact Drew Azzara, ASTM, 1916 Race Street, Philadelphia, PA 19103, USA, (215) 299-5579, FAX: (215) 299-2630.

Organized in 1898, ASTM presently has over 34,000 technically qualified members throughout the world. ASTM has developed almost 9,000 standard test methods, specifications, practices, guides, classifications, and terminology. These standards cover a wide range of areas, such as paints, plastics, textiles, petroleum, construction, energy, the environment, consumer products, health care services, medical services and devices, electronics, and metals.

ASTM provides a forum where producers, users, ultimate consumers, and those having a general interest, such as representatives of government and academia, can meet and have an equal voice in the standards development process. All interested parties may attend committee meetings, and membership in ASTM is not necessary.

To receive *ASTM Standards International*, please write to Ellen McGlinchey, ASTM, 1916 Race Street,

News From Member Bodies (ASTM), continued

Philadelphia, PA 19103, USA.

ASTM News Release

ASTM News Release

COMMITTEE MEETING

The E-12 Committee on Appearance will meet from June 23-25, 1993 at the Hyatt Regency Atlanta in Atlanta, Georgia. For more information, contact Bode Buckley at (215) 299-5599.

IESNA ANNUAL CONFERENCE ON LIGHTING

IES

The Illuminating Engineering Society of North America (IESNA) hosts its Annual Conference this August in Houston, TX at the Westin Galleria Hotel.

This four day conference, to be held August 9-12, is the most comprehensive educational forum for all industry professionals involved with design, specification, maintenance, services, and applications in lighting.

Seminars will be held on such timely topics as liability and legislation for lighting design; recycled light and its impact on the environment; the 1992 energy policy act and its impact on efficiency and design; lighting for the aging eye; lighting designs for kitchens and baths; applications of light and color; total lighting systems: lamps, ballasts, luminaires, and controls; restoration lighting; and roadway lighting topics.

Authors will present technical papers during sessions on design and application theory, measurement and controls, daylight calculations, photometry, light sources, HID, fluorescents, energy and the environment, and psychology and vision.

A four hour workshop will cover the step-by-step development and implementation of museum gallery lighting design. Case studies and past applications will be demonstrated to illustrate concepts.

A progress report on Tuesday will feature the latest innovative lighting products and services in a lively presentation format and will be followed by tabletop exhibits of products from leading manufacturers. Tabletops are also scheduled for Wednesday morning.

A Monday luncheon will feature a keynote address on "The Philosophy of Roadway Lighting." The Tuesday All Industry Luncheon keynote speaker will be Michael Neils of the National Council on Qualifications for the Lighting Professions (NCQLP). Also featured is the annual IIDA awards luncheon on Wednesday recognizing outstanding design projects for ingenuity and originality in lighting design.

Sponsored ice breaker welcome receptions and breakfasts are scheduled. A Monday evening outing, partially underwritten by the local IESNA San Jacinto Section, the Southwestern Region and local manufacturers will include down home barbecue and entertainment at a local Texas dance hall. Wednesday evening is capped off by the IESNA Presidents banquet.

For more information, contact Valerie Landers, conference manager at (212) 705-7269, FAX (212) 705-7641.

SOCIETY FOR IMAGING SCIENCE & TECHNOLOGY

46TH ANNUAL IS&T CONFERENCE



The awarding of the first Edwin H. Land Medal

for imaging science research, and a panel discussion with the research directors of the world's leading imaging companies, will highlight the 46th annual conference of the Society for Imaging Science and Technology (IS&T), to be held May 9-14, 1993 in Boston, Massachusetts.

The Land Medal and \$10,000 cash award, presented jointly by the IS&T and the Optical Society of America, will be given in recognition of pioneering work empowered by scientific research to create inventions, technologies, or products. In conjunction with the presentation of the Land Medal, a number of scientists who worked with Dr. Land will offer reminiscences and comment on his contribution to imaging and how his approach to technological and business development can lead the industry into the next century.

The Conference's 200 papers will be presented over four days in 11 symposia. These symposia will cover silver halide technology; image processing; papers and substrates; electronic photography; non-impact printing; microlithography; aerial and astronomical imaging; image permanence, restoration, and archiving; coating and drying; and radiography. A number of tabletop exhibits are also planned.

The first day of the Conference will offer eight tutorials, intended to give solid grounding to attendees wishing to broaden their knowledge base in imaging science and technology. A special Monday evening presentation at the Massachusetts Institute of

Technology will highlight the work being done by its famed Media Laboratory.

After the Land Medal activities, the senior research officers of the industry's biggest and most influential imaging companies will join together in a unique plenary panel session to discuss their views and answer questions from the audience on how imaging technology and business will evolve in the 21st century. Scheduled to participate in "Imaging's Future: 1990s Compared with Imaging in the 2000s" are:

Steven Bolte, Director of Research
Webster Research Laboratory,
Xerox, Corp.

James A. Ionson, Vice President and
Director of Research
Polaroid Corp.

James W. Meyer, Vice President and
Director of Research
Eastman Kodak Co.

Senri Miyaoka, Managing Director
Corporate Research Laboratories,
Sony Corp.

Yoshinobu Ohba, Director of
General Research
Science and Technical
Laboratories, NHK (Japan
Broadcasting Corp.)

Michael R. Paige, Senior Vice
President
Product Development, Miles Inc./
Agfa Division

Abraham Peled, Vice President
Systems and Software
IBM Corp.

Yasuo Uchida, Director of the Board
Konica Corp.

The state-of-the-art seminars to be given on the last day of the Conference will run on three parallel tracks: advances in electronic image capture and presentation; advanced topics in silver halide systems; and advanced topics in color printing technologies.

For a complete program, including Conference and hotel registration forms, contact IS&T headquarters at 7003 Kilworth Lane, Springfield, VA 22151, (703) 642-9090, FAX (703) 642-9094.

Jeff Seidman

INTERNATIONAL CONGRESS ON ADVANCES IN NON-IMPACT PRINTING TECHNOLOGIES

IS&T and SEPJ are now accepting papers for the 9th International Congress on Advances in Non-Impact Printing Technologies/Japan Hardcopy '93. The conference will be held October 4-8, 1993 at Pacifico Yokohama in Yokohama, Japan. Hardcopy technologies for copy machines, printers, and faxes have improved greatly. However, changing customer needs and environmental considerations are creating the need to increase the reliability, quality, and performance, while decreasing cost and size.

Original contributions related to state-of-art and future technologies are invited. Papers regarding the main theme "Color Hardcopy Technology for the 21st Century" would be greatly welcomed. The presentation on each paper should be 15 minutes plus 5 minutes for discussion. Please note that the conference language is English.

Proposed program topics include:

- Electrophotography - Materials, Processes, Photoreceptors
- Liquid Toner & Liquid Printing Systems
- Ink Jet Printing
- Thermal Printing
- Electronic Printing - Magnetography and Ionography
- Novel Printing Methods
- Advanced Printing Systems & New Applications of NIP Technology
- Input-Output Scanners
- Image Acquisition & Processing, Quality & Measurement
- Color Science & Color Standards
- Psychophysics of Printing/Displays
- Safety and Reliability of NIP Materials
- Media for Non-Impact Printing

Six technical seminars will be provided at the congress. Each seminar will be conducted by a world-class researcher or technologist who is recognized by recent information or experiences in each area.

These seminars will be given on October 7:

T-1) Neural Network and Fuzzy Control used in Non-Impact Printing Technologies, Dr. Masahide Yoneyama, Ricoh Co., Ltd.

T-2) Simulation and Modeling of Non-Impact Printing, Mr. Kozo Oka, Fuji Xerox Co., Ltd.

T-3) New Halftone Methods for High Quality Color Reproduction, Mr. Toru Takahashi, Canon, Inc.

T-4) Principles of Design, Analysis and Optimization of Color Imaging Systems, Dr. Gary Starkweather, Apple Computer, Inc.

T-5) Can Non-Impact Printing Technology Play in the Press Environment? Dr. Dave Stockman, Colorep, Inc.

T-6) Light Sources and Optical Design for Non-Impact Printing, Dr. James C. Owens, Eastman Kodak Co.

An executive seminar entitled "Management Problems and Strategy for Hardcopy Technology in Advances Information Society" will be held on October 8 at the congress. The presidents of major companies and professors have been invited as speakers.

For more information and applications, contact Paula Alessi, President, ISCC.

Karen Rybarczyk

TECHNICAL ASSOCIATION OF THE GRAPHIC ARTS



When it comes to books and magazines about graphic arts, bookstores and libraries fail miserably. How do we find graphic arts books?

The Information Services Department at the Institute of Paper Sciences in Atlanta, Georgia provides a monthly listing called *Graphic Arts Bulletin* (GAB) of graphic arts books, conference proceedings and trade magazine articles, categorized by subject, and collected worldwide. This service is also offered by the Research Association for the Paper and Board, Printing and Packaging Industries (PIRA) in Leatherhead Surrey, England. Extensive abstracts are also on the PIRA computer database, if you have the hardware and software needed to access this. The *Industrie Graphique* by la Federation française de l'imprimerie et des industries graphiques (FFIIG) in Paris, France is another shorter listing. It is published in English, French and German. Many graphic arts associations publish graphic arts books themselves and have their own listings. Another innovative idea is occurring at the 1993 Conference of the Technical Association of the Graphic Arts, TAGA. They are initiating a Books Table, where selected authors will have copies of their books that Conference attendees can have autographed while having the opportunity to discuss the book with the author.

COLOR REFERENCES AND SOURCES LIST AVAILABLE

Keeping abreast of the latest technology and procedures for quality color reproduction is an important concern of many persons in the graphic communications field. A complete listing of over 160 books and references dealing

with color theory and today's procedures to produce color is now available. Also included is a listing of 25 color related newsletters and over 100 sources of information about color reproduction. This list covers references and sources from the color desktop to high-end color systems. This bibliography was prepared by Prof. Miles Southworth, the Roger K. Fawcett Distinguished Professor of Publication Color Management in the School of Printing Management and Sciences at Rochester Institute of Technology. To obtain a copy of this 8 page color bibliography, contact the Graphic Arts Publishing Company, 3100 Bronson Hill Road, Livonia, NY 14487; (800) 724-9476. The cost is \$8 including postage.

HOT NEWS FLASH !!!!!

The Proceedings of the 1993 TAGA/ISCC Williamsburg Meeting are finally available.

The proceedings have been issued as Volume 2 of the *Proceedings of the Technical Association of the Graphics Arts*. This attractive, hard bound volume has 974 pages packed with technical presentations on The Comparison of Color Images Presented in Different Media. The Table of Contents lists the following papers:

Techniques for Reproducing Images in Different Media: Advantages and Disadvantages of Current Methods - A. Johnson

Colorimetrically Quantified Visual Tolerances for Pictorial Images - M. Stokes, M. D. Fairchild, R. S. Berns

State-of-the-Art Hardcopy/Softcopy Image-Matching Techniques - P. J. Alessi, T. E. Madden

Appearance Modelling - R. W. G. Hunt

Chromatic Adaptation to Image Displays - M. D. Fairchild

The Influence of Surface Properties on Image Interpretation - R. P. Mason

Device Independent Color - Achievable?, Desirable? - W. L. Rhodes, Moderator

Color Transformations and Lookup Tables - K. J. Heuberger
Color Data Interchange: Technology and Standards - R. R. Buckley
Trade-Offs in VDU Monitor Calibration - M. H. Brill
Measurement of the Transfer Function of Hardcopy Color Reproduction Systems: A Metric for Comparison - D. L. Spooner
Study of Colorimetric Changes that Occur in Transparent Color Images Reproduced by Ink on Paper - R. S. Fisch
A Comparison of Algorithms for Mapping Color Between Media of Differing Luminance Ranges - J. A. Stephen Viggiano, J. Wang

As you can see, the list is very exciting, but the most exciting part is the price! The entire contents of Volume 2 of the TAGA Proceedings is available to ISCC Newsletter readers for \$70.00, ppd. To get your copy of this great issue, contact the following address for your order form:

The Technical Association of The Graphic Arts
P.O. Box 9887 Rochester NY
14623-0887

IT'S SPRING!



O T H E R N E W S

COUNCIL ON
OPTICAL
RADIATION
MEASUREMENTS
CORMINTERNATIONAL
CONFERENCE ON OPTICAL
RADIATION MEASUREMENTS

CORM 93 will feature presentations by National Laboratory Representatives. Those countries represented are: South Africa - Franz Hengstberger speaking about "Optical Radiometry at the CSIR"; Italy - Paolo Soardo discussing "The Gonioreflectometer at the Istituto Elettrotecnico Nazionale Gallileo Ferraris"; Japan - H. Onuki presenting "The Present Status of Measurement Techniques in Photometry and Radiometry, and the Development of New SR Sources in ETL"; China - Li Zai-Qing talking about "Optical Radiation Measurements in China"; Australia - James L. Gardner telling about "Optical Radiation Measurements at CSIRO"; United Kingdom - David Price describing "The British Standards Institute Measurement Program for Optical Radiation Measurements" and Teresa Goodman contrasting "Optical Radiation Measurements at the National Physical Laboratory"; Germany - G. Sauter presenting "Realization of Photometric Units at PTB: Methods and Standard Sources" and Heinz Terstiege discussing "Uncertainties of Measurements with Filtered Colorimeter Heads"; France M. Jean Bastie discussing "Optical Radiation Measurements in the French National Laboratory"; Canada - Arnold A. Gaertner speaking about "Optical Radiation Measurements at NRC, Ottawa, Canada"; Mexico - Fernando

Padierna presenting "Optical Radiation Measurements at the Centro Nacional de Metrologia"; United States - Albert Parr discussing "Optical Radiation Measurements at the National Institute of Standards in Gaithersburg, Maryland" and Aaron A. Sanders contrasting "Optical Radiation Measurements at the National Institute of Standards in Boulder, Colorado"; Russia - Victor Sapritsky revealing "Optical Radiation Measurements of the National Laboratory in Russia"; and India - Devinder Gupta discussing "Optical Radiation Measurements in India." The Franc Grum Memorial Lecture will be presented by Klaus Mielenz, and Philip Wychorski will moderate a Panel on International Laboratory Accreditation.

COLOR LOGIC

At the 1992 ISCC Annual Meeting in Princeton, Brian Rose, a Color Science graduate student at Rochester Institute of Technology's Munsell Color Science Laboratory, demonstrated an interactive program for Apple Macintosh® computers.

This program, COLOR LOGIC, is designed as an educational tool to explore the fundamentals of color science, aesthetics, and design in the context of computer graphics. The design and development of the program was Brian's M.S. thesis, and has been completed. The Munsell Color Science Laboratory, as part of its educational mission, is making this program available for non-commercial, educational use. Anyone interested in this program should contact Colleen Desimone, Munsell Color Science Laboratory, Rochester Institute of Technology, P.O. Box 9887, Rochester, N.Y. 14623-0887.

Munsell Color Science Laboratory

1993 ARCHITECTURAL DESIGN
AWARDS PROGRAM
FOR RELIGIOUS
STRUCTURES

CALL FOR ENTRIES

The Interfaith Forum on Religion, Art, and Architecture (IFRAA), an organization affiliated with the American Institute of Architects (AIA), is seeking to encourage design excellence through its annual design awards program. This unique program will judge religious projects on their design excellence, liturgical sensitivity, programmatic solutions, budget/site constraints, and community impact. To be eligible for entry, a built or unbuilt structure must be designed by a registered architect (North American) and must be a work of architecture, a renovation, a restoration, or an interior design project completed after 1988 that serves as, or supports, a religious facility. All entries must have been commissioned, for compensation, by clients with the authority and the intention to carry out the proposal submitted. The Awards Program is open to projects of all religious faiths. Entry forms are due by July 1, 1993 and submissions are due by August 2, 1993. For entry forms and requirements, write to: IFRAA National Headquarters, Doris Justis, Executive Secretary, 1777 Church Street N.W., Washington, DC 20036. Telephone (202) 387-8333 FAX (202) 986-6447

CIE NEWS



① It should be noted that the Central Bureau of the CIE has a new telephone number: (1) 714 31 87.

② CIE Publ. No. 101/1993: Technical Report "Parametric Effects in Colour-Difference Evaluation" is now available.

COLOUR GROUP (GREAT BRITAIN)

CG There are two interesting meetings to report: Colour Vision in Animals jointly organized by the Colour Group and the British Photobiology Society, May 13, 1992 and Colour Vision Deficiencies held on January 8, 1993.

The following are excerpts from reports in the Colour Group Newsletter.

For many animals, colour is significant for survival. Colour can, for example, identify: a species, an individual, the reproductive state of an animal, its aggressive intent of the suitability of a particular food source. It is not surprising therefore that most animals have a well developed sense of colour, which in many cases is arguably superior to that of man. The diversity and quality of animal colour vision, in both vertebrates and invertebrates, was demonstrated during this meeting by four speakers drawn from three countries. Professor R. Menzel (Institut für Neurobiologie, Freie Universität Berlin) reviewed the colour vision of flower-visiting insects. A detailed review of Professor Menzel's work will appear in *Biological Reviews*. Perhaps the most astonishing example of animal colour vision is provided by several species of Mantis shrimp, whose visual systems have been extensively studied by Dr. Justin Marshall (University of Sussex). While trichromatic colour vision is thought of as the norm, it has been reported that some animals have retinæ containing four or even five visual pigments. The Mantis shrimp has these 'higher' animals beaten hands down with some species having a total of up to ten different visual pigments. Professor G. H. Jacobs (University of California, Santa Barbara) dispelled the notion that colour vision within the mammals is not widespread. He reported that while a small number of mammals have only one class of cones, all appear

to have at least some cones, and most are dichromatic. Finally Dr. J. K. Bowmaker (Institute of Ophthalmology, University of London) reported recent measurements of visual pigments in fish native to Lake Baikal. Since underwater photic environment is spectrally so diverse it can be regarded as a natural laboratory for colour vision research. Consequently, one finds fish living in a large variety of different chromatic environments and their visual pigment systems provide some of the best examples of evolutionary adaptation to diverse habitats. There is a general correlation between depth of an animal's habitat and the peak sensitivities of its rod and cone visual pigments: all show a displacement towards shorter wavelengths with increasing depth.

The meeting on colour vision deficiencies featured four speakers. Dr. D. A. Palmer's presentation was entitled "Spectral Sensitivities of Protanopes and the Underlying Visual Pigments". It was suggested at the 1979 January meeting that the CIE scotopic curve might not accurately represent the pure rod response at the long wavelength end of the spectrum. Contamination by long-wave cones could be elevating the curve by about 0.5 log units. Results for two protanopes were presented which seemed to fulfill the prediction. The second presentation entitled "Rapid Determination of Discrimination Ellipses in Colour Deficiency" was prepared by Dr. J. Mollon, Mrs. B. Regan and Dr. J. Reffin. This paper described a basic test using a computer display to probe sensitivity along the protan, deutan and tritan directions by a staircase computed in $u'v'$ space. The test takes about 4 minutes and does a good job in separating protanopes, deutanopes, and normals. The test was then extended to measure MacAdam-like ellipses, probing in 20 different directions in colour space, at three different chromaticities. It typically took a patient 20 minutes to produce one ellipse. Results of a variety of colour anomalous observers were reviewed. John L. Barbur of The City University presented "The measurement of colour

discrimination using psychophysical and pupillometric methods." The results obtained so far suggest that the new psychophysical and pupillometric tests of chromatic discrimination which do not require the subject to set isoluminance and measure threshold and suprathreshold sensitivity to chromatic stimuli may find extensive applications in clinical work and in newborn and animal studies. Finally the "Use of a Computerised Colour-contrast Sensitivity Test" was described by G. B. Arden. Colour monitors permit better testing of colour vision in clinical circumstances because the clinical test can begin with assessment of the relative luminosity of the phosphors for each individual, thus compensating for any filters in the media. Then tests measuring threshold colour modulation without luminance clues can be devised.

CALL FOR PAPERS

The Colour Group of Great Britain announces a residential Symposium to be held at Robinson College, Cambridge, April 10-12, 1994. The Colour Group is organizing the meeting on behalf of the International Colour Association (AIC) and with the cooperation of the IS&T Group of The Royal Photographic Society.

The overall theme of the Symposium is "Images in Colour" which may be interpreted in its broadest sense to include photographic, graphic arts, television, and visual display imaging technologies. Papers are invited that cover aspects of colour reproduction that, for example, describe methodologies, discuss measurement, and present new ideas. The Symposium will incorporate the third Bartleson Lecture.

Abstracts (200 words) and enquiries should be sent to Dr. M.R. Pointer, Kodak Limited - Research Division, Headstone Drive, Harrow, Middlesex HA1 4TY, England.

IEI-J

CALL FOR PAPERS

The 1994 Annual Conference of the Illuminating Engineering Institute of Japan (IEI-J) will be held in Tokyo from July 26-28, 1994. General sessions on the art, science, and practice of illumination and radiation include:

- Vision and Color
- Emission or Optical Properties of Materials
- Radiometric, Photometric Measurements
- Actinic Effects of Optical Radiation and Application
- Light Sources (discharge phenomena, diagnosis, material and components, design, circuitry)
- Luminaires and Lighting Electronics
- Fundamentals of Lighting and Daylighting
- Lighting Design and Application
- Optical Device, Sensor, and Display

In addition, IEI-J is planning to hold an international symposium as part of the 1994 Annual Conference of the IEI-J. The 1994 International Symposium will include discussions on vision, color, and lighting environments. The organizing committee welcomes participants and contribution papers from all over the world. The themes and their scopes are as follows:

A New Photometric System and Its International Standardization

Perceived brightness of a colored object or a source cannot necessarily be evaluated correctly by the current photometric unit, the CIE luminance. Research on the perception of brightness of an object in the mesopic range of light intensity or of a colorful object has progressed. IEI-J has worked with these problems for many years, widely surveying the research. A discussion of a new photometric system which correlates well with the human perception of brightness, and of the international standardization of the system will be included in this symposium.

Color Appearance, From the Basics to Application

Color appearance of an illuminated object cannot be specified psychophysically by the CIE colorimetric procedures because of chromatic adaption. Some models predicting the chromatic appearance procedure have been studied for many years. From the application viewpoint, the color matching between a color of an illuminated object (e.g. printed materials) and a self-luminous color (e.g. CRT displays) has become an important issue. The technical committees of ISO, CIE, and IEI-J have been actively studying these problems to find theoretical and practical solutions. This symposium will include a discussion of the state of art in chromatic adaption models and the problems of the color matching discrepancy between an object color and a self-luminous color.

Creation of Comfortable and Pleasant Lighting Environments

The purpose of lighting is to provide an environment where adequate visual performance is achieved in comfort. There have been extensive studies on visual performance which have made great contributions in realizing good lighting environments from the point of visual performance. Recently, in addition to good visual performance, needs or wants for more comfortable and pleasant environments are increasing, particularly in interior lighting. To create these environments, various studies have been carried out, for example, on subjective estimations of lighting environments, relationships between lighting and psychological/physiological responses, and the standardization of daylight. Along with these studies, various intelligent control units and luminaires are being developed. In this symposium, these recent studies and developments will be discussed to clarify the issues which need further study.

Applications and guidelines are available from Paula Alessi, President, ISCC, for those wishing to attend or present at the conference. The deadline for submission is February 28, 1994.

Karen Rybarczyk

NEW PRODUCT INFORMATION

Wave-scan for the Measurement of Surface Structure

The advent of exceedingly small lasers has made it possible to develop a new line of instruments. A portable instrument, wave-scan, that evaluates surface smoothness and thus provides a measure of orange peel in high-gloss finishes has been introduced.

The specimen is illuminated at an angle of 60° by a tiny battery-powered laser diode that subtends an aperture of less than one-half degree. A silicon detector responds to the intensity of light reflected at the equal but opposite angle (-60°). The surface of the specimen is scanned by moving the instrument in one direction for a distance of 10 cm. There is no requirement on rate of scan or constancy of speed of movement.

When the laser beam is reflected from peaks or valleys of a wavy surface, a maximum signal is obtained, whereas on the ascending or descending slopes the detector receives less specularly reflected light. The measurement results provide optical profiles of surfaces. They are divided into two categories described as long-term and short-term waviness. In addition, the measurement results can be expressed in industry-recognized scales, tension value and ACT Rating, to provide quick pass/fail judgements. Measurements can be made of solid colors or metallic surfaces that are flat or curved (radius greater than 0.7 m).

The small size and portability of the wave-scan together with menu-guided operation and internal memory make it ideal for evaluating specimens on the production line or in the field. For in-depth analysis, stored data can be transferred via a serial interface to a personal computer. The program gardner-soft wave-scan allows further statistical and analytical evaluation and facilitates starting one's own Statistical Process Control.

For more information contact:
Gabrielle Kigle-Boeckler.

Harry K. Hammond III

QUALITY STATISTICS AND EDUCATION

FROM THE MUNSELL COLOR SCIENCE LABORATORY AND RICHARD S. HUNTER PROFESSORSHIP 1992 ANNUAL REPORT

Recently, "total quality management" has invaded academia. I must admit that I'm not sure whether students are my product or my customer. I prefer to think of them as students. I have had a "quality" experience which profoundly influenced my teaching that I would like to share with you. During March 1992, I attended a three-day seminar on quality, productivity, and the competitive

position. The seminar was conducted by W. Edwards Deming, the world-recognized leader in statistics and quality control, now 94 years old. It was very exciting to experience Dr. Deming firsthand along with 999 other students. (I periodically wondered whether our industrial colorimetry seminar could ever attract 1000 participants!) I learned about quality circles, continuous improvement, and management philosophy and responsibility.

I soon had several opportunities to apply my new knowledge. The first occurred while grading laboratory reports. I found that the style and content of a report submitted by a new student were unsatisfactory. In the past, I would have given a low grade with a written explanation. Deming teaches that this is wrong, demoralizing to the student, squelching his motivation, and subverting

his productivity. Instead, I wrote "redo" on his report and took time to explain what I wanted. To my great surprise, the redone write-up was excellent as were all of his subsequent reports. More importantly, the student became very enthusiastic about the subject and became a part of our research team. This possibly would not have occurred if I had taken my past approach to grading.

I also learned to appreciate how each member (students, staff, and faculty) of the Munsell Color Science Laboratory contributes to our total environment of education and research. The success of an individual should be based, in large part, on the success of the team. I have the honor of "directing" the Laboratory, but our successes come from all of us learning to interact effectively.

Roy S. Berns

Color Research and Application IN THIS ISSUE June 1993

Rolf Kuehni begins this issue by "Talking About Color... Piero della Francesca, a fifteenth century painter and mathematician."

It is unusual for the articles of one issue to follow directly those of the issue immediately preceding. However, this month is the exception. Not only does the lead article respond to a call made last time, but three of the articles build on ideas or research presented in the last issue.

In last issue's Color Forum, both Mark Fairchild and William Thornton pointed out needs for further study of the standard observers. In this issue, Amy D. North and Mark D. Fairchild present a two-part article discussing "Measuring Color-Matching Functions" In Part I, North and Fairchild describe the visual colorimeter which was developed in the Munsell Color Science Laboratory at Rochester Institute of Technology. The instrument proves

both quick and reliable. It uses CRT primaries and with it the color-matching functions of a naive observer can be measured in approximately 30 minutes. In order to ensure compatibility with earlier sets of data, the results from one observer were correlated with data taken on the same observer on the National Research Council of Canada's Trichromator. "Part II: New Data for Assessing

Observer Metamerism" examines the variability for a single observer with 20 repetitions and the variability of 18 different observers.

In a follow up of the theory presented in their article from the April issue, "Illuminance Dependency of Equivalent Lightness on Chromatic Object Colors," Y. Nayatani, H. Sobagaki, and K. Hashimoto examine the "Illuminance Dependency of L/Y (Lightness/

(*con't* ➡)

1992 RESEARCH MEDAL AWARDED TO COLIN WILKINSON

The Worshipful Company of Dyers of London awarded the Research Medal for 1992 to Colin Wilkinson, Applications Manager (Pigments) for Datacolor International, Altrincham. The medal is awarded for research that contributes to the advancement of color. It follows work that Colin Wilkinson carried out in 1987 for his MSc in Colour Physics at the University of Manchester Institute of Science and Technology, and subsequent work published in the following two years on the accurate representation of color on a cathode ray tube. The award is being made jointly with two of Colin Wilkinson's former colleagues in the University's Textile Department, and the medal will be presented at the Livery Dinner of the Worshipful Company of Dyers to be held on April 28, 1993 in the Dyer's Hall in London.

CR&A, from previous page

Luminance Factor) Ratio Effect." The perceived lightness of chromatic object colors was studied over a wide range of illuminance from scotopic to photopic levels. Contour lines of equal lightness/luminance factor ratios were developed for the whole chromaticity gamut. These led to insights concerning variations found in earlier experiments.

Due to the increased use of color in displays and reprographics, and the use of these many different media in design and industry, there is an increasing desire and need to be able to create the same appearance no matter what medium is used. Thus the total impression must be considered, rather than simply object color. Color appearance models consider many aspects, such as surround, luminance level, and white point. Earlier, Mark Fairchild published a chromatic adaptation model that accounts for changes in color and luminance of the adapting stimulus. Now in "Image Color Appearance Specification Through Extension of CIELAB," Dr. Fairchild joins with Dr. Roy S. Berns to combine this model with the CIELAB color space and extensions that result in RLAB color space. This space is useful for determining the required color changes that are needed for reproduction in different media.

In the last issue, I described the work undertaken at LUTCHI Research Center to develop a body of color appearance data. In this issue, M. Ronnier Luo, X. W. Gao, P. A. Rhodes, H. J. Xin, A. A. Clarke, and S. A. R. Scrivener present yet another extension of "Quantifying Colour Appearance." In "Part IV: Transmissive Media," large cut-sheet transparencies viewed using a back-lit illuminator and 35 mm slides projected onto a white screen were used to evaluate color appearance in transmissive media.

We continue to examine the human visual system's amazing ability to discriminate small increments in intensity over a range of more than 100 000 000. As I promised in the last issue, Marcia A. Finkelstein follows her article on "Spatial Sensitization and Adaptation in a Long-wavelength Cone Pathway" with a second article "Sensitivity Loss and Adaptation within the Short-wavelength Cone Pathway." Using techniques similar to those described in the first article, Dr. Finkelstein examines short-wavelength detection, and models this part of the visual system with a two stage detection system. The first stage has sites resembling the three cone classes, and at the second (blue/yellow opponent) stage the signal from the short-wavelength cones combines antagonistically with those of the middle- and long-wavelength cones. Adaptive mechanisms of multiplication and subtraction are included.

In this issue's "Communication and Comments", James J. Gordon and Richard Holub try to wipe out persistent pockets of ignorance about the conditions necessary for linear conversions between scanner signals and tristimulus values. In "On the Use of Linear Transformations for Scanner Calibration," they present a different proof that the transformations between scanner codes and tristimulus values are exactly linear only for given conditions.

Dr. Ellen Carter, Editor

C A L E N D A R

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

Harry K. Hammond, III
BYK-Gardner, Inc.
2435 Linden Lane
Silver Spring, MD 20910
301-495-7150 FAX 301-585-4067

1993

IS&T ANNUAL CONFERENCE, May 9-14

The Society for Imaging Science & Technology 46th Annual Conference, Boston Marriott Cambridge Hotel, Cambridge, Massachusetts. Information: IS&T (703) 642-9090.

CORM '93, May 18-21

Council for Optical Radiation Measurements Annual Meeting, National Institute for Standards and Technology, Gaithersburg, Maryland.

Information: Dr. Jack Hsia (301) 975-2342.

ASPRS WORKSHOP ON COLOR PHOTOGRAPHY & VIDEOGRAPHY IN RESOURCE MONITORING, May 24-27

American Society for Photogrammetry and Remote Sensing - 14th Biennial Workshop on color Photography and Videography in Resource Monitoring, Utah State University, Logan, Utah. Information: Christopher Neale (801) 750-3689.

CIE SYMPOSIUM '93, Jun. 8-10

CIE Symposium '93, Colorimetry, Central Bureau of the CIE, Vienna, Austria. Information: Dr. J. Schanda (fax +43 1 713 0838).

AIC-7TH CONGRESS, Jun. 14-18

International Colour Association - 7th Congress, Technical University of Budapest, Budapest, Hungary. Information: Prof. Antal Nemcsics, Technical University of Budapest, Conference Office, Building Z, Room 101/b, H-1521 Budapest, Muegyetem rkp.3-9, Hungary, Phone and FAX (36-1) 185-2218.

LIGHT AND COLOR IN THE OPEN AIR, Jun. 16-18

Optical Society of America Second Topical Meeting on Light and Color in the Open Air, The Pennsylvania State University State College, Pennsylvania. Information: OSA Office (202) 223-0920.

IS&T INTERNATIONAL SYMPOSIUM, Jun 21-25

International Symposium on Electronic Imaging Device Engineering, Munich Fairgrounds south, Munich, Germany. Information: IS&T (703) 642-9090.

Calendar continues on page 19

MEMBERSHIP APPLICATION

INTER-SOCIETY COLOR COUNCIL APPLICATION FOR INDIVIDUAL MEMBERSHIP

Name _____ Date _____

☐ Dr. ☐ Mr. ☐ Ms.

Company/Affiliation _____

Street _____

City, State, Zip _____

Telephone (____) _____

☐ Home

Fax (____) _____

☐ Business

Signature

My chief interests in color are:

☐ Fundamental and Applied Research

☐ Industrial Application of Color

☐ Art, Design and Psychology

My work relates to the following
products and services:

Name other interests

My present and past business, professional or educational connections with color are: _____

My particular interests in color are: _____

I belong to the following national organizations or associations: _____

I learned about ISCC from: ☐ ISCC Newsletter ☐ Other source: _____

Please tell us the individual or organization that interested you in ISCC

ISCC dues are shown on the reverse side. Applications for membership dated prior to July 1 should be accompanied by full annual dues; those dated July 1 and later should be accompanied by 50% of annual dues. You have the option of subscribing to Color Research & Application at special membership rates. If you wish to do so, please add \$70 (U.S.) or \$100.00 (Overseas) to the amount of your check.

This application and remittance should be sent to

Ms. Ann C. Laidlaw, Membership Committee,

c/o SheLyn, Inc., 1108 Grecale Street, Greensboro, NC 27408 Telephone: (919) 274-1963

ISCC BY-LAWS

EXCERPT FROM THE BY-LAWS OF THE INTER-SOCIETY COLOR COUNCIL, INC.

Constitution, Article II — Aims and Purposes

The Council shall operate solely and exclusively as a non-profit organization with the aims and purposes:

- A. To stimulate and coordinate the work being done by the various members leading to the description and specification of color by these members.
- B. To promote the practical application of this work to the color problems arising in science, art, and industry, for the benefit of the public at large.
- C. To promote communications between technically oriented specialists in color and creative workers in art, design, and education, so as to facilitate more effective use of color by the public through dissemination of information about color in both scientific and artistic applications.
- D. To promote educational activities and the interchange of ideas on the subject of color and appearance among its members and the public generally.
- E. To cooperate with other organizations, both public and private, to accomplish these objectives for the direct and indirect enjoyment and benefit of the public at large.

Council Activities

The ISCC is the principal professional society on the field of color in the United States, encompassing the arts, sciences and industry, pursuant to the Aims and Purposes described above. Other national organizations with an interest in color are Member-Bodies of the Council and appoint delegations to participate in the Council's work. Individual members are the largest single group. The Annual Meeting, usually held in April, includes meetings of the Project Committees and sessions of four Interest Group: Measurement & Colorimetry; Vision & Color Appearance: Art, Design & Psychology; and Color Education. There is also a main program devoted to a specific aspect of color plus a Poster Paper session. Joint programs with one of the Council's Member-Bodies are interesting and educational.

In most years there is a separate topical Williamsburg Conference, often in February, where a single color subject is explored in depth with participants from all over the world providing state-of-the art information. Attendance at these conferences is usually smaller than at Annual Meetings, reflecting their topical nature and permitting interaction between speakers and participants.

The ISCC is the U.S. Member of the Association Internationale de la Couleur (AIC), which holds general meetings quadrennially and topical meetings annually. Color Research & Application, published bimonthly in English, is the principal international journal in this field; it is endorsed by ISCC. It reports recent research and opinions of colorists, review books and reports on national and international color meetings. Membership in ISCC permits subscription at more than a 50% discount. The ISCC News, a bimonthly newsletter, reports the color activities of the Council, its members, Member-Bodies and international color organizations. Members receive the ISCC News at no cost. Member-Bodies and Sustaining Members receive 10 copies of the ISCC News.

Categories of Membership

	Annual Dues
<i>Individual Member.</i> Any person interested in color and desirous of participating in the activities of the Council.	\$45.00
<i>Student Member.</i> Full time students.	\$10.00
<i>Member-Body.</i> Any non-profit national organization interested in color and desirous of participating in the activities of the Council.	\$100.00
<i>Sustaining Member.</i> Any organization not eligible as a Member-Body, or any individual, interested in color and wishing to support the work of the Council. Receives 10 copies of ISCC News.	\$500.00
<i>Retired.</i> Treasurer must be notified, in writing, of retirement before dues have been billed.	\$10.00
<i>Library Subscriptions.</i> Receives all ISCC mailings, including ISCC News.	\$60.00
<i>Overseas Member.</i> A surcharge of \$20 is added to \$30 dues to cover additional mailing costs.	\$65.00

ASTM COMMITTEE E-12 ON APPEARANCE, Jun. 23-25
Atlanta, Georgia. Information: , Bode Buckley, (215) 299-5599.

ASTM COMMITTEE D-1 ON PAINT, Jun. 27-30
Wyndham Franklin Hotel, Philadelphia, Pennsylvania.
Information: Scott Orthey, (215) 299-5507.

MONTAGE 93, Jul.11-Aug.7
Montage 93: International Festival of the Image, Rochester, New York. Information: Montage 93 (716) 442-8898.

COLOR VISION DEFICIENCIES XII, Jul. 18-22
Symposium of the International Research Group on Colour Vision Deficiencies, University of Tübingen, Germany.
Information: J. D. Moreland FAX 0782 613847.

IESNA ANNUAL CONFERENCE, Aug. 8-12
Illuminating Engineering Society of North America, 87th Annual Conference, Houston, Texas. Information: Valerie Landers, (212) 705-7269.

EUROPEAN CONFERENCE ON VISUAL PERCEPTION, Aug. 25-29
Edinburgh, Scotland. Information: Michael Morgan: 44-31-650 3511.

CMG - CONFERENCE, Sep. 12-14
Color Marketing Group International Color Directions Conference, Hotel del Coronado, San Diego, California. Information: Katie Register (703) 528-7666.

DCC MEETING, Sep. 23
Detroit Colour Council New Pigments for Automotive Applications, Michigan State Management Education Center, Troy, Michigan. Information: James Hall (313) 947-5428

USNC/CIE, Oct. 3-5
The United States National Committee of the CIE, Annual Meeting, Hawthorne Hotel, Salem, Massachusetts. Information: Dr. Jack Hsia (301) 975-2342.

AATCC - CONFERENCE AND EXHIBITION, Oct. 3-6
American Association of Textile Chemists and Colorists, Montreal, Quebec, Canada. Information: AATCC, (919) 549-8141.

OSA - ANNUAL MEETING, Oct. 3-8
Optical Society of America Annual Meeting Toronto, Canada. Information: OSA (202) 223-0920.

IS&T 9th INTERNATIONAL CONGRESS, Oct. 4-8
The Society for Imaging Science & Technology, 9th International Congress on Advances in Non-Impact Printing Technologies with Exhibit, Pacific Convention Plaza, Yokohama, Japan. Information: IS&T (703) 642-9090.

FSCT - 71st ANNUAL MEETING, Oct. 27-29
Federation of Societies for Coatings Technology 71st Annual Meeting and 58th Paint Industries' Show, Georgia World Congress Center, Atlanta, Georgia. Information: FSCT Office, (215) 940-0777.

COLOR IMAGING SYSTEMS, Nov. 7-10
Color Imaging Systems co-sponsored by the Society for Imaging Science and Technology and Society for Information Display, The Pointe Hilton Resort at Squaw Peak, Phoenix, Arizona. Information: IS&T (703) 642-9090.

ASTM COMMITTEE D-20 ON PLASTICS, Nov. 15-18
Fort Worth, Texas. Information: Katharine Schaff, (215) 299-5529.

SECOND DUES NOTICES FOR '93

Second Dues Notices for '93 have gone out. If we receive no response, we are going to have to drop your membership. We do not want to have to do this! If you are unsure of your status, contact Ginny Baca at Hunter Lab (703) 471-6870.

NEWSLETTER EDITOR Michael A. Hammel

Send photo material (black and white if possible) to:

Editor, ISCC News • 98 Grand View Drive • Fairport, NY 14450 • Tel. (716) 223-1823

If at all possible, please send all other materials ON DISKETTE as follows:

MSDOS-ASCII, Q&A, Word Star, Word Perfect (5.25"-1.2 Meg, or 360K)
(3.5"-1.44 Meg, or 730K).

Macintosh-Word, Macwrite, MS Works
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For hard copy transmission, FAX to (716) 425-2411.

Or send to: Dr. Ellen C. Carter • 2509 N. Utah St. • Arlington, VA 22207-4031

Please note: the deadline for submission of material
is the 1st of even numbered months.



meeting reports



photos



contributions from
members

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ISCC MEMBER-BODIES

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American Chemical Society (ACS)	The Human Factors & Ergonomics Society
American College of Prosthodontists (ACP)	Illuminating Engineering Society of North America (IESNA)
American Psychological Association (APA)	National Artists Equity Association (NAEA)
American Society for Testing and Materials (ASTM)	National Association of Printing Ink Manufacturers (NAPIM)
American Society of Interior Designers (ASID)	National Paint and Coatings Association, Inc. (NPCA)
American Society for Photogrammetry and Remote Sensing (ASPRS)	Optical Society of America (OSA)
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Color Marketing Group (CMG)	Society of Motion Picture and Television Engineers (SMPTE)
Color Pigments Manufacturers Association (CPMA)	Society of Plastics Engineers, Color & Appearance Division
Detroit Colour Council (DCC)	Society for Imaging Science and Technology (IS&T)
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