



Inter-Society Color Council News

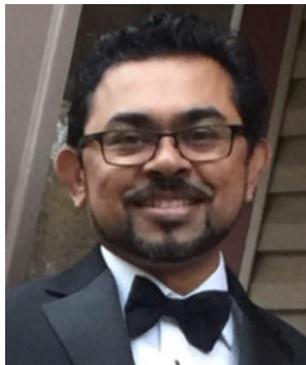
Issue 476

Fall 2016

Board of Directors Corner

Hello dear fellow ISCC members,

My name is Simon Thayil. I am serving on the Board of Directors (BoD) for the ISCC for the 2016-2018 term, and it is my pleasure to bring you the



BoD column for the Fall 2016 edition.

I can summarize my work in the color industry by simply saying that it has involved learning about the nature and properties of colorants from their chemical and physical aspects to then leverage those into color matching databases. Little did I know at the time, that this opportunity to “earn and learn” was one of

the big “Keys to the Kingdom” of converting a “black art” (in which one should never look at the human behind the curtain), to a scientific method that involved mathematical equations and software that generations ahead of me had already perfected. I was naïve...but willful and determined to unlock many of the secrets that lay ahead.

As I look back at my career, I see connections between what I learned and how I learned them through interactions with other like minds that I could have never planned for myself. All this occurred first while serving the automotive industry, and then in retail industry home and apparel consumer products, while doing a soft stint in the retail packaging printing arena. I owe the color community a lot for having given me the opportunity and the forum to learn so I could refine my trade...my brand.

I currently work for Under Armour Inc., a global brand that utilizes a global supply chain where I see challenges in color execution primarily due to language and educational resources. I see a need for technical experts to educate and impart knowledge in local languages. One good way to carry this thought forward would be to start a discussion on our LinkedIn page to solicit ideas on how to get technical information into the world’s many remote places in the local languages. I’ll be doing that soon...stay tuned.

This Fall newsletter will feature information on the ISCC Workshop & Annual Business and Awards Meeting to be held during the Color Imaging Conference (CIC) on Friday Nov. 11, a report from the Nominating Committee featuring biographies on the candidates for President, President-Elect, and Board of Directors, a summary of our transition to a new online membership service, a one-time special event (ISCC-AIC) to honor Albert Munsell in 2018, and a summary of the September Webinar given by Nurhan Becidyan. This newsletter also honors the legacy of two members we recently lost: David L. Alston and Richard Ingalls.

Simon Thayil, *Under Armour, Inc.*

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ISCC EXECUTIVE OFFICERS

Terms end 2016

President	Mr. John Conant Aerodyne Research, Inc. 45 Manning Road Billerica MA 01821-3976 USA 978-663-9500 fax: 978-663-4918 jconant@aerodyne.com
Secretary	Ms. Ann Laidlaw ACL Color Consulting LLC 136 E. Hill St Decatur, GA 30030 336-420-1998 acl99colors@yahoo.com
Treasurer	Dr. C. Cameron Miller Nat'l Inst. of Standards and Technology 100 Bureau Drive, Stop 8442 Gaithersburg, MD 20899 301-845-4767 fax:301-975-4713 c.miller@nist.gov
President Elect	Vacant
Past President	Mr. Scot R. Fernandez Hallmark Card Inc. 2501 McGee Kansas City MO 64141 USA 816-545-2462 fax: 816-274-7367 scot.fernandez@hallmark.com

ISCC BOARD OF DIRECTORS

Term ends 2016

Ms. Paula J. Alessi	Retired Color Scientist 126 Gnage Lane Rochester, NY 14612 585-225-4614 geinhaus@frontiernet.net
Mr. Kim Vlaun	Artist/Educator kvlauncolor@verizon.net
Mr. Jack Ladson	Color Science Consultancy 3661 Spring Hollow Lane Frederick, MD 21704 USA 267-981-7112 Jack@ColorScienceConsultancy.com
Dr. Renzo Shamey	North Carolina State University College of Textiles rshamey@ncsu.edu
Dr. Dave Wyble	Avian Rochester, LLC dave@avianrochester.com
Ms. Jodi Baker	Konica Minolta Sensing Americas, Inc. 101 Williams Drive Ramsey, NJ 07446 201-749-2659 Jodi.Baker@konicaminolta.com
Mr. Nurhan Becidyan	Retired CEO & President United Mineral & Chemical Corporation 557 Forest Avenue Paramus, NJ 07652 201-262-8262 nurhanbecidyan@gmail.com
Dr. Paul Centore	www.MunsellColourScienceForPainters.com Groton, CT paul@isletech.net
Mr. Simon Thayil	Under Armour Simonthayil09@gmail.com

Terms end 2018

Summary of September Webinar

On September 22nd, Mr. A. Nurhan Becidyan, Ex-President of United Mineral & Chemical Corporation and current member of your Board of Directors,



presented our fourth online webinar: "The Chemistry & Physics of Special Effect Pigments & Colorants". These types of colorants challenge modern measurement and process control systems, and Nurhan did a great job of educating the audience from his

wealth of knowledge in this area. After the formal presentation we had time for questions from the audience, and an interesting discussion followed. Thanks for your time and expertise Nurhan!

For a copy of Nurhan's presentation, please visit our website at:

<http://iscc.org/resources/SeminarSeries.php>.

Dave Wyble and Ann Laidlaw
ISCC Online Seminar Committee

ISCC Annual Meeting 2016 San Diego

We are excited to announce that the 2016 Annual Meeting will be co-located with the Imaging Science and Technology (IS&T) Color and Imaging Conference (CIC), in San Diego, California. CIC will be November 7-11, and **our Annual Meeting will be within CIC as a Friday morning workshop on November 11.**

While the workshop will serve as our Annual Meeting, it will be open to any regular CIC attendees. There is also a workshop-only registration (\$225) for those who do not wish to attend the entire week. The morning workshop will be followed by a \$10 box lunch served in the same room as the workshop. A vegetarian option for the box lunch will be offered. After lunch, the ISCC will hold its Annual Business and Awards Meeting. The Friday afternoon CIC session will begin immediately following this ISCC Meeting.

The theme of the ISCC workshop will be *Life of a Color*. We have scheduled four presentations spanning much of the breadth of ISCC membership. It will begin with a description of the creative design

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ISCC Annual Meeting 2016 San Diego continued

process given by **Leslie Harrington (CAUS)**. The



title of her presentation is *The Design of a Color*. Leslie will walk through how a brand color is originally selected, and then the associated strategic decisions for introducing that color into the marketplace.

Once a color has been defined, we need to make sure that everyone is looking at the same color. So



Max Derhak (Onyx Graphics) will present *The Management of a Color*. Max will describe a color-management system that accounts for a complete color process from light sources onto objects captured through

color matching, and provides the means to add perceptual aspects of color.

Now that color is accurately communicated, the industrial processes can begin.



Ann Laidlaw (ACL Color Consulting LLC) will present *The Manufacturing of a Color*. Ann follows the path of a color from the creative process through development, approval, and manufacturing.

Finally, for all of the above to have any effect in the world, the color must be seen by an individual.



Mark Fairchild (RIT) will present *The Perception of a Color*. Mark will trace the fate of a photon from the surface of an object to the point a color appearance is experienced in the brain.

There are a number of unique aspects of this meeting. First, since the meeting is wholly within the Color Imaging Conference, the main-CIC attendees are also encouraged to attend. This will present an opportunity for ISCC to tell its story to individuals who perhaps have never even heard of us! Also, we feel that the presentations and resulting discussions more completely represent the ISCC constituency than perhaps has been achieved in recent years. Addressing the breadth of our membership is always a goal, but has proven an

elusive one for many years. So artists, designers, scientists, industrialists and educators with an interest in color, come one come all to this unique ISCC workshop on *Life of a Color*.

It is not too late to register! For registration information, please visit the following web address: <https://www.imaging.org/ist/Events/ConferenceDescription.cfm?Meeting=2016CLR24&activesection=Conferences>.

We hope to have many of you participate in this great opportunity to increase awareness of ISCC.

David R Wyble, Avian Rochester, LLC.

2016 Annual Meeting Chair & Workshop Organizer
(585) 259-5956

dave@avianrochester.com

ISCC December Webinar

The ISCC will be holding its next webinar on **Monday, December 5th from 2:00-3:00PM EST**. This presentation will be given by Professors Susan Farnand and Michael J. Murdoch from the Munsell Color Science Lab at Rochester Institute of Technology (RIT). The title of their presentation is *Challenges and rewards of teaching an online color science course*. Here is their abstract:

“In this webinar, we will look behind the scenes into the Munsell Color Science Lab’s (MCSL) most recent foray into teaching color science online. We will provide some background on trends in online learning in general and specifically at RIT. Focusing on our curriculum for a 10-week Fundamentals of Color Science course, which took place in the summer of 2016, we will explain how we engaged our students with a mix of readings, online discussions, and weekly projects, and how we approached teaching important aspects of colorimetry without hands-on, in-person laboratory measurement experience. We will reflect on the successes and challenges and hope to discuss new ideas and feedback with our audience.”

Susan Farnand is a Visiting Assistant Professor in the Program of Color Science. Her research inter-



ests include human vision and perception, color science, cultural heritage imaging and 3D printing. She received her BS in engineering from Cornell University, her Masters in Imaging Science and her PhD in Color Science from the Rochester

Institute of Technology. She began her career at Eastman Kodak, designing and evaluating printer

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ISCC December Webinar continued

systems. She is the Publications Vice President of the international Society of Imaging Science and Technology and serves as an Associate Editor for the Journal of Imaging Science and Technology. She participates in several Standards efforts including ISO TC 42 JWG26 Archival Imaging.

Michael J. Murdoch is an Assistant Professor in RIT's Program of Color Science with current research in visual quality of lighting systems and color perception in augmented and virtual reality. He earned his PhD in Human-Technology Interaction from Eindhoven University of Technology (The Netherlands), MS in Computer Science from RIT, and BS in Chemical Engineering from Cornell University. Prior to coming to MCSL, Michael worked in the research labs of Eastman Kodak and Royal Philips on projects including LCD and OLED displays and perceptually-accurate lighting simulation. He is serving as Program Co-Chair of the 24th Color and Imaging Conference.



We are very excited about this webinar as it should lead to some very lively discussions. **So please mark your calendars for Monday, December 5th from 2-3PM EST.** For details on how you can participate in this webinar, please visit: <http://iscc.org/resources/SeminarSeries.php>.

Nominating Committee Report

The ISCC Nominating Committee would like to announce candidates for Officer and Board of Director positions. Ballots for voting will go out at the beginning of December.

There are two candidates for Officers. The first is Renzo Shamey, a candidate for the Office of President-Elect. Renzo Shamey received a Bachelor of Science degree in Textile Chemistry and Fibre Science & Engineering (1989), Master of Science in Dyeing and Finishing (1993), and Ph.D. in Colour Chemistry (1997) from Leeds University, England, and conducted Postdoctoral research for about year.



After six years as a faculty member at Heriot Watt University (Edinburgh, Scotland), he joined North Carolina State University

(NCSU, Raleigh, USA) where he currently serves as Professor of Color Science and Technology, Director of Polymer and Color Chemistry (B.S.) and Textile Chemistry (M.S.) programs and Director of the Color Science and Imaging Laboratory. He is also an honorary professor at Tianjin Polytechnic University, China. He was named a University Scholar in 2014 (NCSU), and a Fellow of the Society of Dyers and Colourists (SDC) in 2010. He has been the recipient of several awards from various organizations. He has authored over 160 peer reviewed/technical publications, four book chapters and a book. He is a Board of Directors member of the ISCC and has been an active member of several other organizations dealing with color including CIE, OSA, IS&T, and SDC. He served as the chair of the Color Measurement Test Methods Committee (AATCC- RA36), and has been active in several technical committees including CIE TC1-78: unique hues (co-chair), TC1-55: Industrial color difference equations, and TC1-77: Validity of CIE Whiteness and Tint equations. He has also served on the Board of Governors of the AATCC, and on the editorial board of several scientific journals. If elected, Renzo's term will run from January 2017 to December 2018.

The second candidate for Officer is Jerald Dimas, a candidate for the Office of President. Jerald A. Dimas is Vice President, Technical for Color Communications Inc. (CCI) in Chicago Illinois. Jerald has worked for 33 years in Applied Color Science. Since joining Color Communications 33 years ago, Jerald has made color technology contributions helping to make CCI a leader in the production of Color Cards, Color Tools, Color Systems and Color Control Programs for the paint, coatings and fabrication industries. His direct responsibilities include



Technical Support, Research and New Product Development. Jerald first found his passion for the world of color while studying Graphic Arts at the College of DuPage. He went on to further his knowledge at Rochester Institute of Technology (RIT) studying Psychophysics and Color Science. Finally he rounded out his applied knowledge of color in the coatings world by studying Coating Formulations at the University of Missouri Rolla (UMR). Jerald has been an active member of the

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Nominating Committee Report continued

ISCC since 1987, Detroit Color Council (DCC) since 1994 and American Society for Testing and Materials (ASTM) Committee E12 on Color and Appearance and ASTM Committee D01 on Paint and Related Coatings, Materials and Applications. Other professional affiliations for Jerald are Chicago Paint and Coatings Association and the Council for Optical Radiation Measurements (CORM). Jerald served on the ISCC Board of Directors from 2005-2008. Jerald looks forward to serving the ISCC in appreciation for all that he's received through his membership these many years. If elected, Jerald's term will run from January 2017 to December 2018.

We are still seeking candidates for the Office of Treasurer. If you would like to nominate someone, please send your nomination to isccoffice@iscc.org.

There are two candidates for Board of Director positions: Maggie Maggio and Anthony Stanton. Their terms of service will go from January, 2017 until the end of the 2019 calendar year.

Maggie Maggio's early career was focused on creating healing environments in health care facilities around the world as part of the US Army Medical Service Corps. After leaving the Army and moving to Portland, Oregon, Maggie transitioned from working as an architect to teaching adults about color.



Over the last twenty years, Maggie's personal explorations into the science of light and pigments led to the creation of "Smashing Color" workshops for artists and designers who wanted to "smash" traditional theory and learn more about

modern color theory. After hearing over and over again from her adult students "Why didn't we learn this in grade school?", Maggie is now researching how color is taught to children all over the world and advocating for elementary color education that bridges between art and science. Maggie has been an ISCC member for three years. As an architectural designer, artist and art educator, Maggie is interested in promoting 21st century color literacy and would like to see ISCC play a major role in supporting and encouraging early color education for the digital age.

Anthony Stanton is a Teaching Professor and Director of Graphic Media Management for the Tepper School of Business at Carnegie Mellon Uni-

versity (CMU). In addition to teaching, Stanton is responsible for developing the curriculum, administering over adjunct faculty, and advising students in the graphic media track. Stanton has held this position since 1996.



In 2003, he received an award for sustained teaching excellence. Prior to teaching at CMU, Stanton spent twelve years as Director of Process Controls for the

Graphic Arts Technical Foundation (GATF). In this position, he was responsible for designing and overseeing the manufacture of quality control devices for the printing industry. He also performed research on print analysis and color reproduction. During his tenure at GATF, Stanton introduced whole-process test forms into the product line, which previously included only individual devices. He also introduced digital targets (and later, native PostScript targets) into the Foundation's product line. Stanton's educational background includes a BA in Art Studio from Colorado College (1972), MEd in Industrial Education from the University of Maryland (1978), MS in Printing Technology from Rochester Institute of Technology (1982), and PhD in Instructional Technology from the University of Pittsburgh (1992). He has authored 47 technical papers, and has taught over 100 tutorials, workshops, and seminars. From 2002—2015, Stanton was a consulting editor in the fields of Graphic Arts and Photography for the McGraw-Hill Encyclopedia of Science & Technology. Stanton has been a member of the Technical Association of the Graphic Arts since 1978, and is a past president of TAGA (2007—2009). In 2013, he received the Michael H. Bruno Award for outstanding contributions to the Graphic Arts.

Ballots for the candidates of Officer (Renzo Shamey and Jerald Dimas) and Board of Directors (Maggie Maggio and Anthony Stanton) will go out to the voting membership at the beginning of December. Once elected, the new Officers and Directors will begin serving their terms at the beginning of January, 2017.

Call for Nominations for the 2017 ISCC Godlove Award

The Godlove Award was established by Mrs. Margaret N. Godlove in memory of her husband, Dr.

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Nominations for 2017 Godlove Award continued

Isaac H. Godlove. The fund was presented to and accepted by the ISCC during the 25th Anniversary Meeting of April 6, 1956. The award is usually, but not necessarily, presented biennially in odd-numbered years. The last Godlove recipient was the late Anna Campbell Bliss in 2015. (Thankfully she received it before she passed away!)

The Godlove Award is the most prestigious award bestowed by the Inter-Society Color Council, and honors long term contributions in the field of color. Candidates will be judged by their contribution to any of the fields of interest related to color, whether or not it is represented by a Member-Body. A candidate's contribution is to be considered in the light of the objectives of the Council as defined in Article II of the Constitution. This contribution may be direct, it may be in the active practical stimulation of the application of color, or it may be an outstanding dissemination of knowledge of color by writing or lecturing, based upon original contributions of the nominee. **The candidate need not have been active in the affairs of the Council, but they must be current or former members of the ISCC. All candidates must have had at least five years experience in their particular field of color.**

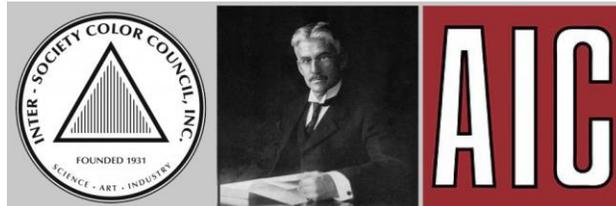
Nominations should include the following information:

1. The name and full address of the nominee.
2. A sentence or two giving the specific reason for the award's bestowal. This will normally form the basis for the citation presented to the successful nominee.
3. A narrative (up to one-page) of the nominee's contribution and its significance.
4. A curriculum vitae or the nominee, as well as any other material deemed useful.
5. The name of the person or Member Body or Award Committee who prepared the nomination with appropriate contact information.

Note: Confidentiality of the nomination is of the utmost importance. The nominating individual/group must ensure that the nomination is not disclosed to the proposed nominee. If any of the above information cannot be obtained without risking disclosure, then the information should be omitted from the nominating letter.

Nominations should be submitted using the form, <http://www.iscc.org/UniversalNominationForm.pdf>. This form can be filled out, scanned and emailed to isccoffice@iscc.org or printed, completed and sent to: ISCC Secretary, 7820B Wormans Rd. Suite #115, Frederick, MD 21701.

Joint ISCC - AIC Special Event 2018 Munsell Centennial Celebration



The year 2018 marks the 100-year anniversary of the passing of Albert H. Munsell (June 28, 1918) as well as the 75-year anniversary of the Munsell Renotations. The ISCC and AIC are excited to announce a once in a lifetime event to celebrate the work of Albert H. Munsell!

Since Albert H. Munsell's work in color theory, color education and color communication has been felt worldwide for the past 100 years, ISCC is hosting a one-time special event with AIC. This event will be held in early June of 2018. We will announce the exact dates as soon as possible.

A painter and art teacher who contributed to the color science world in many ways, Munsell is best known for his Munsell Color Theory, which led to his invention of the Munsell Color Order System. In addition to creating a standardized specification system, "One of Albert Munsell's goals in life was to standardize the way color was taught to children". (1) As a result, the Munsell Color Theory developed in the early 1900s is still a foundational basis for color education around the world today. Munsell was also a pioneer in the integration of art and science and his system provided an essential communication bridge between artists, scientists and industrialists.

The theme of the event is Munsell's Legacy: Inspiring 21st Century Color Concepts. This inclusive theme will allow us to bring together artists, scientists and industrialists to honor Albert H. Munsell's legacy and explore how we might continue his quest for high quality color standards, color education and color communication.

This event will celebrate the wealth of information that Munsell left us regarding his color theory and color order system. This event will feature workshops and presentations that explore how we might continue Munsell's quest for accurate standards and high quality color education, as well as how we might continue his vision for a working bridge between art and science. The goal would be for us to walk in Munsell's shoes in 2018 and imagine what he might see as opportunities to expand color

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Joint ISCC-AIC 2018 Munsell Event continued

knowledge around the globe. With Munsell by our side, perhaps we can inspire the next pioneers in the areas of color theory, color education and color communication between art, science and industry.

The venue for this event is the Massachusetts College of Art and Design (MassArt) in Boston, Massachusetts. Albert H. Munsell graduated from and taught at this school when it was the Massachusetts Normal Art School. (2) This vibrant, urban campus is close to many of Boston's cultural attractions including the Museum of Fine Arts, Isabella Stewart Gardner Museum and Fenway Park. It will be a fascinating venue because its library holds many of Munsell's artifacts, which we hope will be made available for display.

Many artists, designers and students will attend this event. **We are sensitive to the fact that cost might be an issue. We will do everything we can to limit the cost wherever possible.**

This event will consist of 2 days of workshops and 3 days of presented papers.

The workshops will be highly interactive featuring hands-on experience highlighting the Art of Color and Color Education. All workshops will be given by **invited presenters**. These workshops will be given by painters, designers, artists and educators who will show the participants how they use color tools inspired by the Munsell Color Order System in their work. The participants will then have an opportunity to try out some of the demonstrated methods during the workshop.

The three days of presented papers will feature oral papers and poster papers, as well as the ISCC Annual Business and Awards meeting in a single-track format. Papers from people all over the world who are interested in Munsell's legacy as well as continuing his quest for color standards, color education, and color communication in the 21st century will be sought. We will also have a poster paper competition for art and design students from colleges all over the world.

This event is co-chaired by Paula J. Alessi and Maggie Maggio. So far, the committee organizational structure features a Papers Committee (Mark Fairchild – chair) and a Workshop Committee (Maggie Maggio – chair). If you are interested in helping to plan this event, please contact Maggie Maggio at maggiemaggio@gmail.com or Paula J. Alessi at geinhaus@frontiernet.net.

References:

1,2. https://en.wikipedia.org/wiki/Albert_Henry_Munsell.

Meet Your Fellow ISCC Members

Hello fellow members; my name is Karl Tylman and I am the Technical Director for the Duha Group,



a fourth-generation family owned business headquartered in Winnipeg, Canada. The Duha Group is located in eight countries and manufactures color sampling and marketing tools selling primarily to the architectural and

decorative markets in 130+ countries. In addition, the Duha Group provides color forecast information and trend guidance. As Technical Director, I oversee all aspects of color technology within the group where I advance and support the development of our color management and color reproduction technologies at the global level, in addition to being the supplier and customer liaison.

I personally began my *colorful* career in the mid 80's when I joined Courtaulds Textiles located in central England. There I trained as a Technical Dyer in the manufacture of weft knitted fabrics and also earned my diploma in Textile Technology from the Derbyshire College of Higher Education (known now as the University of Derby). In the early 90's, I elected to immigrate to Canada where I joined Kromacorp Printing Ink Specialists, a manufacturer of liquid inks for the flexographic and gravure printing industry. I remained with Kromacorp as the Quality Systems Manager until 2000 at which time I had the opportunity to join the Duha Group as the Color Technology Division Manager and where today I serve as Technical Director. I have since earned my MSc. in Color Application and Technology from the University of Leeds.

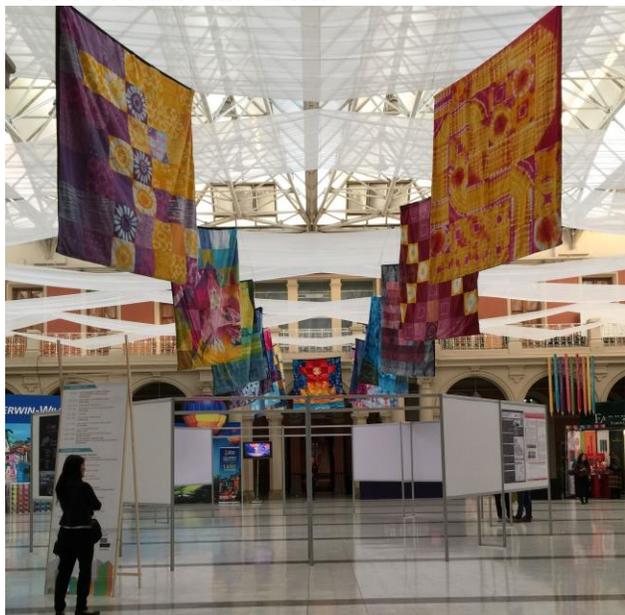
While all aspects of color interest me, I am particularly interested in and passionate about computational color, color specification and color order systems. I feel extremely fortunate to have worked for three different color industries and found the experience tremendously rewarding. While I do not consciously recall the moment when color transitioned from a job to a career, I am extremely pleased it did. I have found friendship and community through membership in organizations such as the Inter-Society Color Council and look forward to my continued involvement.

Summary of AIC 2016 Interim Meeting

The Chilean Color Association hosted the AIC 2016 Interim Meeting in Santiago, Chile from October 18th-22nd. “Color in Urban Life: Images, Objects and Spaces” was a very fitting title for this AIC meeting in Chile.



The “space” or venue was located within the most impressive buildings in Santiago, Universidad Católica de Chile, on the most important avenue of Santiago city, “Alameda Bernardo O’Higgins”. The open hall filled with bright sunlight greeted us each day. It was the perfect space for everything color; poster sessions, colorful exhibits, and coffee breaks with traditional Chilean fair.



The “objects” that surrounded the attendees held a special magic. First there was a special display from Sherwin Williams that focused on local color of Chile.



Then we enjoyed the Faber Castell tree of color.



Next was an incredible life-size coloring book of Santiago landmarks where all the attendees took time to express their creative side.



The exhibit *Color Textil*, a display of colorful and imaginative weavings from some of the most important contemporary Chilean textile artists, was a highlight for many. The next two images are from the *Color Textil* exhibit for our readers to enjoy.



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Summary of AIC 2016 Interim Meeting continued

The “images” came in two forms. First, there were those from Jaime Cordova, *Festival de Cine Recobrado de Valparaíso*, who presented a lecture about color application in cinema from its origins. Second there were the images we all captured on the tour of the city’s landmarks or the trip to one of the most colorful cities in the world, Valparaíso.

It was a trip worth making, supplying new knowledge, insights and a chance to connect with the international color community. The “images, objects and spaces” will always be fondly remembered.

Leslie Harrington, *CAUS*

13th AIC Congress

2017 JEJU

Color & Health

AIC 2017 Congress – Call for Papers

The 13th Congress of the AIC will be held in Jeju, Korea at the International Convention Center from October 16th – 20th. The AIC 2017 organizing committee invites submissions of papers or posters or interactive presentations on any aspect of color. This Congress provides a unique forum bringing together researchers, academics, artists, architects, industrialists, engineers, designers, lighting experts and business leaders from all over the world.

The following list of topics is provided as a guide, but submissions in any area related to color are welcome:

- **Color & Health**
- **Color & Environment**
- **Architectural Color Design**
- **Color in Art**
- **Color Psychology**
- **Color Education**
- **Color in Cultures**
- **Color & Light**
- **Color Science & Technology**
- **Color in Product Design**
- **Color in Communication**
- **Color Application**

We encourage all ISCC members to submit an abstract in English of maximum length one page (between 300 and 500 words), to the submission website, which can be accessed via the Congress website www.aic2017.org. The abstract submission deadline is **January 31, 2017**. Further instructions regarding submissions can be viewed on the Congress website. Selected authors will have the opportunity to publish an extended version of their paper in a special issue of the Journal of the International Colour Association (JAIC).

Eulogy for David L. Alston

David was born on April 11, 1940 in Cleveland, Ohio and succumbed to pulmonary fibrosis on March 10, 2016 in Colorado Springs, CO where he had retired 13 years earlier. He and his wife, Elaine had two sons, Jeffrey and David and a daughter, Lorie. He spent nearly 40 years in the field of industrial color technology.



His first full time job was with B.F. Goodrich Co. in 1959 at their Vinyl Polymer Div. in Avon Lake, Ohio. Initially he worked in the color mixing department. After a few years, he progressed to the Color Lab and became a color matcher. This position

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Eulogy for David L. Alston continued

opened up the whole new world of color technology that became his focus for the rest of his life.

As the plastics industry matured, they recognized matching colors was an expensive and time-consuming burden. Eventually they all closed their color labs and recommended that their customers go to a new type of company that offered color concentrates, master batches and compounding services. At this point, after 13 years, Dave joined Bee Chemical in Ashtabula, Ohio. Bee Chemical was a new business initially providing color concentrates for plastic product manufacturers. In 1977, he left Bee and joined Plasticolor, Inc. located in the greater Chicago area. During that period, he became proficient at using computer color matching systems. A few years later (1977) he was offered a position as a plastics industry applications specialist with Applied Color Systems, Inc. (ACS), in Princeton, N.J. In this position, he conducted one-week color science courses and a second week training course for new customers in their own plants. Because of his extensive knowledge of plastics coloring, he became in demand at SPE and RETEC meetings. Internally at ACS, he became a key problem solver and began to take on new responsibilities for new product ideas both in software improvements and new spectrophotometer features.

Following the acquisition of ACS in 1988 by the Swiss Company, Eichhof (Datacolor), Dave joined Color and Appearance Technology, Inc. (C.A.T.) in 1992 in Princeton, where he became the Executive Vice President. This new company was formed to develop an instrument for the measurement of spatial color and artificial-intelligence (A.I.) software to quantify the various attributes of appearance in order to establish color and appearance quality tolerances. To do this, Dave established three projects: (a.) the development of an accurate digital color camera system that had adjustable illumination from variable angles of illumination and viewing using different light sources, (b.) an A.I. fuzzy logic based color tolerancing model and an appearance acceptability model for spatial colors. A rotatable three-dimensional asymmetrical ellipsoid was also to be developed to assist the operator in interpreting the results, (c.) an extensive evaluation of a neural net based color matching model developed by Dr. Stephen Westland of Keele University in the UK. The objective was to determine its effectiveness for matching various materials that were beyond the capability of the widely used Kubelka-Munk model.

Dave and his team of programmers and engineers met their first two objectives and received patents for the "Fuzzy Logic Color Tolerancing System" (U.S. Patent No. 5,410,637) and the "Colorimetric Imaging System for Measuring Color and Appearance" (U.S. Patent No. 5,850,472). As for the neural net model, although the results were encouraging, it was decided to put it on the back shelf primarily because of the complexity and effort necessary for a customer to establish the optimum network. Unfortunately C.A.T. was also put on the shelf due to insufficient capital.

Following C.A.T.'s demise in 1995, Dave joined Macbeth in New Windsor, NY just before their acquisition by Gretag. During his tenure there, he worked primarily on improving the multi-angle measurement methods and the quality control and formulation models for metallic and pearlescent automotive paints and plastics. In 2002, he retired to Colorado Springs, CO. Dave was a member of ISCC for at least a decade before his retirement in 2002.

Dave was an incredibly hard working technologist who loved solving color problems. His combination of color theory knowledge and extensive practical color manufacturing experience gave him the ability to find problem solutions that weren't often apparent to others. He is truly missed by both his former customers and co-workers.

Don Hall, *As a co-founder of Applied Color Systems and founder of Color & Appearance Technology, Don Hall had a substantial interaction with David Alston during his illustrious career.*

How an Enzyme in Fireflies, Click Beetles, and Glow Worms Yields Different Colors

From Biochemistry (see page 12 for reference)

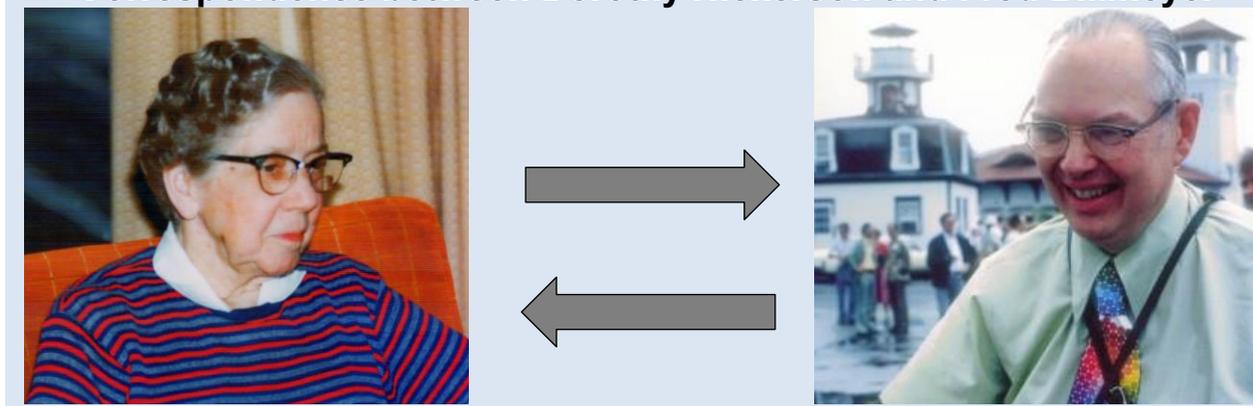
In the ACS journal *Biochemistry*, one team reports new insights into the mystery of different colors displayed by fireflies, click beetles and glow worms. Vadim R. Viviani and other researchers used modeling, mutations and spectral and kinetic studies to probe how changes to an enzyme called luciferase affect what color is emitted. Mutations to two particular parts of the enzyme produced a red glow. These



Credit: Cathy Keifer/Shutterstock.com

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ISCC Archives from Hagley Museum Correspondence between Dorothy Nickerson and Fred Billmeyer



Danny Rich was a graduate student at Rensselaer Polytechnic Institute (RPI) from 1975 – 1980 and he recalls some of the correspondence and interaction between Professor Billmeyer and Dorothy Nickerson that was found at the Hagley Museum and Library in Wilmington, DE. It is worth sharing some of his insights here.

First, the article in ISCC News #475 commented on the fact that Dorothy described some Munsell colors in terms of what we today call natural products; tomatoes, cotton, hay, etc. This is because Dorothy's government job was in the Department of Agriculture. RPI had possession of several of Dorothy's unique colorimeters in which she would visually judge the colors of agricultural crops against papers from the Munsell Book of Color. One of them was the Nickerson Hay colorimeter in which she inverted the traditional Maxwell spinning disk colorimeter and had a mechanism for spinning a prism that provided a series of views of the end of a bale of hay or of cotton. The prism would transmit a view of a single region of the bale and then was rotated to view another region and so on. When the prism was rotated quickly enough, the images fused, just as the segments of a disk colorimeter or a visual display unit frames would. So, the observer could compare a uniform colored field against the uniform color of a matte Munsell paper.

In this issue, we continue with the correspondence between Dorothy Nickerson and Fred W. Billmeyer, Jr. found at Hagley Museum and Library. Four documents remain that were scanned on October 9, 2014. These can be found, along with the six reported in ISCC News #475, on our website at http://iscc.org/resources/hagley_nickerson_billmeyer.php. Please keep in mind that this is not a complete collection of all of Dorothy's correspondence. There are missing letters and sometimes things seem out of

place. However, we are doing our best to present the membership with a glimpse of the most precious documents from Dorothy's collection for your information and enjoyment.

Memo to Dorothy for her Fred Billmeyer file (5/4/82)

This correspondence relates to the color ordering difference between the Munsell System and the Natural Color System (NCS). Dorothy wrote a memo to herself on May 4, 1982 for her Fred Billmeyer file. The memo is somewhat difficult to read, but with the help of Danny Rich, it has been clarified. The memo says to send Fred Billmeyer a "copy of 5/4/82 notes to Henry Hemmendinger including a copy of pp. 622/23 of the 1940 JOSA Newhall committee report" [1]. Unfortunately, the 5/4/82 notes to Hemmendinger were not found on this visit to the Hagley. Finally, the memo says to also send Billmeyer "a copy of the attached letter from Anders Hård's (4/26/82) query", which was found and is attached to this memo as page 2 [2]. The letter from Anders Hård reminds Dorothy that previously he sent her "CIE data for samples in the NCS atlas" along with their calculated NCS notations based on the production color control limits. Interestingly enough, he also provided data for samples that could not be produced given the technology available in 1982. The tables he sent Dorothy were from his own manuscript, which was used to compose the NCS standard. Finally, he sent Dorothy a NCS color index. Anders sent these to Dorothy as a gift "from one friend in color to another". Please read the letter from our website [2]. It is very touching!

Manuscript from February 16-17, 1984 Annotated by Fred and Dorothy

This manuscript was written by Gunnar Tonnquist entitled "Philosophy and Applications of

continued on next page

Correspondence Between Dorothy & Fred continued

Color Order Systems” [3]. He presented it at the Frontiers in Color Science Symposium held at the inauguration of the Munsell Color Science Laboratory at Rochester Institute of Technology (RIT) on February 16-17, 1984. This manuscript was heavily annotated by Fred and Dorothy. It is obvious that a very controversial color topic of the time was the NCS vs. the Munsell Color Order System and Fred, Dorothy, and Gunnar were in the middle of it. Fred asked Dorothy to comment on pages 9-11 and 16, but you will note that Dorothy’s handwriting shows up in many places elsewhere. On the page numbered 22, Gunnar ends with this quote, “Both Munsell and NCS are surely capable of further developments, where both may profit from each other. Are those developments going to be just another struggle between two systems, or a common search for new knowledge in color science?” Dorothy’s annotation of this paragraph says that she and Deane B. Judd agreed with the words in this last paragraph. However, the NCS system was published without any coordination with those working on the Munsell System like Dorothy and Judd. It was Dorothy’s belief that if NCS had adjusted a few points within their system (i.e. the white point, the black point and a few points on the inside on the space) both Munsell and NCS could be “simply-interrelated” because they each represent different methods “of mapping the same uniform color space”.

Dorothy to Fred May 16 1984

This letter from Dorothy to Fred (5/16/84) is a reply to a request Fred made of Dorothy regarding Gunnar Tonnquist’s manuscript, “Philosophy and Applications of Color Order Systems” [4]. Fred wanted to see Dorothy’s annotations that she made after his. So Dorothy enclosed them with this letter. This is a very heart-felt letter, where Dorothy expresses her frustration and concern over the fact that after many years of research studying the NCS and Munsell Systems with Judd and others and discussion with those responsible for finalizing the NCS System, like Gunnar, NCS published their system ignoring important issues that she and others raised so that both systems could work in concert with each other. There was a fundamental difference between both groups. The Swedish color experts working on NCS did not believe “the fact that there are different and equally valid ways of mapping perceptual color space”. Dorothy and Deane Judd “felt confirmed in their view that each method presented but a different set of scales for mapping what eventually will be found to be the same uniform color space”. This let-

ter also refers to the Munsell Preface from Munsell’s 1904 lecture series that was enclosed for Billmeyer, but found separate from this letter at the Hagley.

Fred to Dorothy July 2, 1984

This letter from Fred to Dorothy (7/2/84) discusses the work of Fred’s graduate student, Anna Bencuya, on the relationship between the NCS and Munsell Systems [5]. Anna’s work found equations to convert Munsell Value into NCS blackness and Munsell Chroma into NCS chromaticness. Fred pointed out that Anna’s equations were a bit more complex than the ones that Dorothy and Deane Judd reported in their 1975 paper. Anna’s work did not produce equations to relate Munsell Hue and NCS hue because of the scatter in NCS hue. Billmeyer assured Dorothy by saying, “Nevertheless we agree completely with your conclusions with Dr. Judd that the two systems clearly sample the same underlying space.” He also assures Dorothy that he will send her Joann Taylor’s thesis on the multidimensional scaling of the OSA-UCS system Finally, Fred discusses cleaning out 20 years of work from his lab at RPI, as he gets ready to retire and encourages Dorothy to correspond with him at his home address.

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2. <http://iscc.org/resources/hagley/Memo to Dorothy from File to Fred May 4 1982.pdf>
3. <http://iscc.org/resources/hagley/Manuscript from February 16-17 1984 Annotated by Fred and Dorothy.pdf>
4. <http://iscc.org/resources/hagley/Dorothy to Fred May 16 1984.pdf>
5. <http://iscc.org/resources/hagley/Fred to Dorothy July 2 1984.pdf>

Many thanks to Dave Wyble for his work on putting an historical archive section on our website. For more information on the Hagley Museum, please visit <http://iscc.org/resources/hagley.php>.

Biochemistry Reference for Article on bottom right of page 10

Article #2 “Glu311 and Arg337 Stabilize a Closed Conformation and Provide a Critical Catalytic Base and Counteraction for Green Bioluminescence in Beetle Luciferases”

A Blast from the Past: ISCC Newsletter 50 Years Ago

Number 184-185 – September - December 1966 on ISCC website

This 1966 issue is 25 pages long. This issue begins with **four** pages of information on **36** new members who were approved by the Board of Directors. This was a very popular time for ISCC to serve the color needs of people from many different backgrounds. Four reprints (two from a Williamsburg Conference and an article plus a supplement from *Chemical and Engineering News*) were sent out to members with this newsletter!

News from The Rensselaer Color Measurement Laboratory (TRCML) was featured. First, November 1966 marked the Interscience Division of John Wiley and Sons publishing of the first edition of Principles of Color Technology co-authored by Fred W. Billmeyer and Max Saltzman. Here is exactly how this book, the first of its kind, was described: “The book was written to provide the industrial scientist working in the production or use of dyes and pigments with a simplified introduction to the basic principles of color science and their practical application. The book is said to be of interest also to styl-ists and designers whose duties include the specification of color effects to the industrial colorist. In addition, it is reported to be suitable as a textbook wherever color science is taught, and will be so used at The Rensselaer Color Measurement Laboratory. Designed in large (8 1/2 x 11) format and profusely illustrated, Principles of Color Technology is arranged with a continuous text uninterrupted by tables or equations, for the benefit of those unfamiliar with or not requiring the mathematical background of color science. Yet all the pertinent equations and data for quantitative study are presented in an accompanying column for use by the more advanced reader. It is reported that an outstanding feature of the book is an extensive bibliography listing, with explanatory comments, over one hundred of the most useful books and articles on color in existence.” Second, The Rensselaer Color Measurement Laboratory announced that Max Saltzman, Billmeyer’s co-author, was going to be an Adjunct Professor



at Rensselaer Polytechnic Institute! At the time, Max was a senior scientist at Allied Chemical Corporation in the Harmon Colors Division, where he set up a robust pigment identification color matching system that was used in many laboratories

around the world. Max’s role as professor involved periodic visits to TRCML to advise and help teach color science courses to graduate students as well as assist in teaching color science summer courses to members of industry, who needed more color knowledge to be successful in their color-related jobs.

There is also a fascinating article on Biometeorological Applications of Color Technology discussed at a meeting held at the Skin and Cancer Hospital in Philadelphia. Interestingly enough, the problems faced by this group of scientists are similar to those faced by many ISCC members:

- “1. What are the normal variations in the solar energy spectrum in the ultraviolet and visible range?
2. What is the appropriate "standard" daylight spectrum and what are the preferred artificial sources for its duplication?
3. What is the preferred source for accelerated testing of the biological responses under controlled, reproducible conditions?
4. What are the preferred spectrophotometric devices and procedures for precisely measuring changes in absorption and transmission in the complex laminar epidermal layers?
5. To what extent can the different biological responses (e.g. erythema, pigmentation) be quantified by reflectance measurement?
6. What are the preferred viewing conditions and procedures for clinical observation of skin color, for purposes of diagnosis and of recording observations in absolute communicable terminology?
7. What are the chemical changes induced by solar radiation and how may they be controlled?”

For ISCC members working in the areas of textiles, paper, paint, and plastics, answers to the above seven questions regarding basic problems of physical measurement would help them develop better commercial products. For biometeorological scientists, answers to the above seven questions could lead to the discovery of methods to prevent sunburn and skin cancer! Please read how ISCC members participated on a panel to discuss the “Optics of Skin” and feel the magic that took place as color scientists shared technology with biometeorological scientists to advance their knowledge through synergistic discussions from research on both sides.

Paula J. Alessi, *ISCC News Editor*

refractions

seemingly random musings on color



How Art Got Its Colors: The Alchemists



Modern pigments - Art Supply Store Florence, Italy

Today's artists are spoiled - for choice that is. Go to any well stocked art supply store and you will be confronted with hundreds, if not thousands, of brilliant and nuanced colors, ready to go. But this is a relatively recent development. Historically, artists had to make their own colors. Though most of the earliest colors such as those found in the Paleolithic cave paintings of Lascaux and Chauvet came from natural mineral sources, the majority of colors, since the time of Ancient Egypt were manufactured. Egyptian Blue, considered to be the first synthetic pigment (about 2,400 BC) - was created by 'cooking' together sand, chalk and copper. It could be created in large quantities, and met the demand for blue that more natural and rarer forms such as turquoise and lapis could not. Later craftsmen would use trays of vinegar stacked between bricks of lead to corrode the surface making white flakes to produce one of the most prized (and most poisonous) white pigments in all of art history: Lead white. Doing the same with copper plates yielded verdigris, the most vivid green available for painters until the 19th century.

The history and 'technology' of artists' colors is, pun intended, a colorful one. Two of the strangest examples are Mummy brown and Indian yellow. Mummy brown, as the name indicates, was a brown pigment derived from the crushed remains of human and animal mummies. And Indian yellow, a pungent, bright and transparent color, was derived from

the urine of cows in India that were force fed mango leaves.



Alchemist. From the Twelve Keys of Basil Valentine. (1599)

According to one of the earliest and most popular manuals for painting, Cennino Cennini's, *Il Libro del Arte* (1390)¹, by the Middle Ages and the Renaissance, color-making was largely the province of alchemists, the precursors to modern chemists. Though shrouded in tales of madness, magic, and charlatanism, these 'magicians' experimented tirelessly with minerals and toxic compounds and were responsible for creating some of the most popular and influential pigments in all of art history.

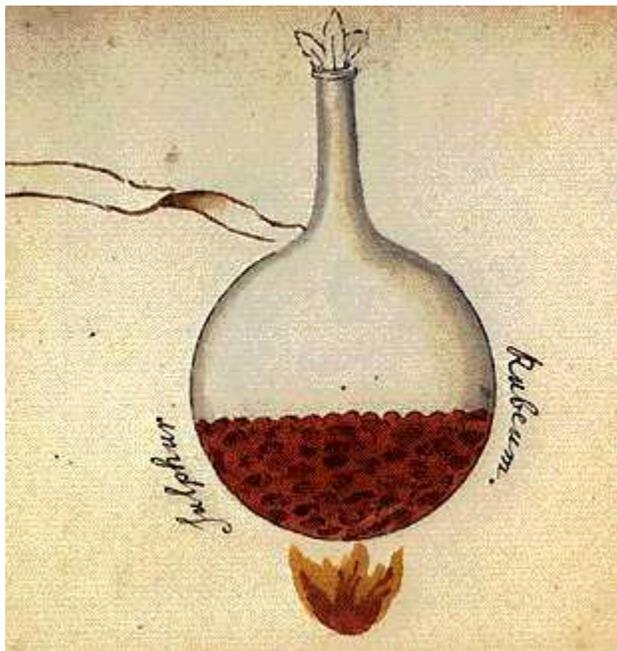
Artists, alchemists, and apothecarists tended to come in families and could often be found in one and the same person: the people supplying the pigments also supplied the tinctures, medicines, and remedies, leading some scholars to note the connection between our word *pharmacy* and one of the Greek words for color, *phármakon*².

One of the most well-known colors of the alchemists, was red lead – achieved by cooking white lead slowly and uncontained. Also known as *minimum*, in Medieval Latin, it was used extensively in illuminated manuscripts and gave us the word 'miniature' as a result, which referred to the use of red rather than the size³.

But by far the jewel in the crown of alchemical colors was the creation of vermillion. This bright red, known also as the Dragon's Blood, was one of the most prized colors in the Middle Ages and the Renaissance, and was made by cooking sulphur and

continued on next page

How Art Got Its Colors: The Alchemists continued
mercury, the main elements of Alchemical theory.



The red sulphur, cabala mineralis, British Library 17th century

Theophilus, in the eleventh century, described the synthesis of vermillion from sulphur and mercury thus:

When you have mixed them carefully, put them into a glass jar. Cover it all over with clay, block up the mouth so that no fumes can escape, and put it near the fire to dry. Then bury it in blazing coals and as soon as it begins to get hot, you will hear a crashing inside, as the mercury unites with the blazing sulphur. When the noise stops, immediately remove the jar, open it, and take out the pigment.⁴

This brilliant red fueled the craze for other brilliant hues, which according to art historian Daniel Thompson⁵, transformed the history of art by stimulating the eye and appetite for brighter pigments that came to define the Gothic era and the Renaissance.

Through their quest for the elusive Philosophers' Stone, shrouded as they were in secrecy and poisonous fumes, they gave artists some of their most valued colors and thereby made a lasting contribution to material science and visual culture.

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Carl Jennings
University of Hawai'i

Please visit Carl's blog at
<http://cjenning.wix.com/refractions> for comments and feedback on his articles!

Online Upgrade for ISCC Members and the Organization

The ISCC is implementing a new membership software program that will allow members to log in to their own profile, renew their membership and update their own contact information through our website. There will be no changes to the types of membership available. This upgrade will be integrated into the existing website so we hope to make this change very transparent to all members. The system makes management of events and our webinar registration easy.

One reason for moving to this system is to increase the efficiency of communication to the membership and simplify the accounting process. It will be tremendously valuable for the leaders of the organization to all have access to the same database to streamline the work they do for the ISCC. We look forward to reaping the benefits of the new system. Once it is in place it will be easier to attract, renew and inform the membership. We plan to have it completed by January for the annual membership drive.

Jodi Baker, *Konica Minolta Sensing Americas, Inc.*

Enzyme – Insects – Different Colors continued

parts display opposite charges, which attract each other and keep a "gate" closed where the light-emitting compound is generated. Under normal conditions, the enzyme active site remains closed restricting the entrance of water, which favors green light emission. But mutations and other alterations that break this attraction open the gate and allow water in. This relaxes the active site, resulting in the emission of light with lower energy in the red region.

HUE ANGLES

(Send contributions to mbrill@datacolor.com and see <http://hueangles.blogspot.com>)

Paradox Lost

In the Spring 2016 issue (#474) of ISCC News, I described what appeared to be a paradox that emerged from an exercise for students [1]: “If the wavelength of the green line of mercury is 546 nm in a vacuum, what is it in water? In heavy flint glass? [410 nm, 331 nm].” Would change of refractory material abutting the eye’s photoreceptors cause the color of a light to change as drastically as suggested here? More precisely, would changing the refractive index change the tristimulus values of a light with emitted spectral power distribution $E(\lambda)$?

Unlike in the wavelength domain, the change of refractive index would not affect the frequency of the transmitted light. I concluded that the proper choice of integration domain in which to perform tristimulus integration could be a matter of experiment. This conclusion was incorrect. As often happens when one poses a paradox, closer examination provides a resolution. The tristimulus values should not change if the integrals are performed properly. I describe the resolution in a tutorial note recently posted for publication in *Color Research and Application* [2].

It is reasonable and respectful of physical principles that a tristimulus value [say, $M = \int E(\lambda)m(\lambda)d\lambda$] should not depend on the domain of integration used to obtain it. In [2] it is shown that the domain invariance from wavelength λ to frequency $\nu = c/\lambda$ is assured if the spectral power distribution of the test light in frequency is represented as:

$$E^*(\nu) = |d\lambda/d\nu| E(\lambda(\nu)).$$

Now imagine a transformation from frequency to two alternative wavelength domains $\lambda_1 = c_1/\nu$ and $\lambda_2 = c_2/\nu$, where c_1 and c_2 represent speeds of light in different refractive indices (possibly functions of ν). Here, M doesn’t change either; rather, the spectral power distribution $E(\nu)$ is multiplied by the Jacobian $|d\lambda_1/d\nu|^{-1}$ or $|d\lambda_2/d\nu|^{-1}$, respectively. (Things get a bit more complicated when λ_1 or λ_2 is a nonmonotonic function of ν , but the principle is the same.) Of course, changing from λ_1 to λ_2 is equivalent to changing from λ_1 to ν and then from ν to λ_2 . There is no predicted variation of M , by construction.

So my “gentle paradox” evaporates by construction. Obeying the rules of mathematics leads back to where one started: tristimulus values don’t depend

on the refractive index of the transmitted medium where one started.

Where does that leave the role of experiment? If one were to measure the camera version of tristimulus values in different refractive media (say, with M being a measured camera value for a light E through a camera sensitivity function m), we would expect no change in those values. But experiment can trump theory. If M were observed to change, then a new paradox would surface. From “paradox lost” we would see “paradox regained.”

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- [1]. HQ Fuller, RM. Fuller, and RG Fuller, *Physics Including Human Applications*. Harper and Row, 1978. Revised electronic version copyright 2009 by RG Fuller.
http://physics.doane.edu/hpp/Resources/Fuller3/pdf/F3Chapter_19.pdf exercise 2, p. 436.
- [2] MH Brill, Ways to define a tristimulus value. *Color Res. Appl.* 2016, Early View, DOI 10.1002/col.22079.

Michael H. Brill, *Datacolor*



IN THIS ISSUE, December 2016

Our perception of color in the environment is both useful and enriching. For as long as humans have existed, the world had provided a broad spectrum of color experience, which is important not only for survival, but also pleasure. Also, our ability to add color to our man-made products is continuously expanding. The way we associate colors with our world not only gives us more detailed information, but also psychological visual aesthetics. However, these color experiences vary depending on genetic variations in our visual system. For approximately 4% of the population, the experience of color can appear very different from that of most people,

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CR&A In This Issue, December 2016 continued

which may also lead to different associations in the process of cognition. In our first article, Xia Li, Shuangyan Li, Lu Yang, and Tong Wu report on their study of “Color Association Research on Red-Green Dichromats in the Color Ergonomics of Users.” They believe that the proper utilization of color in the interface design of digital devices can promote not only interaction efficiency but also the user experience.

Staying in the color vision research field, Kai Lin, Ning Fang Liao, Dazun Zhao, Shuwen Dong, and Yasheng Li report on research done with random-dot stereograms. Random-Dot stereograms are tools used in the study of human and primate stereopsis. They are images that only can be seen by binocular combination of the left- and the right-hand halves of the stereograms. In “Chromatic Contrast Dependence of Reaction Time to Random-dot Stereograms at Isoluminance” they found that for the same value of contrast, reaction times were shorter for luminance contrast cues than the chromatic contrast cues along the red–green axis, which in turn were shorter than those along the blue-yellow axis.

Our next two articles deal with computations in fundamental color science. Often when we are trying to determine the stability of a color measuring instrument or the quality of the measurement of a specimen, we use the metric mean color difference from the mean. In our next article, Paul Centore proposes the use of “The Coefficient of Variation as a Measure of Spectrophotometric Repeatability.” In the article, he describes the metric, CoV, and reports on a study in which measurements were made of nearly 300 colored specimens of diverse media and substrates. Besides showing the benefit of using the supplementary metric CoV, he demonstrated that the surface geometric structure explained much of the observed spectrophotometric variability.

Following Centore’s article, Geoffrey Rogers takes us on a “Random Walk Analysis for Reflection and Transmission of Turbid Media.” The interaction of light on an object that is then reflected or transmitted to the observer’s visual system is a key component in our perception of an object’s color. Modeling this component has been the goal of color scientists for hundreds of years. Various models are currently being employed in color formulation and shading software widely used in industry. In his article, Dr. Rogers determines the path length probability densities, and then sums all paths weighted by their probabilities. He shows the results are simple expressions for the reflection and transmission in

terms of the physical properties of the medium.

In recent years, spectral imaging techniques have been applied to the fields of remote sensing, astronomy, physics, medicine, and museum work such as document or artifact archiving. With recent events, the preservation of our cultural heritage through developing digital image archives has increased in importance. Our next article, “Research on Filter Selection Method for Broadband Spectral Imaging System Based on Ancient Murals”, reports on the technique of selecting optimal filter sets in order to obtain spectral images with high spectral and colorimetric accuracy based on the broadband spectral imaging system. In their article, Jinxing Liang, Xiaoxia Wan, Qiang Liu, Chan Li, and Weipeng Lu identified the optimal filter set and evaluated it by applying it to images of the Dunhuang murals from grottoes, which were built in the Beizhou Dynasty. The results showed that the optimal optic filter set could result in promising improvements both in spectral and color accuracy when compared with the production camera and could be used for the construction of the Dunhuang murals spectral image database.

Our next article is from the packaging industry. Paper is an important and widely used material for packaging material. Very often the surface of the paper is coated to enhance its characteristics. The top layer changes the chemical and morphological surface features and determines the final surface properties including (but not limited to) print quality and optical appearance. Pieter Samyn, Jurgen Van Erps, and Hugo Thienpont report on the “Specular Gloss versus Surface Topography for Oil-filled Nanoparticle Coatings on Paper.” They found that the gloss values could not be directly related to statistical surface roughness parameters. However, a best-fit model illustrates that gloss properties of various nanoparticle paper coatings mainly relate to the spatial surface roughness parameters determined from non-contact profilometry.

Beata Stahre Wästberg and Monica Billger were looking for a better understanding of how color research findings can be conveyed to a broader target audience using digital media. So, they decided to do a “User Evaluation of a Virtual Colour Laboratory as a Tool for Demonstrating Colour Appearance.” The Virtual Colour Laboratory (VCL) is an interactive webpage for presenting and demonstrating existing research results on spatial color phenomena. Their study involved two groups in the field of architecture: students and professionals. They found that the VCL was appreciated by both, but there were

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CR&A In This Issue December 2016 continued

differences in how the two groups experienced the visual and written content of the stations in the VCL, as well as differences in how they experienced the VCL. They concluded it is important to adjust levels of information depending on the target group being addressed.

For our next two articles, we move to the textile industry. Textiles produced with mélange yarns can provide interesting color effects. However, they also present challenges for color measurement and color identification because the color appearance is the result of the visual blending of the colors of separately dyed yarns. Last year in Issue #6, Jie Zhang, Ruru Pan, Weidong Gao presented the article "Automatic Detection of Layout of Color Yarns of Yarn-Dyed Fabric Part I: Single-System-Mélange Color Fabrics." Now in this issue they join with Bugao Xu, and Wei Li to present "Part II: Region Segmentation of Double- System-Mélange Color Fabric." In this part, they propose a 5-step projection-based fabric segmentation method for double-system-mélange. This allows the color regions to be analyzed independently. The biggest advantage of the new system is that it does not take the number of fabric regional colors into consideration.

The other textile article also deals with the processing of mélange yarns. Jijia Shen, Hui Ma, Weiguo Chen, and Xiang Zhou present "A Novel Analysis of Color Component for Top Dyed Mélange Yarn with a Support Vector Machine." In their article, they describe the support vector machine, which uses four kernel functions as well as five spectral preprocessing methods including principal component analysis to achieve over 96% recognition rate to determine the color composition of the mélange yarns. This analysis is useful for accurate color matching.

The primary function of teeth is to process the food we eat. Therefore, dental health is important to our survival. Dentistry has made great strides in allowing people to keep their natural teeth even while our life expectancy has increased over the generations. However, having our teeth look natural and match each other is also important to many people. Therefore, it is desirable to have the materials used to repair defects in teeth appear as natural as the original teeth. Javier Montero, Cristina Gómez-Polo, and Juan Santos Marino studied the parameters of the ceramic veneers (thickness and cement shade) and how the veneers change their colorimetric prop-

erties when bonding to teeth. The results of these studies are presented in the final article of this issue and this year, "Effect of Ceramic Veneer Thickness and Cement Shade on the CIELAB System After Bonding - An In Vitro Study."

Ellen Carter

Editor, Color Research and Application

In Memory of Richard Ingalls

Richard David "Dick" Ingalls, 83, from Seattle Washington, passed away peacefully with family



present at his bedside on August 23, 2016. He was born on 11/23/32 in Spokane, WA to Earl Serge and Genevieve (Gunderman) Ingalls. In 1956 he married Marjorie (Barry) Ingalls at St. James Cathedral in Seattle, WA. He was the first ever art major at a Jesuit University

when he graduated from Seattle University in 1956. He earned his Master's Degree from San Francisco University in 1960, and created the Art Department at Gonzaga University in 1962, where he was a professor for 17 years.

For 53 years, he and his wife, Marjorie owned and operated the highly successful Tourmap Company, which produced beautiful maps of cities all over the world.

In 1980, Dick and Marjorie joined the ISCC. Dick was very proud of the first lecture he gave at the ISCC conference in 1981 on reproducing color accurately with photosensitive material using an algorithm that Marjorie discovered. In 1984 he and Marjorie co-chaired the ISCC-GATF Williamsburg Conference on Color and Imaging. Dick was also chairman of the ISCC Long Range Planning Committee in the mid-1980s. Dick was happy to be an ISCC member the rest of his life.

He was a poet, an artist, a lecturer, a world traveler, a loving husband and father. He's survived by his wife Marjorie; his daughters Pam Ingalls & Cynthia Rose Ingalls Smith and his faithful Old English Sheepdog, Tiffany. He was truly an inspiration.

Dick, we miss you from the bottoms of our hearts.

Pam Ingalls, *Daughter of Richard Ingalls*

Calendar

2016

- Nov 7 -11** 24th Color and Imaging Conference (Special Topic: Mobile Color), San Diego, CA
Info: www.imaging.org/color
- Nov 11** ISCC Workshop (Life of a Color) and Annual Business and Awards Meeting, co-located with CIC 24, San Diego, CA, Info: [http:// www.imaging.org/color](http://www.imaging.org/color)
- Nov 17** 24th Annual Workshop on Object Perception, Attention, and Memory, Boston, MA, Info: <http://www.opam.net/>
- Nov 23-24** 3rd International Scientific Conference Colour-Culture-Science, Krakow, Poland, Info: <http://www.deutsches-farbenzentrum.de/2016/06/3rd-international-scientific-conference-colour-culture-science-23-24-november-2016-cracow-poland/>

2017

- Jan 29-Feb 2** Electronic Imaging 2017, Burlingame, CA, Info: www.electronicimaging.org
- Feb 1-2** ASTM E-12, Norfolk Waterside Marriott, Norfolk, VA.
- Mar 29-31** Computational Color Imaging Workshop (CCIW'17), Milan, Italy, Info: <http://www.ivl.disco.unimib.it/cciw17/>
- May 8-12** 3rd International Conference on Applications in Optics and Photonics (AOP 2017), Faro, Algarve, Portugal, Info: <http://www.aop2017.org>
- May 15-18** IS&T Archiving Conference, Riga, Latvia, Info: <http://www.imaging.org/archiving>
- May 19-24** 17th Annual Meeting of the Vision Sciences Society (VSS 2017) Trade Winds Island Resorts, St. Pete Beach, Florida, Info: <http://www.visionosciences.org>
- Jun 6-7** ASTM E-12, ASTM International Headquarters, West Conshohocken, PA
- Jun 13-17** Vision in the Real World, Center for Vision Research (CVR), York University, Toronto, Canada, Info: <http://cvr.yorku.ca/conference2017>
- Aug 10-11** "The Thinking Eye... The Seeing Brain" Conference, London, UK, Info: <http://visionscience.conferenceseries.com/>
- Aug 27-31** 40th European Conference on Visual Perception (ECVP), Berlin, Germany, Info: <http://www.ecvp.org/2017/>
- Oct 16-20** AIC 13th Congress, International Convention Center, Jeju, Korea, Info: www.color.or.kr
- Oct 23-25** CIE 2017 Midterm Meeting, Jeju Island, Korea, Info: www.cie.co.at
- Oct 26-28** CIE Division 1 and 2 Meetings, Jeju Island, Korea, Info: www.cie.co.at

2018

- Oct 1-5** AIC Interim Meeting, Colour and Human Comfort, Portuguese Colour Association, Lisbon, Portugal

ISCC Sustaining Members

Sustaining Members of the ISCC are organizations who support the mission and goals of the ISCC through financial or other support. With our Member Bodies, Sustaining Members also provide a critical connection to the color community. If you feel your company or organization should support the ISCC in this way, please contact the office for more information about member benefits.

Avian Technologies	www.avianttechnologies.com	603-526-2420
Datacolor	www.datacolor.com	609-895-7432
Hallmark	www.hallmark.com	816-274-5111
Hunter Associates Laboratory, Inc.	www.hunterlab.com	703-471-6870

We could still use your help!

ISCC has positions in the organization that need filling. We can help identify a place for you depending on your skills and desires. Contact Nomination Chair Scot Fernandez, scot.fernandez@hallmark.com

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Editor: Paula J. Alessi

(585)225-4614 geinhaus@frontiernet.net

Editor Emeritus: Prof. Gultekin Celikiz

(215)836-5729 gcelikiz@yahoo.com

ISCC Member Bodies

At its foundation, the ISCC is composed of many related societies. These societies, our Member Bodies, help the ISCC maintain a relationship with each organization's individual members. We frequently hold joint meetings to further the technical cross-pollination between the organizations.

If you belong to one of our member body organizations, we encourage you to work with ISCC and your society to further the connection. Contacting the ISCC President is a good place to start. If your organization is not on this list and you think it should be, the ISCC office can provide you with details about membership.

Or use our new online application: www.iscc.org/applicationForm.php

American Association of Textile Chemists and Colorists (AATCC)
 American Society for Testing and Materials International (ASTM)
 American Society for Photogrammetry & Remote Sensing (ASPRS)
 The Color Association of the United States, Inc. (CAUS)
 Color Marketing Group (CMG)
 Color Pigments Manufacturing Association (CPMA)
 Council on Optical Radiation Measurements (CORM)
 Detroit Colour Council (DCC)
 Gemological Institute of America (GIA)
 Illumination Engineering Society of North America (IESNA)
 International Colour Association Environmental Colour Design Study Group (AIC – ECD)
 International Color Consortium (ICC)
 National Association of Printing Ink Manufacturers (NAPIM)
 Optical Society of America (OSA)
 The Society for Color and Appearance in Dentistry (SCAD)
 Society for Information Display (SID)
 Society for Imaging Science and Technology (IS&T)
 Society of Plastics Engineers Color and Appearance Division (SPE/CAD)