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INTERSOCIETY COLOR COUNCIL

NEWS LETTER No. 62

NOVEMBER, 1945

News Letter Committee:

I. H. Godlove, Editor-in-chief
Research Laboratory,
General Aniline & Film Corp.,
Easton, Pennsylvania

Faber Birren
Charles Bittinger, Editor for Art
Carl E. Foss, Editor for Industry
H. Phelps Gage
Deane B. Judd, Editor for Science

For matters of business,
Address the Circulation Manager

Dorothy Nickerson, Circulation Manager
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WASHINGTON AND BALTIMORE COLORISTS

Several dinner meetings are scheduled for the Washington and Baltimore Colorists for the 1945-6 season. On Monday, December 3, a meeting arranged by Mr. Waldron Faulkner will feature a talk on stained glass windows by Herbert Wilbur Burnham of Boston, representing one of the two firms supplying stained glass windows at the Washington Cathedral. On Monday, January 14, Captain C. W. Shilling of the U. S. Submarine Base at New London will be the speaker. On March 11, Egbert Jacobson of Container Corporation of America will discuss the Ostwald system and applications. Plans for a May meeting are not yet completed.

Any member of the Council who is interested in any of the above meetings will be very welcome if he will make his reservation with the chairman of the Program Committee, Mr. Kenneth L. Kelly, 2217 Constitution Avenue, N. W., Washington 7, D. C. The meetings will be held at 6:30 P. M. at the YWCA, 614 "E" Street, N. W.

NEW YORK COLOR ASSOCIATES

Before Walter C. Granville left for Chicago he appointed Elizabeth Burris-Meyer and Dean Farnsworth to carry on in planning a program for post-war meetings of the New York group. Mrs. Helen Taylor has agreed to serve in the important job of sending out notices, making reservations, etc. Their first meeting is to be held on Friday evening, November 30, an informal dinner meeting with members of the I.S.C.C. Executive Committee who plan to meet that day in New York.

CALLING BOSTON, CHICAGO AND HOLLYWOOD

And what of the Boston and Chicago groups? Let the News Letter Editor know of your meetings, for we want to keep in touch with you. As for Hollywood, we hear that a group there is a-borning. Let us know when the christening is, so that it can be properly announced in the pages of the News Letter.

ANNUAL COUNCIL MEETING

The Program Committee, appointed to plan the next annual meeting of the Council, consists of Ralph Evans, chairman, Margaret Hayden Rorke, and John Scott Williams. The date and place will probably be late spring in New York City in order that we may hold a joint color session with the Society of Motion Picture Engineers at their 1946 Spring Meeting. As plans develop you will be kept informed.

MEETINGS RESUMED

With transportation and hotel restrictions lifted, member bodies of the Council are beginning again to plan regular meetings. Those known at present follow in order of meeting dates:

December 27-29, 1945	American Psychological Association, Special meeting of Council and committees, Hotel Fort Hayes, Columbus, Ohio
January 3-5, 1946	American Association of Textile Chemists and Colorists, Victory Convention, Hotel Pennsylvania, New York City
February 23 on or about	American Artists Professional League
February 25-28	Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York City
March 8-9	Optical Society of America, Hotel Statler, Cleveland
April 28-May 1	American Ceramic Society, 48th annual meeting, Statler Hotel, Buffalo, N. Y.
May 6-11	Society of Motion Picture Engineers, Hotel Pennsylvania, New York City
June 24-28	American Society for Testing Materials, Hotel Statler, Buffalo, N. Y. Annual meeting and 7th exhibit.
September 18-21	Illuminating Engineering Society, Chateau Frontenac, Quebec City, Canada

BRITISH COLOUR GROUP MEETS

The 23rd science meeting of the Colour Group of the Physical Society met on Wednesday, September 19, at the Imperial College to hear a lecture, with films and demonstrations, on Methods for Investigating Colour Discrimination.

AATCC REPORTS ON COLOR TRANSFERENCE

Under the leadership of Mr. Daniel P. Knowland, chairman, and Mr. W. A. Holst, secretary, the AATCC Committee on Color Transference has just completed its work begun about a year ago. Finished charts for rating the degree of transference of dyestuff have been inspected and delivered to the secretary of the Association, from whom they may be obtained at $2.00 each ($1.50 for lots of 10 or more). If interested, address Dr. H. C. Chapin, Secretary of the A.A.T.C.C., Lowell Textile Institute, Lowell, Mass.

TCCA AGAIN VERY ACTIVE

The great activity of the Textile Color Card Association of the U. S., Inc., which we reported in the July issue of the News Letter, is again very evident. Since starting the make-up of the September issue, in which we reported on the advance woolen collection for Spring 1946, we have learned of the following new issues: Regular editions of the 1946 Spring Woolen and Rayon Cards, Men's and Women's Shoe Colors for Spring 1946, Spring Millinary Colors for 1946 and Spring Glove Colors for 1946.

To go with the "Colors of Freedom" and the "Frappé Pastels" of the woolen card, the 1946 Spring Rayon Card features new "Jubilant Colors" and "Romantic Pastels." Of the Jubilant Colors, Margaret Hayden Rorke, managing director, says: "These festive colors reflect our joy and exultation that the war has ended victoriously and our gallant troops are coming home. They are in lively tune with the new feeling for gayety and excitement in post-war fashions." This animated range includes Exciting Green, Gay Chartreuse, Festive Fuchsia, Rapture Purple, Glowing Orange, Joy Blue, Cheer Green and Happy Red. The Romantic Pastels are more feminine and sentimental, suggesting a Watteau or Fragonard painting. They include Moonlight, Charm Yellow, Love Coral, Honeymoon Blue, Romance White, Sentimental Mauve, Nosegay Green and Sweetheart Rose. The "tone-on-tone" groups making up the basic ranges have in the forefront the springlike Beauty Rose and the lighter harmonizing color Rosebud Pink, while the violine and purplish ranges include Tropic Mauve, Pink Orchid, Chinese Iris and Russian Violet. The high favor expected for the aqua, turquoise, peacock theme is reflected in the new variations Water Turquoise, Foam Aqua, Ming Peacock and Seascape Blue. New greens include Orient Jade, Blossom Green, Summer Lime and Buoyant Green. In the important "neutral" family are light brown and blonde colors, Mexicoco and Cuba Beige; also Dew Grey and Aerial Grey, while a more lively spring note is obtained with Orange Melon, Copper Earth, Sunnigold and Dawn Yellow, along with a dramatic Spotlight blue which is grouped with Paradise Blue.

The Spring 1946 Shoe Colors for men and women were adopted through cooperation of the TCCA with the Joint Shoe and Leather Color Committee, which is comprised of representatives of the Tanners' Council of America, the National Shoe Manufacturers Association and the National Shoe Retailers Association. The six colors of the men's range include the repeated color, Yankee Brown, and the new colors, Indian Tan, Tawny Tan, Cordo Wine, Bermuda Tan and Sandune Beige, which are specified along with black, white and grey. The women's group includes eleven colors: Frappé Cocoa, Town Brown, Cinnamon Tan, Rancho Tan, Cream Blond, Victorious Blue, Admiral Blue, Brave Red, Cherry Red, Magnetic Green and Colony Green, of which only Town Brown is a repeated color.

According to Mrs. Rorke, the majority of the nineteen colors chosen for the 1946 Spring and Summer seasons by the TCCA were selected from the advance woolen and rayon collections for Spring 1946, recently issued to its members by the Association. Colors repeated from former issues include Country Beige, Hockey Green, California Sun and Strato Grey, while Apple Red has been taken from the Ninth Edition Standard Card. The new colors include Rum Frappé, Candy Blue, Exotic Turquoise, Amber Honey, Sun Olive, Mandarin Rose, Cream Caramel, Violet Dawn, Wild Clover, California Blue, Midship Blue, Pacific Lime, Valor Rose and Rosebud Pink. These are recommended along with black, brown, navy and white, and Burnt for straw.

For the 1946 Spring Glove Colors, the Glove Color Committee of the AATCC has carried over from recent season cards the five colors: Pink Camellia, Hockey Green, Country Beige, Strato Grey and California Sun. Nine colors chosen from the advance woolen collection for Spring 1946 comprise Exotic Turquoise, Amber Honey, Cream Caramel, Wild Clover, California Blue, Midship Blue, Pacific Lime, Brave Red and Valor Rose. In addition to these fourteen colors, a new tan in the "turf" range has been adopted, while for gloves white, chamois, black, brown and navy are also recommended. Emphasizing the close coordination between glove and millinery colors, Mrs. Rorke stated that twelve of the colors are common to the two new cards.

SGT. RORKE RELEASED — Along with the technical information disclosed in the preceding item which we received from Margaret Hayden Rorke, managing director of the TCCA, was the personal and very pleasant news that her son, Sgt. Edward F. Rorke, has been liberated as a Japanese prisoner of war and is in good physical condition, according to information received from the War Department.

Serving in the 803rd Engineers Battalion under Major General Edward P. King, Jr., Sgt. Rorke reached the Philippines several months before Pearl Harbor. He fought through the Bataan campaign and was in the march of death. Reported as missing in action for two years, he was transferred in June 1944 to a prisoner-of-war camp in Osaka, Japan. Sgt. Rorke, who attended the Brooklyn Preparatory School, is an alumnus of Duke University and a graduate of Notre Dame University. He was associated with the Sun Oil Co. in New York City at the time he entered the service. He has two brothers in the Army, Capt. James Hayden Rorke of the Field Artillery, now serving with the A.M.G. in Germany and Sgt. Hayden Rorke, a director of Irving Berlin's soldier show, "This Is the Army," now playing at U. S. Army Camps on Iwo Jima.

COLOR TERMS The following discussion of color terms was received from Dr. Sidney M. Newhall, chairman of the Color Terms subcommittee of the ISCC Problems Committee. According to a letter from Dr. Newhall dated November 17, this is the first of three installments; the second will be on the "photon" and the third on "brightness." Of Color Terms, Dr. Newhall states in an introductory paragraph: As everyone knows, color terms can be quite confusing or misleading. In general, this is because there are so many of them, because they can be used in so many different ways, and because of accidental or deliberate shifts in the meanings of terms. Important elements in this confusion are the variability and the "constancy" in the apparent color of seen objects. (Specific discussion follows:)

Popular Color Names. For many years an important cause of confusion has been the multiplicity of color names in common, popular use. Names like rose, scarlet, brown, buff, lemon, jade, navy blue, plum, magenta, or gray have always been used popularly for the purpose of providing some indication of normal or nominal appearance under ordinary conditions of viewing. In fact, such words are likely to be used with the belief that a much more exact designation of the appearance of the color is being made than is at all possible in that manner. The particular names mentioned above happen to be ones which have been assigned more specific meanings, but they are representative of thousands of similar, overlapping expressions. Many color names have the same meanings and many have been used with different meanings in different, or even the same, situations.

An effective aid in the reduction of the confusion and uncertainty attending the use of all such popular names is available to all who will take the trouble to use it. This is the well-known ISCC-NBS System of Color Names (D.B.Judd & K.L.Kelly, J. Research Natl. Bur. Stand. 23, 355; 1939, method of designating colors, RP1239; K.L.Kelly, J. Opt. Soc. Amer. 33, 627; 1943; color designations for lights.) This system includes several hundred carefully chosen and comprehensible names, such as "light pink," "yellowish green," or "strong blue green," which belong to a logical and learnable series. These terms are not only reasonable ones to use but the range of variation, as well as the average, of each term is definitely specified in standard Munsell terms (convertible if desired to the ICI Tristimulus System.) Thus it is perfectly possible to use common-sense, color-suggestive terms with neither confusion nor misunderstanding concerning their meaning.

Technical Color Terms. Another important cause of confusion is the variety of technical color terms to be found in scientific and technical applications. In the

March 1945 number of the News Letter appeared a diagram showing the Colorimetry Committee's recommendations with respect to a few of the outstanding color terms. Since the Colorimetry Committee's usages are being adopted and should be standard for years to come, it is believed that careful study and general acceptance of these terms will do much to clarify matters in the technical and scientific fields. Of course, various professional groups advantageously employ certain special terms convenient in relation to their respective technical needs. However, if the significances of such usages are appreciated and related in terms of a common standard terminology, there need be little confusion between groups. A standard color terminology is available in the terms recommended by the Colorimetry Committee ("The psychophysics of color," J. Opt. Soc. Amer. 34, 245; 1944).

The ISCC Color Terms Committee is publishing occasionally in the News Letter simple descriptions and discussions of technical terms which seem strange or difficult, in the belief that this will be interesting or helpful to some readers. The committee will be glad to consider for discussion either terms or definitions in current usage which Delegates or Members of the ISCC may wish to suggest. Comments or criticisms concerning the committee items which appear in the News Letter are also welcome. Suggestions may be given to any member of the committee.

The two terms discussed below have been considered not because they are specially difficult so much as because they are (1) relatively recent and unfamiliar recommendations of the Colorimetry Committee, (2) represent two basic concepts which are perhaps used more than any others by workers in light and color, and (3) may be desirable to use in subsequent discussions of color terms.

ILLUMINANCE = the areal density of luminous flux ("amount of light," "degree of illumination," "flux density," incident at a place on a surface. This quantity known as illuminance is used as the measure of light falling in various places under various conditions. Thus, for instance, the floor, walls and table in a room may be illuminated by light from the window, but the illuminance of the different parts of the room and table will vary with distance from the window, etc. Among the various units of illuminance may be mentioned; the lux or lumen per square meter, the foot candle, the meter candle, in a word all the old familiar measures of what has long been called "illumination." Now it seems best to reserve terms like "illumination," "illuminate," "illuminated," "illuminating," etc., for use in reference to the general process involved; while the newer term illuminance is obviously quantitative and refers to the measurement. These terms (illumination and illuminance) have been appropriately used in the example above.

LUMINANCE = the luminous flux per unit solid angle emitted from an effective source in a given direction, per unit projected area of the source. This quantity called luminance is used as a measure of light from any object in any specified direction, but especially in directions from which it is likely to be seen. Luminance is a measure of light emitted (transmitted, reflected) as compared with illuminance which is a measure of light received. Thus, for instance, one might measure the illuminance of a spot on a table by placing a meter in the plane of the spot; but to measure the luminance from the spot one would place the meter so as to receive light only along the observer's line of sight.

If the spot or other effective source is perfectly diffusing, measurement is not restricted to the direction of chief interest, because then the luminance is independent of direction. In any case where an ordinary integrating meter is used, however, the distance of the instrument from the source is important. This distance should be small enough to assure representative readings for the source or surface in question. If the permissible minimum angle subtended at the meter by the diameter of the source is known, one can avoid exceeding it. Luminance is the recommended term synonymous with what has long been known as "photometric brightness"; and the same units of measurement apply; viz., candles per square meter of projected area, millilambert, apparent foot candle, etc.

POPULAR COLOR NAMES

Continuing the above discussion, in furtherance of Dr. Newhall's own suggestion we welcome to these pages discussion by representatives of our member-bodies, The Textile Color Card Association, for example. The opinion of this Association is authoritative on the question of the advantages and the appeal of romantic popular color names. We have already told our readers something about the work which is being done by and for this Association to specify, in the several standard colorimetric systems, the colors which it has standardized under such names as Flesh Pink, Tea Rose, Harvard Crimson, Princeton Orange, Bois de Rose and Orchid. Personally, the Editor thinks that he likes Irish Green better because of its name (- bless the irresponsibility of the Irish which is a large part of their charm -); but, having been bred a scientist, he feels more comfortable when he is assured that he has available several adequate colorimetric specifications of standard Irish Green, as well as standard Primitive Green and standard Scarab Green. Jade Green and Emerald don't worry him in this connection; they differ just a little too much.

But on the other hand, in order to be provocative, in the hope of aiding in stimulating discussion, the Editor would like to repeat what he pointed out in 1933 and again in 1941. Suppose we wish to ignore the "scientific" (systematic) advantages of graduated systems of color names and desired to use only popular names like Irish Green. We are faced at once with a practical difficulty. If we used 600 of the most common names (and that number would have to include some suprisingly uncommon) to name 600 portions of the color solid, there exist no names for two-thirds of them. The reason is, of course, because the common names are so concentrated in a few portions. But for this very reason, a proponent of popular names would say, the situation is not unfavorable. For there are names for the important groups of colors. The rejoinder of an opponent is obvious: "Oh, but tomorrow a new dye may give us a color in an unnamed region, and we would have to invent a new and unfamiliar name." Well, have we started anything?

The Editor.

COLOR CLASSES IN NEW YORK CONTINUE

For the third successive year William H. Peacock of the Calco Chemical Division of American Cyanamid Company is giving a course on color, color systems and coloring agents at the Textile Evening High School, 18th Street near 9th Avenue, New York City. The class meets on Thursday evenings from 7:00 to 9:00 P.M. and will run for about twenty sessions.

For the second year Lorain Fawcett of the Allcolor Company is conducting a color class at Columbia University. This class, which meets on Wednesday evenings, is a natural follow-up of classes conducted for a number of years prior to this at the Arthur Allen studios in New York; also of classes in Boston. At the Art Students League for the twelfth year, Frank J, Reilly is conducting a lecture course, a compendium of art, in which color is a chief topic.

Perhaps there are color courses, given by competent teachers, which we have omitted;

but only because they have not come to our attention. We know that any of the above-mentioned series should be of interest and profit to prospective students of color.

WHITE, GRAY AND BLACK REFLECTANCE STANDARDS

The National Bureau of Standards is now prepared to issue sets of white, gray and black reflectance standards. Each set contains ten calibrated porcelain-enameled panels which diffusely reflect approximately 80, 70, 60, 40, 20, 15, 8, 4, 0.8 and 0.5 percent, respectively, of the light that strikes them. They are 4 x 4 inches in size and have folded edges to minimize warpage resulting from enameling.

These standards are intended primarily for use with reflectometers used to measure paints, papers, textiles, ceramic products, and other opaque materials for reflectance and approximate color by the photo-electric tristimulus method. As was pointed out in NBS Circular C429 (July 1942) on photoelectric tristimulus colorimetry, accurate chromaticity measurements are possible only when samples and standare are spectrally similar. For this reason, accurate measurements of the colors of only near-white, near-gray and near-black materials are possible with the new standards. They are intended primarily for use with the multipurpose reflectometer developed at the National Bureau of Standards (J. Research NBS 25, 581; Nov. 1940; RP 1345), and with other reflectometers used to measure $45^{\circ}0^{\circ}$ directional reflectance.

Each set is calibrated with the blue, amber and green filters described in NBS Circular C429, and is packed in a permanent, hinged-top, wooden box. The fee to non-government agencies is $50.00 a set.

COLOR FOR STREET CARS

In Washington, D.C., the public has just voted its color preference in street cars in a Cavalcade of Progress exhibit by the Capital Transit Company. Three cars and one bus, styled for color both on interior and exterior, and improved in ventilation, lighting and destination signs, were exhibited downtown for two days, so that the public might view them and state preferences. It is said that the color schemes were determined by the most outstanding color stylists and industrial designers in the country (and we understand that Faber Birren was one, and that Walter Granville was on the job somewhere).

The display leaflet gives a number of interesting items. It says, for example, that a number of scientific factors were considered along with pleasing appearance and functional use, that the color stylists worked independently and then in cooperation before the final results were produced. Cool hues were used for the interiors because of the "generally warm temperature in and around Washington!" "The present exteriors on Washington street cars are a bluish green, chosen by an artist who used that color as symbolic of the electric arc. The new exterior designs were achieved, however, through a functional method. A quick recognition is a dominant requirement, therefore the colors have been chosen from the high-visibility region of the spectrum."

In reporting this item the Washington Post lists the four color schemes as follows: (1) burning-bush red and robins-egg blue; (2) maroon, with three "matching tones" of tan; (3) peach-fuzz with maroon trimming; and (4) Kentucky blue-grass green and aluminum. We would check this list with the street-car officials, but unfortunately at the moment this item is written those officials are far too concerned with a strike of their operators for us to have so much termerity.

SOLAR HOUSE The sun's spectrum yields things other than color: heat, for one! Recognizing this, experiments with the Solar House are being carried out at present. In an article in Heating and Ventilating 42, 96-7 (Sept. 1945), Prof. F. W. Hutchinson of Purdue University describes a research program now under way in the Housing Research Division of the Purdue Research Foundation, in which the thermal performance of a pair of experimental houses will be studied. Under a project cooperatively supported by a grant from the Libby-Owens-Ford Glass Company, an extensive theoretical and experimental study is being made of solar housing.

At Toronto, Canada, the Hobbs Sun House is being built for similar investigations by Hobbs Glass, Ltd., Canadian affiliate of Libby-Owens-Ford.

"P. E. O. C's" IN COMMERCE Following up their article on "Polyethylene Oxide Condensates, an Aid in the Spectrophotometry of Dyestuffs" (Amer. Dyestuff Rptr. 34, 319; Aug. 13, 1945), Messrs. H. H. Taylor and F. T. Simon state, in a recent letter to the Editor, that any of the following proprietary products will produce the interesting and useful effects mentioned by them when used in a final concentration of not over 0.6 percent. The effects referred to were discussed in News Letter No. 61 (Sept. 1945), p. 10, under the title "Stabilization of Dye Spectra," as well as on the preceding page. The product and corresponding company names are:

Glysist	Alrose Chemical Company
Tween 60	Atlas Powder Company
Tween 80	Atlas Powder Company
Igepal CA	General Dyestuff Corporation
Peregal O	General Dyestuff Corporation
Palatine Fast Salt O	General Dyestuff Corporation
Leonil O	General Dyestuff Corporation
Neutronyx F	Onyx Chemical Company
Triton NE	Rohm and Haas Company

Messrs. Taylor and Simon, whose work was done at the Research Laboratory of Sidney Blumenthal and Co., Inc., Shelton, Conn., say that any of the above products at the stated concentration, will produce the maximum effect.

COLOR IN MEN'S FASHIONS Under the inspiration of Individual Member Raymond Twyeffort, long active among fashion tailors in behalf of more chromatic color in men's clothing, an article, New Plumage for the Male Animal, appeared in the September 9 New York Times magazine section. In it reporter Edith Efron quoted one articulate faction as declaring that "This war has been fought for freedom of fashion: freedom from brown shirts and black shirts!"

"Even if they are not in the Army or Navy our men are growing clothes-weary. If it's not a gray suit, it's a brown suit; and if it's not a brown suit, it's a blue suit; and if it's not any of these, it's a dull, unexciting tweed. But whatever it is, it's been seen and worn a million times. And in the shiny new post-war world, say the male-fashion designers, the men are going to want things different."

"What's the answer? Color!"

So the reporter interviewed Ray Twyeffort as representative of the group, indeed in the forefront of the group that wants to introduce bolder color into men's garb. He reminded her that color was manly to early Americans. The lumberjack, the cowboy, both wear bright colors. Even George Washington, in the days of colored waistcoats and pastel pants, designed his own clothes; and George was not known as a timid, blushing violet.

On the other hand, conventional designers feel fairly sure that the American man is hardly up to this brand of self-expression; that is, not yet. So the reporter interviewed Merrill Mitchell, editor of Men's Modes, one of the authorities in the field who does not hold with such ideas. Says ex-service man Mitchell, "The American man is a conservative guy........ Colors may come eventually; but not for a long, long time."

A series of chats on the subject with a number of men disclosed opinions varying from the idea that bright color is preposterous to those of men quite taken with the idea of wearing a bright yellow sports jacket with purple trousers. Reporter Efron gave as the consensus that, "It all depends on what every one else is wearing." This interesting item from the Times indicates that Member Twyeffort is still hard on the job of introducing American men to bolder color in their clothing. More power to you, Ray Twyeffort!

OUR EDITOR WRITTEN UP Under the heading "He Couldn't Escape Color," our News Letter editor is the subject of a recent article in "The Rainbow," magazine published by General Aniline and Film Corporation. "It was only natural," says the article, "that Dr. Godlove....(should turn to color work) for his whole life has been filled with color." "His earliest memories are of a big house in old St. Louis, where the walls of the nursery and play room were covered with vivid pictures of screaming fire-engines, brilliantly lighted steamboats going under bridges, locomotive iron-horses running rampant, and the bright costumes of people scurrying to carnival and circus. There was also an incident at school. He thought red paint was not as useful on paper as on the face of an Indian warrior dancing and whooping in the school-room aisles. Sent home in charge of a janitor, the young warrior's war-paint was mistaken by his mother for blood."

"These color events cooperated with others to turn Dr. Godlove toward color. His father had established a Society for the Promotion of Art, which turned eventually into one for buying meals for indigent artists; and two to six were always cluttering up the dinner table. He decided against art as a career; so after a year as Professor of Chemistry in a state normal school and four as Associate Professor in a state university, he took a year off to study color measurement and specification."

The article then describes the four years in charge of research for Munsell Color Company, including the development of the Book of Color; direction of the Exhibition on Color at the museum now in Radio City, work as color editor for Webster's New International Dictionary, and ten years with E. I. DuPont de Nemours, where one typical job was finding the dyes for nylon. Since 1943, Dr. Godlove has been with General Aniline and Film Corporation, where his work centers around the intertranslation of the color languages of the manufacturer and the consumer. Here he is assisted by Mrs. Winifred Williams, former Easton student and social leader, and Mr. "Ted" Larson, formerly of Massachusetts Institute of Technology. The article concludes with a list of editorial and committee activities and a mention of hobbies which range from tennis and basketball to the mathematics of bridge and color in painting.

WILLMER AND WRIGHT EXPERIMENT

Reprints of an article, Colour Sensitivity of the Fovea Centralis, from Nature (v. 156, p. 119; July 28, 1945), by E. N. Willmer and W. D. Wright, recently circulated to a number of workers in color vision in this country, contain a report of an experiment of very considerable interest. Following a report by Willmer that a small central area of the fovea was unable to discriminate blue-green colors and in other ways also appeared to have the tritanopic form of color blindness, correspondence in Nature pointed out that König, some fifty years ago, had noted that his foveal center was tritanopic, although his observations did not appear to have been generally accepted.

Confirmation of König's observation is reported as a result of experimental work by the present authors in which they obtain measurements of the luminosity curve, spectral mixture curve, and hue discrimination curve for the central fovea. The observer's head was fixed by a dental impression mouthpiece in such a way as to bring the exit pupil of the apparatus on the optical axis of the observer's eye. Dichromatic coefficient curves for W.D.W. using 650 mμ and 460 mμ are shown, the units being chosen to be equal in matching yellow at 582.5 mμ. All the spectral colors could be matched by positive mixtures of these two wave lengths. With Illuminant B the neutral point for the central fovea was 578 mμ, with a second neutral indicated in the region of 410 mμ.

Details of the work are reported in Nature. The authors say that any deviation from direct fixation immediately caused a breakdown in the matches obtained, and it may be that the difficulty of locating the small test field on the fovea and maintaining it is the reason that König's original observations were received with such doubt. Experiments are in progress to investigate whether the characteristics of the central fovea differ significantly from those of retinal areas in its immediate vicinity.

(Our Editor for Science (D.B.J.) remarks, "I told you so." See News Letter No. 57, p. 9, item Tritan: "Normal perception of fields affecting retinal areas subtending less than one minute of arc is tritanous.")

HILAIRE HILER'S "WHY ABSTRACT?"

A question. An answer. A 5-page note on the author and his paintings by William Saroyan. A 12-page essay on painting and the author by Henry Miller; and a postscript which covers 51 of the book's 100 pages. Altogether this book is an unusual presentation of a modern artist's credo. It is published by James Laughlin, 67 West 44th St., New York 18, N. Y. Price $2.50.

Reading this book is like sitting in on a studio discussion: it covers a lot of territory, all of it interesting to the color- or art-minded lay reader. We cannot begin to review or discuss it here; there are too many ideas involved. But we can quote the following paragraph in the expectation that it may lead Mr. Hiler's fellow Council members to investigate for themselves what the rest of the book is about.

"The highly unscientific attitude of most painters is well illustrated by their manner of handling their color problems. An investigation of this phase of their activities is both significant and revealing. They don't think in terms of color per se at all, but in terms of an archaic and purely fortuitous range of pigments and pigment names. This sort of highly personal day dreaming gives birth to an activity which is either below the level of painting entirely (the case of the commercial artists, admitted or otherwise); or it is so antiquated, neurotically subjective, poorly defined and codified, that it can hardly be dignified by the term thinking. All they have really built up is a great illusory set of conventions which have been accepted by a certain group or cult. These have been elaborated into a more or less formidable and extensive wishfully-agreed-upon means of expression. This statement may sound extreme, but because of factors to be explained shortly it is difficult honestly to arrive at any other conclusion."

Although this may not be the best quotation we might have selected, it is provocative, to say the least. Not all artists are so capable as Mr. Hiler of expressing themselves in words. Without wishing thereby to sponsor his point of view, we may say that we wish more artists were as lucid in presenting their point of view.

D. N.

CONTROL OF GLASS COLOR

A rather ingenious application of the mathematics of light transmission through glasses has been made by Dr. H. Phelps Gage in the paper, "Thickness Control of Sharp Cut-off Type of Glasses" (J. Opt. Soc. Amer. 35, 276-82; April 1945). Although this is in a journal available to many of our readers, we think it worth while reproducing in essence the author's abstract of this interesting paper.

Dr. Gage noted that certain spectrophotometric curves, especially those of the sharp cut-off type of colored glasses, have essentially the same shape - merely displaced in wave-length for different thicknesses. If this were strictly true, the curve between log log transmittance and wave-length would be a straight line, for only a straight line can be moved vertically (by change of glass thickness) and match the same curve moved horizontally (by change of wave-length). If a straight-line relation between log log transmittance and wave-length be assumed, then the curve relating transmittance and wave-length has an S shape which is not a bad fit for actual transmittance curves of certain glasses. If the fit were perfect, the wave-length displacement of the curve caused by change in thickness would be proportional to the logarithm of thickness. The proportionality constant can be determined by the slope of the curve. With a series of infinitely sharp cut-off curves, in which there is complete transmission for all wave-lengths greater than a certain one, and complete absorption for all shorter than that, the values of Y, x, y and z (transmission and I.C.I. coordinates) may be calculated. A wave-length of cut can be found which will produce the same chromaticity (x, y) as any of the sharp-cut glasses; but the transmission will differ, being the maximum possible for the given chromaticity. The change in chromaticity measured by change in y coordinate can be determined relative to change in wave-length of cut-off. By combining this relation with that giving the change of wave-length of cut-off caused by change of thickness of the given glass (as determined from the shape of the log log curve) it is possible to calculate the required change in thickness to produce any desired change in the y coordinate within the capabilities of the glass.

Applications of the outlined method to the colors of red, orange and yellow dyestuff solutions immediately suggest themselves, with the relation between transmittance and concentration (Beer's law) taking the place of Gage's relation between transmittance and thickness; but the Editor has not yet followed this possible path.

COLORIMETRIC CHARACTERISTICS OF THE BLACKBODY

The standard method of giving the radiometric and colorimetric characteristics of various sources of light is to relate them to those of the standard radiator, which has become known as the blackbody. This has been defined as a body that will absorb all the radiation that falls upon it, *neither reflecting* nor transmitting any. It will therefore be black at room temperature and at any other temperature at which its radiation in the visible spectrum is inappreciable. But at any temperature at which the blackbody is useful as a source of light, it is certainly not "black." On the contrary, it radiates more energy than any other body for the same size and temperature (provided the radiation is due to temperature alone), and is often more aptly called the "complete radiator." No known substance has the radiating characteristics of a blackbody, although some, such as lampblack and certain finely divided metals, approach it in certain parts of the spectrum. But it can be shown that an enclosure with opaque walls at uniform temperature, and of finite emissivity at all wavelengths, contains blackbody radiation of the same temperature as that of the walls. If a small hole is made in the walls, the radiation which escapes will approximate that of a blackbody. F. Benford (Genl. Elec. Rev. 46, 377, 433; 1943) has shown that for certain easily realizable conditions, the approximation is suprisingly good. The concept of the blackbody or complete radiator furnishes a convenient terminology and handle for grasping certain sets of useful radiometric data. Many common radiators are non-selective in respect to the energy which they radiate in various wave-length regions. The light from such illuminants can be approximately matched in chromaticity (hue and saturation) by the light from a complete radiator maintained at some temperature. This temperature is known as the "color temperature" of the (incomplete) radiator. This constant gives a convenient way of characterizing the radiating characteristics of of incandescent-filament lamps, for example. The concept has been somewhat questionably extended in some cases to selective radiators, such as Welsbach mantles and fluorescent lamps, and even to radiators, such as the sky, for which the term "temperature" has no meaning.

The spectral emittances (amounts of energy emitted per second per square centimeter per unit wavelength interval, expressed as a function of wave-length) can be adequately represented by the formula known as Planck's law. Computations by means of the law are very laborious, however. Consequently they are usually avoided by means of tables and charts. Frehafer and Snow (1925) published charts; and tables may be found in the International Critical Tables (1929) and in publications by Skogland (1929) and by Moon (1937). Skogland gave data at 20° intervals from 2000°K. color-temperature to 3120°K color-temperature. Moon gave data at 100° intervals from 3500°K. to 8000°K.

The gap between Skogland's highest and Moon's lowest temperature is particularly inconvenient in the field of tungsten-filament incandescent lamps, because several general-service lamps and practically all of the lamps designed for photographic use have color temperatures in this range. Therefore, E. Q. Adams and W. E. Forsythe, for their own use and that of the Colorimetry Committee of the Optical Society of America, made calculations by 100° intervals from 2800°K. to 3800°K. (Radiometric and colorimetric characteristics of the blackbody between 2800°K and 3800°K, Denison Univ. Bull., J. Sci. Labs. 38, 52-68; Dec. 1943).

A minor complication in the use of the data published by the various authors mentioned arises from variations in the constants of Planck's law. For the "second" constant of this law, expressed in micron degrees, Moon used 14320, Skogland used 14330, and the International Commission on Illumination (Judd) used 14350. Although a review by H. T. Wensel (J. Research Natl. Bur. Stand. 22, 375; 1939) indicated that 14360 micron degrees is the value in best agreement with experimental data, Adams and Forsythe used 14350 in order to be consistent with other published colorimetric data. The "first" constant is simply related to the "second" constant by an expression including the values of the velocity of light and the "Boltzmann constant" k. Using these and the chosen value of the second constant, Adams and Forsythe find the value of the first constant which is consistent to be 3.7313 x 10^{-12} watt cm^2. Since in the Planck equation the second constant c_2 and temperature T appear only as their ratio in the exponent, their tables can be used for another value of c_2 by changing the temperature in the same ratio. For example, the tabular value for 3000 K and $c_2 = 14350$ applies to a temperature of 3002.1 K for $c_2 = 14360$.

The paper concludes by discussing very briefly the "1931 I.C.I. Standard Observer for Colorimetry and giving a figure showing the location of spectrum, blackbody and light-source colors on a "tristimulus-ratio" chromaticity diagram. This type of diagram plots x/y versus z/y instead of the more usual x versus y, and is said by the authors to be one on which directions and distances are more significantly related to the appearance of colors.

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