D. B. Judd
IV-3c, note
MHB
HJK
DLA
WFM
MaB

# INTER-SOCIETY COLOR COUNCIL

## NEWS LETTER NO. 70

## MAY, 1947

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
H. Phelps Gage
Deane B. Judd,

Dorothy Nickerson, Circulation Manager
P. O. Box 155, Benjamin Franklin Station
Washington 4, District of Columbia

For matters of business,
Address the Circulation Manager
Subscription price to non-members: $3.00 annually

### COLOR SESSIONS OF THE AMERICAN CERAMIC SOCIETY

One of the valuable services which the Inter-Society Color Council can contribute to its member body societies was demonstrated again when the Council participated in the Forty-Ninth Annual Meeting of the American Ceramic Society in Atlantic City, N.J., April 22-24, 1947.

At the General Session of the meeting a most successful lecture-demonstration on "Color, What Is It" was presented by Dr. Isay A. Balinkin. In this lecture the speaker outlined the factors which determine the perception of color by using many demonstrations. Five boxes of various equipment were shipped from the University of Cincinnati and properly set up to make clear that the color appearance of a surface is determined by the type of light source, the reflecting characteristics of the substance and, finally, the perception evoked in the observer. The nearly nine hundred members that attended this interesting lecture-demonstration have many things to remember. Few will forget that Dr. Balinkin can pull a rabbit out of a bag — or is it a duck? Question: Do you see what you see, or what you think you see!

Dr. Balinkin was also delegated by the Council to arrange a Color Symposium for the Design Division. In this task he was assisted by Mr. Richard S. Hunter, chairman of the American Ceramic Society delegation to the ISCC and by Mr. Don Schreckengost, chairman of the Program Committee for the Design Division. This program extended throughout the day, April 24, and was composed of six papers for which the titles and speakers follow: Use of Color Terms in Ceramic Industry, Richard S. Hunter; Color and Its Description, Dorothy Nickerson; Representations of Color Space and Their Applications, Carl E. Foss; Pigments During and After the War, Victor H. Remington; Possible Colors of the Future, Woldemar Weyl; Colors for the Consumer Market, Faber Birren.

The high degree of excellence of the papers presented at this meeting is indicated by many requests to make the contents available in printed form. Their publication is expected, possibly as a unit if this can be arranged by editors of the American Ceramic Society publications. When they are published, it is intended that reprints will be made available to Council delegates and members, so that such

contributions may receive a wide circulation, not only within the single member society for which they were prepared but also among representatives of the twelve other member associations and the individual members that form the Inter-Society Color Council.

On the part of the Inter-Society Color Council and the American Ceramic Society there was considerable effort spent to make this meeting another milestone in the successful participation of the Council in fulfilling its aims and purposes -- to promote the knowledge of color in science, art, and industry.

OPEN HOUSE AT NEW LONDON

On Friday and Saturday, April 25 and 26, the U. S. Naval Medical Research Laboratory held Open House at the U. S. Naval Submarine Base for members of the Inter-Society Color Council and their friends. This Color Conference was pronounced a great success by the 120 or more Council members and other guest scientists in the field of visual research who took part and were guests of the Navy. Captain Charles W. Shilling, in charge of the laboratories, Lt. Comdr. Dean Farnsworth, and Dr. Forrest L. Dimmick, long-time Council members, are to be congratulated not only on the success of the conference as a research event but on maintenance of the traditional reputation of the Navy personnel as genial and gracious hosts. This gracious and efficient handling of the unexpectedly large attendance, which included prompt provision of the sufficient busses, station wagons, and cars to negative the dampening effect of the bad weather which prevailed, was evident from the start, when the visitors were greeted by Captain Jesse Hull, representing Captain Charles W. Gray, commanding officer of the Base. Captain Hull gave a brief but lucid description of the work of the Base and the Medical Research Laboratory. This was followed by an equally interesting and informative talk by Captain Shilling, in general charge of arrangements for the meeting. In the evening, the members of the group were entertained at a reception at the Officers' Club attended by Rear Admiral James Fife, Jr., commander of submarines, Atlantic Fleet.

Many of the visitors had contributed visual-research data to the war effort and some saw for the first time the uses to which the armed services had put their work. At the sessions on Friday and Saturday, papers were read by Dr. Walter Miles of the Psychology Department of Yale University, Dr. Glenn A. Fry, head of the School of Optometry of Ohio State University, and Dr. Selig Hecht of the Biophysics Laboratory of Columbia University. The respective titles of these papers were: "Entopic Studies of the Macular Area," "Dependence of Hue upon Temporal and Spatial Patterns of Stimulation," and "Problems in Color Vision." Discussions in which many persons participated followed the talks. An especially spirited discussion followed Dr. Hecht's paper; this was participated in by Hecht, Wald, Judd, Miles, Farnsworth, Dimmick, Dr. Gertrude Rand, Fry, and others, all of whom are well known in the color and visual research fields.

A highlight of the meeting was the showing of an oil painting of the ice-cap phase of the Bikini atom-bomb explosion made by the News Letter's editor-for-art, Captain Charles Bittinger, the Navy's official painter. The affection which all color workers hold for Captain Bittinger was evidenced by the spontaneous rising and applause which followed his introduction at the dinner at the Officer's Club. Other events included three movies illustrating color chemistry and "color conditioning;" painting and surrounding work conditions in submarines, workshops, dental laboratories, etc.; and many "tours" to the submarines, Gilmore Hall, Dental Laboratory, the Chapel on the Thames, one showing the Medical Research Laboratory activities. The most spectacular event was the splendid exhibition of "free" as well as artificial-device-aided escape, made by Navy personnel in the special 100-foot escape training tank.

A most useful feature of the conference was the extensive exhibition of systems of color standards, technical exhibits on color blindness research, color signal methods, color coding systems, etc., and various optical devices for the examination and specification of color. In one room there were permanent Navy exhibits of this sort, in another room those supplied by Council members.

All in all it was an unusually successful and pleasant event; and the News Letter editors, speaking, they are sure, for all who were able to attend, earnestly congratulate all who had a part in the arrangement of the conference.

AAPL APPOINTS NEW CHAIRMAN

The national Executive Committee of the American Artists Professional League has appointed to serve as chairman of the AAPL delegation to the Inter-Society Color Council, Mr. Alon Bement, 200 West 57th Street of New York City. We are very glad to welcome Mr. Bement in this capacity. He is well-known as an artist and teacher, particularly as an executive in art educational fields. He was trained at Teachers College, Columbia University in the days of Arthur Dow. For some years he was head of the Maryland Institute in Baltimore and later left to serve as director of the Art Center in New York, his reputation there having reached many wide fields with which our members are acquainted. We shall look forward to meeting him in person at our annual meeting next winter.

NEW INDIVIDUAL MEMBERS

At a meeting of the Executive Committee on April 26, applications from the following were approved for individual membership in the Council. We are glad to welcome them as members.

H. Creston Doner, director of design for Libbey-Owens-Ford Glass Company, member of the American Ceramic Society and the American Designers' Institute, particularly interested in colors for factory maintenance painting and psychological use of color in mental institutions;

George W. Ingle, plastics division of Monsanto Chemical Company, Springfield, Mass., member of AATCC, ASTM, OSA, and American Chemical Society, interested particularly in spectrophotometry, industrial applications of colorimetry, and color related to chemical constitution of colorants;

Rey Neville, Trinity, N. C., member of American Designers' Institute, formerly with Barker Bros. and Bullocks of Los Angeles; W. & J. Sloane, New York; Warner Brothers of Burbank, now with Tomlinson of High Point, particularly interested in correlating colors in fabrics, increasing sales through improvement in color, consumer trends in color preference, and designing colors for fabrics;

Paul Otto, with Botany Worsted Mills, Passaic, N. J., member of AATCC and ASTM, interested in all color problems, physical and chemical, that relate to textiles, in color notation and color systems;

Reuben E. Peterson, with Dow Chemical Company, Midland, Mich., member of O.S.A. and American Chemical Society, works with polystrene plastics and interested particularly in color names, color tolerances (industrial), and color systems;

Sandoz Chemical Works, Inc., Attn. Edward W. Rhael, member of AATCC, TCCA, American Leather Chemists Association, Society of Dyers and Colourists, American Chemical Society, particularly interested in spectrophotometric standardization of dyestuffs, and interpretation of spectrophotometric data;

Paul W. Schwimmer, Detroit, Mich., works principally with photography and paper, particularly interested in color photography;

Sun Chemical Company, New York City, Attn. Mrs. Janet F. Heitzmann, member of O.S.A., particularly interested in color specification, tolerances for printing inks and allied problems, preparation and maintenance of standards for spectrophotometric tests;

Sylvania Electrical Products, Inc., New York City, Attn. Mr. J. Kromhout, member of I.E.S. and American Institute of Architects, interested in color and light;

Alan J. Werner, Corning Glass Works, Corning, N. Y., member of American Ceramic Society and O.S.A., interested particularly in problems of color standards, photoelectric colorimetry, abridged spectrophotometry, tristimulus colorimetry.

NEW COMMITTEE APPOINTED

A committee on Problem 2 has been reestablished in accord with recent action by the Executive Committee. This follows a request by Mrs. Rorke of the TCCA, seconded by Dr. Stearns of the AATCC, at the last annual meeting that revision be made of the color names boundaries for ISCC-NBS color names. Deane B. Judd has been appointed chairman, with the following to serve on the committee with him: W. D. Appel, I. H. Godlove, K. L. Kelly, Dorothy Nickerson, Genevieve Reimann, Margaret Hayden Rorke, E. I. Stearns.

NEW PROBLEM ESTABLISHED

Following a recommendation of the Problems Committee, the problem suggested by Dr. R. H. Osborn, reported in the minutes of the last annual meeting, has been established by the Executive Committee as Problem 14. The purpose is to study the interrelation of transparent standards that make use of single number specifications. Most of these are not yet measured in I.C.I. terms, and many may overlap for the very reason that not enough colorimetric data are available to forestall development of new sets of standards made for the same, or slightly different, purposes. The standards referred to are usually set up in liquid, plastic, or glass form and are used in grading oils, naval stores, honey, etc. Among these are the Gardner standards, U. S. rosin standards, Hazen standards, the new set recently suggested by Osborn and Kenyon, and a number of others. A committee to start work on this problem will be named in the near future.

COLOR VISION CONFERENCE CAMBRIDGE, ENGLAND

A conference of color vision workers from many countries is scheduled for July 28 to August 2, in Cambridge, England. Following is a full list of those invited to speak or to lead various phases of the discussion: S. L. Polyak, R. N. Hartline, G. Wald, W. D. Wright, Ragnar Granit, Selig Hecht, W. S. Stiles, D. B. Judd, D. L. MacAdam, G. L. Walls, and E. N. Willmer. The organizing committee consists of W. S. Stiles, K. Tansley, L. C. Thomson, E. M. Willmer, and W. D. Wright. The first two days of the conference will consist of open meetings, thereafter the round table discussions will be by invitation only in order to allow free discussion among those actively engaged on the particular problems. A number of the ISCC delegates and members invited to attend or to speak are planning to be present, and we look forward with interest to having their reports of this meeting at the next session of the Council.

REPORT ON POSSIBLE FUTURE ISCC MEETINGS

Last fall Walter C. Granville was asked by the Executive Committee to investigate the idea of a large, full meeting at which much color information might be presented.

There was no idea that such a meeting should be held apart from meetings of one or more member bodies (in fact both the TAPPI and American Ceramic Society programs were planned thereafter) but no restriction of this sort was placed on Mr. Granville in asking for information from delegates and members regarding the kind of meeting they would like to have, what topics should be covered, and what kind of program should be planned. A questionnaire was suggested. This was prepared and circulated by Mr. Granville. His recent report to the Executive Committee summarizing the replies is of such interest that parts of it are presented here.

Ten specific questions were asked. Of 55 replies received answers to some of these may be summarized as follows:

1. Meeting should be how long? Average of replies: 2-1/2 days.
3. How long should daily sessions be? Average: 9:30-4:30
4,5. If yes to an evening program, how long? Average: 2 hours.
6. In what city should meetings be held? Over 75% replied: New York.
7. Replies indicated that topics should cover several phases of color work.
8. Over 90% of replies indicated that a display of instruments, apparatus, books would be welcome. (There was such an exhibit at the New London meeting.)
9. The majority indicated that single sessions should be held, rather than several simultaneous groups.
10. About 60% expressed a desire for 1-day of round table discussions; over 30% said "No" to this.
11. The topics members would like to have discussed were listed in detail by Mr. Granville in 2-1/2 closely typed pages. This list will provide both the Executive Committee and future program committees with good reference material.
12. A few listed topics they felt to have been overemphasized, but not more than 2 persons listed the same items.
13. There was no answer to the question as to what problems members felt it would be especially desirable to have solved.
14. About 2-1/2 pages of detailed replies are systematically listed regarding color information that should be, but is not now conveniently available.
15. Among the few "other comments" was one suggesting a meeting to be held in the West in midsummer at which several member bodies should be solicited to supply a program and exhibition of related materials on successive days.

BOSTON COLOR GROUP

Announcement of two spring meetings has been received from the Boston Color Group: On April 29, Lee W. Court of Wm. Filene's Sons Company to speak on "A Philosophical Approach to the Problem of the Use of Color"; and on May 13, Norman F. Barnes of the General Electric Company to give a demonstration lecture on "Color Facts and Fantasies." Both meetings were preceded by dinner in the Campus Room of the M.I.T. Graduate House.

WASHINGTON AND BALTIMORE COLORISTS

The Washington-Baltimore Colorists held its fifth scheduled dinner meeting for the 1946-47 season on May 19. The colorimetric standardization of the Textile Color Card Association's standard on U. S. Army color card samples was reviewed under the Title "A Study of Fashion Colors" by Harry Keegan, Genevieve Reimann, and D. B. Judd, who did the work at the National Bureau of Standards for Mrs. Rorke's association. This was a review of the work presented at the ISCC Discussion Session of May 1946 which was jointly sponsored by the TCCA and the AATCC.

CALIFORNIA COLOR SOCIETY

The California Color Society, of which 40 members receive the News Letter, has recently elected Albert H. King as chairman, Norman C. Bilderback, secretary, Frank Wilbar, treasurer, and Bruce Inverarity, chairman of publications. We do not have word regarding the schedule of their meetings, but the secretary has received recent correspondence from Mr. Bilderback, and Mr. King (whom many will remember meeting at the 1944 annual meeting). We have also had recent correspondence with California color group member Gustave Plochere, who with his wife Gladys, has recently produced the new book, "Color and Color Names" which was on exhibit at the New London meeting. The book contains 64 plates of 1536 systematically arranged, hand sprayed color swatches that are approximately 1"x2" in size. Information about this new book, and other Plochere Color Guides, may be obtained from the Plocheres, 1820 Hyperion Avenue, Los Angeles 27, Calif.

BRITISH COLOUR GROUP

The annual report of the British Colour Group for 1946-47, published with announcement of the seventh annual meeting on March 26, 1947, at the Royal Photographic Society, shows a total of 208 members in 1946 compared with 178 in 1945. Five meetings were held during the year, with an average attendance of 45. The Report on Defective Colour Vision in Industry published in 1946 has already had considerable sale, with favorable notices in technical journals and the daily press, also on the Home and Overseas Service of the B.B.C. The subcommittee on Colour Terminology held several meetings during the year and hoped to present their report at the annual meeting. Note was made of the close contact maintained with the ISCC, and the exchange of reprints and reports that has continued. Officers nominated for 1947-48 are: J. G. Holmes, for chairman; W. D. Wright, secretary; D. R. Duncan, L. C. Jesty, R. B. Morris, W. S. Stiles, J. W. Strange, T. Vickerstaff, committee.

Announcement of a paper to be presented at this meeting of Imperial Chemistries Industries, Ltd., Dyestuff Division (Clarkson, Davies, and Vickerstaff), "A Statistical Investigation of Some Aspects of Colour Harmony" will be of such interest to a number of Council members that the abstract for it is given in full. The paper was to be followed by informal discussions. "ABSTRACT: Previous work on colour harmony is first reviewed. In order to assess the value of the various theories proposed, an experimental study of the harmony of binary combinations has been made. One colour from a colour circle of twenty-four hues has been combined in turn with all the other colours of the circle, and the relative harmony of the resulting combinations has been assessed by a statistical treatment of the preferences of forty observers. The experiment has been repeated using different reference colours. The results indicate that for saturated colours of this type, the belief that complementary colours are the most harmonious is not generally true although complementary combinations may yield the best harmonies under special conditions. The experimental results are well fitted by a colour harmony function embracing the three Munsell variables — hue, chroma, and value. The form of this function is such that complementary colours are most harmonious only when they are of the same value and chroma."

COLOR COURSE AT M.I.T.

The Department of Physics of the Massachusetts Institute of Technology announces a special 10-day summer course, June 16 - 27, 1947, in Color Measurement covering the subject matter of the course regularly offered during the spring semester by Professor A. C. Hardy, described as follows: "Measurement and specification of color in the objective and subjective sense and the application of such methods to industrial problems. Experiments illustrate the photometric and chromatic properties of the human eye and give experience in the technique of spectrophotometry and colorimetry."

Students registering for the course are expected to have completed either two years at M.I.T. or the equivalent. Classes will begin at 9:00 A.M. on Monday, June 16 in Room 8-215. A one-hour lecture followed by a two-hour period in the Color Measurement Laboratory will be given each morning Monday through Friday, and a similar session will be held from 2:00 P.M. until 5:00 P.M. on each afternoon. Classes will not be conducted on Saturday, June 21. Tuition for the course will be $75.00, with rooms available in the M.I.T. dormitories at $10.00 per week.

Registration will be limited to the capacity of the laboratory, and must be completed prior to June 3. Requests for admission forms and applications for rooms should be addressed to: Prof. S. Q. Duntley, Dept. of Physics, Room 8-203, Massachusetts Institute of Technology, Cambridge 39, Mass.

LORAIN FAWCETT ON LECTURE TRIP

At the New London meeting we learned that on May 6, at the Franklin Institute, Lorain Fawcett, director of the Allcolor Company, Inc., was to be presented by the Junior Executives Club of Philadelphia in a lecture and demonstration on color in relation to the Graphic Arts. From there she planned to go on to Chicago, Minneapolis, and Detroit where the same lecture, Seeing Color, was scheduled for May 19, 21, and 23. This sounds like an interesting lecture and trip. She is taking along with her plenty of charts, as well as a viewing box showing incandescent, white fluorescent, soft white fluorescent, and daylight fluorescent so that the color chips may be observed under these different illuminants.

PRINCIPLES OF COLOR AND COLOR MIXING

J. H. Bustanoby, pp. 131 plus xi, 10 illustrations in color, McGraw-Hill Book Co., Inc., New York: London, 1947, Price $4.50. This short nontechnical book is packed full of practical information on how to color effectively with paint. One critic of the voluminous report of the OSA Colorimetry Committee remarked, "This report tells me too much about color; I am looking for a book that has in it exactly what I want to know." To many people, Bustanoby's PRINCIPLES OF COLOR AND COLOR MIXING, will tell exactly what they want to know about color. The treatment is nonscientific and condensed, but it is to the point. The 3-page introduction has three color prints. The 5-page section on pigments and mediums discusses 9 mediums and 28 pigments, just a paragraph or two for each. The 12-page section on color mixing explains the production of strong colors from the subtractive primaries: magenta, yellow and cyan, and the production of tints, tones and shades by adding white, gray or black to these. This section also describes the technic of mixing tints, of staining wood, and of tinting materials (lace, chiffon, rayon, crepe) with oil-soluble pigments, and there is a discussion of 16 volatile thinners and solvents, as well as a color print showing how it is possible to produce shades of a strong color either by adding black or by adding paint of the complementary hue. And the section closes with a color print showing 96 standard swatches identified by name (citron yellow, wistaria, jade green, and so on). The 57-page section on how to obtain standard and popular colors contains the real meat of the book. Formulas are listed for about 250 colors identified by name arranged alphabetically, and for about half of these colors a second group of less permanent pigments is also suggested for painting and decorating, the first group being too expensive for general use in large quantity. For example, under Pistachio Green is given: "A pale, neutral tint of green, resembling the color of the edible kernel of the pistachio nut from a native tree of western Asia, used as a dessert and in confections.

I

65 parts Zinc White
2 parts Cadmium Lemon
2 parts Cobalt Blue
1 part Raw Sienna

II

White
Chrome Green Light
Chrome Green Medium"

The book closes with brief sections on color individuality (wearing apparel, color in the home), color sensation (light and pigment primaries, afterimage, legibility, color blindness), color psychology (feelings associated with the various hues), color systems (Munsell, Ostwald, Birren, Bustanoby), and a dictionary of color terms.

Though the style of the book is admirably clear and direct and will be much appreciated by anyone in search of elementary practical knowledge of the use of paint for decoration, the author has not succeeded in being very articulate about color, itself. In the preface he says: "Color is not only a physical phenomenon; it is the vibration of life, itself." On page 9 he says: "Pigments are the tangible evidence of color." On page 21 he says: "Many materials ... may be tinted with oil colors dissolved in benzine." And on page 108, he says "Color is the general sensation perceived by the eye and the mind that includes all hues, tints, tones and shades." It is hard to see how color can be a physical phenomenon, a life vibration, the thing of which pigments are the evidence, and a thing that can be dissolved in benzine. Furthermore, the phrase "general sensation perceived by the eye and mind" would probably cause a Titchenerian to tear his hair. However, in a literary sense, the Bustanoby statements are all true enough to be at worst not seriously misleading. The same can be said of the definitions given of color terms. The layman will find them generally enlightening, and none seriously misleading. The only out-and-out mistake detected by the reviewer, strangely enough, had to do with sound rather than color. To the definition of wavelength (p. 115) is appended the remark, "This term is also used in other fields, as in radio, sound waves being measured in kilocycles." Of course, the kilocycle is not a unit of length. Sound waves are measured in inches, feet or centimeters, and the vibration frequency of a musical note is customarily expressed in cycles per second, not kilocycles. Even this scrambled statement, however, may mean just as much to the general reader as the more correct statement, "This term is also used in other fields, as in radio, radio waves being measured in meters." It may be concluded that Bustanoby is no physicist, but he is eminently qualified to write on the subject of how to color effectively with paint and he has produced a valuable book deserving of a wide sale.

(D. B. J.)

BOSTROM COLOR VISION TEST — Tabulae pseudo-isochromaticae B.-K. Plates for testing colour vision. By C. G. Boström and I Kugelberg. Stockholm: Kifa.

This is a new series of pseudo-isochromatic plates for testing red-green vision published since 1943 and only recently reaching this country. It was designed by C. G. Boström, ophthalmic adviser to the Board of Swedish Railways, and

I. Kugelberg, Docent in Ophthalmology at the Caroline Institute, Sweden. The Swedish Medical Board has officially prescribed the use of this test for examinations of the color sense for traffic and transport services.*

The series consists of 20 plates of uniform size, mounted so that their serial order permits variation. There are 15 plates with one numeral, 2 plates with a serpentine line and 3 dissimulation plates without design. All plates have the same outline pattern which is filled with the same mosaic of round dots, 2.5 millimeters in diameter, arranged in staggered horizontal rows. In the significant plates some of the dots are colored in one hue to form a design on the background dots which are colored in a different hue. In all, fifteen different paired colors are thus presented, planned, as stated by the publisher, to cover the confusion color pairs of practically all forms of defective red-green vision. Three value levels are presented in the dots of both figure and ground, and all colors are of low chroma. Information is not given as to the basis on which the confusion pairs were selected, and no differential classification of the extent or the type of defect revealed by the various plates is claimed. The test is intended for screening purposes only.

cent

A three-page leaflet of directions for administering the test is supplied. "The examination shall be carried out, if possible, in full daylight. If urgently required, as for instance during the darkest months of the year, the test may be performed in the light of a really good, so-called daylight lamp." Observation distance is 50-75 millimeters; time of exposition of each plate is not to exceed 15 seconds, during which time the testee is permitted to outline the design if he hesitates to name it. Normal color sense is indicated by the successful reading or outlining of the figure or path in 17 plates and the failure to see any design on the dissimulation plates; failure to read 2 or more significant plates indicates defective color vision; failure to read only one plate indicates doubtful color vision which calls for more detailed examination by other techniques.

If a more exact specification of the amount and quality of the illumination under which the plates are to be administered had been made, the B-K series might have provided an interesting addition to our growing list of pseudo-isochromatic tests. Because of the small size of the colored dots and their low chroma, it appears on inspection to be a more rigid and sensitive test of color performance than are the series of Stilling, Ishihara, Rabkin and the plates compiled by the American Optical Company. It is probable that many cases who have been classified as having low normal color vision would have been diagnosed as defective by the new Swedish plates. Particularly because of the higher sensitivity of the test, however, a more exact specification of the illuminant to be used should unquestionably have been made. The spectral composition of "full daylight" varies within wide limits, and any test which employs pigment stimuli is valid only when the color temperature of the illuminant for which it was designed is exactly specified and followed during the administration. Standard illuminants for color work were adopted in 1931 by the International Commission on Illumination, and today this type of specification is accepted as mandatory for the accurate testing of color vision with pigment stimuli.

(Gertrude Rand)

---

* From information received in a personal communication from the publisher of the test.

ONCE IN A BLUE MOON

J. H. Pruett (reference in the Bibliography, this issue), remembering the popular phrase denoting rarity, states that a blue moon was actually observed on July 28, 1944. It was at quarter phase, veiled thinly by a patch of high cirrus clouds which were colored orange red by the sun just below the horizon. But it was not a contrast phenomenon, because the moon soon floated out into a clear sky and was just as blue as ever. Others also witnessed the effect, which lasted for 15 minutes; and it has been observed before.

STROBL AND LUMINESCENCE

Mr. Alexander Strobl, ISCC member and head of the Stroblite Company, has written an article on luminescense which, because of Strobl's authoritative voice in this field, will repay any one for a careful reading; see the reference in the Bibliography section of this issue. His company was perhaps the earliest going concern in this field commercially, and he has kept abreast not only of commercial developments but of theoretical trends as well. The Editor well remembers his astonished but pleased surprise when he first viewed a job done for him by an artist under Strobl's direction (and with Strobl's materials), a painting to be shown under varying lights in the Exhibition on Color (1930-1931) of the Museum of Science and Industry, now in Radio City. Under one light, the canvas protrayed a medieval castle; under another light one saw a factory village. The article distinguishes fluorescence and phosphorescence and deals with their causes. It treats of "radium luminous pigments" and various phosphors, their manufacture and uses. Also included are the use of "black light" (ultra-violet) and a number of scientific and practical applications.

FADING AND TENDERING

The reference given in the Bibliography, alphabetized under the name of Waly, is another of a long series of fine papers by the Scholefield group. The phenomenon of fading is well known to most of our readers; tendering, the weakening of cotton fibers when dyed with certain dyes, especially vat and sulfur dyes, is a less familiar effect unless one has encountered it in the form of holes in a curtain hung in a well-lit window. Waly et al have now made a study of the electro-affinity of dyes dyed on cellulose by determinations of "redox" (oxidation-reduction) potentials, the dyes being in equilibrium with their leuco (reduction) forms. It is well known that many yellows, oranges and reds are tendering while blues are not, though correlation with absorption spectra is not perfect because of the existence of non-tendering yellows and oranges. Excellent correlation is now found between the shift of potential in the light (as compared to the dark) and the tendering activity. For example, Indanthrene Yellow G, which is non-tendering, shows no shift in light; Indanthrene Yellow FFRK and Cibanone Yellow R, tendering dyes, show a great change. Since redox potentials correlate well with the inductive (electrostatic) factors associated with various chemical groupings, which along with the "resonance" factors mainly determine the course and speed of chemical reactions, and inductive measures are obtainable from the ionization constants of non-resonant acids, this work opens the way to the prediction of tendering activities.

LAMELLAR MICELLES

Sheppard and Geddes, who have published considerable valuable material on the effect of solvents on absorption spectra have made some speculations as to the form and structure of proteins and certain dye molecules; see the reference in the Bibliography. They attribute pronounced changes in absorption spectra in changing from water to alcohol as solvent, to breakdown from aggregates to single molecules in alcohol. A similar effect is obtained on adding gelatin at pH 5.6 or cetyl pyridinium chloride to dyes in water solution. The dye is partitioned between water and the micelles of added

colloid. It is suggested that the hydrophilic (water-seeking) groups of the dye molecule, which penetrate into the colloidal micelle and cause monomerization, are able to do so because of a lamellar rather than a spherical structure of the micelle, the lamellae being hydrophilic on one side and hydrophobic (water-repelling) on the other side. A spheroidal shape would require an exterior hydrophilic surface, which for the positively charged acid gelatin would cause repulsion of dye cations. The phenomenon is closely related to the "solubilization" of dyes, on which much has been published recently, and to adsorption of dyes and proteins on silver halides.

HELMHOLTZ LINE-ELEMENT

In the Bibliography is given reference to a paper by Stiles on this line-element, modified in a simple way. This modified expression should be applicable to the calculation of hue limens, step-by-step visibility curves, Fechner fraction curves, and general color limens at varying points of the chromaticity diagram. The data are in fact reproduced in their main outlines; but discrepancies from the data of Wright and MacAdam indicate that there is "some factor operative in their experiments is ignored" by the modified line-element.

BIBLIOGRAPHY

F. B. Pidduck; J. Opt. Soc. Amer. 37, 55-8 (Jan. 1947); Talbot's bands (seen in a continuous spectrum through a hole the size of the eye-pupil, half covered with glass film)

H. Pieron; Nature 157, 106 (1946); tritanopia and colour-vision

L. Pincherle; Nature 157, 226 (1946); total reflection in absorbing media

M. H. Pirenne; Proc. Cambridge Phil. Soc. 42, 78 (1946); variation of visual acuity with light intensity

H. D. Polster; J. Opt. Soc. Amer. 36, 350 (1946); theory of the multilayer filter

J. M. Preston & P. C. Tsien; J. Soc. Dyers Col. 62, 242-8 (1946); the cellulose-dyestuff complex; II, the intensity of light reflected from dyed fibers

D. J. Price; Proc. Phys. Soc. 58, 704-6 (1946); note on the calculation of optical constants (from polarization of reflected beam, by a simplified method)

G. E. Pride; J. Opt. Soc. Amer. 36, 367, 510-13 (1946); reflectance-measuring attachment for the Beckman spectrophotometer

J. A. Prins & J. J. M. Reesinck; Physica 12, 396-401 (1946); trichromatic specification of interference colors

J. H. Pruett; Sky & Telescope, March 1946; through Nature 158, 194-5 (Aug. 10, 1946); a blue moon (note review in the body of the News Letter under the title "once in a blue moon")

Radio Corporation of America; Brit. Pat. 570,717 (1945); anti-reflection coatings

J. A. Radley; Paint Manuf. 15, 115-7, 144 (1945); fluorescent lacquers.

P. Ramart-Lucas; Compt. rend. 215, 468-70 (1942); through Chem. Abstr. 38, 3907 (1944); absorption spectra and structure of hydroxy-azo dyes

P. Ramart-Lucas; Bull. soc. chim. (5) 11, 75-81 (1944); through Brit. Chem. Abstr. 1946, A II, 21; hydroxy-azo dye acyl derivatives, structure and absorption spectra

J. T. Randall & M. H. F. Wilkins; Proc. Roy. Soc. A184, 347-64 (1945); the phosphorescence of various solids

J. T. Randall & M. H. F. Wilkins; Proc. Roy. Soc. A184, 365-89, 390-407 (1945); phosphorescence and electron traps; I, study of trap distributions; II, interpretation of long-period phosphorescence

(Lt.-Col.) R. H. Ranger; Amer. Cinematographer 26, 416-7 (1945); U. S. government (Signal Corps) report on the Agfacolor process

D. H. Rank; J. Opt. Soc. Amer. 36, 239-41 (1946); resonance spectrum of iodine

D. H. Rank; J. Opt. Soc. Amer. 36, 299-301 (1946); modified Rayleigh scattering in a liquid

RCA Laboratories Division, Radio Corporation of America; RCA Review 7, 459-68 (Dec. 1946); simultaneous all-electronic color television (Apparatus is described and illustrated by means of which the three-color images are being transmitted and received simultaneously; the green channel of the system can be used for monochrome presentation; slides and 16-mm film driven at the rate of 30 frames per second are the subjects scanned)

G. Reimann & E. J. Carmine; J. Opt. Soc. Amer. 36, 235-6 (1946); device to facilitate the reading of spectrophotometric curves

G. Reimann, D. B. Judd & H. J. Keegan; J. Research Natl. Bur. Stand. 36, 209-47 (1946); J. Opt. Soc. Amer. 36, 128-59 (1946); spectrophotometric and colorimetric determination of the colors of the TCCA standard color cards (RP 1700); review by D. Nickerson, Text. Research J. 16, 344-5 (1946)

J. Reiner; Camera 69, 36-9, 128 (Jan. 1947); try (Ansco Color) Printon in your camera (method given)

R. Reiter; Z. Instrumentenk. 64, 105-21 (1944); a universal radiation-measuring instrument; its description, function and applicability

R. Reuther; Film und Farbe, 1943, p. 103; a method of color measurement for color photography

F. S. Richardson; Text. Bull. 69, No. 6, 42, 44, 66-7 (1945); Germany's wartime dyeing and printing (a survey)

B. F. Rider & M. G. Mellon; Indus. Engin. Chem., Anal. Ed. 18, 96-9 (1946); colorimetric determination of nitrites.

P. Ridler; Brit. J. Photog. 93, 111 (March 29, 1946); a 2-sq.ft. light source

J. Robins & L. E. Varden; Electronics 1946 (June), 110-5; photoelectric controls for color printing

H. A. Robinson; J. Opt. Soc. Amer. 36, 270-77 (1946); evaluation of colorimetric stimulus values by means of a new centroid method

H. Roeder; Amer. Photog. 41, 30-32 (Jan. 1947); outlook for color photography in Europe (translation from "bulletin by Perrot of Bienne, Switzerland")

A. Rose; J. Soc. Mot. Pict. Engin. 47, 273-94 (Oct. 1946); a unified approach to the performance of photographic film, television-pickup tubes, and the human eye

R. E. Rose; Text. Research J. 15, 383-8 (1945); mechanism of the direct or substantive dyeing of cellulosic fibers

P. Rumpf; Bull. soc. chim. (5) 11, 515-26 (1944); through Brit. Chem. Abstr. 1945, A I, 273; hydroxylated triphenyl-methane dyes; reversible transformations (and colors)

T. B. Rymer & C. C. Butler; Phil. Mag. (7) 36, 515-33 (1945); broad spectrum lines; precision of measurement

S. Sambursky & G. Wolfsohn; Nature 157, 228-9 (1946); fluorescent dyes; quenching by van der Waals forces

R. Samuel; Rev. Mod. Physics 18, 103-47 (1946); dissociation spectra of covalent polyatomic molecules

R. G. Sanders; Photogrammetric Engineering 11, 101-3, No. 2, April-May-June 1945; through Monthly Abstr. Bull., Kodak Research Labs. 32, 37 (Feb. 1946); stereoscopy, its history and uses

P. B. Sarkar, H. Chatterjee & A. K. Mazumdar; Nature 157, 486 (1946); absorption of basic dyes by jute

J. L. Saunderson & H. H. Grossman; J. Opt Soc. Amer. 36, 243 (1946); simultaneous linear equations in absorption spectrophotometry and mass spectrometry

J. L. Saunderson & B. I. Milner; J. Opt. Soc. Amer. 36, 36-42 (1946); modified chromatic-value color-space

M. Scalera & A. W. Joyce (to American Cyanamid Co.); U. S. Pat. 2,385,106 (1945); dyes of specified composition (1,8-naphthalic acid imides) fluorescing in oils and plastics

O. Schaffrath; Allgem. Textil.-Z. 2, 148-9 (1944); through Chem. Abstr. 40, 5925 (1946); yellowing of vat-dyed field-gray cloth.

W. Schneider & H. Berger; Z. wiss, Photog. 42, 43-52 (1943); through Monthly Abstr. Bull., Kodak Research Labs. 31, 329 (Nov. 1945); sensitometry of the Agfacolor process

W. Schneider, A. Fröhlich & H. Schulze; Chemie 57, 113-6 (1944); the diffusion-proof color-formers of Agfacolor film

E. B. Schuler; Offic. Digest Fed. Paint Var. Prod. Clubs, No. 253, 64-72 (1946); hiding-power, - a critical review

L. H. Schwartz; "Your Eyes Have Told Me"; E. P. Dutton (1945), pp. 208; review in Science 103, 120-2 (Jan. 25, 1946) by LeG. H. Hardy

W. D. Schweisheimer; Text. Colorist & Converter 69, 41, 47 (Jan. 1947); color vision in the textile industry (work of J. Tiffin and H. S. Kuhn; of G. A. Strebel and of W. A. Mailer)

H. G. Scull & H. DeW. Smith; Rayon Text. Monthly 26, 99-102, 189-90, 297-9 (1945); modern methods of dyeing some manufactured fibers (general)

C. A. Seibert; Amer. Dyestuff Rptr. 34, P 272-80 (1945); proposed method for the calibration of carbon-arc lamps used for testing and grading light-fastness; comments by E. R. Laughlin, p. 280

F. Seitz; Rev. Mod. Physics 18, 384-409 (1946); color centers in alkali-halide crystals

D. A. Senior; J. Sci. Instr. 23, 81-3 (1946); higher-power stroboscope

M. W. Seymour; see J. S. Friedman, dichroic filters, 1946

F. W. Sharp; Photog. J. 85 A, 254 (Dec. 1945); three-colour carbon printing

J. H. Shaxby; J. Sci. Instr. 22, No. 1 (Jan. 1945); a simple form of Nagel anomaloscope

J. H. Shenk, E. S. Hodge, R. J. Morris, E. E. Pickett & W. R. Brode; J. Opt. Soc. Amer. 36, 361, 569-75 (1946); filters for the visible and near infra-red regions

M. Shepherd; Anal. Chem. 19, 77-81 (Feb. 1947); rapid determination of small amounts of carbon monoxide; preliminary report on the NBS colorimetric indicating gel

S. E. Sheppard; Science 102, 207-8 (1945); overlapping trichromatic excitation curves; review by the editors in ISCC News Letter No. 61 (Sept. 1945), 8-10

S. E. Sheppard & A. L. Geddes; J. Chem. Physics 13, 63-5 (1945); amphipathic character of proteins and certain lyophilic colloids as indicated by absorption spectra of dyes; note brief review in the body of the News Letter under the title "lamellar micelles"

E. V. Shpol'skii & E. V. Grishkun; J. Phys. Chem. USSR 19, 107-16 (1945); photochemical sensitization by dyes and quenching of fluorescence in solutions

W. A. Shurcliff; J. Opt. Soc. Amer. 36, 427 (1946); means, involving visual-range light only, whereby own troops can see better than enemy troops at night

W. A. Shurcliff & E. I. Stearns; J. Opt. Soc. Amer. 36, 478-80 (1946); use of a constant-hue flickering filter to distinguish poor imitation from real green foliage

L. Silberstein; Phil. Mag. 37, 126-44 (1946); complete three-dimensional colour domain and its metrics

L. Silberstein; J. Opt. Soc. Amer. 36, 464-8 (1946); two accessories of three-dimensional colorimetry; I, probable error of colorimetric tensor components as derived from a number of color matchings; II, determination of the principal colorimetric axes at any point of the color threshold

R. A. Silow; Paper to Genetics Soc., London 1946, p. 3; through Plant Breeding Abstr. 16, 130 (1946); cotton flowers: inheritance of color

R. H. Sinden; J. Opt. Soc. Amer. 35, 737-41 (1945); note on MacAdam's determination of chromaticity sensibilities

B. G. Skinner & T. Vickerstaff; J. Soc. Dyers Col. 61, 193-201 (1945); Amer. Dyestuff Rptr. 34, 435-8, 448-52 (1945); absorption of acid dyes by wool, silk, casein fiber and nylon

L. L. Sloan; J. Opt. Soc. Amer. 35, 761-6 (1945); improved screening test for red-green color deficiency composed of available pseudoisochromatic plates

B. W. Smith (to Todd Co.); U. S. Pat. 2,380,195 (1945); safety paper

B. W. Smith; Science 104, 490-91 (1946); method for making filters transmitting the near ultraviolet and absorbing visual light (using Methylene blue, fuchsine and phosphine)

T. R. Smith; Amer. Dyestuff Rptr. 35, 511-2 (1946); dyeing of hosiery in Germany

Society of Chemical Industry, Basle; French Pat. 865,903 (1947); improving the fastness to light of direct dyeings

H. T. Souther; J. Soc. Mot. Pict. Engin. 46, 245-53 (1946); illusion of depth in motion pictures

J. McG. Sowerby; J. Sci. Instr. 21, 42-5 (1945); a photoelectric photometer for measuring the light scattered by the surface of a transparent material

R. Speiser & B. A. Brice; J. Opt. Soc. Amer. 36, 364 (1946); light-scattering photometer for determining high molecular weights

E. I. Stearns; Amer. Dyestuff Rptr. 35, P 330-31 (1946); standard angular conditions for the colorimetry of textiles

R. S. Stein & P. Doty; J. Amer Chem. Soc. 68, 159-67 (1946); cellulose-acetate solutions: light-scattering and molecular size

D. M. Steven; Nature 157, 376-7 (1946); relation between dark-adaptation and age

W. S. Stiles; Proc. Phys. Soc. 58, 41-65 (1946); a modified Helmholtz line-element in brightness-colour space; see brief abstract in the body of the News Letter under the title "Helmholtz line-element"

W. S. Stiles; J. Opt. Soc. Amer, 36, 491-2 (1946); basic sensation curves of the three-colour theory

J. Straub & W. Simons; Rec. trav. chim. 61, 809-18 (1942); through J. Text. Inst. 37, A 332 (1946); wheat flour and white pigment powders: measurement of whiteness

(Capt.) R. S. Stribling; Amer. Dyestuff Rptr. 34, P 99-104 (1945); recent developments in the application of vat dyestuffs

A. Strobl; Colloid Chem. 6, 735-41 (1946) (J. Alexander, Ed., Reinhold Publ. Corp., New York City); Chem. Abstr. 40, 2651 (1946); luminescent paints, pigments and inks; see abstract in the body of the News Letter under the title "Strobl and Luminescence"

G. v. Studnitz; Film und Farbe 1943, p. 81; vision and photography

G. v. Studnitz; Film und Farbe 1943, p. 95; the physiological basis of color vision

K. F. Stultz; Natl. Paint Var. Lacq. Assoc., Sci. Sect. Circ. No. 708, 435-57 (1945); measurement and specification of color

B. Y. Sveshnikov & P. P. Dikun; J. Phys. Chem USSR 19, 289-97 (1945); chemiluminescence of lucigenin

M. H. Sweet; Electronics, March 1945, pp. 102-6; direct-reading color densitometer

M. H. Sweet; J. Opt. Soc. Amer. 35, 379-81 (1945); simple intensity-scale sensitometer which conforms with American standard requirements

E. M. Symmes; Amer. Photog. 40, 38-9 (1946); new ways of making color matrices (in photography)

H. A. Tanner & L. B. Lockhart Jr.; J. Opt. Soc. Amer. 36, 701-6 (1946); German reflection-reducing coatings for glass

H. H. Taylor & F. T. Simon; Amer. Dyestuff Rptr. 34, 319-21 (1945); polyethylene-oxide condensates, an aid in the spectrophotometry of dyestuffs; review in ISCC News Letter No. 61 (Sept. 1945), 10 and in No. 62 (Nov. 1945), 8

L. S. Thompson; Cotton (Atlanta) 110, No. 2, 95-8 (1946); solving the problems of dyeing mixed fibers

L. C. Thomson; Nature 157, 805 (1946); foveal colour sensitivity

D. L. Tilleard & N. D. P. Smith; J. Soc. Chem. Indus. 65, 305-8 (1946); examination of pigments and extinguishers with the electron microscope

B. M. Tolbert & G. E. K. Branch; J. Amer. Chem. Soc. 68, 315-9 (1946); absorption spectra of the negative ions of diamino-triphenylmethane dyes

B. M. Tolbert, G. E. K. Branch & B. E. Berlenbach; J. Amer. Chem. Soc. 67, 887-93 (1945); absorption spectra of some N-phenyl-pp'-diamino-triphenylmethane dyes (including malachite and viridine greens; the phenyl group is bathochromic, but the asymmetry due to a second phenyl on one nitrogen atom is hypsochromic)

R. Tousey & E. O. Hulburt; J. Opt. Soc. Amer. 36, 358-9 (1946); 78-92 (Feb. 1947); brightness and polarization of the daylight sky

F. Townend; J. Soc. Dyers Col. 61, 144-50 (1945); two-colour dyeing of all-wool materials

F. Townend & G. G. Simpson; J. Soc. Dyers Col. 62, 47-52 (1946); recent advances in wool dyeing; the relation of dyeing properties to dyestuff constitution

W. Trendelenburg; Naturwiss. 32, 1-11, No. 1/4 (Jan. 1944); through Monthly Abstr, Bull., Kodak Research Labs. 32, 57 (1946); systematic (survey of) color science (perception and vision)

L. S. Trimble; Canad. Pat. 436, 474 (1946); tricolor printing

L. S. Trimble & F. W. Bowden; J. Soc. Mot. Pict. Engin. 46, 231-6 (1946); colored trace oscillograms

N. H. Turnbull; J. Chem. Soc. 1945, 441-4; absorption spectra of acridines; II, mono-amino acridines

A. F. Turner; J. Opt. Soc. Amer. 36, 711 (1946); increasing the reflectance of metals with multiple films

F. Urbach; J. Opt. Soc. Amer. 36, 351 (1946); storage and release of energy in phosphors of long duration

E. I. Valko; Colloid Chemistry (J. Alexander, Ed., Reinhold Publ. Corp., New York City) 6, 594-619 (1946); physical chemistry of dyeing (Editor: Valko is an outstanding authority in this field)

J. A. Van den Akker; J. Opt. Soc. Amer. 36, 561-8 (1946); multi-step sector photometer

A. T. Vartanyan; J. Tech. Phys. USSR 14, 703-12 (1944); through Chem. Abstr. 40, 1359 (1946); dye-fastness testing apparatus

H. A. van der Velden; Physica 11, 179-89 (1944); number of light quanta in the visual purple necessary for light perception when seeing with rods

T. Vickerstaff & D. R. Lemin; Nature 157, 373 (1946); aggregation of dyes in aqueous solution (existence of high polymers; changes in absorption spectra; work on methylene blue)

A. I. Virtanen & T. Laine; Nature 157, 25-6 (1946); red, brown and green pigments in leguminous root nodules

P. W. Vittum & G. H. Brown; J. Amer. Chem. Soc. 68, 2235-9 (1946); 69, 152-5 (1947); indoniline dyes; I, some phenol blue derivatives with substituents in the phenol ring; II, the effect of multiple substitution on the (light) absorption of phenol blue

F. Vles; Arch. phys. biol. 16, 137-66 (1943); through Chem. Abstr. 40, 369 (1946); proteins: excitation of fluorescence

F. Vles; Arch. phys. biol. 16, No. 5, Suppl., 73-5, 75-7 (1943); through Chem. Abstr. 40, 2387 (1946); empirical calculation of absorption spectra from the constituent chromophore groups; I, chromophore origins; II, applications of the formulas

W. Von Bergen, T. Crowley & W. Brommelsiek; Amer. Dyestuff Rptr. 34, P 53-63 (1945); continuous indigo dyeing of wool stock

H. deVries; see De Vries

F. T. Wadsworth (to Pan American Refining Corp.); U. S. Pat. 2,380,561 (1945); improving the color stability of toluene

G. Walt; Colloid Chemistry (J. Alexander, Ed., Reinhold Publ. Corp., New York City) 5, 753-62 (1944); the molecular organization of visual processes

M. J. Walker & F. M. Steadman; Amer. J. Physics 15, 65-7 (Jan.-Feb. 1947); the treatment of extended light sources in elementary textbooks

T. Wallace; "The Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms; a Colour Atlas and Guide"; Suppl 1944; pp. 9 plus 48 plates (115-209); H. M. Stationery Office, London (1944); 5 s. net (94 color plates for diagnosis; original vol. in 1943)

G. L. Walls; J. Opt. Soc. Amer. 36, 615 (1946); "axial image conversion"

Y. M. Waly, J. M. Preston, F. Scholefield & H. A. Turner; J. Soc. Dyers Col. 61, 245-55 (1945); fading and tendering activity in vat dyes; a new method for its diagnosis; see brief review in the body of the News Letter under the title "fading and tendering"

D. War; Photog. J. 86 A, 62-5 (March 1946); production of documentary 16-mm. colour films

G. C. Ward & B. T. Pull (to C. Dreyfus); Canad. Pat. 435,766 (1946); improving the fastness (to acid fading) of dyed cellulosic textiles

J. F. Warner; Amer. Dyestuff Rptr. 35, P 332-3 (1946); benefit to industry of measured (color) standards (work of the Textile Color Card Assoc. of the U. S., Inc.)

E. Waters (to Imperial Chem. Industries Ltd.); Brit. Pat. 576,232 (1946); colored gelatin light filters made with solubilized vat dyes

S. A. Watson & R. L. Whistler; Indus. Engin. Chem., Anal. Ed. 18, 75-6 (1946); estimation of iodine color of starches and starch fractions (classified in accordance with Munsell and Ridgway color charts)

W. A. Weyl; J. Appl. Physics 17, 628-39 (1946); the use of color and fluorescence indicators for determining the structure of glasses

G. S. J. White & T. Vickerstaff; J. Soc. Dyers Col. 61, 213-24 (1945); colour (general review)

J. A. Widmer & B. H. Carroll (to Eastman Kodak); U. S. Pat. 2,405,106 (1946); use of the pyrrole dyes of U. S. Pat. 2,268,798 and 2,298,731 in filter and anti-halation layers facilitated by the use of anionic dispersing agents

J. H. Wilkinson & I. L. Finar; J. Chem. Soc. 1946, 115-7; acetylation of some 5-amino-acridines (gives data on fluorescence of a large number of bases and derivatives)

J. S. Williams; Inter-Society Color Council News Letter No. 59 (May 1945), 9-10; color and the professional artist

E. N. Willmer & W. D. Wright; Nature 156, 119-21 (1945); colour sensitivity of the fovea centralis; review in Inter-Society Color Council News Letter No. 62 (Nov. 1945), 10

H. B. Wobbe; Camera 68, 84-8 (1946); equipping the color darkroom

K. J. B. Wolfe; Metal Treatment, Spring 1946, pp. 25-40; photomicrography of metals in color

M. Wolkenstein; Acta Physicochimica USSR 20, No. 6 (Eng.) (1945); through Sci. Bull. Amer. Soviet Sci. Soc., Sept. 1946; theory of vibrational spectra of polyatomic molecules; IV, spectra of deuteromethanes and electro-optical properties of valence electrons

A. H. Woodhead; Paint Manuf. 15, 192-4 (1945); phthalocyanine colors (review of blues and greens)

D. W. Woodward (to Du Pont); Canad. Pat. 436,627 (1946); naphthylamine color formers

W. D. Wright; "The Measurement of Colour"; (add to previous references:* review by C. B. Stevens, J. Soc. Dyers Col. 61, 128-9 (1945)

A. W. Wundheiler; J. Opt. Soc. Amer. 35, 767 (Dec. 1945); on the MacAdam ellipses

A. W. Wundheiler; J. Opt. Soc. Amer. 36, 288-91 (1946); on the metric of color space

H. Zahnd & D. Gillis; J. Chem. Education 23, 128-34 (1946); chemical knowledge in the New Testament (includes section on bleaching and dyeing)

A. M. Zimkina & A. V. Lebedinsky; J. Genl. Biol. 6, No. 5 (1945; Russian with Eng. summary); through Sci. Bull. Amer.-Soviet Sci. Soc., Sept. 1945; variations of mechanisms of the pupil reaction in various species of animals

B. H. Zimm, R. Stein & P. Doty; Polymer Bull. 1, 90-119 (1945); a classical theory of light scattering from solutions; a review