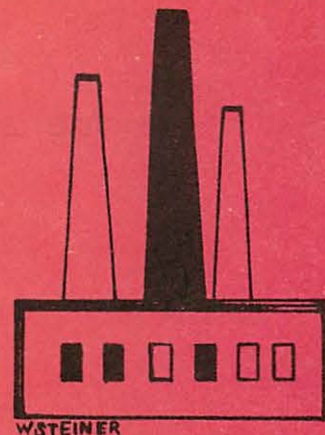




I.S.C.C. I.S.C.C. newsletter I.S.C.C.



WSTEINER

INTER-SOCIETY *Color* COUNCIL

NUMBER 146

March, 1960

News Letter Committee:

Warren L. Rhodes, Chairman
Deane B. Judd
Robert W. Burnham

Helen D. Taylor
Dorothy Nickerson
Ralph E. Pike

Send News Letter Items to Editor,
Warren L. Rhodes
Graphic Arts Research Department
Rochester Institute of Technology
Rochester 8, New York

Other correspondence to Secretary,
Ralph M. Evans
Color Technology Division
Eastman Kodak Company
Rochester 4, New York

PROBLEMS COMMITTEE MEETING PROGRAM AND SUMMARIES OF SUBCOMMITTEE ACTIVITIES

For the purpose of keeping the ISCC membership better advised on current color problems, and to encourage a higher degree of participation in committee work,

the Board of Directors have formally designated the first day of the Annual Meeting for a full Problems Committee program. In a sense this is merely a recognition of a tradition which has come to play an increasingly important role in ISCC activity. This News Letter provides a brief history of the origin and objectives of subcommittees currently active on ISCC problems. A schedule of the committee meetings will be provided at the registration desk. Members and friends of the Council are encouraged to attend and to participate on this occasion in the discussions of the working groups in their area of interest.

This year the Annual Meeting will be held at the Philadelphia Museum, College of Art at Broad and Pine Streets, Philadelphia, Pennsylvania on Tuesday, April 12, 1960. The preceding Monday, April 11, has been designated as Problem's Day and Problem Committees will meet at the Philadelphia Museum, College of Art beginning at 9:30 A.M. Meeting locations and schedules will be bulletinized in the lobby. We expect more space than usual so that as many meetings as possible will be scheduled in the morning. Open meetings of each of the active Problem Subcommittees listed in this News Letter will be held.

R. E. Pike, Chairman
Problems Committee

Statement from Report of Executive
Committee, 1944, Covering I.S.C.C.
Organization and Functions

(Revised 1954)*

- IV. 2. PROBLEMS COMMITTEE - From time to time various inquiries on color problems come to the attention of the Council.
- a. Problems germane to a particular society are referred to the delegation chairman of that society.
 - b. Problems capable of immediate answer or solution by a recognized authority are so referred. Frequently problems have broad aspects which concern many Member-Bodies requiring a coordinated effort for their solution.
 - c. Other problems are referred to the chairman of the Problems Committee for consideration. If the chairman of the Committee feels that the problem warrants individual study by a special subcommittee, he recommends appropriate action to the Board of Directors. Usually the chairman of the Problems Committee serves as a committee of one, but this is not necessary. Whenever possible, opportunity is provided the Member-Bodies to comment, through their delegation chairman, on the desirability of establishing the proposed subcommittee. An affirmative vote by the Board of Directors leads to the establishment of the subcommittee whose chairman is appointed by the President.

Members of the subcommittee may come from either the membership lists of the Member-Bodies, Individual Member list, or any other competent person chosen by the Chairman of the Subcommittee or suggested by the Board of Directors.

The purpose of the subcommittee is to solve the assigned problem and it is expected that written reports on progress will be made for presentation at the annual meeting. In recent years the Chairman of the Problems Committee presides at the meeting at which the reports of the Problems Committee Subcommittees are presented.

* The new terminology resulting from the incorporation has been substituted for the titles actually in effect up to 1954.

SUBCOMMITTEE NO. 2 Color Names

Committee Membership:

Kenneth L. Kelly, Chairman
Room 305 East Building
National Bureau of Standards
Washington 25, D. C.

Deane B. Judd
Kenneth L. Kelly
Dorothy Nickerson

Problem 2, Color Names, was actually the problem for which the ISCC was established. The subcommittee on Problem 2 has published two reports: the first in 1939, NBS Research Report Paper RP-1239; and the second in 1955, NBS circular 553, the ISCC-NBS Method of Designating Colors and a Dictionary of Color Names. The November 1958 work on this problem was re-established by reactivation of the subcommittee to help supply the subcommittee on Problem 23 with samples representing centroids of ISCC-NBS color designations. This subcommittee on Problem 23 was formed in 1957 to develop a technique of expressing historical color usage of consumer products in order to facilitate intercomparison among industries, or, stated otherwise, to develop a technique for studying color trends in different industries and the effect of a trend in one industry on another industry. The first requirement of this subcommittee was for an appropriate set of reference color samples and the subcommittee felt that those which represented the colors of the center of each of the 267 ISCC-NBS color-name blocks would be most useful for this purpose. The designations of these central colors or centroids were then being developed at the National Bureau of Standards. The ISCC Board of Directors, as a result of a request by the subcommittee on Problem 23 to procure these colored samples, arranged for their production by Davidson and Hemmendinger, and in 1958, reactivated the subcommittee on Problem 2, Color Names, to supervise the production of these centroid colors and determine their acceptability.

Arrangements have been made to have the colors measured on the GE recording spectrophotometer at the National Bureau of Standards. Those that do not meet the color tolerances specified by the subcommittee will, after suitable examination, be recommended for re-painting with suggestions for their betterment. Upon completion of this task, the subcommittee will report to the ISCC the colorimetric data for the acceptable centroid colors.

SUBCOMMITTEE NO. 10 Color Aptitude Test

Committee Membership:

Forrest L. Dimmick, Chairman
U. S. Naval Submarine Base
P. O. Box 400
New London, Connecticut

Carl Foss, Co-Chairman
72 Elm Road
Princeton, New Jersey

Daniel Smith

Robert Hefner
Paul Blackmore

In May 1940 the Color Aptitude Test Committee was set up by the Inter-Society Color Council and given the task of developing a test that would evaluate the capacities of individuals to make fine color discriminations. The immediate

impetus that led to this action was a request from the Cheney Silk Company for some means to predict the probable success of apprentice dyers in their industry. Mr. Carl Foss and Dr. Forrest L. Dimmick were made Co-Chairmen of this Committee. About a dozen other members of the Council who were attracted by the problem and who could contribute either theoretically or practically to its progress, were included in the roster of the Committee.

In 1944 an experimental version of a test was offered for distribution. This form of the test incorporated ideas and practical experience from numerous sources within and without the Committee. About 50 sets were distributed and data were accumulated on which could be based a final more accurate and satisfactory version. In 1953, thanks to the financial support of the Federation of Paint and Varnish Production Clubs, a satisfactory edition was presented for commercial distribution. Adequate standardization data had already been accumulated to make the test applicable to practical situations. The Federation undertook to distribute the sets at cost to industries and laboratories who were interested. No sales campaign was conducted, nevertheless, by 1959 approximately all of the test material originally provided had been distributed. This amounted to nearly 250 sets.

During this period the Committee was not active as a group but the Chairman accumulated results from the application of the test and conducted studies with its future development in view. Also during the same period the Chairmen were frequently called upon for information and advice, by purchasers of the test.

Although the original problem of the Committee had excluded color defect as a major consideration, many of the test purchasers used it on such subjects and made numerous inquiries about the significance of its results in such applications. Also, the Committee received many inquiries about the interpretations and evaluation of scores in particular colors. While the Committee maintains its position (1) that the test is not suitable for evaluating color defect and (2) that fractionation of the total score to evaluate performance on the separate component colors is not valid, these lines of general interest suggest that other series of color discriminations than those included in the test may yield information of value in specific applications. The Committee is beginning the exploration of such new series by attempting to develop ones which require hue discrimination.

At the last meeting of the Committee in March 1959, this line of investigation was discussed and several regions for exploration were suggested. First steps in production of the series have been taken.

SUBCOMMITTEE NO. 14 The Colorimetry of Transparent Materials

Committee Membership:

R. C. Stillman, Chairman
The Procter & Gamble Company
M. A. & R. Building, Ivorydale
Cincinnati 17, Ohio

Francis Scofield
A. J. Werner

B. A. Brice
G. J. Chamberlin
R. S. Hunter
G. W. Ingle
T. G. Pett
W. B. Reed

The purpose of this work is to study the colorimetry of existing transparent color standards in an effort to establish their color characteristics and their interrelation with each other. As a result of this work, it is hoped that the applicability of the standards to the systems being measured may be established and/or suggestions for the improvement of the standards made. Such a program necessitates a study of the colorimetry of the materials being measured for color.

Problem 14 was originally set up by the Executive Committee on April 26, 1947 under the title "A Study of Transparent Standards Using Single Number Specifications". The formal statement of Problem 14 as recorded in the minutes of the Executive Committee meeting was as follows:

"The purpose is to study the interrelation of transparent standards that make use of single number specifications as suggested by R. H. Osborn at the 1947 annual meeting. As noted in the annual report of this meeting, (pages 24 and 25) there are now many well-known systems of colored standards specified by a single number that are used in color grading. Most of these are not yet measured in I.C.I. (C.I.E) terms, and many may overlap for the very reason that not enough colorimetric data are available to forestall the development of new sets of standards made for the same or slightly different purposes. Standards referred to are usually set up in liquid, plastic, or glass form, and are used in grading oil, naval stores, honey, etc. Among these are the Gardner Standards, the U. S. Rosin Standards, Hazen or American Public Health Association (A.P.H.A.) Standards, the new set recently suggested by Osborn and Kenyon, and a number of others. Osborn, just prior to the meeting of the Executive Committee, discussed the matter with Drs. Ziegler and Judd, and the Secretary. Dr. Ziegler's report as Chairman of the Problems Committee indicates it should serve a useful purpose to study the existing standards so that colorimetric data on them might be exchanged. The committee might also wish to give consideration to many of the problems that arise in the preparation or use of such standards so that a report covering the evaluation of all well-known systems could be made through use of the I.C.I. (C.I.E.) system with recommendations regarding the limitations of single number specifications."

"This problem is intended to apply to the limited field of transparent or related series of material standards set up to provide a comparison for color grading by means of reference to a single member of the series, each series following a single path in color space".

The subcommittee on Problem 14, was finally organized with the following membership: Blanche R. Bellamy, C. C. Hartman, R. S. Hunter, N. J. Kreidl, Francis Scofield, Procter Thomson, A. J. Werner, R. H. Osborn, Chairman, with Dorothy Nickerson and Dr. Deane B. Judd as advisory members.

In the spring of 1952, Dr. Kreidl resigned and was replaced by Mr. Tyler G. Pett.

In 1954 Mr. R. C. Stillman was appointed Chairman of Problem 14 Subcommittee. The work of the Committee since that time has been reported yearly to the Council in the form of committee reports. The Committee is currently working on the construction of a detailed chromaticity diagram of existing standards. Where authentic information on existing standards is not available, that information is being obtained. Methods for relating one standard to another are being developed.

SUBCOMMITTEE NO. 16 Standard Methods for Mounting Textile Samples for Colorimetric Measurement

Committee Membership:

Richard Landry, Chairman
Chemstrand Corporation
Decatur, Alabama

A. Aronson
G. P. Bentley
Therese R. Commerford
R. E. Derby, Jr.

H. R. Davidson
L. R. Easley
P. M. Fisher
Seymour Goldwasser
R. S. Hunter
Victor Rebmann
F. J. Rizzo
Ernest Schweizer

Various people engaged in making color measurements on textiles, working independently, have developed techniques of sample preparation and mounting which give them satisfactory precision of measurement. Others may not be too well pleased with their own methods. Overall, there have grown up many methods, without too much exchange of information or any organized attempts at standardization until the year 1950. In that year, discussion among Mr. J. Barach, Dr. E. Stearns, Mr. F. Simon, and Miss D. Nickerson resulted in the formation of Problem Subcommittee No. 16 of the ISCC with Mr. Barach as chairman.

In defining the scope of the committee work, four sources of variance in colorimetric measurement of textile materials were recognized. They are:

1. Selection of material
2. Preparation of specimen
3. Mounting of specimen
4. Remeasurement without removing specimen

As finally determined upon, the scope of the committee is "to survey the sample characteristics, both mechanical and optical, of the textile materials which normally might be measured with colorimetric equipment, and to set up standard methods for the preparation of specimen and the mounting of specimen for any instrument which may be used".

A questionnaire was prepared and distributed to survey the textile industry. Outside of committee membership, very few of these questionnaires were returned and the idea was abandoned.

During the year 1952, a program for interlaboratory study on methods of preparation and mounting of textile samples for color measurement was initiated; and because of the predominant interest in carpet wool by the committee members, the tests were limited to wool staple. The interlaboratory studies were never completed. The lack of interest might have been due to the narrow scope of the studies (carpet wool). At any rate, what results were obtained are inconclusive.

In 1958, Mr. R. Landry was appointed chairman of the subcommittee. A meeting was held in March of 1958 to establish whether there was still interest in the committee work. Not only were the remaining members interested, but

apparently the problem of how to mount textile samples is far from resolved. Several new members were added to the subcommittee. On March 31, 1959, the subcommittee met and decided to request of the council that the objective of the subcommittee be changed. The subcommittee feels that it is not possible to set up one standard method which will give the same precision with all chemical classes of fiber or which would serve the needs of both research and production.

A more practical objective would be the evaluation of all known methods on each class of fiber and type of color measuring instrument with the emphasis on the sample rather than on the method.

The committee would contact the Cotton Council, Wool Bureau, major fiber producers and instrument manufacturers and endeavor to have them represented on the subcommittee and enable them to participate in this extensive study.

We believe that such a "consumer report" type of evaluation of methods of preparing textile for spectrophotometric measurement would be invaluable to the textile industry.

SUBCOMMITTEE NO. 17 Color in the Building Industry

Committee Membership:

Waldron Faulkner, Chairman
1710 "H" Street, N. W.
Washington 6, D. C.

Katherine Chandler
W. C. Granville

R. S. Hunter
H. J. Keegan
Dorothy Nickerson
Francis Scofield
Mildred Trimble

At the 1951 Annual Meeting, a request was presented to the Council to consider the appointment of a subcommittee to make a study of the color of building materials of different kinds so that they could be better selected and specified in order to harmonize in completed buildings. This request was approved. A subcommittee for Problem 17 was officially appointed. Waldron Faulkner was made Chairman.

When the subcommittee began its work, it was faced with the difficult task of deciding where to begin. Because of the large number of building products, it was decided in 1952 to make a pilot study of the color of Indiana Limestone as a guide for future studies.

The subcommittee presented its report on Indiana Limestone at the Annual Meeting in 1954. This report was later discussed on several occasions with representatives of the Indiana Limestone Institute who agreed that the recommendations of the subcommittee were entirely practical. However, no further action was taken by them.

In 1956, the subcommittee met on several occasions with representatives of the Architectural Terra Cotta Institute with the object of setting up color standards for architectural terra cotta. Architectural terra cotta is produced in an almost unlimited range of colors. It was suggested by the subcommittee

that a limited range of standard colors would be helpful both to producers and consumers. The Architectural Terra Cotta Institute has since that time developed a series of standard colors for their product and has become a member-body of the Council in 1957.

Since that time the subcommittee has been on inactive duty. Its experience thus far has been valuable but not entirely encouraging. It still seems clear that it would be desirable both for producers and consumers to set up unified color standards for building products. However, the problem is extremely complicated and varies from industry to industry. Setting up new standards is a laborious and costly process which no producer will undertake unless he sees real benefits to his industry. It takes time and study to convince him that this step will be advantageous. The producer must have a basic understanding of color so that he can appreciate the value of improved color standards. It has been suggested that this project be taken over by the A.I.A. with the subcommittee acting in a consulting capacity.

SUBCOMMITTEE NO. 18 Colorimetry of Fluorescent Materials

Committee Membership:

Eugene Allen, Chairman
American Cyanamid Company
Bound Brook, New Jersey

J. E. Callen
Seymour Goldwasser
A. C. Hardy
Henry Hemmendinger
C. W. Jerome
D. B. Judd

J. L. R. Landry
Raymond Liss
Norman Macbeth
W. E. K. Middleton
Ailene Morris
Dorothy Nickerson
G. H. Patterson
Alexander Strobl
R. A. Ward

In February 1952, Mr. W. E. K. Middleton proposed to the ISCC Board of Directors that a new problem be considered by the Council: The Colorimetry of Fluorescent Materials. In a memorandum to the Board, he suggested that the study encompass the measurement and specification of energy sources, and procedures for instrumental and noninstrumental measurement of the color of fluorescent materials produced by irradiation by ultraviolet, fluorescent and incandescent lamps, and by a combination of sun and sky. This suggestion was accepted, and Subcommittee No. 18 was organized under the chairmanship of Dr. S. Goldwasser.

At several preliminary meetings, it was decided that the problem of specifying a suitable source of irradiation should take precedence over the problem of color measurement. It was also decided fairly soon that although the original proposal was intended to encompass only colored fluorescent pigments and dyes, fluorescent whitening agents should also be studied because of their great commercial importance. This decision made the choice of a light source even more difficult; since fluorescent whitening agents are excited by ultraviolet radiation alone, it was necessary to find a source which approximated daylight in the ultraviolet region very closely.

A study of the usual ultraviolet sources and combinations of these with various visual sources showed that these did not match daylight too well. The Committee has been fortunate in having the cooperation of Macbeth Daylighting Company, who, in cooperation with Sylvania Electric Products, made available an experimental lamp. This is currently undergoing testing.

In 1956, Dean Farnsworth proposed that the Committee also consider the extension of the Munsell system to samples of higher chromas than were available at the time of the basic Munsell revision. This would be done through the medium of selected fluorescent samples which would be both measured instrumentally and evaluated visually. Dr. Rita Halsey, in a memorandum to the Committee, described a method for visually extrapolating Munsell chroma notations, and the apparatus for doing this was designed.

At the present time, the Committee intends to pursue three paths: First, a complete evaluation of the experimental light source and several other lamps to see how well they function for fluorescent whitening agents; second, an evaluation of the same lamps for colored fluorescent substances; third, the extension of samples represented in the Munsell system. Future work of the Committee will concern itself with the measurement of the color produced by fluorescent materials.

SUBCOMMITTEE NO. 20 Basic Elements of Color Education

Committee Membership:

Randall M. Hanes, Chairman
Applied Physics Laboratory
Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland

Robert W. Burnham
C. James Bartleson

At a meeting of the ISCC Board of Directors on March 23, 1954, Mr. Ralph M. Evans suggested that a problems subcommittee be formed to study means of correctly presenting basic knowledge in the field of color. At the next board meeting on June 24 and 25, 1954, the subcommittee was formed for the specific purpose of reporting to the ISCC "A statement of the basic principles which should be included in any elementary teaching of color". The Board further requested that this subcommittee "should state the basic principles but should not attempt to specify exactly how they should be taught".

There was initially great divergence of opinion among the members of the subcommittee but it was finally agreed that the term "basic" be restricted to color facts about which there is wide general agreement, and that a detailed outline be prepared which would include facts useful at any level of instruction.

A detailed and comprehensive outline was then prepared by a working group comprised of Burnham, Hanes and Bartleson. The outline was circulated to all members of the ISCC Board, to all delegates from the APA and OSA, and noted authorities for review.

A tentative draft of the final report entitled "Basic Elements of Color Education" was submitted to the ISCC Board of Directors in December, 1959. An editorial committee was appointed at that time to review this draft of the report and to advise the Board on the question of publication. The subcommittee was formally disbanded at that time with commendation and immediately reconstituted with Dr. Randall Hanes as Chairman and Dr. Burnham and Mr. Bartleson as committee members to expedite final editing and publication.

SUBCOMMITTEE NO. 21 Standard Practice for Visual Examination of Small Color Differences

Committee Membership:

Norman R. Pugh, Chairman
Sears, Roebuck & Co.
3301 W. Arthington St.
Chicago 7, Illinois

C. J. Bartleson
M. Bruno
Hugh Campbell
C. E. Foss
K. C. Gale
H. F. George
W. P. Greenwood
W. D. Hall
H. K. Hammond
R. M. Hanes
Martha L. Hensley

S. J. Huey
W. J. Kiernan
C. C. Krause
K. C. McCartt
R. W. McKinley
G. H. Mealley
W. J. Morgan
D. N. Obsenshain
Elizabeth D. Quackenbush
W. B. Reese
F. J. Rizzo
R. E. Rossell
Stewart Seass
Francis Scofield
R. C. Stillman
F. L. Wurzburg

This Subcommittee was organized in the fall of 1957, at the request of A.S.T.M. and held its first meeting the following spring. Problems and objectives outlined by the Board were based on Committee E-12 unsolved Problem 8.

In commerce most intercomparisons of sample and standard for duplication of color are made visually. The conditions under which these visual examinations are made and the skills of the persons making them vary widely.

It is believed that disagreements between parties interested in such intercomparisons could be diminished if there existed standard procedures for:

1. Illuminating and viewing specimens and standard.
2. Instructions for observers in making panel judgments.
3. Rating observers for skill in color matching and/or color vision.

Note: This problem should be limited initially to comparison of opaque non-metameric materials of similar composition and appearance for the purpose of judging visually whether the observed color difference falls within a pre-established standard or scale of color difference. The object of this restriction is to keep out of the problem the controversial factors of tolerance related to end use and observer experience on degree of acceptability.

The objectives are:

1. To establish illuminating and viewing conditions suitable for judging small color differences of specimen panels for the purpose of determining the adequacy of a color match.
2. To determine whether it is practical to apply existing tests for color perceptibility or aptitude to define the eligibility of individuals to participate in such judgments.
3. To establish written procedures to cover good general practices with respect to viewing conditions, qualifications for observers and specimen preparation for the purpose of establishing uniform conditions for color matching so that unbiased observers, singly or acting as a jury, might examine color differences satisfactorily according to these written procedures (such procedures to be compatible with trade practices).
4. To publish recommendations based on the results of these studies in an authoritative journal in a form that will encourage wide-scale adoption by supplier and consumers of color commodities.

In the first two meetings, discussion has been mainly exploratory, obtaining information on usual practice in different industries represented, and on particular procedures for unusual cases.

Because this particular problem has wide importance, and because there are more difficulties associated with comparing samples of differing colorants and surface texture, there has been a tendency to wander outside the original limits of the problem. It is now the intention of the chairman to narrow the scope to meet the original conditions more closely.

Of the three procedures listed under the "Problem" above, the first-illuminating and viewing conditions -- has received considerable attention from an ASTM D-1 Sub X Group, which has produced a "Guide to Recommended Practice in Visual Evaluation of Color Differences". While this is primarily oriented toward paint industry practice, it can provide a good starting point for a more general guide for the many industries represented on this Subcommittee.

On the second point - instructions to observers - very little research has been reported. There are limited data available, however, on the variation to be expected when a number of observers are given different kinds of instructions. Indications are that the type of instructions given observers and the skill of the observers in picking out exact color match from a variety of chips is not as important as the ability to make reasonably rapid, consistent judgments.

There are strong differences of opinion on the usefulness of the Color Aptitude Test, in evaluating the potential skill of prospective inspectors and color matchers. Various proposals have been made to provide more meaningful tests. At the present time this Subcommittee has recommended that Subcommittee 10 be asked to investigate the feasibility of designing such tests.

Future work will emphasize the production of a Recommended Practice that will cover:

- a. Classification of particular types of color difference evaluation problems.
- b. Illuminating and viewing conditions for different types of problems.
- c. Procedures for selecting and instructing observers.
- d. Statistical aspects of making critical judgments by means of an observer jury.

SUBCOMMITTEE NO. 22 Material Standards for the Colorimetry of Opaque, Translucent, and Transparent Materials

Committee Membership:

Fred W. Billmeyer, Jr., Chairman
E. I. DuPont deNemours & Co. Inc.
DuPont Experimental Station
Wilmington 3, Delaware

Carl E. Foss
Vice-Chairman
72 Elm Lane
Princeton, New Jersey

R. D. Alexander
H. D. Carter
S. L. Davidson
A. J. Derr
W. J. Goodwin

N. H. Pulling
Daniel Smith
R. C. Stillman
J. A. Van den Akker

The basis of Problem No. 22, accepted by the ISCC late in 1957, is the increasing need for stable, rugged material standards, readily available in a wide range of colors, for use in instrumental measurement of the appearance attributes of materials. While some standards are available in limited color ranges as by-products of other uses, there has been little, if any, systematic effort towards the objectives of the Subcommittee for Problem No. 22: To determine the types of materials most suited for use as colorimetric standards; to develop specifications for the preparation of a set (or sets) of representative standards; to arrange for the preparation, calibration, and distribution of the standards; and to develop and recommend procedures for their care and use.

The initial objective of the Subcommittee has been the selection of materials for transparent and opaque standards. Little data have been uncovered on the suitability of materials for such standards. Since the chief property of materials in question is their long term color stability, their evaluation must be made through instrumental measurements of the highest precision and constancy. The stability of the colors of glass transmittance filters or glass reflectance specimens appears to be quite high, but more data are needed on the long term behavior of such materials as porcelain enamels and acrylic plastics, which also show promise of having high stability. For some less stable materials, such as lacquers based on nitrocellulose, cellulose acetate, or cellulose nitrate, data are already available.

In view of the lack of adequate data on all promising candidate materials, the Subcommittee has initiated the following continuing program of measurement of the color stability of candidate materials.

1. Make a preliminary survey of materials and, where pertinent, material-colorant systems showing promise for high color stability.
2. Obtain specimens of such materials in a representative gamut of colors, using commercially available formulations wherever possible.
3. Set up and direct the program of instrumental measurements.

In addition to its primary investigation of materials, the Subcommittee has given some consideration to the use of material standards for calibrating such color measuring instruments as spectrophotometers and colorimeters. It is generally agreed that the needs of spectrophotometry may be met by sets of standards providing systems checks, such as the set of transmittance standards soon to be made available by the National Bureau of Standards.

The calibration of a colorimeter poses different and more complicated problems. First, by their nature, these instruments have limited absolute accuracy. Thus instead of (or in addition to) systems checks, a colorimeter requires calibration at a number of points throughout color space, whose optimum location and spacing will undoubtedly differ from instrument to instrument. A second complication in the calibration of a colorimeter lies in the fact that it may not describe color differences among metameric samples in the same way as do "normal" (not color-blind) human observers. If an instrument is "abnormal" in this sense, then it is impossible to use material standards with that instrument except by specifying in some way the spectral characteristics of the standards and the samples to be measured. Such a step may require that the Subcommittee consider the problem of metamerism and provide an objective definition of "degree of metamerism".

The Subcommittee is not unaware of the importance of translucent standards and standards for gloss and for other appearance attributes. It is anticipated that these subjects can be considered in the near future.

SUBCOMMITTEE NO. 23 Expression of Historical Color Usage

Committee Membership:

Helen D. Taylor, Chairman
100 West Evergreen Avenue
Philadelphia 18, Pennsylvania

Elschen Hood
Frederic Rahr
A. J. Benjamin
Elizabeth Burris-Meyer
Carl E. Foss
Martha Jungerman

Everett R. Call, Co-Chairman
American Institute of
Marketing, Inc.
1000 Vermont Avenue, N. W.
Washington 5, D. C.

W. C. Granville
Midge Wilson
F. L. Wurzburg
Kenneth L. Kelly

In June 1957, Mr. Everett R. Call and Mr. Francis Scofield, delegates for the National Paint, Varnish and Lacquer Association, presented to the ISCC Board of Directors information concerning the need for a standard technique of recording historical color usage of consumer products in order to facilitate intercomparison among industries. A committee, composed of a group of Member-Body representatives most interested in this field, concurred with the NPVLA on the need and desirability of such a study and recommended that this problem be established. Problem 23 was formally adopted by the Board of Directors in October 1957 and committee studies were immediately and enthusiastically initiated.

A need for an appropriate set of color samples was soon found to limit progress. The Subcommittee on Problem No. 2 was reactivated by the Board of Directors in November 1958 for the purpose of producing a set of color swatches representing the centroids of the ISCC-NBS System for Color Names. This was believed by the committee to represent the most useful color collection for this purpose. Methods for handling statistical color usage data with the system were developed in a program paralleling the production of the color swatches. The 1959 Annual Paint Color Survey was prepared by Everett R. Call for the National Paint, Varnish and Lacquer Association using these techniques.

Committee members and other interested companies and industries will report 1959 sales by percentage of color sold, in accordance to the developed method to the Committee Chairmen for tabulation. This will be the pilot report for what we expect will become an annual report, containing information from every industry utilizing color.

Current interest of the Committee is directed towards preparation of a detailed report and extended consideration of:

1. Refinement of the methodology to encourage wide industrial use of the system.
2. Development of specific data from varied consumer industries to further substantiate the commercial significance of the type of new information made possible through application of the system.

* * * * *

PERMISSION TO
REPRINT N. L.
ITEMS

For the last few years the News Letter has borrowed freely material from many sources. (Some publishers have used expressions such as "fast and loose," in referring to the ISCC News Letter, but I like the more reserved "borrowed freely".) Occasionally we have noted with pride that some publications (even some "slick" magazines) have borrowed from the News Letter. At a recent board meeting, the committee was instructed to give public blessing to those editors who wish to use items which have appeared in the News Letter. (We haven't enough money to prosecute anyway.) So, editors, use any material you wish from these columns, but credit the Inter-Society Color Council when you do, or we will waggle our finger at you.

Editor

AUTOMATION IN COLORIMETRY

An article in the February 1960 number of the Journal of the Optical Society of America calls attention to the fact that it is now possible to convert spectrophotometric data to CIE or even to Munsell renotation by fully automatic operations.¹ This is an epoch-making achievement, especially in view of the many problems with which colorimetrists have long been familiar. Apart from the cited article, which describes the last link in the chain, it now becomes interesting to outline briefly the general achievement of automatic colorimetry.

Evidently, this development has progressed in steps about as follows. First, the taking of reliable spectrophotometric data was rendered automatic by the invention of what is now known as the General Electric recording spectrophotometer.² Next, the conversion of the transcribed spectrophotometric data to CIE chromaticity coordinates was made automatic by programming for and running on an electronic high-speed digital computer (IBM 650 or 704); and then by a second computer program with a complex search routine, these CIE data (source C) could be converted automatically to Munsell renotation.³ The latter conversion was difficult because of complex relations between the CIE and Munsell renotation systems, and because of substantial extrapolations beyond the published Munsell renotations which were required to permit satisfactory programming.^{4,5,6}

The operation remaining to be automatized was the transcription of the spectrophotometric data for acceptance by the computer. This step was taken by the introduction of a digitizer device, known as the Librascope digital readout unit.¹ This accessory for the spectrophotometer is used in conjunction with a printing summary punch, such as IBM type 526, to produce punch cards for the computer.

Thus the full sequence of automatic operations, following the insertion into the spectrophotometer of the color sample to be measured, is (1) the running of the spectrophotometric curve, (2) the digitalization of the resulting spectrophotometric data, (3) the conversion by computer to CIE chromaticity coordinates, and (4) if desired, the further conversion to Munsell renotations. The respective accuracies of these automatic operations appear to be satisfactory relative to those of the far longer operations they can supersede.^{1,3,4}

(1) F. W. Billmeyer, Jr., "Use of a digital readout unit in converting spectrophotometric data to color coordinates," J. Opt. Soc. Amer., 50, 137-143 (1960). (2) A. C. Hardy, "A new recording spectrophotometer," J. Opt. Soc. Amer., 25, 305-311 (1935). (3) H. J. Keegan, W. C. Rheinboldt, J. C. Schleter, J. P. Menard, and Deane B. Judd, "Digital reduction of spectrophotometric data to Munsell renotations," J. Opt. Soc. Amer., 48, 863 (A) (1958). (4) W. C. Rheinboldt and J. P. Menard, "Mechanized conversion of colorimetric data to Munsell renotations," J. Opt. Soc. Amer., 48, 864 (A) (1958). (5) J. C. Schleter, Deane B. Judd, and H. J. Keegan, "Extension of the Munsell renotation system," J. Opt. Soc. Amer., 48, 863 (A) (1958). (6) Deane B. Judd and Günter Wysezecki, "Extension of the Munsell renotation system to very dark colors," J. Opt. Soc. Amer., 46, 281-284 (1956).

S. M. Newhall

BYRAZ SYSTEM

(from Journal of the Oil and Colour Chemists Assoc.,
Vol. 43, No. 2, February 1960)

We have received a publication entitled BYRAZ--a most extraordinary document produced by Louis Loynes, of 6 Monmouth Street, London, price 10s. The author has evolved yet another method of colour representation. Blue, Yellow, Red, A (for white), Z (for black). The three primaries are represented by the apexes of a triangle and on a 3 co-ordinate system any mixture of the primaries is represented by points within the triangle. Mixtures with white or black are represented by movement up or down respectively in a triangular solid.

In practice the production of a colour chart is intended to be evolved by "do it yourself" methods using red from Messrs. A, yellow from B & Co. and blue from C Bros. as the primaries. Colours and mixtures are painted in water or poster colour on to specially prepared charts which will build up the colour solid. It could be a pleasant way of filling in time for anyone who has spare time to fill in, particularly when the full use of the system apparently involves the mastery of a new vocabulary, e.g., huciate, fugiate, penlers, mucids.

We think, however, that most serious workers in colour will prefer to stick to Munsell, C.I.E. and so on.

From W. J. Kiernan

OSA TRANSLATES
RUSSIAN JOURNAL

The Optical Society of America announces its translation of Optika i Spektroskopiya (Optics and Spectroscopy) commencing with January 1959 issue (Vol. 6,

No. 1).

This leading scientific journal of the USSR Academy of Sciences publishes the work of Russian scientists in all branches of optics and spectroscopy, including x-ray, ultraviolet, visible, infrared and microwave, thin layer optics, filters, detectors, diffraction gratings, electroluminescence, thermal radiation backgrounds, infrared polarizers, and their many other applications in science and industry.

Optics and Spectroscopy is available free to all members of the Optical Society of America as part of their membership privileges.

Membership dues OSA including both Optics and Spectroscopy and The Journal of the Optical Society of America \$13.00 per year. Write Dr. Mary E. Warga, Executive Secretary, Optical Society of America, 1155 Sixteenth Street, N. W., Washington, D. C. for membership application form.

Optics and Spectroscopy is available free to all subscribers to the Journal of the Optical Society of America who are non-members of the Society.

Non-member subscription--package deal of Optics and Spectroscopy and The Journal of the Optical Society of America \$28.00 per year. Send non-member subscriptions directly to the American Institute of Physics, 335 E. 45th Street, New York 17, New York.

COLOR IN
SCHOOLS

There has come to our attention the announcement of the recent appearance of an Italian book, Color in Schools, about 400 pages with numerous illustrations, consisting of the papers presented at the 3rd National Congress on Color, 6 and 7 June 1959, at Padua, Italy. There are three parts: 8 papers on color in the school curriculum, 5 papers on color in classroom surroundings, and a section on color in school accidents. Except for a paper by Prof. Deribere (Applications of light and color in French schools), the authors are Italian, Austrian, and Yugoslavian. One paper by Prof. Elisa Oberti covers a controversial subject, Color as a Factor of an Anti-Intellectual Education. The price of the book is 2,200 lira, and may be obtained from the Istituto Nazionale Del Colore, Via Nicoló Tommaseo, 59, Padova, Italy. The 4th National Congress on Color will be held, 2 to 3 June 1960 in Padua, and the theme to be discussed is "Il Colore Nella Pubblicità" which might be roughly translated as Color in Advertising.

D. B. Judd

LIST OF ARTICLES ON
COLOR RECEIVED BY
NEWS LETTER

"Chrome Yellows--Part I Chemistry of Manufacture,"
A. J. Ryan and L. J. Williamson, Paint J. Aust. &
New Zealand, 4, No. 2, pp. 11-13 (1959).

"Chrome Yellows--Part 2 Chemistry of Manufacture--Pale Shades," A. J. Ryan and L. J. Williamson, Paint J. Aust. & New Zealand, 4, No. 3, pp. 9-11 (1959).

"Chrome Yellow--Part 3 Chemistry of Manufacture," A. J. Ryan and L. Williamson, Paint J. Aust. & New Zealand, 4, No. 5, pp. 11-13 (1959).

"Chrome Yellows: Recent Developments--Part 4," A. J. Ryan and L. Williamson, Paint J. Aust. & New Zealand, 4, No. 6, pp. 31, 33-35, 37, 39 (1959).

"Color Matching, Science, Art and Practicality," F. Warren Porter, Ind. Finishing, 35, No. 11, pp. 32-34, 39 (1959).

"Color Trends Predicted," Anon., Western Paint Rev., 45, No. 8, p. 16 (1959).

"Color Vision," The Sight-Saving Review, 29, No. 4, pp. 197-203 (Winter 1959).

"Evaluation of Metameric Colors," Günter Wyszecki, J. Opt. Soc. Amer., 48, No. 7, pp. 451-454 (July 1958).

"Heliogen Viridene Y--A New Light-Fast Green Pigment for Use in Printing Inks," Emil A. Wich, Am. Ink Maker, 37, No. 8, p. 26 (1959).

"Is True Color Reproduction Possible," Joe Snyder, Prof. Lloyd Varden, Print (July-August 1959).

"Lighting Cotton Classing Rooms for Color Grading," ASTM Designation: D 1684-59T (1959).

"The Minythescope an Instrument for Viewing Any Type of Photography on Gradually Decreasing Size (or scale) for Many Purposes. Part IV: Instrumental Aids in Photo-Interpretation," Hugh T. O'Neill and William J. Nagel, Photogrammetric Eng., pp. 533-535 (June 1957).

"New Development Adds Yellow-Green to Phthalocyanine Spectrum," Robert E. Brouillard and Vellney Tullsen, Am. Paint J., 44, No. 1, pp. 42, 46, 48, 50 (1959).

"Pink Discoloration of Vinyls," T. A. Girard and C. F. Koda, Mod. Plastics, 36, No. 10, p. 148 (1959).

"Practical Application of Colorimetry," F. Braun, Peinture Pigment Varnis, 32, (1956).

"Principles of Textile Colour Control," Roland E. Derby, Jr., The Derby Company, Inc., 49 Blanchard Street, Lawrence, Massachusetts.

"Propagation of Errors in Colorimetric Transformations," Günter Wyszecki, J. Opt. Soc. Amer., 49, No. 4, pp. 389-393 (April 1959).

"Quantitative Evaluation of Color Perception: An Hypothesis," E. Hoyt De Kleine, J. Opt. Soc. Amer., 48, No. 10, pp. 722-725 (October 1958).

"A Quantitative Study of Reversal of Classical Lightness-Contrast," Harry Helson and Frederick H. Rohles, Jr., Amer. J. of Psychology, 72, pp. 530-538 (December 1959).

"Radical Changes in Color Trends," Grace K. Anderson, Am. Paint J., 43, No. 18, pp. 11-12, 14 (1959).

"A Rapid Alkali-Wash Method of Refining Cottonseed Oil for Refined Color Determination," B. D. Deacon, W. B. Harris and A. Cecil Wamble, J.A.O.C.S., 34, No. 7, pp. 367-368 (1957).

"Reflection Coefficient of Optically Inhomogeneous Layers," Joseph F. Hall, Jr., J. Opt. Soc. Amer., 48, No. 9, pp. 654-657 (September 1958).

"Refractive Index of Arsenic Trisulfide," William S. Rodney, Irving H. Malitson, and Thomas A. King, J. Opt. Soc. Amer., 48, No. 9, pp. 633-636 (1958).

"The Relationship of Two Hues in the Standpoint of Visibility," Masamitsu Oshima, Studies of Color, Japan Color Research Inst., 5, No. 1, p. 23 (1958).

"The Relationship of Pigment Packing Patterns and C.P.V.C. to Film Characteristics and Hiding Power," F. B. Stieg, Jr., Off. Digest, 31, No. 413, pp. 736-751 (1959).

"Relative Flatting Efficiency of Extenders and Effect of These Extenders on Sheen Uniformity, Color Uniformity, Suction Spotting, and Enamel Hold-out in Solvent Systems," A. R. Morgan, Off. Digest, 31, No. 413, pp. 780-787 (1959).

"Relative Spectral Energy Distribution of Standard Light Sources for Colorimetry," B. Hisdal, J. Opt. Soc. Amer., 48, No. 9, pp. 608-613 (September 1958).

"Remissionskurven Bedigt-gleicher Farben," Manfred Richter, Die Farbe, 7, Nr. 4, pp. 163-166 (1958).