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INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 39

JANUARY 1942

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P. O. Box 386, Wilmington, Del.

Charles Bittinger, Editor for Art
C. E. Foss, Editor for Industry
D. B. Judd, Editor for Science

NEW DELEGATES AND INDIVIDUAL MEMBERS

We welcome to Council activities Dr. Willard F. Bartoe, physicist for the Rohm & Haas Company, Bristol, Pennsylvania; and Mr. J. Arthur Ball, Walt Disney Productions, Burbank, California, as non-voting delegates for the A.S.T.M. and and S.M.P.E., respectively. We welcome also the following individual members: Messrs. Niles A. Patterson, Griesedieck Bros. Brewery Company, St. Louis, Mo.; Alan W. Steppler, The Watson-Standard Company, Pittsburgh, Penna.; and the Color Standards Company, Atten. Barrie Stavis, New York City.

ELEVENTH ANNUAL MEETING

Preliminary program notices for the 11th annual meeting have been mailed to delegates and members. This meeting will be held on February 26 and 27, 1942, at the Metropolitan Museum of Art in New York City. The technical session has been arranged with the active assistance of several of the country's leading art educators, and will concern subjects of interest to those who teach color, particularly those who teach in professional and college art schools. Plans for the several sessions are as follows: February 26, 10:00 A. M., Business Session: Annual reports of officers and committees and reports from chairmen of delegations; 2:00 P. M., Technical Session: Color in Art Education; 8:00 P. M., Popular Session; February 27, 10:00 A. M., School Exhibits Session; 2:00 P. M., Discussion Session.

All committee chairmen, and chairmen of delegations are reminded that annual reports will be expected. It is requested that these reports be prepared in writing so that copies may be supplied to the secretary for inclusion in the report of the annual meeting.

WASHINGTON AND BALTIMORE COLORISTS

This, the oldest of our cooperating groups, on January 12 held a dinner meeting at the Arts Club in Washington. The first after-dinner speaker was Dr. Othmar Solnitsky, Department of Anatomy of the George Washington Medical School. Georgetown University Dr. Solnitsky is a pioneer in the use of Kodachrome for teaching surgery. He showed both motion pictures and stills which illustrated in a very interesting way the importance of faithful color reproduction to the student. The second guest and speaker was Mr. John Molyneaux, ~~also~~ of George Washington University, who demonstrated some of the color hallucinations which he has found to take place under hypnosis during his long experience in this field. The Colorists were particularly fortunate in having these two fine speakers presenting such interesting subject material.

In the last issue, we neglected to mention the subject of the talk by the guest speaker before the Colorists, Mr. H. A. Reddy of the Krebs Pigment Department of E. I. Du Pont de Nemours & Co. His subject was: "Manufacture of Dry Colors." In that

issue we named the members of the Program Committee. There are no officers nor formal organization; but the membership of the Steering Committee includes Charles Bittinger, Chairman; Kasson S. Gibson, Deane B. Judd; and Dorothy Nickerson, Secretary, 912 - 19th Street, N. W., Washington, D. C.

CHICAGO ASSOCIATION FOR COLOR RESEARCH

The officers of this active group are Mr. Merle B. Sweet, President, and Mr. B. Hochstadter, Secretary, (address at present unknown to us), Chicago, Ill. We reported previously the October 1, 1941, meeting at which Dr. Christian A. Ruckmick, color psychologist, spoke on the subject "Facts about Color." Since then the series, already mentioned, has been begun with four short, practical discussions and demonstrations of the use of color in camouflage and national defense. This meeting was on January 2 at the Art Center Chicago. Besides Dr. Ruckmick, who again participated, the other speakers were Dr. V. A. Schoenberg, color physicist; Mr. Otto Jelinek, of the Mayor's Civilian Defense Committee; and Mr. Merle B. Sweet, lecturer on color in industry. On exhibit during the meeting were charts of the Ostwald and Munsell color systems, the FadeOmeter, perimeters, color mixers, glossimeters, color selectors, densitometers, multiple reflectors, fixation charts; and displays of color photography, offset lithography and letterpress printing. Questions on the techniques of blackouts and camouflage, and the increase of industrial production through the informed use of color, were asked and answered.

BOSTON COLOR GROUP

The officers of this Group are Professor Michael J. Zigler, Chairman; Dr. S. Q. Duntley, Secretary, Massachusetts Institute of Technology, Cambridge, Mass. It has been announced that all meetings are to be held in the Emma Rogers Room, M. I. T., where dinners can be held and followed by easy access to lecture halls and demonstration and laboratory equipment. The December meeting of the group was held on December 2, at which the season's program on Color Reproduction was furthered by Mr. Arthur W. Cornell of the Forbes Lithograph Company, whose subject was: "The Preparation of Printing Plates for Type, Lithography and Gravure." On January 6, Professor Arthur C. Hardy spoke on the subject: "The Color Aspects of Color Reproduction."

NEW YORK COLOR ASSOCIATES

The Executive Officer of this most recently formed of the affiliates of the Council is Mr. Walter C. Granville, Interchemical Corp. Research Laboratories, 432 W. 45th Street, New York, N. Y. The Administrative Committee consists of Messrs. Arthur S. Allen, Faber Birren, Elizabeth Burris-Meyer, Dean Farnsworth, Lorain Fawcett, Carl E. Foss, Le Grand H. Hardy, Norman Macbeth, Frederic H. Rahr and Helen D. Taylor. According to an announcement received late in October, 1941, no formal organization of this group is intended; and for the coming season the operating expenses were underwritten by the persons named. The New York Color Associates arose under the impetus of a group of individual members of the ISCC for the purpose of permitting participation in activities by persons interested in color but not members of the Council. The first dinner meeting and speaker was announced in News Letter No. 38. On January 15 the Associates met for a dinner meeting in the Grill Room of the London Terrace Restaurant, 405 West 23rd Street, New York City. A talk on "Animal Luminescence" was given by Professor E. Newton Harvey of Princeton University, well-known authority on this subject. Professor Harvey's talk was illustrated with slides showing the various kinds of animals that produce self light.

WHAT'S IN A NAME? COLOR?

The following item was submitted by Faber Birren, eminent writer and color consultant well known to all our readers, just too late for inclusion in the November issue. The

amusing trip he suggests was, however, outlined before the practical difficulty of obtaining tires for such a trip was experienced, and before it was suspected that Mr. Hitler's next trip might be in the direction of the original Magenta, named from an 1859 battle-site on the Mediterranean sea.

Mr. Birren writes:

In glancing through a postal guide the other day I chanced upon the town of Pink, West Virginia. Wondering what sort of an All-American Tour might be arranged for those of us interested in color I went through the whole list from A to Z and worked out the following schedule. These places, incidentally, ought to make good convention towns for color symposiums, meetings and forums. Starting off, say, at Orange, New Jersey we would drop down at once to Crayon, N. C. Picking up the necessary materials to check our itinery we would proceed with dispatch to Sapphire, N. C., thence over the border into Virginia. Here we would visit Ruby, Orchid, Aqua, Gray, making a side call at Radiant and then spending the night to pay our respects at Newton.

Up bright and early we would cross the Alleghenys to Auburn, W. Va., going on to the aforesaid Pink, thence to Sunlight, with another side trip to Dingy. Heading south we would visit Daylight, Tenn., White, Ga., and Redland, Fla. Now treking westward into Alabama we would call at Black, Chestnut, a side trip to Brilliant, resting over at the town of Hazel Green. In Mississippi we would visit Ecru and Value; and in Louisiana, Violet. Now northward we would reach Shade, Ky.;thence to Cherry, Media and Vermilion in Illinois; Aura, Coral and Garnet in Michigan, and Emerald in Wisconsin. In Minnesota we would visit Delft and Goodhue, spending the night at Sleepy Eye.

Now out in broad western spaces we would hie to Deep, N. Dak., Lustre, Mont., and Bright, Wyo. In Nebraska we would, we hope, be welcomed at Mulberry and Lilac. In the Rockies we would get up a petition to change the spelling of Chromo, Colo., getting it to agree with the nomenclature of the Munsell System . In Kansas our port of call would be Green. In Oklahoma we would visit Amber, Rose, Jet and Blue. Three calls in Arkansas at Sage, Light and Ink; thence to Magenta and Carmine in Texas. Weary now, we would speed to California, mailing postcards from Olive and Brown.

PROPOSED A. S. A. STANDARD

A formal request for adoption of an American Defense Emergency Standard for the Specification and Description of Color has been filed with the American Standards Association. The General Electric Company has been joined in this request by the Interchemical Corporation, both firms having made extensive use of the ICI and the Munsell color systems mentioned in the proposal. The complete text of the proposal is reproduced below because of its great interest to us and importance to the war effort of our whole nation. Note that provision 4 recommends the system of color designation approved by the Inter-Society Color Council. In drawing up this proposal, the sponsors consulted a number of the Council officers, delegates and members as well as some members of the colorimetry committee of the Optical Society of America. The present form of it seems well designed to eliminate confusion due to use of different and uncorrelated methods of color specification by various parts of industry. Since one of the primary aims or our Council is to promote the practical application of technical knowledge to the color problems of industry, it would seem that any action by the American Standards Association of the sort proposed here should be viewed by us as a supplement to our own efforts, or even perhaps in some degree a culmination of them. We can assist the American Standards Association in

its judgment and possible revision of this proposal by submitting comments either through our own Secretary, or directly to Dr. P. G. Agnew, Secretary, American Standards Association, 29 West 39th St., New York, N. Y.

SPECIFICATION AND DESCRIPTION OF COLOR

Proposed American Defense Emergency Standard: Submitted January 1, 1942.

PREFACE

For almost half a century, spectrophotometry has been the accepted method for the determination of those characteristics of an object which relate to its color. The National Bureau of Standards pioneered in this type of measurement and has continued its use as a primary method.

Color standardization and specification for technical purposes has been an accomplished fact for at least twenty years. The 1922 Report of the Colorimetry Committee of the Optical Society of America codified and published a standard procedure based on scientific investigations carried out by leading investigators in this and other countries since the middle of the nineteenth century. In 1931 the International Commission on Illumination adopted essentially the same procedure, with details modified on the basis of the most recent and reliable investigations, incorporating almost completely the recommendations of the National Bureau of Standards and the British National Physical Laboratory. This system has been widely published, elaborated for convenience in practical applications, and extensively used during the past decade in academic and industrial laboratories both here and abroad.

The chief criticism of this basic system of color specification has been due to its technical character, very little provision having been made for its interpretation in familiar terms. This limitation has been overcome in the present standardization by recognition of the correlation between the basic system and the useful and readily comprehensible system of colored samples embodied in the 1929 Munsell Book of Color. Reference to the Munsell Book of Color, supplemented by the basic specifications of the colors exhibited therein, provides a convenient, readily comprehended interpretation of the basic specifications, and facilitates their visualization. This is especially important for those who are not familiar with the basic specifications of color. Used in this manner, the 1929 Munsell Book of Color bridges the gap between the aesthetic and qualitative comprehension of color employed by artists, designers, and the general public, and the basic specifications employed by and necessary for the purposes of science and industry.

When a numerical specification of color is undesirable, the use of a correlated system of color names adapted from common language and proposed by the Inter-Society Color Council is recommended. This system of color names has been defined in terms of the Munsell system, and provides a literary method for the description of color where general comprehensibility is desired and precision is not important.

AMERICAN DEFENSE EMERGENCY STANDARD FOR THE SPECIFICATION AND DESCRIPTION OF COLOR

Purpose

To recognize and recommend a basic method for the specification of color, and to facilitate its popular interpretation.

Provisions

1. The spectrophotometer shall be recognized as the basic instrument in the fundamental standardization of color.(1)

Note: Specifications of the spatial distributions of the incident and collected light are essential to the standardization of spectrophotometry. Until standard conditions are established by agreement, the particular conditions employed in each instance should be stated clearly.

2. Color specifications computed from spectrophotometric data shall be found by means of the standard observer and co-ordinate system adopted in 1931 by the International Commission on Illumination.(2,3,4)

In the absence of a special reason for adopting some other illuminant in reducing spectrophotometric data, standard ICI illuminant C, representative of average daylight shall be used.(2,3,4)

The basic specifications of color shall consist of the tristimulus value, Y, and the trichromatic coefficients, x and y, of the ICI co-ordinate system, or they shall consist of the tristimulus value, Y, and the dominant wavelength and purity.(3,4)

Note: Dominant wavelength and purity are obtainable by computation (3,4) from the trichromatic coefficients, x and y. Several methods of expressing purity have been proposed and used to some extent. In this standardization, purity refers to the quantity which is called excitation purity in discussions(4,5,6) of the several possible purity scales. For the sake of uniformity, the symbol, p, and expression in terms of per cent is recommended for purity. Likewise, when Y is specified in terms of reflectance it should be expressed in per cent, symbol, R. It is customary to express dominant wavelength in millimicrons, mμ, and this practice is recommended, together with the symbol, A (capital lambda).

3. For the popular identification of color, material standards may be used. The only system of material standards that has been calibrated in terms of the basic specification is represented by the 1929 edition of the Munsell Book of Color.(7,8) The use of this book is recommended wherever applicable to the specification of the color of surfaces. Approximate identifications of Munsell hue, value, and chroma may be secured by direct visual comparison with the samples in the 1929 Munsell Book of Color. When the most accurate visual comparisons are needed, the mask method(9) is recommended. Wherever more exact Munsell notations are desired, they shall be found from the basic specification, Y, x and y by interpolation among the smoothed curves (10,11) for Munsell hue, value, and chroma.

Note: Most surfaces whose colors fall outside the range covered by the samples of the 1929 Munsell Book of Color cannot be assigned Munsell notations by reference to the smoothed curves. For such surfaces, for transparent media, and for illuminants, only the basic specification Y x and y, or Y, dominant wavelength and purity are recommended.

4. A descriptive name according to the ISCC-NBS system of color designation (9,12) may be derived from the Munsell notation. This name is recommended wherever general comprehensibility is desired and precision is not important. The use of color names for color specification is not recommended.

Note: It should be emphasized that the ISCC-NBS names are descriptive only and are not adapted to sales promotion nor intended to replace names that are developed for that purpose.

1. ASTM Standard D 307-39.

2. Proceedings, Eighth Session, Commission Internationale de l'Eclairage, Cambridge, England, September, 1931, p. 19-29.

3. D.B. Judd, "The 1931 I.C.I. Standard Observer and Co-ordinate System for Colorimetry," J. Opt. Soc. Am., 23, 359-374 (1933).

4. A.C. Hardy, Handbook of Colorimetry, Technology Press, Cambridge, Mass. (1936).

5. D.B. Judd, "A General Formula for the Computation of Colorimetric Purity," Bur. Stds. J. Res., 7, 827-841 (1931).

6. D.L. MacAdam, "Photometric Relationships between Complementary Colors," J. Opt. Soc. Am., 28, 103-111 (1938).

7. Munsell Book of Color (standard edition with complete explanatory matter; abridged edition adapted for comparisons), Munsell Color Company, 10 East Franklin St., Baltimore, Md. (1929).

8. J.J. Glenn and J.T. Killian, "Trichromatic Analysis of the Munsell Book of Color," J. Opt. Soc. Am., 30, 609-616 (1940).

9. D.B. Judd and K.L. Kelly, "Method of Designating Color," Bur. Stds. J. Res., 23, 355-385 (1939); RP 1239.

10. D. Nickerson, "Use of the I.C.I. Tristimulus Values in Disk Colorimetry," U.S. Dept. Agriculture (May, 1938); mimeograph copies obtainable on request.

11. S.M. Newhall, "Preliminary Report of the O.S.A. Subcommittee on the Spacing of the Munsell Colors," J. Opt. Soc. Am., 30, 617-645 (1940).

12. D. Nickerson, "Central Notations for ISCC-NBS Color Names," J. Opt. Soc. Am., 31, 587-591 (1941).

SOIL COLOR NAME CHARTS

U.S. Department of Agriculture Miscellaneous Publication No. 425, "Preliminary Color Standards and Color Names for Soils," which is now on sale by the Superintendent of Documents ($3.00 per copy, including color charts) is the outcome of years of work by various color committees of the soil groups. The late Mr. T. D. Rice was a leader in this work; and at the time of his death in 1939 the work was so far advanced that others were able to carry it to the color-chart stage. A paper outlining the work was read to the November, 1941, meeting of the Soil Science Society of America, by Dorothy Nickerson, Agricultural Marketing Service. The co-authors of the above publication are T. D. Rice, Bureau of Plant Industry, Dorothy Nickerson, Agricultural Marketing Service; A. M. O'Neal, Soil Conservation Service; and James Thorp, Bureau of Plant Industry.

The general plan is to use charts exhibiting color-chip standards designated by ISCC-NBS names, the gray ground of the charts being perforated by holes close to the

standards, thus facilitating the bringing of standards and soil samples close together. There are seven charts bearing the following numbers of chromatic samples of the named hues: reds, 4; reddish browns, 5; oranges, 6; browns, 8; yellowish browns, 4; yellows, 5; olive browns, 3; olives, 6. On portions of some of the charts are shown: reddish grays, 2; brownish grays, 3; yellowish grays, 2; olive grays, 3. Three grays, white and black are also shown (with repetitions, at least three on each chart). The total number of different colors is 54. They cover the range of soil colors generally met in practice, from red to olive in hue, from strong to gray in saturation, and from black to white in lightness.

It was found that this number of color names, among those already proposed as standard by the Inter-Society Color Council and the National Bureau of Standards, were illustrated among 250 representative measured soil samples. The system thus put into use for soils is that already employed by the U.S. Pharmacopoeia and the National Formulary. It is described in detail by D. B. Judd and K. L. Kelly in the National Bureau of Standards publication RP1239. "Method of Designating Colors" (10¢ from the Superintendent of Documents). This report gives specifications for only the boundaries between the pockets of the color solid to which the names apply. The central notations were calculated and reported by D. Nickerson and S. M. Newhall in Jour. Opt. Soc. Amer. 31, 587-91 (Sept. 1941), "Central Notations for ISCC-NBS Color Names." Such central notations were supplied to a producer of color charts, who developed them in their final convenient form. It is hoped that soil experts will report any additions in the charts which are required to cover the range which they meet in practice.

STANDARD NINTH EDITION TCCA COLOR CARD

The Standard Ninth Edition, a new master color card for all industries and trades, has just been released by the Textile Color Card Association. It was emphasized by Margaret Hayden Rorke, managing director, that this did not present fashion colors for one season only, but embraced a complete collection of important staple colors having continued popular acceptance. While the colors cover the needs of many industries, any one industry may select as few colors as may be required for its own particular purposes, Mrs. Rorke explained.

The preparation of this Standard Ninth Edition Card has required over two years of exhaustive research. It represents 26 years of progress in color standardization undertaken by the Association since the first standard edition was brought out during the last war in 1915 and revised from time to time, the eighth edition having appeared in 1928. The colors assembled in this new card were adopted by a majority vote of the Associations members, representing practically every industry using color. To determine these present color-name usages, the Association sent out thousands of questionnaires, to which there was wide response. This practical color assembly portrays the colors in large ($1\frac{1}{4}$ x 2") fabric staples, mounted to show a dull as well as a shiny surface, thus enabling users to match lustrous as well as mat surfaces. The majority of colors have been repeated without change from the Standard Eighth Edition, while a few from the latter edition were also adopted in modernized versions. A good number of colors have been incorporated from the Association's seasonal cards, because, through continued use, they have assumed importance as staples and have been requested by the members. Some entirely new colors having broad commercial significance have also been added. The colors are arranged in harmonious gradations of 6, 3 and 2 and there are also groups of individual pastels and vivid colors. The total number of colors is 216 on 18 fold-over pages, with the arrangement such that when conveniently folded the whole makes a handy book about 1 5/8 x 6 x 10" in size.

Incorporated in the Ninth Edition are many official colors which have been standardized for various uses by the United States Government and leading industrial associations. For example, Old Glory Red and National Flag Blue are the red and the blue of the United States wool bunting flag, while Old Glory Blue is the blue of our silk banner flag. United States uniform colors for various branches of the service include Khaki, Light Olive Drab, Marine Corps and West Point. Most of the colors adopted by the ceramics industry with the help of the National Bureau of Standards for sanitary ware and kitchen and bathroom accessories are also represented. Likewise included are the standard colors adopted for the various color codes of the National Electrical Manufacturers Association, the National Electric Light Association, the Radio Manufacturers Association and other important industrial organizations. In addition to such broad application as a master card for color-using industries, Mrs. Rorke states that the colors of leading colleges are also shown; and she calls attention to the importance of the Standard Ninth Edition as a color reference card for schools and colleges, libraries, advertising and display firms, printers, publishers and many others. The price of the card is $25.00 a copy; but the membership discount brings this down to $16.67 to members, who are included as subscribers through the large number of national organizations which support the TCCA of the U.S., Inc.

The Editors call attention to the fact that that organization has been a member of the Inter-Society Color Council since its inception, while its puissant Managing Director, Mrs. Margaret Hayden Rorke, was long an officer and director and intimately associated with Council and ISCC committee activities. It is believed that this association has been mutually beneficial. We can not only congratulate Mrs. Rorke on a considerable achievement, but take some modest vicarious pride in it ourselves. It is not hard for us to realize the consumate skill with which she has mastered the difficult combined problems of an organizational, survey, technical, commercial, practical and artistic nature. In past issues of the News Letter, we have mentioned outline plans for cooperative endeavor by the TCCA and the ISCC. These plans in part look forward toward making the Standard Color Card more useful to colorimetrists and other scientists, while retaining all the valuable practical, commercial, standardizing and artistic features which make the Ninth Edition a notable success. Colorimetrists may wish to know the tristimulus and Munsell specifications, for example, of the colors standardized by TCCA. They may be interested in comparing the TCCA standards with those of the Maerz and Paul "Dictionary of Color". The TCCA Standards have really the true function of a dictionary, namely, to record current usage of language. On cursory inspection one finds, for example, that M & P's "Turquoise" is very close to the "Turquoise" TCCA (9th Ed.), possibly a trace in the direction of the latter's "Blue Turquoise". But the M & P "Ivory" is more saturated and darker than the TCCA "Ivory," the former being about 2Y 8.3/2.1 and the latter roughly 2Y 8.8/1.5 in the Munsell notation. M & P "Cherry" is about 6.5R 4.8/16, while TCCA's (9th Ed.) "Cherry" is about 9RP 3.4/11, that is, much closer to M & P's "Cerise" (the French word for cherry), which is about 9.5RP 3.8/12. These are the colors, however, of TCCA's matt (ribbon) and M & P's glossy (printed paper) samples as seen under Macbeth artificial daylight for 45° illumination and normal viewing. Colorimetrists may argue over the different colors (on their definition of color) of the satin and matt sides of the ribbon samples, the two being obtained with the same dye bath on the two sides of different finish. In general the glossy colors are darker and more saturated than the matt colors, so that when, as is very common in industry, they are called by the same name, a definition of color as a material substance (a dye) is implied. This should cause no great difficulty so long as the relation between the two usages is properly understood. It is most likely that colorimetrists, for reasons of convenience, will choose the matt surface as standard. Mrs. Rorke has come to their aid very sensibly by exposing more matt-finish than satin-finish surface. Congratulations, Mrs. Rorke.

CRITICISM OF THE ISCC-NBS COLOR NAMES

Early in November, 1941, a letter was received from Mr. L. H. Copeland, 1420 Chestnut Street, Philadelphia, Pa., which severely (and abusively) criticized the work of the authors of RP 1239 that describes the ISCC-NBS system of color names. This letter was addressed to the Bureau of Standards and was turned over by that bureau to the Council for answer. The Council secretary suggested to Mr. Copeland, in the belief that all views deserve a hearing, that he might wish to publish his in the News Letter over his signature; and for this purpose might wish to write a more restrained letter. This suggestion was accepted by Mr. Copeland in a letter of December 6 along with an explanation that he is "one who gets considerable pleasure out of teasing or kidding and when tinkering with the truth it can often be made more interesting with a little razzing." He apparently believes with Montaigne that "no one is exempt from talking nonsense; the misfortune is to do it solemnly." His letter follows:

Dear Miss Nickerson:

Through favor I recently received Research Paper RP 1239 published by the National Bureau of Standards. While I know that it is impossible to accomplish anything with public officials I will take trouble to write. With ham art on the stamps and money, with ignoramus and bastard letters on every government product from buildings to stamps I would not expect a pamphlet from any government department to be of value or correct.

The physics and standards of color are already known in Prismatic Color, made known by Helmholtz and used by artists. This is the source of information in the drawings on pages 357 and 385 but the problem is so confused in the cylinder that even I who understands color find this hard to comprehend, and the problem is further confused by the misapplication of terms. Color is the eye's sense of quality of light and the terms applied to variations from pure color are these.

Tint, a variation toward white.
Shade, a variation toward black.
Hue, a variation toward another color.
Tone, a variation toward gray.
Cast, a variation toward a material.

All the variations except cast can be included in a single form, most convenient and easily understood is the cylinder in which the core is white, curved surface black, on one end half way between the center and circumference are the pure colors in prismatic order in their exact degrees of the circle and on the other end is gray blending from the black circumference to the white center. From the color end to the gray are all the possible tones in all the tints and shades from pure color. Parallel to the white core are all the color progressions from gray to color in uniform depth which are the bases of the Munsell color system. This cylinder has the same identical content as the one on page 357.

In this cylinder every possible color has a point position and can be mathematically scaled as I am showing in the isometric drawing herewith. The entire cylinder can be made clear by explaining a few variations in one color. For example red has a point position in the prismatic circle half way betweenthe white center and black circumference. At 1 the color is a 1/4 tint of red, 1/2 tint at 2, 3 is a 1/2 shade, 3/4 shade at 4, 5 is a 3/4 tone, 6 is a 1/2 tone and 7 a 1/4 tone. Any line of sequence between two points, except on the black surface or coinciding with the white core will find a color progression. The most scientific and interesting would be a logarithmic conical spiral with its pole in the core.

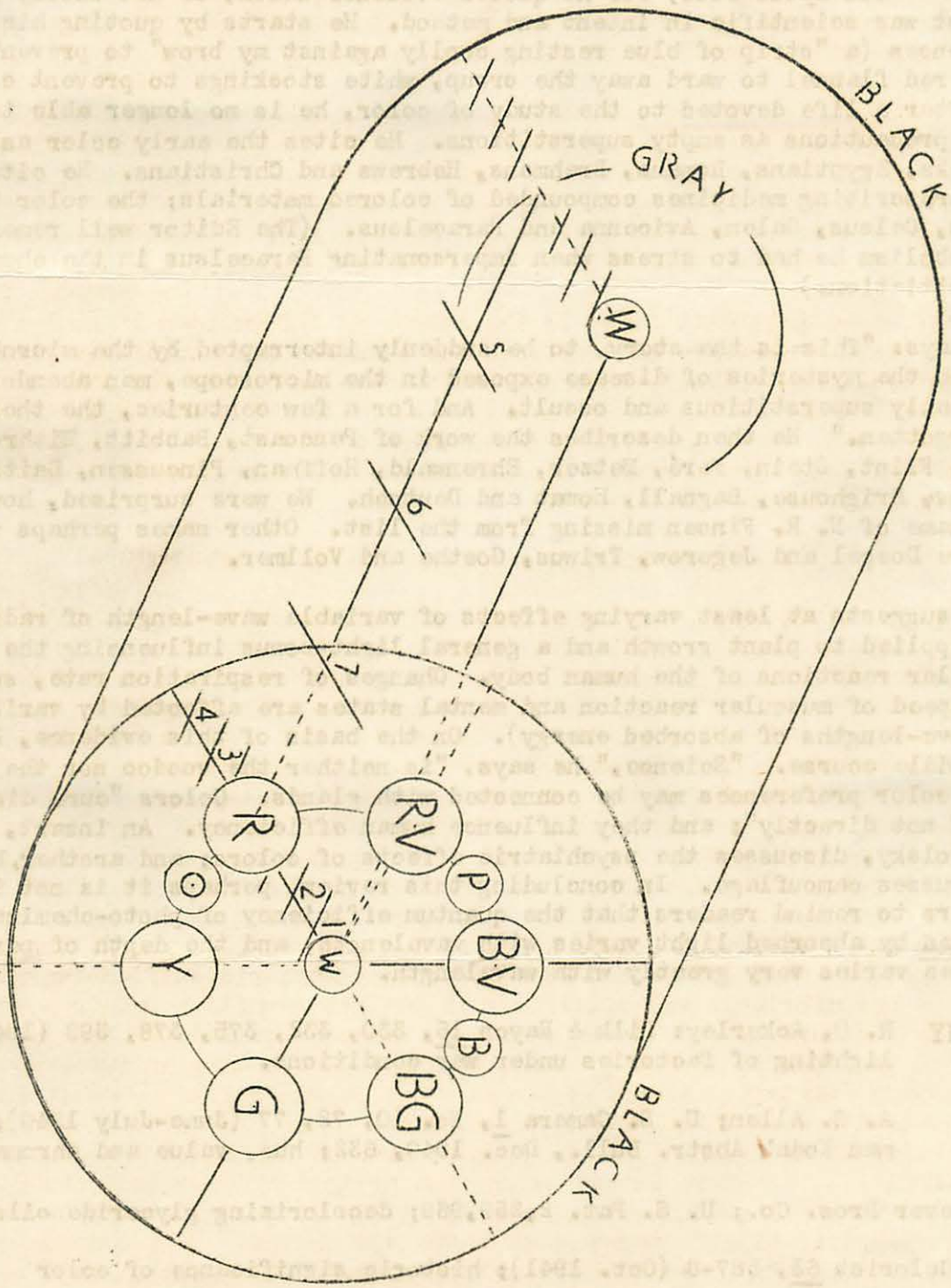
In color the primaries are green, red and blue violet, 120 degrees apart on the prismatic circle. Half way between these are three secondaries, yellow, red violet and blue green making six major colors, then half way betwen these are six tertiaries, three well known of which are orange, purple and blue. Purple is a definite term applied to violet without hue toward either red or blue. Violet is the flexible term. The tertiary between yellow and green has never been named as far as I know nor has the one between green blue however the adjective "Turquoise" applied to turquoise blue and turquoise green is close to it in significance.

Color designations in use are more related to pigments than to prismatic color which has only been known within the last century while pigments precede historic records. There are three ways of naming color, by metaphor as orange and olive, by name of pigment when pigment is concerned and by position in the prismatic cylinder in which every color can be exactly expressed mathematically if necessary. However some colors have been named like pullman cars with no significance whatever.

In the pamphlet where prismatic color is the source of information it is badly confused by the writer. There are many artists and chemists who could have provided correct information but evidently somebody had to have an excuse for his job whether he knew or not. The member bodies of the Council, while each would have technical problems of their own, are not in enterprises where a true color knowledge would be acquired or maybe used. The cylinder is redrawn for the sake of improvement and trusting the revised letter meets your approval I am,

Yours truly, (S) L. H. Copeland

Since Mr. Copeland states that he enjoys the good American game of razzing, it is presumed that, when he rose in wrath and smote the product of the RP 1239 authors, he was not objecting to what he considered nonsense; he was attacking solemn nonsense. We assume he will agree that "A little nonsense now and then is relished by the best of men." The editors suggest respectfully that any of our readers who may care to discuss Mr. Copeland's idea, if necessary comparing it with the ideas of RP 1239, do so seriously but not solemnly. When the chief editor first assumed his duties he warned the readers, in an article entitled "A Hueful Talk to You," that he would stray from the straight path of scientific accuracy and objectivity, hoping thereby to make the scientific pabulum more palatable. So now it is proper for us to start off discussion with a brief consideration of the definition of terms used by Mr. Copeland. He defines Cast as "A variation toward a material." We recalled Mr. Milton E. Bond's remark, reproduced in News Letter No. 38: "If you get mercuric sulfide (vermilion) in your eye, it is uncomfortable and dangerous; if you get vermilion red in your eye, it may be pleasing and thrilling." So we cast some mercuric sulfide on the desk before us. The thrill was insufficient. Thinking we might have a cast in our eye, we moved closer. That was a "variation toward a material" (mercuric sulfide). That is, according to Mr. Copeland's definition, our movement was a cast. The realization gave us a thrill; and we forgot the vermilion. Seriously, but not solemnly, we rejected Mr. Copeland's definition, because it had not helped us to a clearer understanding of color. We think that all useful discussions of difficult subjects must be based upon adequate definitions of all the terms used in the discussion. If you agree with this principle, and with the one that all authors and razzers who "hand it out" should also be prepared to "take it," then we invite you to enter in a constructive way the discussion of the relative utility of the Copeland and the ISCC-NBS systems, beginning with a serious but not solemn definition of terms. Any method of plotting colors intended to exhibit and facilitate the understanding of their relationships deserves serious consideration.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BLACK

THERAPEUTIC BENEFITS OF COLOR

An article by Faber Birren, "A Review of Color, its Uses and Powers," appeared in Tomorrow, vol. 1, no 2, pp. 7 - 11 (Oct. 1941). In a letter, Mr. Birren wrote: "I trust my enthusiasm for the therapeutic benefits of color will not make too many members of the Council too mad." A reading of the article, however, shows that he need not be too apologetic; for he quotes evidence which, if not wholly conclusive, at least was scientific in intent and method. He starts by quoting his own early experiences (a "strip of blue resting coolly against my brow" to prevent sun prostration, red flannel to ward away the croup, white stockings to prevent corns and bunions). After a life devoted to the study of color, he is no longer able to regard his mother's precautions as empty superstitions. He cites the early color associations of Greeks, Egyptians, Romans, Brahmans, Hebrews and Christians. He cites papyri (1500 B.C.) prescribing medicines compounded of colored materials; the color therapy of Pythagoras, Celsus, Galen, Avicenna and Paracelsus. (The Editor well remembers the color symbolism he had to stress when impersonating Paracelsus in the chemical fraternity initiation.)

Birren next says: "This is the story, to be suddenly interrupted by the microbe hunters. With the mysteries of disease exposed in the microscope, men abandoned all things presumably superstitious and occult. And for a few centuries, the therapy of color was forgotten." He then describes the work of Pancoast, Babbitt, Withrow, W. H. Hoover, Flint, Stein, Feré, Metzer, Ehrenwald, Hoffman, Pincussen, Daitsch and Kogan, Kravkov, Brighouse, Bagnall, Howat and Deutsch. We were surprised, however, to find the name of N. R. Finsen missing from the list. Other names perhaps worth mentioning are Doegel and Jegorow, Triwus, Goethe and Vollmer.

The evidence suggests at least varying effects of variable wave-length of radiant energy when applied to plant growth and a general light-tonus influencing the muscular and vascular reactions of the human body. Changes of respiration rate, sugar metabolism, speed of muscular reaction and mental states are affected by various colors (or wave-lengths of absorbed energy). On the basis of this evidence, Birren suggests a middle course. "Science," he says, "is neither the voodoo nor the robot." He says that color preferences may be connected with glands. Colors "cure diseases, indirectly if not directly"; and they influence human efficiency. An insert, signed by Dr. E. Podolsky, discusses the psychiatric effects of colors; and another, by Howard Ketcham, discusses camouflage. In concluding this review, perhaps it is not improper for the editors to remind readers that the quantum efficiency of photo-chemical reactions induced by absorbed light varies with wavelength; and the depth of penetration of tissues varies very greatly with wavelength.

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