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INTER-SOCIETY COLOR COUNCIL

NEWS LETTER No. 109

NOVEMBER, 1953

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ISCC INCORPORATED — Secretary Evans reports to us that the Inter-Society was incorporated on October 14, 1953. The details of this action will be discussed at the next annual meeting.

ANNUAL MEETING — At a recent Executive Committee meeting, plans were made for the one-day Annual meeting which will be held at the Statler Hotel, New York City, on March 24, 1954, and will include a banquet and evening program.

NEW INDIVIDUAL MEMBERS — At an Executive Committee meeting held on October 14, 1953, the following applications for individual membership were approved:

Mr. J. Beresford-Horniblow, 46 Sherwood Road, Hall Green, Birmingham 28, England. Particular interest: Resultant colours of light sources; illumination of aquaria and underwater plants; study of defective colour vision.

Dr. I. G. Hanna Ishak, Ibrahim University, Cairo, Egypt. Particular interest: Color vision characteristics of the human eye.

Dr. Allan E. Parker, Worcester Polytechnic Institute, Worcester 2, Massachusetts.

Mr. John S. Walsh, Pacific Gas and Electric Co., 245 Market Street, San Francisco 6, California. Particular interest: Color specification of light sources.

CALIFORNIA COLOR SOCIETY — This affiliate of the ISCC opened its 1953 Fall Season with a "Water Resources Exhibit" which employed color, sound and motion perception for its effects. It was presented by Norman Bilderback at the Museum of Science and Industry of California in Exposition Park. The exhibit was designed by the Barondon Corporation under the direction of Sterling Leach. The date of the meeting was Armistice Day, November 11.

OPTICAL SOCIETY MEETING

Although your Editor was unable to attend because of a speaking engagement elsewhere, all accounts indicate that the October 15-17 meeting of the Optical Society of America at the George Eastman House, Rochester, N. Y., was one of the most interesting, from a color standpoint, held over many years. The Editor did have the opportunity of perusing the paper by Henry Hemmendinger, of Davidson and Hemmendinger, on The Effects of Metamerism on Color Measurements with Filter Photometers. He undertook to evaluate the importance of specified degrees of metamerism in color measurements with typical filter photometers. One series of samples was used to demonstrate the types of differences arising in color-difference evaluations with a number of different photometers in an extreme case. Another series dealt with pairs of samples characterized by very small color differences as well as by very small degrees of metamerism. Even here it was found that there was required careful matching of the filters to the individual source-photocell combination to provide the accuracy required in color matching to close tolerances.

On the same Thursday morning program were six other papers of color interest. Two of these were on the description, performance and maintenance of the new General Electric Recording Spectrophotometer. Other papers included, A Tristimulus Colorimeter for Translucent Media by I. Nimeroff & S. W. Wilson, National Bureau of Standards; Model for the Three-Dimensional Representation of the Colors of Pigments, by H. E. J. Neugebauer of Adelia Ltd.; The Tritanomalous Relation of Color at Small Subtense as Found by Three Experimental Methods, by D. Farnsworth of the Medical Research Laboratory, U. S. Naval Submarine Base; and Rapid Method of Color Quality Control, by R. H. Peckham, L. J. Houze Convex Glass Co. On Thursday afternoon there were ten fine papers on various aspects of vision. On Saturday morning, D. L. MacAdam read a paper on a new Automatic Recording Spectrophotometer for measuring various phases of daylight, or energy from artificial sources which radiate steadily, not intermittently. On that morning there were at least six other interesting papers relating to some aspect of color, color photography or vision. The Optical Society of America, the contributing authors and the committee in charge of the meeting are to be sincerely congratulated on the arrangement of a very successful meeting.

As a by-product of the OSA meeting were at least three formal or informal committee meetings. One was a meeting of the OSA committee on Uniform Color Scales, Dr. D. B. Judd, chairman, held at the home of Dr. David L. MacAdam. Another was a meeting of the ISCC committee on the Colorimetry of Fluorescent Materials, held in spite of the absence of Chairman Dr. S. Goldwasser, who was prevented by a late arrival of his flight by air from presiding. A third meeting, called by Mr. R. S. Hunter, for discussion of ISCC Problem 19, "White Surfaces," was held after the OSA meeting late Friday evening.

EVANS' LECTURE BEFORE BRITISH COLOUR GROUP

While in England for other purposes as well (see the following item), Ralph M. Evans, ISCC Secretary and Director of the Color Technology Division of Eastman Kodak Co., Rochester, gave a paper before the 74th Science Meeting of the Physical Society Colour Group on September 16. The title of the paper was "Some Aspects of White, Gray and Black." The following abstract of this paper is taken from the Color Group's notice of the meeting.

"There has been some confusion in the past literature over the concepts to which the terms 'white', 'grey', and 'black' and the related term 'clear' refer. The paper to be presented is an illustrated reconsideration of these concepts. All of the terms are perceptual in origin, so that the emphasis of the paper is on the conditions giving rise to these perceptions. An attempt is then made to consider how they might all be placed on a psychophysical basis. It is found, in particular, that grey is an independent variable not necessarily related to either white or clear with black a special case of grey. It is found that no one of the four terms can be considered as a colour under any non-spatial, non-temporal definition of the word colour. The paper concludes with a discussion of the terms in relation to the modes of appearance. They are all found to be attributes of the object mode of appearance, although not restricted to this mode."

Two other Science Meetings of interest to our readers were scheduled by groups of the Physical Society, both to be held at the Institute of Ophthalmology, London. The first of these, by the Colour Group, was scheduled for November 4; The subject: Visual Purple; the speakers: Dr. W. A. H. Rushton and Dr. R. A. Weale. The second meeting by the Optical Group, was scheduled for November 12. The papers were: The Latent Period of Vision and the Pulfrich Effect, by Dr. G. B. Arden and Dr. R. A. Weale; and a Discussion on Binocular Vision led by Prof. W. D. Wright, Dr. D. Gabor and Mr. R. J. Spottiswoode.

EVANS' LECTURE BEFORE THE ROYAL INSTITUTION Mr. Evans, as indicated in the preceding item, went to England in part to deliver his lecture "Creative Directions in Color Photography" during the Royal Photographic Society's Centenary International Conference on the Science and Applications of Photography. This conference was held in London on September 19-25, 1953. The public was invited to the lecture, which was held at the Royal Institution.

YELLOWING OF PAPER BY PRINTING INKS At the Editor's request the following account of a serious problem of color change of paper under the influence of printing inks, and of course change of over-all color, was written by Mr. G. L. Erikson, Executive Vice President, the Braden-Sutphin Ink Company, 3800 Chester Avenue, Cleveland, Ohio. Since we cannot readily reproduce the colors of the exhibits we have interposed rough Munsell notations, from which many of our readers may visualize the color changes. The letter follows:

Enclosed with this letter you will find several exhibits. First, there is an exhibit of a green tint (7GY 7.5/4), our No. 20256, a sheet taken from one of our books printed about twenty years ago, and the same ink printed on November 3, 1953 (2.5G 8/4). Incidentally, the Imperial stamp on these prints indicates the grade of paper, which we have found to be the very best for this particular property of holding the colors without a color change. Most other papers we have tested show a great deal more color change. And you can still see that there is a tremendous change which has taken place over the years.

Secondly, there is an exhibit of a blue ink, our No. 20258, which we also show you in a twenty year old print (10B 7.5/2) and a fresh print (6PB 7.5/2.5). There is a tremendous difference in color.

I'm sure you will agree with me that not all of this color change is due to the change in color of the paper itself; that as mentioned to you, I believe the paper underneath the ink film changes a great deal more than the paper which is not printed. There are some reactions that take place between the oils, the driers, and the paper itself, which causes a color change under the ink film. Thirdly, notice the Peacock Blue Tint No. 20257. And here we were able to show you a print twenty years old (7.5 BG 8/2), also a print which is three and one-half years old (3B 8/2.5) taken from our recent color book, and a fresh print made on November 3rd, 1953 (0.5PB 8/3.5). And here again, notice the tremendous difference from twenty years, but even a large difference in hue over a period of three and one-half years. And here again, this three and one-half year sample is printed on this very same Imperial stock, which is the very best that we have been able to find for this purpose.

Also included are three sets of prints which we have made for you on Cumberland coated stock, and you will notice that there is just a slight difference in the color of the print on this paper, as compared to the same ink printed on the Imperial paper. Apparently this slight difference is due to the color of the paper itself. But if you will make some measurements on the Cumberland coated print and then put these away for six months, or a year, and measure again I think you will really be surprised. This re-action can be hastened by storing them in a rather warm place. Even if you were to make measurements on those prints on the Imperial paper, best for this purpose, you will find that they will change within six months or a year. Of course this change is not so apparent with strong colors, and with colors which are opaque. These particular colors happen to be transparent and also happen to be tints, which are reduced considerably with transparent base. But, all greens, purples, and blues will have a tremendous change over the period of years when printed on paper. This is not so apparent with yellows, oranges, and reds. Because the change which takes place always seems to be a change toward the yellow and, of course, a little yellow added to oranges and reds will not show so very much difference.

Also, enclosed is a print of one of our Buff Tints No. 20255. And here we have a print twenty years old (8.5YR 9/2), one three and one-half years old (9YR 9/2), and you can see that there has not been very much difference in color, although it certainly is noticeable over a period of time. In this case, the change which has taken place over just the past three and one-half years would be slight, but would also be noticeable. We do not have fresh prints of this particular ink to show you, because we felt that the change would not be as great and would not illustrate our point as strongly as the prints of Green, Peacock, and Blue. We would like to have your comments at your leisure when you have had a chance to examine these exhibits. I believe they will illustrate the point that prints on paper are not a good way to preserve a color sample. We feel that Walter Granville's and Carl E. Foss' method of putting these colors in opaque form on plastic (in Container Corporation of America's "Color Harmony Manual") is very much better

CHEMICAL SOCIETY COLOR COURSES — A course of ten lectures on Monday evenings beginning October 5, 1953, was recently announced by the Chemical Education Committee of the American Chemical Society's Philadelphia Section. This course on "The Objective Specification of Color and Color Differences" is under the direction of Dr. Henry Hemmendinger, of Davidson and Hemmendinger, Easton, Pa. The following topics were listed for discussion: The three-dimensional nature of color; Properties of illuminants and of the eye; their relation to color specification; Various useful three-dimensional systems, with detailed study of the Munsell and CIE systems; Simplified procedures of measurement: abridged instruments; Simplified systems of specification: one- and two-dimensional systems. The following three topics were listed for presentation by guest lecturers: October 26, Perceptually important aspects other than color, such as gloss and haze - Mr. Richard S. Hunter, Hunter Associates Laboratory; November 16, Evaluation of color differences and the specification of color tolerances - Mr. Hugh R. Davidson, Davidson and Hemmendinger; December 7, Applications of color specifications and color tolerances in the textile industry - Mr. Roland Derby, Derby, Co.

HARVARD CRIMSON Mr. Henderson Wolfe, of the interesting Color Farm, New Preston, Connecticut, recently sent us an interesting item on this color published along with a spectrophometric reflectance curve, in the November 11, 1950, edition of the Harvard Alumni Bulletin. This color which the Bulletin and the curve say is a slightly purplish red, is the Textile Color Card Association's Cable Number 70050. The curve shows a measured typical Harvard Crimson scarf to reflect red abundantly, along with nearly seven percent of violet light (and three percent of green). The Munsell Renotation of the color, measured at the National Bureau of Standards, is 0.7R 3.4/103. The Bulletin's editor more or less dares someone "to attempt a witticism about Harvard's color being neither red nor pink."

Mr. Wolfe in his letter remarks that "It is strange that this college, which has the largest collection of historic artist's pigments in the world, seems to lack a spectrophotometer." The curve in the Bulletin was obtained by Professor A. C. Hardy in his laboratory at M.I.T. Wolfe states that his Color Farm hasn't one, either. He says that in his lectures, in addition to carefully chosen color slides, he uses two or more projectors and a rheostat. For mixed audiences, he finds the history of painting a good approach. "Many people are surprised to learn", he says, "that scientific color study among painters is at least 125 years old." Some of his subjects are: Methods of Color Study, Broken Color: Pre-twentieth Century Art, Introduction to Modern Art, and Problems of Abstract Painting.

NEW MILLINERY COLORS During the month The Textile Color Card Association of the U. S., Mrs. Margaret Hayden Rorke, Managing Director, released information on its 1954 Spring and Summer Millinery Color Card. In the collection of 15 shades recently issued, Cruise Aqua, described as "a gay peacock," Fiesta Pink, "a glowing cerise," and Cheerio Blue, "a brilliant sapphire," are the colors stressed. Also cited are four summery pastels: Blue Daisy, Pink Tulip, Persian Amethyst and Seasun (a light lemon yellow). The smart neutral scale is represented by Moon Lily, a "natural tone," Misty Dawn, a light gray, and Oatmeal Beige and Glacé Coffee. Cognac, a "spirited brandy" shade is also stressed. French Endive (yellowish green), Joyous Red, Flight Green, white, navy, black and brown complete the list.

CANADAINK ITEMS Canadaink, the little house organ issued by The Canada Printing Ink Co., of Toronto, the firm of the versatile ISCC Vice-chairman C. R. Conquergood, is unusually interesting in its October issue. This issue deals with halos, - halos generally and as seen in printing inks (-remind us to tell you a good story about halos when you see us-), with moisture-set inks, with letterpress fluorescent inks, with "something about orange," and with "litterbugs;" and at the end gives a classification of the brevity of speeches which we shall not repeat, since it might make our lady readers blush orange.

But speaking about orange, Canadaink says that it is distinctive because "orange" and "month" are the two words of the English language for which there is no rhyme. But then he proceeds from the broad highways of speech to the rarer by-ways to give a rhyme. And so shall we, with no apologies. Remembering the old adage, "An apple a day keeps the doctor away," and the therapy of our color psychologists, and that "grunth" comprises the sacred scriptures of the Sikhs, while "venge" is an old form of avenge or revenge, we may say:

Denied an orange per month,
Perchance you'll swear by the grunth.

Exposed a month to mere orange,
You'll swear most loud perchance for venge.

I.H.G.

COLOR PYRAMID TEST — The following report was received in September from our frequent contributor, Mr. E. Taylor Duncan, 409 Marret Ave., Louisville 8, Kentucky.

The Max Pfister, Color-Pyramid-Test is a work of the Institute for Psychology and Characterology of Freiburg University in Germany. It is edited by Robert Heiss and Hildegard Hiltmann and was published in 1951 at Bern, Switzerland by Hans Huber, who also published the well-known Rorschach Test. The Color-Pyramid-Test, like the Rorschach Test, is a clinical tool intended for the purpose of character or personality analysis. The English langauge edition of the Color-Pyramid-Test (also, to be published by Huber) is being prepared by Dr. Hans Hahn, Head of the Department of Psychology of Transylvania College, Lexington, Kentucky.

The German Color-Pyramid-Test is composed of general information and instructions 158 p. illus. (part mounted colored) 26 cm. Test materials comprise a number of printed forms and a box of colored paper chips. The 8½x11 inch forms contain a space at the top for such data as: Name and age of the subject and the Date. The center of the form is printed with a pyramidal arrangement of 1" squares. There are four lines at the bottom of the sheet to receive data indicating various aspects of the subject's response.

The box of chips contains 24 different colors with 45 chips of each color. They are glossy 1" squares. The following colors are used:

Abrev. German Designation	Munsell Notation (approximate)	ISCC-NBS Method of Designating Colors (1939)
R 1	4.0 R 6.2/12	brilliant red
R 2	5.0 R 4.0/15	vivid red
R 3	4.0 R 3.0/12	deep red
R 4	2.5 R 2.0/8	very dark purplish red
O 1	2.5 YR 6.2/16	vivid orange
O 2	7.5 R 5.5/16	vivid reddish orange
Ge 1	5.0 Y 9.0/14	vivid yellow
Ge 2	2.5 Y 8.0/12	strong yellowish orange to strong yellow
Gru 1	10.0 Y 7.8/10	strong greenish yellow

Abrev. German Designation	Munsell Notation (approximate)	ISCC-NBS Method of Designating Colors (1939)
Gru 2	10.0 GY 6.2/12	Strong yellowish green
Gru 3	2.5 G 4.4/10	deep yellowish green to strong green
Gru 4	2.5 G 2.0/4	very dark yellowish green to very dark green
Bl 1	10.0 B 5.4/6	moderate blue
Bl 2	3.0 B 5.5/10	brilliant greenish blue to strong greenish blue
Bl 3	4.0 PB 4.0/12	strong purplish blue
Bl 4	8.0 PB 1.7/14	vivid bluish purple
Vi 1	2.0 P 8.0/4	very pale bluish purple
Vi 2	5.0 RP 3.1/13	deep red purple to vivid red purple
Vi 3	5.0 RP 1.5/6	very dark red purple
Br 1	4.0 YR 3.5/10	strong brown
Br 2	3.0 YR 2.1/5	dusky reddish brown to dark brown
Sz	N 1/	black
Gr	2.5 Y 7.0/2	very pale brown to yellowish gray to weak yellow
W	N 9.5/	white

When taking the test, the subject fills in the squares with color chips of his own choosing. The person giving the test notes the subject's general behavior and method of working. The manner of constructing the design is of considerable importance - for example, some may work from the bottom or base to the top or vice versa. Others may work from the right or left sides, while still others may show different work patterns or maybe none at all. Another important thing taken into consideration is the percentage of warm and cold colors chosen as well as the relative amount of dark, medium, and light colors selected and their relationship in the completed design. Also, the amount of time consumed and the number of changes that were made is noted.

After the subject has completed three "pyramids", they are placed in front of him so that he may select the most pleasing as well as point out the one least preferred. Also, the subject is asked to name his favorite color.

The significance of various colors for character analysis is taken very much into account in the testing and consequent evaluations are made partially on this basis. Miss Ann Snyder, assistant to Dr. Hahn, gives information on this point in a thesis titled, "Selected Problems in Psychology; The Color Pyramid Test." The remainder of this report is taken from this thesis, but all information on the significance of the colors named is intended to refer only to German norms at the present time:

Blue - The introversion color, shows affective control and regulation, possibly even showing the degree of rational development and intellectual reasoning. In neurotics, blue increases as red decreases and vice versa; neurotic predisposition in boys is frequently shown by blue-yellow combination. In schizophrenics, blue is found most frequently in symmetric pyramids. Subjects under the influence of euphoric drugs (the drug used was Perhedrin) use decreasing amounts of blue. Shades of blue: Bl 4 (vivid bluish purple) is used more frequently than the others and more in men than women. It shows the reasoning side of introversion. Bl 1 (moderate blue), Bl 2 (brilliant to strong greenish blue), and Bl 3 (strong purplish blue) are more on the sentimental side. Bl 1 is chosen most frequently by women.

Red - The extroversion color, showing instincts, drives and urges (particularly the sex drive) is found more frequently in men than women. In boys its use reaches the climax of frequency at about the age of 13. During the administration of euphoric drugs its usage increases. Shades of red: R 1 (brilliant red) is preferred by schizophrenics and also shows the weaker drive activity. R 2 (vivid red) is preferred by men and indicates drive and urge in the active sense. R 3 (deep red) is preferred by women and is more passive than R 2. R 4 (very dark purplish red) probably shows the strongest drive.

Green - An introversion color, shows sensitivity and is characteristic as the predominant factor in artists and abnormal personalities. In schizophrenics it is found most frequently in symmetric pyramids. Under drugs it decreases in use. Shades of green: Gru 2 (strong yellowish green) and Gru 3 (deep yellowish green to strong green) are the predominating ones indicating sensibility. They also signify a facility in finding easy and satisfying contact with people. Gru 1 (strong greenish yellow) and Gru 2 show superficial contact. Gru 3 and Gru 4 (very dark yellowish green to very dark green) show difficulties in making contact with others.

Yellow - An extroversion color, shows general force of activity and impulse influenced by drives (particularly jealously and envy). It is found less frequently in neurotics, schizophrenics, and epileptics than in normal persons. Under euphoric drugs its use increases. Shades of yellow: Ge 1 (vivid yellow) is found to be most frequently used by women and Ge 2 (strong yellowish orange to strong yellow) is more favored by men.

Orange - An extroversion color, shows ambition and the drive to be important or recognized; generally it is more frequently chosen by men. In epileptics its use in the second pyramid increases as red and yellow (which predominate the first) decrease. Under euphoric drugs it increases along with red and yellow.

Violet - An introversion color, shows a disorder in the affective sphere when it is used frequently. In schizophrenics it is found most frequently used in symmetrical designs within the pyramids. Vi 3 (very dark red purple) usually predominates.

Brown - Shows developmental disorders especially an over or under-development of sex glands. Brown is near to the sphere of drives and seems to be tightly related to specific development of glands. If it is found in first place, it shows plain disorders of development (usually retarded).

Black - Shows depressive symptoms, an unrevealed inner life, and a darkening of the general mood especially if it is used with other dark colors. It is found frequently in both schizophrenics and manic depressives. It if appears with red, it is significant of the drive factors.

White - Shows a feeling of emptiness; this emptiness can refer to the general personality (when used at the base or bottom of the pyramid) or to the actual mood (when used in the center). It generally signifies schizophrenics and much use shows a dissolution of form.

Gray - Shows neurosis. It is found five times as frequently in neurotics as in normal persons, therefore it is a clear index for neurotics. It also shows a neutral mood and complete indifference.

COLOR HARMONY MANUAL

We recently received the most recent Directory of Owners of Container Corporation of America "Color Harmony Manual." The length of the list is most impressive, and seems to indicate that the Manual has found a useful place in a great many establishments employing color. Indeed, it might almost serve as a basis of mailing lists for ventures concerned with color. The owners are conveniently divided into those in the manufacturing and merchandising industry, in art, in the paint industry and in education. Owners are listed also for 32 foreign countries.

GARDNER INSTRUMENTS

Recently we received the following bulletins from the Gardner Laboratory, 4723 Elm St., Bethesda 14, Maryland. Bulletin No. 144 describes the Gardner Automatic Color Difference Meter; No. 132 describes the Gardner Automatic Multipurpose Reflectometer; and No. 145 deals with the New Gardner 1953 Color Standards for Liquids (permanent). Instrumentation Data Sheet No. 10.10-4 (Aug., 1953) describes the Gardner Automatic Photometric Unit. It is to be presumed that these may be obtained from the Gardner Laboratory at the above address.

MACBETH-MUNSELL DISK COLORIMETER

Recently we had an opportunity to see the new Macbeth-Munsell Disk Colorimeter developed by the Macbeth Daylighting Corporation, a subsidiary of Macbeth Corporation, headed by the ISCC Treasurer Norman Macbeth. This was designed particularly to provide standard north daylight illumination which is constant and available 24 hours a day for comparing tomato products against Munsell spinning disks in the manner specified by the U. S. Department of Agriculture. The Munsell disks are placed concentrically and interleaved to permit rapid spinning and hence fusion of the stimulus from each of the disks in measurable proportions. The papers are calibrated and standardized so that color specifications can be rapidly and simply obtained with them. The instrument is attractively finished in gray wrinkle finish, and has a non-selective gray background for viewing the sample and disks. The instrument is shipped complete with diffusing glass, bulbs, daylight filters, disk motors, motor blower, viewing masks, sample holder and switch panel.

COLORS OF MARBLE

For a century, since the days when Greek inscriptions were first noticed and published, it has been customary for archaeologists and epigraphists to describe the basic material; and among marbles, "Pentelic" and "Hymettian" were notable, while other descriptive terms like marmor album, grey Attic and combinations with fuscum were also used. We may even find "off-white marble with some reddish and some bluish veins." But the geologists who have worked in Attica have mapped the so-called "Pentelic" marble not only in the lower reaches of Mt. Pentelicus, but also at the base of Mt. Hymettus; while so-called "Hymettian" marble has been distinguished farther up on both mountains. Going further, N. Herz and W. K. Pritchett, in the April 1953 issue of the American Journal of Archaeology (57, 71), in tabulating the descriptions used by different authorities, find only confusion.

The remedy, say the authors, is a very careful description which should always be based on four factors: (1) the color of the marble; (2) the grain size; (3) structures (foliation, lineations, banding) visible in the marble; and (4) the presence of accessory minerals (as small reddish brown iron-ore crystals - hematite). Six terms, ranging from "very fine" to "granular" are recommended to describe grain sizes ranging from 1/16 - 1/8 mm. to 2-4 mm. For description of the colors is recommended reference to the Rock Color Chart, based on the Munsell color system, "the most widely accepted system of color identification in use in the United States, standardized by the National Bureau of Standards." This is on sale for seven dollars by the Geological Society of America, 419 West 117th Street, New York 27, N. Y. The advantages of the use of such standards applied to the fresh rock are carefully pointed out. Examples of its use are given for ten cases of fifth-century Athenian inscriptions, whose previous descriptions by different authorities involved serious contraditions. Descriptions according to the Rock Color Chart include "yellowish gray" (5Y 8/1), "very light gray (N8) with blue bands," as well as such compound descriptions as "light bluish gray (5B 7/1) - greenish gray" (5GY 6/1). On page 80, the description "light yellowish blue gray" (5Y 7/1) appears to be a typographical error. Chromatically colored accessory minerals include chlorite (pearly green), pyrite (metallic brass yellow), magnetite (metallic black), limonite (dark brown with yellowish brown streak) and biotite mica (brown-black).

I.H.G.

RED AND WHITE CORONATION

An interesting item in I.E.S. Edwards' recent little book in the Pelican series on The Pyramids of Egypt, is that on the Pharaoh's after-life jubilee ceremony. This was known in Egyptian as the heb-sed. Every king of Egypt was entitled to celebrate the heb-sed after occupying the throne for a certain number of years. The festival seems to have been in some obscure way a relic of the remote past where kings reigned for only a limited period before being ceremonially put to death. Underlying this primitive custom was the belief that it was necessary for the welfare of the kingdom that the physical vigor of its king should be unimpaired. The heb-sed, by enabling the king to regain his vigor through the exercise of magic, removed the necessity of replacing him by a younger man. An important element of the ceremony was a re-enactment of the coronation. A procession led by a sem priest would enter chapels surrounding the heb-sed court in which were gathered the gods of the nomes of Upper Egypt. Having obtained from each god consent to the renewal of his kingship, the king was led to the more southern of two thrones, there to be crowned with the white crown of Upper Egypt. A similar ceremony was then repeated in the chapels of the gods of the Lower Egyptian nomes before the king ascended the northern throne to receive the red crown of Lower Egypt.

I.H.G.

SUBMARINE BASE PAPERS

Recently the editor received from the Medical Research Laboratory of the U.S.N. Submarine Base at New London, Connecticut, a check list of the numerous papers on Color Vision, Illumination, Eye Protection and Human Engineering published since 1943 by the Laboratory. The list contains 45 titles in addition to those published in technical journals by Lt.-Comdr. Dean Farnsworth, head of the Visual Engineering Section, and his collaborators. We are informed that requests for reprints should be addressed to the above address, attention the Librarian.

PLANT TISSUE COLOR CHARTS

From two papers by S. A. Wilde and G. K. Voigt of the Soils Department of the University of Wisconsin at Madison, we learn of a set of 15 special Munsell Plant Tissue Color Charts.

These were received through the courtesy of Mrs. Blanche Bellamy. The papers are published in the Agronomy Journal 44, No. 9 (Sept., 1952) and J. of Forestry 50, No. 8 (Aug., 1952). The color of plant tissues reflects the influence of climatic factors and the nutrient content of the soil. Occasionally the color of the plant tissues reveals the genetic origin of plants, effect of toxic substances, or deterioration of plants caused by parasitic organisms. The two papers give striking detailed information on the colors which help diagnose deficiencies in the elements P, K, Ca, Mg, S, Fe, B, Cu, Mn and Zn. Fortunately, a very complex situation is simplified in actual nursery practice by the maintenance of soil fertility. In the great majority of nursery soils, nutrient deficiencies are limited to phosphorous, potassium and especially nitrogen. But the second-named paper gives in detail the colors which may be expected when there are deficiencies due to any of eleven elements. The other paper gives in tabular form some striking examples. For example, in the case of wheat seedling tissues, those with predominantly 42 and 28 chromasomes are green (5.0 G 4/4-4/8), while those with predominantly 14 chromasomes are red-purple (5.0 RP 3/4-3/8). The foliage of the blue varieties of blue spruce has the color 2.5 B 6/6 to 5/4 - 5/6; the gray variety 7.5 G 5/2 - 5/4. The leaves of corn raised on soil with a low supply of available nitrogen take on a succession of colors from green to pale green, yellow, pink and brown.

COLOR CONTRAST REVERSALS

We have received reprint of an interesting paper, Bezold's Color-mixture Effect by R. W. Burnham, of the Color Technology Division of Eastman Kodak Company, which deals with the conditions for the reversal of the classical phenomenon of color contrast. The paper was published in the American Journal of Psychology 66, 377-85 (July, 1953). This paradoxical effect was first reported by W. von Bezold in 1874, and discussed by R. M. Evans in An Introduction to Color (1948), who included a full-color figure with four patterns which was reproduced in the Burnham paper. This figure contains areas of saturated red and blue along with areas of black and white. Here black elements in the designs produce darker areas in juxtaposition with them, white elements produce lighter colors, red elements more reddish colors, and blue elements more bluish colors. This is a reversal of classical contrast. The effect has not been clearly explained heretofore. S. M. Newhall (1943) pointed out that reversals occur when certain complications of the figure-ground relations are introduced. In the present paper the reversed effect is spoken of as the "mixture effect." It is noted that in the classical situation for contrast, one finds usually a relatively large chromatic area surrounding a smaller area of a different color; in the situation for mixture one finds a relatively large chromatic area surrounded by, or overlaid with, smaller areas of a different area. Bezold thought that the effect was a simple one of configuration, determined by configural factors of size, shape and position. The present work showed that, with only a single configuration, either the classical or the mixture effect or neither could be produced; and other factors determined or modified the result.

Diffusive color mixture may be the important factor for mixture, for anything which interfered with sharp definition promoted the effect. This could result from lack of sharp focus or distant viewing. Scattering in eye media may play a part. The interaction of such factors with factors of size, shape and location of borders produces the mixture effect most definitely in designs with complicated, lacy, overlaid figures and small areas of continuous color. Then local edge effects may predominate over a general effect produced by larger areas. D. B. Judd, in his Color in Business, Science, and Industry pointed out similar effects in mosaics, pointillistic paintings and half-tone printing. Certain factors of suggestion are also found to play a probable part. Eye movements contribute. Reports of mixture by observers were not affected by differences in exposure-time, complexity, nor instruction. It is concluded that the factors here mentioned, without further assumptions, suffice to explain the reversal effect; and that it is not a simple one of configuration as Bezold's comments would indicate.

I.H.G.

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