D. B. Judd

INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 99

MARCH, 1952

News Letter Committee:

Faber Birren
I. H. Godlove
Deane B. Judd
Dorothy Nickerson

I. H. Godlove, Editor
127 Spring Garden Street
Easton, Pennsylvania

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

For matters of business
Address the Circulation Manager

Subscription price to non-members
$4.00 annually

NEW INDIVIDUAL MEMBERS

We are glad to welcome to individual membership the following persons elected at a meeting of the Executive Committee held on February 6:

John E. Cline, Philadelphia Textile Institute, interested particularly in the spectrophotometric evaluation of textile colors; member of AATCC and OSA;

Sven Hesselgren, architect of Stockholm, Sweden, who has been interested in color for many years, has published a number of articles and books concerned with color. Aspects of Architectural Research, of which he has supplied a resume with his membership application, will soon be published in Sweden;

Kenneth L. Kelly, with the National Bureau of Standards, long a delegate representing the U. S. Pharmacopoeia, well known to ISCC members as an active member of ISCC subcommittee on Problem 2, Color Names; author of many reports relating to color and to tests for drugs and pharmaceuticals, member of OSA;

Alexander R. Macdonald, of West Hemstead, Long Island, known to many ISCC members through his association with Instrument Development Laboratories, Needham Heights, in particular with the Color Eye, member AATCC;

Ferdinand J. Riegler, Rockford, Illinois, formerly with Container Corporation of America, now with J. L. Clark Mfg. Co., interested in use of color in decorating, package design, and psychosomatic effect, color-conditioning factories, stores, schools, hospitals, etc., with paint, member S.T.A.;

Traver J. Smith, with Magnuson Engineers, San Jose, Calif., interested in color measurement of agricultural products, particularly fruits and vegetables, with California Tomato Growers Association 1949- , published in Electronics, Jan. 1952, an article about his most recent work; member Am. Soc. of Mechanical Engineers.

THE ANNUAL MEETING

The annual ISCC meeting and the Council's 21st birthday have come and gone. The Council has come of age and has entered

into adult life. As a mark of this maturity, it has been noted that the meeting was the first one held completely on our own, apart from any member-body meeting.

We have not space to review all the fine talks and demonstrations of the meeting; and to highlight a few would be as dangerous and out of place as a discussion of politics or religion. Suffice it to say that virtually everyone who discussed the meeting with your editors appeared to have voted the meeting a grand success. Much of the credit for this goes to the local committee in charge of arrangements, as well as to the speakers. The only regretful notes were due to the absence of two scheduled speakers, on account of illness, Al King of California and Harry Helson, now of Texas. The Editor was happy, therefore, to read in a letter from Mrs. King that the puissant Mr. King had found himself well enough to interrupt his convalescence from pneumonia long enough to give an illustrated lecture to the California Color Society; and to have two letters from Dr. Helson, written in his own hand, stating that the operation on his eye had been successful.

The Editor realized too with mixed emotions the fact that this was perhaps the last meeting in which Secretary Nickerson, who has taken so large a part so long in guiding the Council's destiny, would act for the last time in that capacity. Since we had the pleasure of having with us, as honored foreign guest and speaker, the noted British authority on color vision and colorimetry, Dr. W. D. Wright, the Editor cannot help but think of our Secretary as the honored domestic guest. Our sorrow in having her with us as member only, not as Secretary, is tempered by the knowledge that former Chairman, Ralph Evans will carry on. One is tempted to say: "The Queen is dead, but yet liveth; long live the King!"

Some factual evidence of the success of the meeting was furnished by the retiring Secretary. Sixty delegates and secretaries of member-bodies and 93 individual members (including 12 who were also delegates) were registered at the meeting. This was over 40 percent of all the delegates and individual members, and is all the more remarkable because one member, The Gravure Technical Association, was meeting in New York on the same days. The number of guests present was 196, and 194 dinner tickets were sold. You can total these figures yourself and realize better thereby how good a turnout there was for the Council's 21st birthday.

NEW ISCC MEMBERSHIP LIST

With this issue of the News Letter you should receive a copy of a new membership list, up to date as of January 1952. You may wish to note one correction since then. It provides on the first page the name and address of the new Secretary, Ralph M. Evans, former Chairman, to accord with his appointment made during the annual meeting in February.

COLOR CHAT AND CHATTER

An old profession: dyeing for a living (with apologies to our Chairman).

They say that bright red, as in finger-nail polish, increases apparent size. Must be so; for many a woman's thumb has a man under it.

He's very polished. His conversation is a reflection on everyone.

The bride thought the olive drab gift blanket from the South Seas even more personal than the towels marked "His" and "Hers"; that one was marked "US."

Rhubarb is said to be celery gone bloodshot.

Women buy beautiful red and aqua dresses. But they are rivals; they try to outstrip each other.

She was a suicide blond, dyed by her own hand.

The color expert refused to recommend the old Chinese cure for measles, exposure to red light; he would make no "rash" promises.

I.H.G.

CALIFORNIA COLOR SOCIETY

According to a recent letter from Mrs. Albert (Louise E.) King, Secretary, this active and growing society was addressed on December 19th by Morris Marsh of Jeffries Banknote Company, well known vice-chairman of the C.C.S., whose subject was "Color Copy for Graphic Reproduction." He also introduced Milton H. Lang of the Brown-Caldwell Engravers, Marshall Bennett of Mission Engraving, Bud Keeney of Rapid Color print Company, and Frank Wilbar, Staff Photographer of Huntington Memorial Hospital. They explained limitations, new innovations, and basic requirements of color copy as related to the end results. "An extensive subject - yet extremely well organized and presented."

On January 30th, the "dynamic Albert King" (apt quotation by our Ralph Evans) got up from his bed of pneumonia convalescence to give an illustrated lecture on the "Factors that Influence Contemporary Theory and Practice." He used numerous color slides showing historical examples of some technical, esthetic and economic influences on our use of color and colorants today. This talk, covering a period from prehistoric times to the Greek era, constitutes only one of a series of three lectures bringing this subject up to modern times. The others are anticipated for future meeting. Mrs. King, we are happy to report, stated on February 29, that Mr. King "is much better now." His lecture took place as usual at Art Center School Auditorium, 5353 West Third Street, Los Angeles. About 200 members and guests were present, a tribute to Albert King's known ability as a speaker and color worker.

On February 27th, at the same place, "Color and Visual Environment" was the subject of John Boylin, Head of the Fine Arts Division of San Bernardino Valley College and color engineer for many public buildings. This was an excellent talk describing the use and misuse of color in industrial buildings, schools, etc., as based on the physiological adaptation of vision.

IES AND COLORISTS

A joint dinner meeting of the Colorists and the Capital Section of the Illuminating Engineering Society was scheduled for Monday evening, March 17 in the dining room of the Y.W.C.A. at 17th and K Streets, N. W. The speaker: Miss Kaye A. Leighton, Residential Lighting Specialist of the Nela Park laboratories of the General Electric Company; her subject: Lighted Walls and Windows - Key to a Significant Lighting Trend. Her talk, complete with a full-size window demonstration, was given originally at the Edison Electric Institute Service Conference, and repeated by request of the I.E.S.

Honored guests were Dr. and Mrs. W. D. Wright of London, England. Dr. Wright, well known in the color and illumination field, was active in forming the Colour Group of the British Physical Society and brought greetings from that group.

PHYSICAL SOC. COLOUR GROUP

The Physical Society's Colour Group held its 65th Science meeting on Wednesday afternoon, 13th February, in the lecture theater of the Institute of Ophthalmology, Judd Street, London

W.C.1. A paper entitled "An Experimental Study of Colour Preferences," was read by Dr. G. W. Granger of the Institute of Psychiatry, Maudsley Hospital. The meeting on 26th March, at the Royal Photographic Society, is scheduled to include a paper by R. W. G. Hunt of Kodak Ltd., on The Subjective Appraisal of Colour Photographs, and one by R. G. Horner of Ilford Ltd. on The Visual Interpretation of Characteristic Curves in Colour Photography. An abstract of Mr. Granger's February paper follows. Abstract: The main object of the investigation was to decide between two rival hypotheses in the field of colour preferences: the subjective, which maintains that preferences for surface colours are wholly dependent on personal taste, and the objective, which claims that there is a general order of colour preference. A series of experiments will be described in which sets of single colours and colour combinations were ranked in order of preference under specified conditions of background and illumination by various groups of subjects. In all cases the amount of agreement between rankings was sufficient to justify the objective hypothesis. Furthermore, the results suggest that a basis for the general order of preference may be found in the properties of the colour stimuli themselves.

PASSING OF GEORGE WELP

Just after our last issue was made up, we had word from Walter Granville about the death of George Welp, a very early member of the ISCC. Mr. Welp was long connected with Interchemical Corporation. At the time of his death, he was a delegate from the National Association of Printing Ink Makers.

The Editor did not have the good fortune to know Mr. Welp well, but in the early days of the Council served with him on a Public Relations Committee headed by the ever-capable M. Rea Paul. Even after the years we well remember his dynamic personality and wise counsel. These qualities and others will make his untimely passing felt in the ISCC and the other organizations which absorbed his interest.

I.H.G.

HOWARD KETCHAM

Lest a reader suppose that these words, following unhappy lines about a member who has passed on from among us, refer to another who has left our midst, we hasten to correct the impression at once. For Howard Ketcham is very much alive, and always has been, we are sure, since immediately after birth. If anyone doubts this, let him read the article about our hero in the March 8 issue of New Yorker (page 39, title: Profiles; An Emolument for Heliotrope). The article, like Mr. Ketcham, listed in Who's Who in America as "color and design engineer," is too long and too packed with information to be abstracted briefly. The first couple of pages are full of ideas, facts and fancies which would be useful source material for an author writing on the psychology and the practical utility of color. The later pages are more about the man. On page 42 we learn the origin of the oft-quoted colorquip: at a party, magenta light is the equal of at least two cocktails.

COLOR VIGNETTE NO. 10

Vaguely we remember a story we were told about color in women's dresses. It went something like this: Lady Gray at a party acknowledged an introduction to Mrs. White: "Oh yes", speaking ever so sweetly, "we met last year at the Vandergilds. I can't remember your name, but I never forget a red dress."

I.H.G.

NEUGEBAUER IN CANADA

Some of our readers will remember Dr. H. E. J. Neugebauer formerly of Stuttgart, for his papers on the colorimetry and lightfastness of pigments. A letter from him dated January 24 informs

us that he has emigrated to Canada and has taken a position as Research Associate at McGill University. He expects to publish articles on the applications of colorimetry to problems of multicolor film and multicolor printing. No doubt some of our Canadian members will want to look up Dr. Neugebauer when they are in Montreal.

ASPEN PHOTO CONFERENCE — In a letter from Mr. Walter P. Paepcke, dated in January, we learned about the ten-day Conference on Photography sponsored last September by the Aspen Institute for Humanistic Studies. Since another such conference is to be held at Aspen, 180 miles southwest of Denver in Colorado, early next September, we are including this notice for any of our readers who are interested. With the letter came a copy of an article on the conference (dated October 30, 1951) by Beaumont Newhall of the George Eastman House, Rochester, which was indicated to appear in a forthcoming issue of Modern Photography. One of the evenings was devoted to viewing the color slides of Ralph Evans, past ISCC Chairman (and new Secretary), showing some of the factors by which we judge color photographs. They were the collection which show graphically that we do not see objects "as they are" (in objective reality) but nearer to what we think they are.

TCCA ACTIVITIES — Since our last issue we have received three bulletins from this member-body. The first deals with the regular edition of the 1952 Spring Hosiery Colors, which were reviewed in News Letter No. 48 in connection with the "Confidential Advance Hosiery Card for 1952". The second item deals with the Advance 1952 Fall Woolen Collection. The new colors are exhibited in swatches of three different weights: Heavy, suggesting coatings; Medium, suggesting suitings; and Light, suggesting dress colors. For the heavy weave, the new colors featured are Flaming Rose, Tuscan Olive, Teal Blue, Dutch Copper, Green Quartz, Burnished Topaz and Royal Lustre, these all in the medium register along with Antique White. In the medium weave, the colors high-lighted are Rustic Blue, Indian Curry, Violet Haze, Duckling Green, Venetian Ruby, Gray Carbon, Rose Cinnamon and Mineral Green. In the dress weight, the examplars are arranged in light-sets of tone-on-tones. They include Lacquer Gold, Cloudgrège and Dovetan, Creole Beige and Café Noir, Lavender Mist and Smoky Amethyst, Mauve Clove and Jewel Purple, Fresco Green and Baroque Green, and Blushing Pink with Fire Red.

According to Margaret Hayden Rorke, Managing Director of the Textile Color Card Association of the U. S., three different fabrics were used to portray the Advance 1952 Fall Colors for Man-Made Fibers and Silk. Eight single shades each are shown on cellulose acetate and pure dye silk, while eight groups of tone-on-tones are presented in interwoven acetate and rayon. In the acetate group are Kingfisher (blue), Metal Blue, Garnet Red, Goldflake, Sugarpine (a green), a Copperglaze, Wood Iris and Dusky Gray. In silk are Green Chartreuse, Beauty Blue, Rapture Rose, Glamour Turquoise, Goldenlite, Dynamic Purple, Gay Red and Dashing Green. Among the tone-on-tones are Wine Pink and Cheeryglo, Exotic Lime and Watercress, Rose Ember and Glacé Peach, Coconut Beige and Vanilla Brown, Blue Mallard and Aquarelle Blue, Azurtone and Smoke Blue, Violet Blush and Plum Mauve, and Silver Shadow with Gray Twilite. We regret that we lack the space to give Mrs. Rorke's brief descriptions of these new colors.

NUDE AND SAPPHIRE — Mrs. Helen D. Taylor, color consultant whose clients have included such organizations as Sears and Roebuck and Grant Stores, told us these two, which tickled her sense of humor as they did ours. "Nude," which has been a staple color name for decades still seems to offend

the sensibilities of some people in the areas of the smaller special religious sects, and it is not uncommon to have merchandise so-named returned. The same thing happens to colored goods called sapphire, but for different reasons. The last syllable sounds like "fire", and so there are many people who open the package expecting to find a fire red, only to be disappointed.

FABER BIRREN & CO. We recently received a special folder (with unique and forceful color design on the cover) indicating that this Company (whose fountain spring, Faber Birren, is the author of 14 books and about 250 articles) is delving deeper into the modern use of color in the building and architectural fields. To his consulting work for such firms as du Pont, General Electric, Firestone Plastics, Cambridge Tile, New York Life, Minnesota Mining and Manufacturing, and for the U.S. Navy and Coast Guard, he is adding color planning for public buildings, office buildings, industrial buildings, hospitals, schools and commercial buildings such as banks, stores and hotels.

An article of his in The Modern Hospital for January, 1952, is entitled "Color is More Than Beauty", and deals with the application of color to hospitals, which has been a favorite subject of Birren's for many years. Birren, like Leonardo, always develops his own special theories for approach to his problems; and further, like Leonardo, he always subjects his theories as much as possible to the test of sound practice. The theme of the present brief article is that color in the hospital also has both physiological significance and psychological value. If color is not definitely therapeutic, it has at least physiological significance. He thinks that some hospitals went too far toward undignified and superfluous color, and tempers his recommendations with his usual common sense. He deals with glare and brightness in the private room and the operating room. Walls should have about 50% reflectance, about Munsell "value" 6.5, with ceilings not white but lightly tinted. As to hue, "warm" colors are best for most convalescing patients, with cool greens and blue-greens to relax chronic patients. But connections are drawn to the individual extrovert or introvert character of the patient. For hospital wards, coral and blue-green are highly desirable, for cogent stated reasons. For seclusion areas, variegation of color is the keynote. Suggestions are made with regard to cases of mental illness; and the article ends with the cautious statement that at least "Sound beginnings have been made".

I.H.G.

NAZCA COLORS Much later than the Old World cultures whose colors we have described in previous issues of the News Letter is that of the Nazca Indians of southern coastal Peru. Perhaps no other people at a similar stage of culture ever applied such a variety of bright colors to their pottery as did the Nazcas. The chronological position of the culture may be taken as about A.D. 600 to 900. Two of the best collections of Nazca pottery are housed in the universities of the rival states of California and Florida. One is reminded of the story of the Californian in Florida who picked up a Florida melon and asked: "Is this the largest orange you can grow in this state?" The Floridian's retort was: "Stop fingering that grape." One fears that both these partisans neglected to consider the colors; and in this were akin to most Old World archaeologists, who are apparently color-blind, going into rhapsodies of detail about pot forms, but mentioning colors only as if an afterthought. Not so the New World archaeologists, with whom Ridgway, Maerz and Paul or Munsell charts, are "standard equipment," according to a recent letter from J. O. Brew, Director of the Peabody Museum of Archaeology & Ethnology of Harvard University.

Even the breakdown of Nazca ware into an early ("A") and a later ("B") style, with a transitional style ("X") by A. H. Gayton and A. L. Kroeber, was mainly based on shape, secondarily on design and color. Recently a fourth style, "Y", was distinguished by G. B. Martin-Vegue, in the Amer. J. of Archaeology, 53, 345 (Oct.-Dec. 1949), though this late style may not be pure Nazca. "Only the vivid red and the light brown of the black-edged design seem typical of Nazca ware." In the other classes, the range of colors on the thin, hard, smooth pots is from three to eight colors on a single vessel. Among Florida's 92 vessels, 41 are of class A, 34 of class B. While white, black and red (two shades) predominate in the designs, the vivid colors include also two yellows, two browns, gray, flesh color and violet. The use of black to outline designs is common. The early designs were essentially naturalistic (but not pictorial), but as time went on they became more conventional. Shapes changed also, but of more interest to our readers is the fact that the use of color became greater. Color ties all the periods together, showing that there were no sharp breaks, (as, for example, due to an invasion).

The Nazca culture had no knowledge of any metals except hammered gold. They shaped bricks by hand and sun-dried them and built small pyramids, but they devoted little labor to habitations. They lived on or near irrigated lands, with no large towns and little political organization. Independently, they devised the double-headed eagle symbol, which long before travelled from Egypt to Assyria and the Hittites of Asia Minor, was carried on by Turkish princes and brought to Europe by the Crusaders, to be used by the empires of Russia and Hapsburg Austria-Hungary.

In style A, four and five-color combinations predominate, with dark red, white and black most frequent in tricolor combinations. To these red-orange and gray or brown, and sometimes yellow are used for the more complex combinations. Light yellow or cream may replace white. Backgrounds are white or dark (red or black). Type B uses up to eight of these colors, with white the chief ground, followed by light yellow and light brown. In style X, six-color combinations and white backgrounds predominate, while flesh-color appears on two of the Florida designs. On a full-color page in an old (1933) book in the Editor's library, the Nazca vessels illustrated include: An open food vessel, with design of humming birds painted on a cream slip; a dark red and buff bowl, with cream panels on which are designs of a quaint human figure holding bunches of pepper pods; on a black ground, light-colored birds painted with flowers in their bills (with fish below); a free naturalistic pepper-pod design on a cream ground with red clay and cream slip painted with a wide range of colors; design of a centipede body and legs above a row of human faces, all on a cream ground; another has a conventionalized centipede in a middle band, with mice used as a filling-in pattern. This book gives the Nazca colors as: red, maroon, orange, brown, yellow, pink, pale blue, purple, white and black.

Form was of less interest than color to the Nazca potters, in contrast to the contemporary northern Peruvians, but they solved the problem of a narrow-mouthed water-vessel by providing these bottles with two narrow spouts. These were connected by a strengthening solid tube, which at the same time served as a handle. Designs, besides those already listed included mythological figures (bird-demon, cat-demon, etc.), geometric designs (as frets), pods, birds, fish and human heads.

RED DARK ADAPTATION

At our request we received from Lt. Comdr. Dean Farnsworth, Head, Visual Engineering Section, Medical Research Laboratory, U.S. Naval Submarine Base, New London, Conn., the following summary of Research Report No. 170, Device for Checking "Dark Adaptation Safety" of Red Lighting Installations.

One of the outstanding discoveries which scientists applied to military operations in the last war was that personnel could continue to work, read, and operate under red light and still maintain a readiness for rapid dark adaptation. Much of the amazing efficiency of the Submarine Service at twilight and at night was due to this discovery. The efficiency of red lighting for promoting dark adaptation, however, does not lie in its red appearance but in the absence of short-wave radiation. Navy standards for red lighting are established but conformity to Navy specification previously had to be determined by spectrophotometric analysis and calculation; this method is not readily available to operating forces or to manufacturers of equipment.

Report No. 170 describes an inspection goggle with which a visual check can be made by any person with normal color vision of the spectral composition of red light to determine its conformity to Naval specifications for dark adaptation. The results obtained by observations with the goggles on sample glasses are compared with theoretical and calculated results. The method has been used since 1942 for checking the "dark adaptation safety" of installations in the cockpits of aircraft, submarine conning towers, gondolas of dirigibles and combat information centers on surface vessels.

The Medical Research Laboratory at New London is indebted to members of the Inter-Society Color Council, L. A. Jones and Earl M. Lowry of Eastman Kodak Company, for their help in the search for and development of suitable filters.

VISION REVIEW

The Editor started to review Professor Harry Helson's review of Vision, reprinted from Annual Rev. of Psychology, Vol. III (1952), pp. 55-84. When he was less than a third of the way through, he had used up all of the available space. He then started over, thinking the best review perhaps a mere recommendation: "Read it, it is good." But this is not quite enough; for Helson, though a noted psychologist who has done much work in color vision and illumination effects - and "color constancy" or transformation and "gestalt" -, is not merely that, he is also at home in the principles of colorimetry (where he wisely refers one chiefly to three papers of Judd's) and in many of the physicist's techniques. He twice refers to Duncan's recent paper on the prediction of pigment mixtures from data on the components, and shows familiarity with the controversy over the adequacy of the I.C.I. standard response date at the short-wave end. A short section is devoted to Wall's work on the chemistry of vision. On page 68, it is indicated that a paper by Helson, Judd & Warren, in press in Illum. Eng., will give equations for predicting the colors of objects in Illuminant A from their chromaticity coordinates in Illuminant C. This is a very welcome news indeed for the dyestuff and textile field. There are of course sections on dark adaptation, color discrimination, color blindness, color theory; efficiency and comfort of vision; and a rather full section on "figural after-effects." Only one paper on the esthetic aspect of vision seems to have appeared in the period covered (1950 through April 1951); this was on color preferences.

In his review, Helson shows his ability as a reviewer as in research and stimulating public speaking. For his report is compact, succinct and to the point; but he views with a critical eye, and when he has something more to contribute himself, he gives his views briefly and lucidly.

I.H.G.

COLOR VIGNETTE NO. 11

Dunninger, the mind reader, visited a great magician when he was hunting for his white tie. "Ah, you're the mind reader;

where did I put that tie?" Dunninger said it was in a red lacquer box, but when the magician looked there, he found a black tie. "You're a fine mind reader," said the magician. "If you're any good as a magician, you can change it to white," was the retort.

APPEAL FOR REFERENCE MATERIAL

Through Ralph M. Evans and George B. Gardner of Kodak we received the following appeal to the ISCC for reprints, pamphlets or other sources of general information. If any of our members have such material available, we suggest writing directly to Prof. H. H. Linn, Professor of Education, 525 West 120 Street, New York 27, N. Y.

"One of our graduate students at Teachers College, Columbia University, under the sponsorship of a national organization, the Association of School Business Officials, is preparing a reference handbook, which is primarily a bibliography listing pertinent literature that might be useful to school administrators responsible for related business activities, including the planning, construction, operation, maintenance and equipping of school buildings.

"We acknowledge that a great deal of valuable material has been made available by commercial and industrial organizations and associations in the way of brochures, pamphlets, circulars, booklets, and even complete volumes. We are writing to inquire if your organization has any literature of this nature for distribution, and if so, could you provide us with copies for reviewing purposes so that it can be determined whether or not they should be included in this bibliography, which in all probability will be published and made available to school officials throughout the nation. Possibly you may be able to direct us to other pertinent sources of information. We will appreciate anything you can do for us."

DIMMICK ON GRAY

The following letter was received from Dr. Dimmick late in January. We do not wish to start a controversary, but we suggest that Dr. Judd may wish to reply briefly in the May issue. Dr. Dimmick's letter:

Your abstract of Boring's article on the four dimensional color solid was very clearly done. There are one or two things, however, on which I feel Boring does not place sufficient emphasis. It should be pointed out that you can represent four dimensions in three just as you can represent three in two. The difficulty arises however that in each case you have only a representation and that the three dimensions of geometry cannot be used to define the four dimensions of color relationships.

I do not think that Boring means to imply that a three dimensional representation of the four dimensional figure lacks utility but that the attempt to produce the fourth dimension by way of a time change would lack such demonstrational value.

Moreover, the fact that the color equation always has a value of unity simplifies matters, since it makes unnecessary the representation of the point of origin of the orthogonal dimensions. Therefore, since a single dimension can have only the value of unity it reduces to a single point. Likewise, two dimensions which together have the value unity can be represented on a straight line and so on to the four dimensional equation which also has a value of unity and all of whose variations can be represented in the confines of a geometrical solid, the tetrahedron. This means that a tetrahedron represents all of the colors that have relationships

to each other because they bear resemblance to the maximum of four points of reference. All other colors fall outside this set of references. The same thing can be said about each tetrahedron individually. This I believe to be an important point to make, Judd notwithstanding. It makes explicit the fact that you cannot pass from one group of colors represented by a tetrahedron into another group of colors represented by another tetrahedron by way of a single continuum. I have a feeling that this exclusive relationship of colors might very well be exploited by an artist or decorator and would give a new outlook. It substitutes good psychology for poor pseudo-physics.

It is at this point that I take issue with Judd's remarks. He appears to reject any considerations that do not fall into the conventional type of color solids. Some of us do have problems for which the latter are not adequate and it is the attempt to represent those problems that gave rise to this treatment. These are problems of qualitative color relationships not of color mixture or colorimetry.

ARTISTS' MATERIALS

From Prof. Balinkin we received the following note culled from the Current Scientific Researches in Mellon Institute, page 45 (1950-51):

Artists' Materials. The objectives of the long-range research program of the Fellowship sponsored by the National Gallery of Art, Washington, D.C., will be to develop new materials and techniques for the fine arts, both for use in original work and for restoration, with a special view toward permanence.

Although tremendous advances in the knowledge of oils, pigments, paints, ceramic materials, and metals have been made in recent years, only a small fraction of this research has been concerned with the special problems of the painter and sculptor. Pictures painted in the past hundred years are on the whole less durable than earlier paintings; and although other techniques improved during the nineteenth century, the craft of painting actually declined. But even the methods of the Old Masters offer the possibility of improvement. While an oil painting executed according to the best technical traditions will often last a surprising length of time, with proper care, nevertheless there are certain inherent faults in the traditional materials; for example, the tendency of varnish to yellow and to bloom, of supports, whether of wood or canvas, to deteriorate, and of colors to alter. In seeking to discover better materials for the artist, the Fellowship will apply the latest methods of research in chemistry and allied sciences with the best facilities.

COLOR AND AREA

We have received a study of "The Dependence of Color upon Area", by Robert W. Burnham, of the Color Control Division of the Eastman Kodak Company (from Amer. J. Psychol. 44, 521-33; Oct., 1951), in which the following interesting conclusions were reached:

Observers mixed colorimetric primaries to match test-colors varying in visual angle from 2° to 77°; and the differences in the matching-mixtures were found to be significant. As the visual angle was increased from 2° to 22°, the matching mixtures increased generally in excitation purity; from 22° to 77° there was a tendency for purity to remain the same or to decrease. The mixtures also showed a small shift in dominant wave-length toward longer wave-lengths as visual angle was increased. In reflectance some mixtures increased, others decreased. The visual changes in matching mixtures may be represented by several liminal steps. There was a greater change in chromaticity between visual angles of 2° and 22° than between angles of 22° and 77°. There were marked individual differences in matching mixtures between

the five observers; and finally, the area effects are consistent with luminance effects reported elsewhere.

COLOR OF ATHENS

The following quotation is from an article by Prof. J. L. Myres, historian whose "Who Were the Greeks" has become a great classic. His obvious color consciousness and poetic description of Athens impressed us so much that we pass on the passage to our readers. It is quoted from the third volume of the 4-volume "Wonders of the Past", published by William H. Wise & Co., New York.

"To refigure 'violet crowned' Athens, as Theseus and Kodros loved her, we must clothe the lilac-coloured marble, and its rusty veins and crannies, with soil as red as that of the Mendips, strongly contrasted with the drab and grey alluvium of the plain, the gleaming shingle of Phaleron beach, and the soft cheese-coloured limestones of Munychia and some of the foothills under Parnes. We must afforest Lykabettos and Aigaleos as the government of to-day is doing, with black copses of maritime pine, sprinkle the lower slopes with the bronze-like patina of sturdy oak-woods, and fringe the water-courses with emerald foliage of planes and flickering grey-green poplars.

All arable lands as in the valleys of Judah must 'stand so thick with corn that they shall laugh and sing,' and in the green shall be splashes of scarlet poppies and anemones, purple bugloss and Spanish iris, sky-blue borage and forget-me-not, and sheets of marigold and sorrel. This for April weather; by June, Persephone and her flowers will be in another world, and Demeter will reign in harvest cloth-of-gold. Even then the vines will be green still on the lower slopes, with the velvet texture which is their own; the fodder-crops and salad-beds in irrigated patches will not have wilted yet, though the gourds and melons will begin to glow among their foliage. The darker green and dense shadows of the fig trees, among the perennial grey lacework of olive groves, will set off the white walls and rose-red tiling of the farmsteads, and the blaze of pink oleander bushes long the torrent banks. Around all, the same unpaintable lilac, orange-stained, of the great hills, opalescent among the black clumps of holm-oak, and deep shrubbery tints of myrtle, bay, box-wood, and rosemary; above all, the pines and the sky, cloudless, saturated with colour like the borage-flowers, and so luminous that every shadow is of a strong purple-blue. Such was the site of Athens as nature made it."

BIBLIOGRAPHY

G. N. Rautian; Dokl. Akad. Nauk. SSR, 74, (No. 6) 1073-6 (1950); in Russian; Investigation of the color vision of 995 individuals

L. P. Rendell; Amer. Dyestuff Reptr., 41, 52 (Jan. 21, 1952) from Textile J. Australia 26, 708 (Sept. 1951); "True Blue"

S. Renshaw; J. Opt. Soc. Amer., 41, 484, (July 1951) review of "The Perception of the Visual World" by James J. Gibson, Houghton-Mifflin Co., Boston, 1950. Pp 14-235. Price $4.00

M. Richter; Z. wiss. Photog. 45, 139-62 (1950); Experiments towards establishing a color system based on equal sensory differences

D. Z. Robinson & R. Cole; J. Opt. Soc. Amer., 41, 560 (Aug. 1951); Note on optimum transmittance in spectrophotometry

D. C. Rockola (to Rock-Ola Manufacturing Corp.); U. S. Patent 2,567,403 (1951); Illuminative device for projecting continuously changing color designs

J. Satterly; Am. J. Physics, 19, 448-51 (Nov. 1951); C. V. Boys' rainbow cup and experiments with thin films

J. M. Schandler; Am. Dyestuff Reptr., 40, 765-768 (Nov. 26, 1951); Color stripping with reducing agents

W. Schmieglitz; U. S. Patent 2,561,824 (1951); Multicolor pencil

G. H. Schuler; Am. Dyestuff Reptr., 40, 378-80 (June 11, 1951); Standardization of dyes

W. Schultze; Bild & Ton 4, 11-3 (Jan. 1951); Agfa color chart for color photography 1950

H. J. Selling; Textil-Rundschau, 6, 498-511 (Nov. 1951) (in German); Color measurement and its application to the textile industry

H. J. Selling; Amer. Dyestuff Reptr., 41, P71 (Feb. 4, 1952); A small commentary from a small country. Re: "What's new in spectrophotometry"

G. J. Siezen (to Hartford National Bank and Trust Co.) U. S. Patent 2,552,464 (1951); Color television

W. T. Simpson; J. Am. Chem. Soc., 73, 5359-5363 (Nov. 1951); A mathematical treatment of the color of the merocyanine dyes

B. L. Sites (by mesne to Miehle Printing Press and Manufacturing Co.) U. S. Patent 2,567,240 (1951); Color facsimile system (In photomechanical reproduction, a method of producing a corrected color separation transparency from a colored original)

N. Smith; Scientific American 183, No. 6, 13-7 (Dec. 1950); Color television

W. B. Smits (to Smitsvonk N. V.) U. S. Patent 2,567,037 (1951) Light producing method and apparatus (For producing light of certain spectral colors)

Society of Dyers and Colourists; Amer. Dyestuff Reptr. 40, P381-2 (June 11, 1951) Development of the light-fastness standards

Society of Dyers and Colourists; J. Soc. Dyers and Colourists, 67, 188 (May 1951) Development of the Society's light fastness standards

D. E. Spencer & S. E. Sanborn; J. Franklin Institute, 252, 413-26 (Nov. 1951) Interflections and color

O. Stallmann (to E. I. duPont de Nemours & Co.) U. S. Patent 2,556, 729 (1951) Metal-free phthalocyanine of novel color characteristics

E. I. Stearns; Amer. Dyestuff Reptr. 41, P73 (Feb. 4, 1952) Comments on Selling's commentary. RE: "What's new in spectrophotometry

V. C. Stevens; U. S. Patent 2,543,073 (1951) Method and means for printing and enlarging pictures in color

F. J. Studer, D. A. Cusano and A. H. Young; J. Opt. Soc. Amer. 41, 559 (Aug. 1951) Transparent luminescent films

G. C. Sziklai (to Radio Corp. of Amer.) U. S. Patent 2,552,070 (1951) Color television camera

G. C. Sziklai and A. C. Schroeder (to Radio Corp. of Amer.) U. S. Patent 2,552;386 (1951) Color television camera

G. C. Sziklai (to Radio Corp. of Amer.) U. S. Patent 2,566,707 (1951) Color television system

G. C. Sziklai (to Radio Corp. of Amer.) U. S. Patent 2,567,040 (1951) Color television

S. A. Talbot; J. Opt. Soc. Amer. 41, 895 (Dec. 1951) Recent concepts of retinal color mechanism. I. Contributions from psychophysics

S. A. Talbot; J. Opt. Soc. Amer., 41, 918 (Dec. 1951) Recent concepts of retinal color mechanism. II. Contributions from anatomy and physiology

J. C. Tatum (to Minnesota Mining & Manufacturing Co.) U. S. Patent 2,555,715 (1951) Colored reflex light reflector (The purpose of the invention is not clear from the claim and drawing. It may relate to signal lights or general illumination)

F. Taylor; Nature 168, 524 (Sept. 22, 1951) Changes in colour sensitivity of the eye with posture

Ray P. Teele; J. Opt. Soc. Amer. 41, 733 (1951); Review of "Photometry and the Eye" by W. D. Wright, Hatton Press Ltd., London, 1949. Price $2.00

R. Thomas; U. S. Patent 2,553,285 (1951) Apparatus for reproducing colored pictures (A photographic device)

D. W. Thomasson; Electronic Engin. 23, 91-3 (March 1951); Electronic colorimetry

G. A. Tikhov; J. Tech. Phys. USSR 20, 526-8 (May 1950); in Russian; Photographic determination of high brightness ratios

D. L. Turner; Textile J. Australia 25, 736-44 (Sept., 1950) through Amer. Dyestuff Reptr. 40, 8 (Jan. 8, 1951) The coloring of plastics

C. M. Tuttle and F. M. Brown (to Eastman Kodak Co.) U. S. Patent 2,566,264 (1951) Method of making color prints

J. H. van der Merwe and H. Verleger; Proc. Phys. Soc. B64, 76-81 (1951) Low-reflectance coatings and the sensitivity curve of the eye

A. T. Vartanyan; J. Tech. Physics. USSR 20, 847-53 (July 1950) in Russian; Spectral absorption curves of solid dye-films

V. Votruba (to Koh-I-Noor Pencil Factory L. & C. Hardtmuth) U. S. Patent 2,560,832 (1951) Multicolor magazine pencil

H. de Vries, R. Jielof & A. Spoor; Nature 166, 958-9 (Dec. 2, 1950); Properties of the human eye with respect to linearly and circularly polarized light

George Wald; J. Opt. Soc. Amer. 41, 949 (Dec. 1951) Photochemical basis of rod vision

T. E. Weichselbaum (to Applied Research Corp.) U. S. Patent 2,562,874 (1951) Apparatus for spectrophotometric quantitative analysis

F. C. Williams and F. M. Brown (to Eastman Kodak Co.) U. S. Patent 2,566,277 (1951) Method for making color prints

S. H. Williams; Amer. Dyestuff Reptr. 40, P46.-8 (July 23, 1951) Dyeing by the hot-oil process

G. T. Winch, W. Harrison and H. R. Ruff; Trans. Illum. Engin. Soc. London 16, (no. 1), 1-12 (1951) Fluorescent-lamp artificial-daylight units for color matching

G. T. Winch and H. R. Ruff; Trans. Illum. Engin. Soc. London. 16, (No. 1), 13-25 (1951) Measurement, representation and specification of color and color-rendering properties of light sources

K. J. B. Wolfe; Photographic J. 91B, 94-8 (Sept.-Oct. 1951) Photomicrography in colour by reflected light

W. D. Wright; "Photometry and the Eye" Hatton Press Ltd., London 1949. Price $2.00

W. D. Wright; Proc. Phys. Soc. B64, 289-97 (April 1951) Role of convergence in stereoscopic vision

W. D. Wright; Rayon and Synthetic Textiles, 32, 76-7 (Nov. 1951) Color discrimination - IV.

S. G. Yurov; Dokl. Akad. Nauk. SSSR 74, (no. 6) 1077-80 (1950); in Russian; Spectral sensitivity of the eye for a given level of equivalent brightness

E. N. Yustova; Dokl. Akad. Nauk. SSSR 74, (no. 6) 1069-72 (1950) in Russian; Spectral sensitivity of the receiving organs of the eye

V. K. Zworykin (to Radio Corp. of Amer.) U. S. Patent 2,566,713 (1951) Color television