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INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 74

JANUARY, 1948

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NEW OFFICERS AND COUNSELLORS

On November 28, 1947, ballots received from voting delegates of the 13 member bodies and the individual-member group were counted at a meeting of the Executive Committee. Out of a possible 42 letter ballots 39 were received. The following officers and counsellors were declared elected to serve during 1948-49:

I. H. Godlove (AATCC)	- Chairman
I. A. Balinkin (ACerS)	- Vice Chairman
Dorothy Nickerson (OSA, IMG)	- Secretary
Norman Macbeth (IES)	- Treasurer
R. M. Evans (SMPE)	- Counsellor
D. L. MacAdam (OSA)	- Counsellor
W. C. Granville (ASTM, IMG)	- Counsellor

WELCOME TO NEW MEMBER BODY AND DELEGATES

On November 28, 1947, the voting delegates of the Inter-Society Color Council elected their 14th member body: the American Oil Chemists' Society. We are happy to welcome the delegates appointed by the president, Dr. R. T. Milner of the Northern Regional Research Laboratory, U. S. Department of Agriculture, Peoria, Ill. The chairman of delegates is Mr. G. Worthen Agee of the Barrow-Agee Laboratories, Inc., Memphis, Tenn. Mr. Agee has for some years served as chairman of the A.O.C.S. Color Committee. The other two voting delegates are Dr. E. B. Freyer Spencer Kellogg and Sons, Buffalo, N. Y., and Mr. Procter Thomson, Procter & Gamble Company, Ivorydale, Ohio. Non-voting delegates are: Mr. N. D. Embree, Distillation Products Inc., Rochester, N. Y.; Mr. R. R. King, Mrs. Tucker's Foods Inc., Sherman, Tex.; Dr. Duncan Macmillan, Northern Regional Research Laboratory, Peoria, Ill.; Mr. R. A. Marmor, A. E. Staley Manufacturing Co., Decatur, Ill.; Mr. V. C. Mehlenbacher, Swift & Co., Chicago, Ill.; Mr. R. T. O'Connor, Southern Regional Research Laboratory, New Orleans, La.; and Mr. L. K. Whyte, Colgate-Palmolive-Peet Company, Kansas City, Kansas. One of these delegates, Mr. Thomson, has already been put to work as a member of Dr. Osborn's subcommittee on Problem No. 14.

17th ANNUAL MEETING PLANS

We have received from Mr. Walter Granville, Chairman of the Program Committee, an outline of the *ISCC program for*

March 2 -3, which we reproduce here. We list only the titles of papers, for we understand from Mr. Granville that a final printed program will be mailed to all members and will include abstracts of papers. Mr. Granville's address is care of Container Corporation of America, Color Laboratories Division, 38 South Dearborn St., Chicago 3, Ill. The meeting, which will be held at the Hotel Pennsylvania, New York City, will meet on Tuesday in Conference Room 2 and on Wednesday in the Manhattan Room. On the former day, March 2, registration at 9:30 will be followed by a discussion session at 10:00 which will continue after lunch at 2:00, to be followed by the Council business session at 3:30. The discussion session will center around reports from subcommittees of the Problems Committee, Professor Michael Zigler, chairman, which are studying problems on which the Council is currently working. These include:

Problem 2. Color Names. (Revision) D. B. Judd, Chairman.
Problem 6. Survey of Color Terms. S. M. Newhall, Ch.
Problem 7. Survey of Color Specifications. W. C. Granville, Ch.
Problem 10. Color Aptitude Test. F. L. Dimmick and C. E. Foss, Co-ch.
Problem 11. Color Blindness Studies. D. B. Judd & LeGrand Hardy, Co-ch.
Problem 12. Illuminating and Viewing Conditions in the Colorimetry of Reflecting Materials. D. B. Judd, Ch.
Problem 13. The Illuminant in Textile Color Matching. D. Nickerson, Ch.
Problem 14. Single-Number Specifications for Transparent Standards. R. H. Osborn, Ch.

The title for the talks comprising the second day's discussions is Color Coordination in Industry. The following names are those who are at the same time members of the Inter-Society Color Council and practicing professional color-consultants, designers, or coordinators, and include nationally known figures in the color world. At 9:30:

The Home Furnishings Style Council Plan. Elizabeth Burris-Meyer.
Color Engineering - A Dominant Factor in Human Relations. H. Creston Doner.
Color Coordination for a Housing Project. Isay A. Balinkin.
Color Coordination in Mail Order and Retail Merchandise. Lucile Knoche.

At 2:00 P. M.:

Application of Modern Colorimetry to Plastics. George Ingle.
Color Coordination in Variety Merchandise. Helen D. Taylor.
The 1947 Frazer-Manhattan. Carl Spencer.
Color Coordination for Human Efficiency and Safety. Faber Birren.

Evening (about 8:00 P.M.):

At the National Arts Club, 15 Grammercy Park, New York City, will be shown an exhibition of 24 non-objective paintings executed by Bernard Symancyk from palettes developed by Faber Birren. Mr. Birren will give a brief talk on the principle of these color schemes which has been termed "Perceptionism."

Anyone who is interested is welcome to attend the sessions and may obtain a copy of the final program by writing to the chairman of the Program Committee, Walter C. Granville, at the address given above.

HOLLYWOOD MEETING IN MAY

Through retiring chairman Ralph M. Evans the Council has received from the Society of Motion Picture Engineers an invitation to be responsible for an afternoon and an evening session of the SMPE spring meeting in Hollywood, California, on May 17-21, 1948. The Society plans a full week of sessions relating to color and the Council-planned session will probably be on Thursday, May 20. At a special meeting of the Executive Committee called on November 20 in New York (when four of the seven members of the Committee were present at another meeting), it was voted unanimously to accept the invitation.

Plans are already well under way and will be announced in the next News Letter. Mr. Evans, chairman of SMPE delegates to the Council, has agreed to serve as chairman of arrangements. It is hoped that many members and delegates may find this a convenient time to visit our West Coast friends. We shall certainly hope to meet with the California Color Society while we are there. It would prove useful in making final meeting plans if those who plan to attend these meetings will let the secretary know.

THE COLORISTS OF WASHINGTON AND BALTIMORE

Through the courtesy of Mr. C. Erle Kline, vice president, and Mr. W. F. Gerlach, plant superintendent of the Capitol Printing Ink Co., Inc., who are members of the Colorist group, the usual type of meeting was replaced by a visit to the plant of this company on January 19 at 7:15 P. M. The plant of the company is at 806 Channing Place, N. E., Washington, D. C. Machines were in operation when the members arrived, and they had an opportunity to see how printing ink is made. A tour through the plant included a visit to the laboratory to see techniques employed to maintain control of the finished product; and an opportunity was given for discussion of processes.

NEW INDIVIDUAL MEMBER

We are glad to welcome to individual membership Mrs. Josephine Grove Brennan, Color Control Department, Eastman Kodak Company, Rochester, N. Y., who is well known to many of us. Mrs. Brennan did two years of graduate work with Professor Harry Helson at Bryn Mawr College before joining Mr. Evans' staff in the Kodak laboratories. Her type of color interest is indicated by a recent paper in the Journal of the Optical Society of America, "Changes in Hue, Lightness, and Saturation of Surface Colors in Passing from Daylight to Incandescent-Lamp Light," by Harry Helson and Josephine Grove; this was in the May, 1947, issue.

AMENDMENT TO ARTICLES OF ORGANIZATION AND PROCEDURE

By letter ballot of voting delegates - with 39 votes cast out of a possible 42 - the Articles of Organization and Procedure of the ISCC were amended on November 28, 1947, as follows: Article VI, Section 1. "Counsellors enumerated. There shall be five Counsellors, one to be the retiring chairman, four to be elected."
Section 2. The word "three" shall be omitted, so as to make the section read, "The Counsellors shall be elected by the voting delegates from among the accredited delegates."

By this action the membership of the Executive Committee is increased from 7 to 9. It results at the present time in two vacancies. In accord with Section 7, Article V, these will be filled for the period of the unexpired term by a majority vote of the members of the Executive Committee. They will have to guide them the results of the recent ballot.

DUTCH SOCIETY FOR COLOR STUDY

Under date of November 4, 1947, the Secretary received from Mr. E. Rijgersberg, Piet Heinstraat 111, The Hague (Holland), information regarding the formation of a Dutch Society for Color Study. Mr. Rijgersberg is secretary of the group, and states that this "society occupies itself with the study of the color problem in its widest extension." "Consequently it comprises members of both the physical, psychological, physiological and artistic branches of color science." Since all English and American books were taken from the Dutch libraries, it is indicated that the group is anxious to re-establish libraries in this direction and is inviting cooperation to this effect. In reply, a package of reprints was collected and sent to Mr. Rijgersberg with a letter expressing our pleasure in having their letter and knowing of the formation of their society. We wish them much luck and hope that we shall be able to keep in close touch with each other in the coming years.

COLOR GROUP OF THE PHYSICAL SOCIETY

Under date of December 7, 1947, we had word from Dr. Wright, secretary of the Colour Group of the Physical Society, that activities continue at a high pace. Following the Cambridge Conference there was one Colour-Group meeting to talk things over. In late November there was a successful meeting on Ultramarine. Early in the year the group is to have a meeting on pigment mixture, and later they hope to arrange a meeting in connection with an exhibition of cleaned pictures now on exhibit at the National Galleries. In April the Physical Society will hold its annual exhibition of scientific instruments and research; and the Colour Group is planning an exhibit to illustrate their "Report on Colour Terminology," which they hope will be published by then. Added to these activities will be the Paris meeting of the I. C. I. Altogether it looks to us as if our British co-workers are having about as busy a time as we are having here!

CONGRATULATIONS DR. COHEN

In a letter dated the last day of 1947, we heard from Dr. Josef Cohen, who has published on color adaptation, that he has recovered from the long illness which followed an automobile accident which occurred about a year ago. He states also that after February 13 he will be Assistant Professor of Psychology at the University of Illinois. Congratulations and best wishes, Professor.

Incidentally, Professor Cohen stated that, unable to return to look after his papers because of the accident, he lost his reprint collection. It may be presumed, therefore, that he will be glad to receive reprints from authors in the color field. The papers of his own with which we are familiar are as follows: "Color Adaptation to 1945," Psychol. Bull. 43, 121-40 (1946); "Color Adaptation of the Human Eye," Amer. J. Psychol. 59, 84-110 (1946); "Color Adaptation to Stimuli of Different Spectral Composition but Equal I. C. I. Specification," J. Opt. Soc. Amer. 36, 717 (1946); and there was a note in Science about the middle of 1946 on the "history of a three-color mixer" which has been described earlier by L. T. Troland, G. N. Hunter and W. F. Grether.

1948 SPRING HOSIERY COLORS

According to advices from Mrs. Margaret Hayden Rorke, Managing Director of The Textile Color Card Association of the U. S., Inc., the Association has presented eight new colors in its Advance Confidential Hosiery Card for Spring, 1948, just issued to members. This comprises a larger range than in recent seasons, and permits stressing the significance of smartly individual hosiery colors that achieve a subtle harmony with the important costume and accessory colors in spring fashions.

Although all but one of the new colors are in the medium range, because of the sheerness of the nylon on which they are developed, they give a flattering lighter effect on the leg.

Of the new colors, Pastel Nude is described as a "suntinted" flesh tone; Glace Mocha is an animated, "sunwarmed" light brown; Morning Mist is a versatile taupe, in smart rhythm with a very wide range of costume colors; Brown Shadow is a hazy brown blending effectively with cool neutral browns and beiges; Town Smoke is a light gunmetal; Bronzlite is a glamorous burnished-bronze color; Bludusk is a shadowy grayed medium blue; and Navy Lustre is a smart spirited light navy. In the usual effectively organized bulletins with which Mrs. Rorke accompanies announcements of new color ranges, are given many helpful hints as to the harmonies that may be obtained with the use of the new colors along with various shoe, costume, accessory and ensemble colors; and the one announcing the present new group of hosiery colors is replete with enticing suggestions.

SPECTRO-CHROME AND "MEDICAL FRAUDS"

In a recent issue of the Saturday Evening Post, in an article by Rita Halle Kleeman, entitled "Beware of the Medical Frauds," is included a description of the Spectro-Chrome, developed by one Dinshaw Ghadiali, M. D., M. E., D. C., and so on. Before the Spectro-Chrome was put out of business by skeptical courts, Spectro-Chrome Metry was claimed to cure many ailments! But we do not wish to steal the thunder of the article, though we wanted to get the answer to the question proposed by a "normalator" sales agent for the juke-box-like instrument, namely, "What is the Color energy of Uranium?" But we didn't find the answer, probably because of the picture of the very attractive model on the same page.

TROLLEY-COLOR BALLOT

Through the courtesy of Miss Maryette Charlton, recently of Pratt Institute, Brooklyn, but now in Chicago, we were informed of the results of the Trolley Color Ballot conducted by the Chicago Sun. A clipping dated September 7, 1947, gave some detail. A Yes or No questionnaire asked the public: (1) Do you favor a uniform color for all Chicago streetcars, elevated trains and busses, when this becomes practical? (2) Do you think this color scheme should be the light green and tan of the new Clark-Wentworth cars? (3) If not, what color would you like to see used?

By a score of twelve to one, the public voted in favor of a single uniform color scheme in place of the variegated hues then in use. A smaller majority favored the green and tan scheme of the new cars and busses already on order (vote about 2 to 1). The designer of two experimental trains argued for plain aluminum finish; but the management of the publicly owned system wanted to get the opinion of the public, and the vote gave them a clear mandate for uniform chromatic color, as indicated. Many persons in the ballot and in person indicated that they favored clearly marking front and rear entrance cars; and they proposed different-colored route signs as well as different names and numbers to make it still easier to pick out a car.

Miss Charlton also sent two other interesting items clipped from September news sources. We regret that our limitations of space made it difficult to use them until now; but we think they still have interest. One referred to the use of "black light" (ultra-violet) to detect cancer in blood, by Dr. Louis Herly of Columbia University. Normal blood fluoresces brightly and appears turbid or murky in ultra-violet light, but the blood of animals with cancer shows neither fluorescence nor turbidity.

A third item sent by Miss Charlton concerns color and mosquitos. In tests made in Oregon, men wearing shirts of seven different colors acted as bait for insects, while entomologists counted and checked (and, we presume, wore armorplate and steel helmets). During a half-minute test, 1499 mosquitos of one species were counted on a black shirt in contrast to only 520 on a white shirt. Blue and red were well-liked by mosquitos (Professor J. P. Guilford please note!), while yellow ranked with white among the least liked. So if you plan to live in Jersey, as the Editor did for a time, arrange to add a practicing entomologist to your household staff.

THE CHEMIST'S REVENGE

Miss Charlton's item about a familiar pest, though one less familiar since the advent of DDT, led us to polish up a recently indited paean of victory over our favorite pest, the household fly. These modest lines are at the same time an encomium (or does one say laudatory panegyric) in praise of the chemist, of whom we are no longer one. Since we number many chemists among our delegates and readers, many of you, we may as well admit, will recognize this as an attempt to curry favor among the chemists, in the hope that they will clip or otherwise collect items, as Miss Charlton did, to publish in the News Letter. Incidentally, we must apologize to some poet of forgotten name and verses, who some thirty years ago left a vague memory of some similar idea and constructions. So, the Chemist's Revenge:

In his progress down the ages, numbered in a million stages,
In the course of evolution, from the primitive confusion
'Neath the sky;
Hatching out in horse manure, when there wasn't any sewer,
Rose a pesky little varmint, called the Fly!

On the numberless fine bristles of his tibiae and tarsi
Rode a billion streptococci; vibrios and diplococci,
Millions strong
As he buzzed around your table, finding food where he was able,
He was spreading bacilli both short and long.

I had met the Jersey "skeeter," and I didn't like him either,--
But it's flies that got me cussing; at their tickling and their buzzing,
I went mad;
And for sheer exasperation and destruction of the nation
There's no other pest nor varmint half so bad.

In the past when you did find him, with his trail of dirt behind him,
In your house or in your stable, feeding at your dinner table,
Safe was he:
From fly paper, trap or swatter, or poor formalin in water.
Now we chemists take revenge with DDT!

In the morning we can slumber, for at least an hour longer;
And our food is now much cleaner, disposition is not meaner,
As you see!
For despair led to invention: Flies now tremble at the mention
Of the atom-bomb of fly-world,
(For their carcasses are high-hurled): - DDT!

I. H. G.

COLOR PREFERENCES

It has come to our attention that there has been a good deal of discussion and correspondence during recent months on

problems concerned with the possibility of encouraging research in relative preferences for various colors. Mr. Crouch of the Illuminating Engineering Society, our Secretary, Dr. Judd, Ralph M. Evans, and others have taken part in these discussions, as has Professor J. P. Guilford of the University of Southern California, who has done considerable fine experimental work in this field. With this last fact in mind, Dr. Guilford was asked to prepare a summary of the field for the News Letter. This he obligingly did; and his summary, under the title: "The Present Status of Scientific Study of Color Preferences," follows:

The psychological investigation of color preferences has extended over a period of more than half a century, with reports of studies appearing rather sparsely and spasmodically. At no time has there been a sustained, systematic attack upon the subject. Up to about ten years ago, the studies had been concerned mainly with the dependence of degree of preference upon hue, for colors that were near maximal saturation. The typical investigation utilized colored paper swatches in only a few different samples - from six to ten was probably typical - and depended upon human judgments for indices of preferences. The numbers of judges were often relatively large - sometimes numbered in hundreds. The sampling of judges included both sexes and a number of racial groups besides those of white, European stock - American Negroes, American Indians, Filipinos, Chinese, and Japanese. Exceptions to the rules just mentioned were in isolated studies with human infants, psychotic individuals and albino rats!

From all these studies taken together, certain conclusions seem justified, though there were some exceptions, apparent or real. (1) The most preferred hues were blue, green, and red, usually in that order, blue being highest. The least preferred hues were yellow, orange, and violet, but among these the order was less certain. Human infants seemed most attracted to yellow and red (in reaching tests) up to the age of two years after which preferences shifted toward the adult standards. Albino rats gave a choice to blue and green over yellow and red. Results from vertical racial groups seemed to show more similarities than differences among groups.

In the early studies, very little attention had been given to the relation of preferences to variations in lightness (Munsell value) and in chroma, but there were some indications that lighter colors were preferred to darker ones, and more saturated ones were preferred to less saturated, with some exceptions. There is little basis upon which to account for discordant results when they occurred because most investigators rarely designated their color samples any more exactly than to say, for example, that a certain sample was "saturated red" and another one was "unsaturated green," and often only the hue was named.

The first systematic studies with numerous samples carefully designated were those performed by the writer. (3) It was hypothesized that the degree of liking for a color, everything else being equal, increases or decreases as a continuous function of each of the three psychological properties of color - hue, lightness, and chroma. If this hypothesis proved to be well supported by empirical facts, we would then have a basis for predicting how well the average person would like a certain color sample from a knowledge of quantitative descriptions of hue, lightness, and chroma. The predictions would undoubtedly not be perfect, but they would show a material improvement over predictions made without that knowledge.

These studies utilized more than 300 color swatches (surface colors) systematically selected from the entire color solid. Each color was evaluated for hue, value, and

chroma according to the Munsell system. The samples were in the form of 2-inch squares, and they were exposed under artificial "daylight" illumination on a very large neutral gray (Munsell N 5/) field. The judges were young adults, including 20 males and 20 females. From the results a number of general principles seem to be indicated. When lightness and chroma are held constant, the maximal preferences are for blue, green, and red, in agreement with earlier general findings. The three minimal preferences are for yellow, blue-green, and violet, a result that differs from the previous findings only in substituting blue-green for orange. Of chief interest in the new findings is the fact that the hypothesis of continuity was completely vindicated. Closely neighboring hues in the color solid have very similar degrees of preference. It should be stressed that these conclusions hold only when lightness and chroma are held constant. Without this stipulation, it is easy to point out apparent exceptions; for example, some yellows are preferred to some reds, and some violets are preferred to some blues.

Continuity also held in the relation of preferences to lightness and chroma. In general, it can be said that the minimal preference for colors of constant hue comes in the region of value 3/ and chroma /3 in the Munsell system. For any color series of constant hue and value, as we increase chroma from zero, preference first decreases until a minimum preference is reached (usually at chroma /3) and then systematically increases as chroma increases beyond that point. The one exception is for women judges with colors in the region of red-purple, for which there is another decrease in preference for very saturated samples. For achromatic samples (zero chroma), preferences are highest for extreme blacks, minimal and unpleasant between values 2/ and 5/, and mildly pleasant for the light grays and white. When chroma is not zero, but is constant, there is a different form of relation of preference to lightness depending upon the hue. In general, for the "warm" colors, preference increases with positive acceleration as value increases. That is, the greater the lightness, the more rapidly does preference increase as lightness rises. For "cool" colors, preference is greatest at some moderate lightness or value. The last two principles may be combined and stated in another way: The highest preference tends to be at a value level at which the color can be most saturated; and the value level at which the color can be most saturated depends upon the hue. Sex differences in preferences were not found to be very marked, but there were notable instances among colors whose hues are red-purple and yellow-red. In general, women were apparently more sensitive to minor changes in hue when chromas were low.

On the basis of these results, it has been possible to set up a series of graphic charts from which, knowing the Munsell designations for hue, value, and chroma, one can find at a glance the most probable preference value that the average person of each sex would attach to the particular color. It is not known how far one is safe in generalizing a prediction of this kind, however, without further investigations. The prediction system resulting from these studies, strictly speaking, applies to colored surfaces of similar size, viewed in a similar manner by a certain type of judge. It is the belief of the writer that the systematic relationship of preferences to the properties of colors is real and that there are basic biological reasons for it. It may be possible to set up such a system as a norm from which deviations will be produced from time to time and from person to person under the influence of other factors. Some of these other factors may include: age of the individual, condition of his health, previous conditioning (experiences), culture, fashions, use of the color, and so on. Other properties of the colored object and other factors that may be of importance may include: mode of appearance of the

color (e.g., surface, aperture, or bulky color), texture of the surface, size, and illuminant under which viewed. If these factors have dependable influences upon preferences for colors, knowledge of those relationships and of those particular aspects in any judgment or selection situation would supplement materially the prediction of preference derived from the three basic properties of color alone. It is perhaps not premature to forecast a time when the colorist who wants to choose a color for a specific purpose can refer to a series of charts and locate the color or colors that would give the maximal enjoyment to the most people of a certain type. The pleasing of particular individuals will always be more difficult than pleasing the average person, for individual differences are large. Fortunately, when selecting serviceable colors, it is not usually one individual but a group that one must aim to please.

Nothing has been said thus far in this account concerning preferences for color combinations. This is because practically nothing of a scientific nature has been done in this field. The scientist should begin here by taking note of the rules already proposed by painters and others. He will take those rules as hypotheses to be tested by experiment, however, and not as conclusions, skeptic that he is. One or two very limited studies (2) by the writer have shown, for one thing, that a color contributes to the preference for the combination in which it appears a level of liking in the direction of that of the color when viewed alone. Two colors liked very much when alone will probably be liked when together and two colors disliked when alone will be disliked when together. But other factors do enter into the picture when colors are combined side by side. Some of the rules of the artists seem to be verified, on the whole, when subjected to experimental test (such as the greater preferences for very similar or for very contrasting hues and for contrasting values), but others seem to be due for modification or refinement.

The writer trusts that enough has been said to justify an optimism, perhaps not entirely vain, in the belief in the orderliness underlying the liking and disliking for colors and their combinations. From the scientific point of view, the surface of the problem of color preferences has only been grazed. This leaves unmentioned all other emotional reactions to color, of which there are many; their exciting and soothing effects; their esthetic meanings and impressions. It is going to require the time-consuming and sustained attention of a number of investigators and the support and cooperation of many who are interested in color from all points of view to bring about substantial progress in the mastery of the problems of the enjoyment of color and other problems of color effects.

J. P. G.

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(1) The affective value of color as a function of hue, tint, and chroma; J. Expt. Psychol., 1934, 17, 342-70;

(2) (with E. C. Allen), Factors determining the affective values of color combinations, Amer. J. Psychol., 1936, 48, 643-8;

(3) A study in psychodynamics, Psychometrika, 1939, 4, 1-23.

COLOR HARMONY — Since the Editor has previously commented in these pages on discussions by others of what he has (perhaps too conventionally and glibly) called "color harmony," he is tempted to add a few editorial comments on this summary written by an outstanding authority in a closely related field, though that reviewer has just touched "color harmony" in his penultimate paragraph.

The Editor himself obtained three very extensive sets of data in this field in experiments spread over a course of years, so he does not feel impertinent in entering the discussion. The work remains unpublished, but we believe it would satisfy Professor Guilford as to scientific validity in most respects, for in many experimental details there is much resemblance to his own (many colors, Munsell specifications of all colors, median gray background - as well as others -, daylight illumination, many excellent observers, etc.) In commenting on the work of Moon and Spencer, who ignored Guilford's well-known work, the Editor stated some of his own experimental methods and results (see News Letter No. 53, 7-8; May 1944).

Guilford delineates without explicitly stating or naming the Geissler "rule" relating the pleasantness of a combination to the pleasantness of the component colors. He evidently does not regard the rule as a "law," as it has sometimes been called; and the commendable restraint he used all through his review is particularly in evidence here. Bearing on this point we may mention that out of our 74 pairs of colors (in our best set), our 12th-highest ranking pair had Munsell hues 7.5 P and 7.5 Y; our 15th, 5 Y and 7 Y, and our 16th, 2.5 Y and 4.5 YR. These combinations are made up of components low in individual preference, so contradict the Geissler rule. Also, a combination of 2.5 B and 3 G was fifth lowest in preference. The 5 Y - 7 Y pair, when the relative areas of sample were reversed, received a low ranking, indicating the great importance of area among other factors, as Guilford has stated.

This brings us more definitely to the factor of area. Its apparently potent effect was minimized by our experimental method (and determined in an independent experiment). This was to have 9 of our observers (25 in this set) run preliminary experiments to choose the most pleasing ratio of areas of the two rectangles used to make up the rectangular combination. This was done by starting with the two component rectangles (each of the Greek proportions) and sliding one over the other so as to change continuously the relative areas exposed, stopping at the most pleasing ratio. Each observer repeated this until he was satisfied as to the most pleasing ratio for himself, and the results were averaged. The composite rectangles of variable size so obtained were all then reduced to a constant size, retaining the most pleasing ratio of component areas. The components were then glued together with these ratios of area and used in the main experiments where hue, saturation and lightness were varied.

There is little doubt in the Editor's mind that this method of minimizing (and also determining) the effect of area in order to study the other variables more readily, may be open to criticism by a trained psychologist like Professor Guilford; and we would be glad to have him point out its possible effects on our main experimental results (ratings on a 5-step scale). Indeed, our main purpose in commenting at all on Professor Guilford's excellent summary is embraced in a hope that it may be a beginning in leading others to enter the discussion and study of this interesting subject.

I. H. G.

HELP PLEASE! In the 1922-43 Bibliography of Color, for which the Editor is now preparing a subject index, the list of serial journals in which at least one reference appears, though not quite complete, comprises 36 pages of single-space typing! The list was drawn up to save space, since the enormous magnitude of the total work is appalling. In the main text, one journal appears about 850 times and two others about 240 each. By giving the full titles

of the journals and underlining letters used for abbreviations much space can be saved. The full names of the very great majority have been discovered, all but a few out of over a thousand. But the Editor has not been able to get the full names of a few found as abbreviations in references sent to him in past years by others. This is in spite of the fact that he has access to various editions of the Union List of Serials, the Department of Agriculture's list of abbreviations, those of the Chemical Abstracts, and other similar lists. In some cases, as in the non-underlined part of "Societatis" in the first name, we think we have the correct word, but are not sure. We would also like to have the city (not the street address) of publication. Can you help? Are any of the following known to you?

Acta Societatis med. fennicae
Bastfaser
Bekht. Inst. Brain Research, 20th Anniv.
Bristol Health Reports (Is this Bristol, England?)

B. T. H. Research Laboratory Publications (Does B.T.H. stand for the "British Thomson-Houston Co.?)
Bulletin ergol
Byulleten Malarnoi Tekh.

Chetvertinnii Soveshch fiziol Probl., Fiziol. Org. Chuvstv. Akademiia Nauk URSS, VIEM
Clinical Research Report, Optometric Research Institute
Deutsche Zeitschrift für Maltechnik

Exposés de Biophysique
Film und Farbe

Fortschritte Tech. Beil.
Genetics Review
Lack und Farbe Rundschau
Light Engineering (Russian Journal)

Mazda (or Matsuda ?) Kenkiu Jiho (Japan) (Is this the same as Mazda Research Journal, Tokyo?)
Maryland Agricultural Society, Maryland Farm Bureau Fed.
Nachrichten Textilindustrie Handels

National Lead Company Bulletin (Is this O. K.?)
Nation's Schools (O. K.; where?)
Nihon Gankwa Gakkwai Zasshi
Opt. Rundschau Schweidnitz.
Die Physik

Poludnie
Research Notes
Rev. d'opht. (This is not Rev. d'optique.)
Trudy Chetvertogo Sov. Vop. Anilino-K. K.
Trudy Institut Izuch Mozga Bekht
Yearbook Optom. (Dr. LeGrand Hardy, can you help here?)

BIBLIOGRAPHY

L. H. Lampitt, C. H. F. Fuller & N. Goldenberg; J. Soc. Chem. Indus., 66, 142-7 (May 1947); starches and starch fractions; III, intensity of colour of starch-iodine-iodide solutions as an index of the amylose-amylopectin ratio (with absorption spectra)

A. Landolt (to Soc. Chem. Indus., Basle); U. S. Pat. 2,373,191 (1945); improved color fastness to chlorine by resin treatment

W. R. Lang; J. Australian Inst. Agr. Sci. 12, 108-10 (1946); wool-fiber thickness and the resolving power of the eye

C. N. Legge; Brit. J. Photog. 94, 251-2 (July 18, 1947); the Carbro-imbibition three-colour process (combination of the Carbro and dye-transfer processes)

Y. Le Grand & E. Guillemot; Nature 159, 132-3 (Jan. 25, 1947); measurement of visual acuity with blurred tests)

Lever Bros. & Unilever Ltd. & R. Thomas; Brit. Pats. 584,435-6 and 584,484 (1947); wash-fast fluorescent blueing agent derivatives of 4,4'-dibenzoyl amino stilbene-2,2'-disulfonic acid

Lever Bros. & Unilever Ltd. & R. Thomas; Brit. Pat. 584,436 (1947); blue-fluorescent compounds in washing compounds for textiles for whitening them

A. London; J. Chem. Physics 13, 396-428 (1945); theory of the ultraviolet absorption of diphenyl

M. P. Lord; Proc. Phys. Soc. 58, 477-80 (1946); note on the measurement of spectral distribution when lines and continua are present together

R. P. Loveland; A. S. T. M. Bull. 1944, No. 128, 19-29 (May); metallography in color

M. Luckiesh; "Light, Vision and Seeing"; D. Van Nostrand Co., New York; 323 pp. (1944); review by R. H. Oppermann in J. Franklin Inst. 238, 467-8 (1944)

M. Luckiesh, A. H. Taylor & G. P. Kerr; J. Franklin Inst. 238, 1-7 (1944); seasonal variations of ultraviolet energy in daylight

W. O. Lundberg, R. T. Holman & G. O. Burr; Oil & Soap 23, 10-14 (1946); spectroscopic changes in fats during rancidification

M. E. L. McBain; J. Phy. Chem. 48, 89-95 (1944); absorption of light in soap solutions

A. Maccoll; J. Chem. Soc. 1946, 670-72; light absorption and resonance energies of some heterocyclic molecules (calculations from Förster approximations)

R. Mansell; Text. Colorist & Converter 69, No. 7, 20-1, 44 (July 1947); color fundamentals (elementary treatment, including brief discussion of color harmony)

J. E. Marsh & H. D. Abbott; J. Compar. Psychol. 38, 47-63 (1945); an investigation of afterimages

F. A. Matsen, N. Ginsburg & W. W. Robertson; J. Chem. Physics 13, 309-16 (1945); near ultraviolet absorption spectrum of phenol vapor

T. G. Mayer & L. Hochman; Pop. Photog. 20, 79-81, 180 (April 1947); painting with light

R. S. Mayston; Text. J. Australia 21, 715-22 (1946); color of azo dyes in relation to chemical constitution (prediction of colors)

M. G. Mellon (amplification of previous reference): "Colorimetry for Chemists"; 133 pp.; The G. Frederick Smith Chemical Co., Columbus, Ohio (1945); reviews by G. S. Forbes in J. Amer. Chem. Soc. 68, 917 (1946) and in ISCC News Letter No. 64 (March 1946), 6

A. Mellor & R. J. Mann (to British Celanese Ltd.); Brit. Pat. 570,880 (1945); dyeing process for two-toned fabrics

R. Merck; Med. Vlamm. chem. Vereen 1943 (Sci. Indus. Phot.) 18, 215; July 1947; chemical foundations of color photography (general survey)

W. E. Meyer & R. M. Roberts (to Parker-Wolverine Co. & Owens-Corning Fiberglas Corp.); U. S. Pat. 2,371,458 (1945); construction features in a machine for fabricating camouflage

L. Michaelis & S. Granick; J. Amer. Chem. Soc. 67, 1212-9 (1945); the metachromasy of basic dyes (variability of color of adsorbed dyes) (Brief abstr.:- All metachromatic dyes disobey Beer's law because of the formation of dimeric molecules, showing additional absorption maxima at shorter wavelengths; under certain conditions there is still more displacement of the absorption due to still higher aggregates. Neucleic acid prevents this phenomenon. An important paper. - Ed.)

W. Michel; Ber. schweiz. bot. Gesell. 54, 19-70 (1944); through Chem. Abstr. 41, 2462 (1947); benzidine dyes: metachromatic behavior is plant histology

P. Moon & D. E. Spencer; J. Math. Phys. 25, 111-90 (May 1946); analytical expressions for photometry and colorimetry

P. Moon & D. E. Spencer; Illum. Engin. 42, 611-24 (June 1947); photometric nomenclature for the post-war world (Brief abstr.:- Very similar to the paper in J.O.S.A., previously listed; and an extremely useful compendium of knowledge on this subject. Tables are given of "active" and "passive" as well as connective concepts, units and properties, with dimensional formulas, along with multi-lingual names for the concepts and proposals for a new rationalized system with internationalized features.)

R. S. Mulliken; Rev. Mod. Physics 14, 204-15 (1944); electronic structures and spectra of triatomic oxide molecules

E. Murray; Amer. J. Psychol. 58, 253-61 (1945); alleged cures of color blindness

M. Neubert; Melliand Textilber. 25, 159-60 (1944); calculation of the color-effect on weaving with colored yarns

D. Nickerson; Text. Research J. 15, 257-8 (1945); review of W. D. Wright's "The Measurement of Colour"

R. A. Ogg, Jr.; J. Chem. Physics 14, 114-5 (1946); absorption spectrum of metal-ammonia solutions

S. Pakswer & J. Kirk; Rev. Sci. Instr. 17, 157-8 (1946); color-temperature testing in projector-lamp production

L. Pauling; J. Amer. Chem. Soc. 66, 1985 (1944); light absorption and fluorescence of triarylmethyl free radicals (and relation to Raman spectra of substituted benzenes)

R. Peel; J. Text. Inst. 36, P 46-7 (1945); colour from the artist's point of view (criticism and quotations against 1944 lecture of L. F. N. Reid stating that persons "actually see the component colours of the chord" in pigment mixture); see Reid (1945)

Photovolt Corp.; Instruments 19, 371-2 (1946); photoelectric colorimeter for Nessler tubes

L. W. Pickett & E. Sheffield; J. Amer. Chem. Soc. 68, 216-20 (1946); ultraviolet absorption spectra of dioxadiene ("p-dioxin") and dioxene (its 2,3-dihydro-derivative) (Ed. note;- ultraviolet absorption is, strictly speaking, not a part of the subject of color; but it is useful in the study of the relation of color to chemical structure)

R. W. Pickford; Nature 159, 606-7 (May 3, 1947); sex differences in colour vision

J. R. Platt & H. B. Klevens; Rev. Mod. Physics 16, 182-223 (1944); spectroscopy of organic molecules in the vacuum ultraviolet (theory, tables of data and 150 references)

W. S. Plymale, Jr.; Rev. Sci. Instr. 18, 535-9 (Aug. 1947); filters for spectral corrections of multiplier photo-tubes used from scotopic to photopic brightness levels

A. Polack; Compt. rend. 224, 158-9 (Jan. 13, 1947); photochemical substance of the cones of the retina and the theory of color sensation

Polaroid Corp.; Instruments 19, 234 (1946); yellow light-polarizing filter

A. Polgar & L. Zechmeister; J. Amer. Chem. Soc. 66, 186-90 (1944); a spectroscopic study in the stereoisomeric capsanthin set; "cis-peak effect" and configuration

J. Prinet; in "La photographie et ses applications"; chap. III, Presses Universitaires de France, Paris (1946); pp. 65-77; color photography and three-color printing

T. H. Projector & L. E. Barbrow; Rev. Sci. Instr. 16, 51-3 (1945); oscillographic method for the photometry of photographic flash lamps

T. H. Projector, M. K. Laufer & C. A. Douglas; Rev. Sci. Instr. 15, 107 (1944); an improved "zero-resistance" circuit for photocell photometry