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INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 22

NOVEMBER 1938

I. H. Godlove, Editor-in-Chief
Charles Bittinger, Editor for Art
C. E. Foss, Editor for Industry
D. B. Judd, Editor for Science

THE COLORISTS

of Washington and Baltimore met at the Arts Club, Washington, on November 9th. Miss Lonore Kent, in charge of the "Save the Surface Campaign" of the National Paint, Varnish and Lacquer Association discussed color problems connected with her work. Dr. Deane B. Judd and Mr. Kenneth L. Kelly presented something of the background and progress of the work of the I.S.C.C. color names which has been going on at the Colorimetry Section of the National Bureau of Standards and at the Washington laboratories of the American Pharmaceutical Association. In the October 28 Science, page 11 of the Supplement, may be found a brief description of this work.

NEW INDIVIDUAL MEMBERS

We are glad to welcome to our individual membership the following who have joined the Council since publication of our September News Letter:

Walt Disney Enterprises, Hollywood, California;
Mr. George S. Gladden, Eastern Service Studios, Long Island City, N. Y.;
Mr. James T. Killian, Container Corp. of America, Philadelphia, Pa.

MEETING OF INDIVIDUAL MEMBER GROUP DELEGATES

Delegates representing the individual members of the I.S.C.C., namely Mrs. Burris-Meyer, Dr. LeGrand Hardy, and Miss Dorothy Nickerson, met in New York on October 24, along with a few other individual members. The latter met to advise the delegates in just what way they might serve the group best. Cards are being sent to all other individual members to ask for further suggestions. The following recommendations by the delegates to the I.S.C.C. Executive Committee were suggested:

1. That mimeographed forms of a large scale I.C.I. color-mixture diagram be made available at a reasonable cost;

2. That title references to color articles occurring in current publications be sent to the editorial staff of the News Letter for regular compilation and publication:

3. That requests be made for all information available on consumer acceptance of colors, as: (a) what colors are bought at a particular time; (b) what colors are wanted at a particular time;

4. That patents on color equipment be listed;

5. That exhibits, accompanied by general and technical texts, be made a part of the annual Council programs in order to help bridge the gap between practical and technical people who often express their color ideas in different vocabularies, thus tending to place them in two groups unintelligible to each other. Graphic displays, which require a minimum of words, should be mutually helpful;

6. That there be studied the possibility of outlining particular color problems of general interest in such a way that suggestion for the study of these problems might be developed for graduate study in colleges and universities.

THE COLORQUERY AND VISIONNAIRE

Question No. 12. Why do leaves turn yellow, brown and russet in autumn?

A PRIZE AWARD

Dr. K. S. Gibson has received a citation and cash prize from the Society of Motion Picture Engineers, Tuesday, November 1, at their annual meeting in Detroit. This award was made for his paper entitled, The Analysis and Specification of Color, which was found by the Journal Awards Committee to be the most outstanding paper originally published in the Journal of the Society of Motion Picture Engineers during the year 1937. Remembering that Dr. Judd won this prize the preceding year, the Editor wonders whether Dr. Gibson, with his characteristic modesty, did not withhold his fire until his junior colleague had had the first shot.

COPIES OF I.C.I. MIXTURE DIAGRAM

At the request of one of our individual members, Dr. Le Grand Hardy, it is planned to make available at a price not to exceed $3.00 per hundred, copies of the I.C.I. color-stimulus mixture diagram. Five persons have already ordered 100 copies at this price. If other members wish some, they should order immediately from the Secretary, Miss Dorothy Nickerson, Bureau of Agricultural Economics, Washington. The diagram will be about 18" x 20". It is the one which appears as Fig. 2 in D. B. Judd's paper "The 1931 I.C.I. Standard Observer and Coordinate System for Colorimetry," J.O.S.A., Vol. 23, No. 10, October 1933. Reproduction at such a low cost was made possible by the cooperation of Mr. Carl E. Foss of the Interchemical Corporation.

COLOR SPECIFICATION IN U.S. PATENTS

Patent No. 2,062,137, issued November 24, 1936, to R. M. McKinney and C. E. Smith and assigned to DuPont, describes by means of the Munsell Notations, the colors of linseed-oil rub-outs of the pigments obtained by coloring titanium dioxide with salts of Cr,Co,Ni,Fe and V.

PHOTOMETRIC SPHERE PAINT

Mr. C.H. Bryce, Chief Chemist, Benjamin Moore and Co., in answering an inquiry concerning progress on tests of the special paint used for the spheres of photometric and spectrophotometric apparatus, states that, regardless of the priming coat, sufficient coats of sphere paint must be applied to build up a thick coating. The sphere paint does not have good hiding power, therefore four to five coats should be applied, but not too heavily or with too much brushing or they will loosen previous coats and so cause runs or sags. Spraying is a desirable means of application. Drying overnight, with sufficient ventilation, should be allowed between coats. When a sufficiently thick, thoroughly

dry, coat is produced, it must be brushed with a clean dry brush or soft rag to produce a very brilliant white surface. After the surface has been in service for some time, the same dry-brush treatment may be used to revive the brilliant whiteness, always provided the thickness of coating is sufficient. Mr. Bryce finds that "Paqua", a product of his company's manufacture, is best for the priming coat. This is a water emulsion paint and should be thinned with water in the proportion of $\frac{1}{4}$-gallon of water to 1-gallon of Paqua Paste. The product should be brushed or sprayed on and allowed to dry two days before application of the sphere paint.

ARTIFICIAL DAYLIGHT

The editorial staff has received from Dr. Judd a questionnaire dealing with the definition of artificial daylight for practical purposes. This originated with the German (formerly Austrian) Secretariat Committee (No. 27) of the International Commission of Illumination. Dr. Judd, who is the U. S. Representative on Artificial Daylight, was requested by Mr. Preston S. Millar, President of the U. S. National Committee of the I.C.I., to undertake formulation of an American reply to the questionnaire, condensed translation of which is reproduced here. After an introduction of the problems there follow the questions:

1. Shall the chromaticity of artificial daylight correspond to that of standard illuminant B of the colorimetry committee, which has already been standardized as artificial daylight by the ICI, or is another definition of artificial daylight desired in terms of the color triangle?

2. Since the location of the point in the color triangle is not sufficient for defining the color effect of artificial daylight, then basically it is necessary to have the spectral-energy distribution for a source of artificial daylight. Various procedures are available.....including that of Richter (Das Licht 6, 223, 251; 1936) and that of Bouma (Philips Technical Review 2, 1, 1937).....

Do you have any practical experience with one of these two methods and can you state which of these methods, or both, or a third, could be recommended for a definition of artificial daylight?

3. Since on physiological grounds an essential role is played by the amount of illumination supplied by the source of artificial daylight, it would be desirable if the illumination by artificial daylight approximated that by natural daylight in order to avoid the impression of insufficient illumination. Are you agreed that on these grounds a minimum illumination of E = 1000 lux (about 90 foot candles) be prescribed for artificial daylight at the working plane?

4. Given sufficient illumination, can the mixture of incandescent lamp light and mercury-vapor light in 1 to 1 proportions of luminous flux be designated as satisfactory, or is another proportion required, or for different purposes, the definition of several proportions?

An 8-page reply, based on answers received by Dr. Judd from the persons to whom he circulated the questionnaire, and upon discussion at the Niagara Falls meeting of the Optical Society, was prepared and forwarded early in November to the German Secretariat. Copies of the American Reply to the Questionnaire on Artificial Daylight may be procured by persons interested in the subject by writing to Dr. Judd at the National Bureau of Standards.

In connection with this subject, reference might be made to two papers concerning artificial daylighting on the recent Optical Society program: (1) Definition and Tolerances for Artificial Daylight for Color Matching by Deane B. Judd, and (2) Artificial Daylighting for Color Grading of Agricultural Products, by Dorothy Nickerson, J.O.S.A. (in press).

AFFECTIVE VALUE OF COLOR

We have received the following inquiry from Miss Mary Weiser of the Walt Disney Enterprises: "We are anxious to obtain all available information pertaining to color as a sensation and its psychological effect on people. In compiling reference of this type, it occurred to us that if you would kindly supply us with any data or articles of this nature, it would be greatly appreciated." The Walt Disney Enterprises is one of our most recent members. The Secretary of the Council would like to hear from Council members and delegates who have information of the indicated nature, so that it may be included in a reply to this question. Or write directly, with a copy to the Secretary.

COLOR NOMENCLATURE AND SPECIFICATION

We have received an offprint of an article on this subject by Dr. Forrest Lee Dimmick, our Chairman, which is an excellent contribution to and summary of the literature in this field. It is worthy of special note that the bibliography contains 80 references to previous literature. The Secretary informs us that she has a few extra copies of the article, which appeared in the Psychological Bulletin, Vol. 35, No. 8, pp. 473-86 (October, 1938). Write, if you wish a copy.

EIGHTH ANNUAL MEETING

Plans are being rapidly developed for the annual meeting of the ISCC to be held in New York City. The date is February 23, 1939 (Thursday), just previous to the joint meeting of the Optical and Physical societies to be held at Columbia University February 24 and 25. The afternoon "technical" session of the Council is to be sponsored jointly with the American Psychological Association. Member bodies are cooperating by publishing the program in their official publications.

COURSES IN "COLOR AND ITS APPLICATIONS"

On page 5 of the September News Letter we described briefly the Science Progress courses of this designation being conducted at New York University. There we listed the first four lectures. The remaining ones are as follows: (5) Color in Art; guest speaker, Forest Grant, Director of Art, New York City Board of Education, November 21; (6) Color in the Home; Miss Mora MacLachlan, Color Stylist, Schumaker and Company; November 28; (7) Color in the Home of Tomorrow; Dr. Samuel Hibben, Supervisor, Applied Lighting, Westinghouse Electric Manufacturing Company; December 5; (8) Color and the Emotions, Thomas Wilford, Color Organ, Studio, Grand Central Palace; December 12; (9) Color in Personal Adornment; Roger Conant, Color Stylist and Director, Bureau of Design, Lord and Taylor; December 19; (10) Color Down Through the Ages (Primitive Man's Use of Color); Professor Charles Pilhower, Supervisor in the Schools, Westfield, New Jersey; January 9, 1939; (11) Merchandising with Color; Arthur S. Allen, Color Counselor; January 16; (12) Color in the World's Fair of 1939; Julian Garnsey, Color Consultant, New York World's Fair; January 22.

It is no doubt proper to note that, of the dozen guest speakers for these courses, three are individual members of the ISCC and at least one other a member of a member-society. Four of the speakers, including the conductor, Mr. Herbert Thompson Strong, well known in the field of popularization of color phenomena, are listed in the Council-sponsored "Who's Who in Color".

COLOR NAMES AND GLOSS

One advantage of the use of non-glossy samples, such as those of the Munsell papers, is the minimizing of the effects on the color of variations in the angles of illumination and viewing. The procedure which was adopted, for the translation of the specification of the colors of the Maerz and Paul "Dictionary of Color" into the ISCC designations, was to keep as much as possible of the specularly reflected light from being viewed. This can be done fairly well with matt samples by illuminating the samples at 45° and viewing them normally, but less successfully with many of the M & P printed colors which can be characterized as having an "overtone", apparently overlaying the undertone which is usually predominant under 45°-normal conditions. The "overtone" is brought out especially when viewing or illuminating at nearly glancing angles. In the British textile industry, ratings of fabric colors are commonly distinguished as "downhand" or "overhand". In the inspection of samples having vitreous gloss for the purpose of judging hue, lightness and saturation, viewing in such a way as to avoid the "high light" is fairly successful in arriving at a unique color. However, it must be recognized that the color of such samples, and of fabrics having a "satin finish", is really a composite of all the colors obtained by viewing at many angles.

This complication constituted a difficulty when the Editor and the National Bureau of Standards tried to determine Munsell notations and ISCC designations for the standard and other important colors of the Textile Color Card Association of the U.S. Most of these were exhibited on ribbons having a satin finish on one part and a ribbed or crepe finish on another. Viewed without precautions to minimize the specular reflection of the "high lights" of the satin finish, this part is much lighter than the ribbed part in a certain position; but, when turned 90° in its own plane, is much darker than the ribbed portion. The Editor had been determining the Munsell notations, and from these Dr. Judd and Mr. Kelly had been working out the ISCC names corresponding. With one group of colors, the Editor found it very difficult to eliminate the gloss sufficiently to make accurate determinations. He found it easier to work with the ribbed finish; also that it changed in the same manner as the smooth part, but only to a slight degree, and the average at two positions 90° apart appeared to be near the similar average for the smooth part. He therefore, somewhat too hastily, sent these determinations to the Bureau. Dr. Judd and Mr. Kelley, were unable to check the notations, except in a particular orientation, necessarily not that which most completely eliminates specular light. Accordingly, publication of data on the color names, which was planned for the September News Letter, was held up. Due to the illness of Mrs. Margaret Hayden Rorke, Managing Director of the T.C.C.A. of the U.S., these and other problems have not yet been fully resolved. We therefore beg our reader's indulgence, and express the hope that in an early issue we may resume the tabulated data on important color names.

COLOR IN PAINTING THROUGHOUT THE AGES. V.

Leakey, in his book "Adams Ancestors", wrote: "The men who made the Magdalenian culture differed from modern man in only one noticeable respect. They had on the whole bigger brains than we have today." The Magdalenian was the last of the Old Stone Age cultures, the one in which the art of the cave man flowered. Is it to his great brain that we must attribute the artistic achievements of the authors of the Magdalenian? In these articles, we have already indicated a different explanation. We have pointed out that Neanderthal man, who left neither descendants nor works of art, did not die off for lack of brains. Our alternative thesis has the theme of "hybrid vigor". It is therefore of interest to consider briefly the human types and races who have passed across the stage of pre-history.

We have pointed out how complicated the picture of man's cultures has become during the last decade. Similar statements must be made with respect to the human types. In our school days, we were taught about the "missing link". Today there is known not one but several formerly missing links; within less than a year we have heard even of new Pithecanthropus finds from Java, whence came not only Trinil man, but Wadjak man and Solo man. Each year has added more finds.

Nevertheless, in the midst of all these new complications there have appeared elements lending themselves toward simplification. Can the cultures and the racial types be correlated? There is evidence that a start in this direction can be made. We have pointed out that the implements of Stone Age man can be divided into "core" or hand-axe and "flake" tools; and of course there were interacting cultures. The great Chellean-Acheulean hand-axe group is distinguishable from the Clactonian-Levalloisian-Mousterian flake-tool group, the former, core group being Eurafrican, the flake group being Eurasiatic.

What of the makers of these two groups of tools, the authors of the culture complexes associated with them? Were they distinct races of men? If so, and remembering that the Neanderthal authors of the flake cultures did not feel the artistic urge, what can we say of the Cromagnon and other authors of the Aurignacian and Magdalenian cultures, so marked by art? Were they a different folk?

The classification of races is to a large extent arbitrary. Different ethnologists or anatomists use different criteria, but there has been some approach to uniformity in the classification of fossil races, and for the distinction of others from the "modern races" included in the genus Homo sapiens to which we belong. Cromagnon man is definitely a sapiens type; the great group of Neanderthal and variant Neanderthaloid types are commonly considered as of a different species. The very ancient Trinil (Java) man and Pekin man are put into still other genera, as indicated by the respective names, Pithecanthropus and Sinanthropus.

The chief criterion for distinction is the type of brow ridges possessed. Every race of Homo sapiens has these ridges of bone across the forehead made up of two parts over the eye orbits. The apes, as well as Trinil and Peking men, have only a single bar over the eyes. The Neanderthaloid types, as well as "Heidelberg" and "Rhodesian" men, who are related to them, have a more or less anthropoid type, single bars.

We have discussed the separation of the main human and anthropoid stems of man's family tree, and the stems falling between. The criteria just given in turn enable us to divide the human stem into two. These are: (A) the Palaeoanthropidae, with apelike brow ridges; and (B) the Neoanthropidae, with two double bars, as in Homo sapiens. The family A in turn split off the genera: (1) Pithecanthrapus; (2) Sinanthropus; (3) a group renamed Palaeoanthropus, which includes P. Heidelbergensis, P. Rhodesiensis, P. Neanderthalensis, P. Palestinus (very important type recently found near Mt. Carmel), and others. None of these has survived into recent times.

Group B, the modern men, split off first Eoanthropus (Piltdown man, who was of sapiens type by some criteria; but with anthropoid teeth). He died off without heirs, unless they be the extinct Lady of Lloyds, found when excavating the building for Lloyds, Corporation at London, and the recently discovered Lady of Swanscombe. Next we have the main stem of Homo, including H. Kanamensis, known only by a part of his ancient jaw found in Africa, and descendants of his leading to the modern negroes. The main sapiens branch, as we know, continued on into recent times, gradually evolving and differentiating into Australoids, Negroids, Mongoloids and the European Races.

Recently, "missing links" have been found on the ape side as well as on the human side of the fork at which the stems split. The Taungs ape (Australopithecus) has been mentioned. The South African Sterkfonein and Kromdraai apes are even closer to man than either the Taungs ape, the chimpanzee or the gorilla. The Kromdraai ape, though definitely an ape, in certain details is more human than anthropoid. This illustrates the fact anthropologists have been coming to realize, that types may be primitive in some respects and relatively advanced in others. The Kromdraai ape flourished about 300,000 years ago. Almost as old was the Swanscombe type of human, though she had a brain which was quite like that of a modern woman's in its convolutions. Now the interesting fact transpires that the Taungs ape, as well as Piltdown man and the lady of Lloyds, said to be descended from him, all had relatively smooth foreheads. That is, though these forms are all older geologically than the Neanderthal species, with its great brow ridges, they had the modern human brow.

This raises again an old question. In the middle of the last century there occurred a controversy between the adherents of the "polygenetic theory" of man's descent, holding that mankind was not all derived from a single stock, and the "monogeneticists," who claimed that he was. Apparently, the monogenetic theory prevailed, and it is now generally held that all men now living are descended from the same species, Homo sapiens. Neanderthaloids and others were all killed off. The question now is: Were the types with the massive, single brow ridges (Neanderthals, Peking, and the types of Java) descended from the same group of apes as the gorilla and the chimpanzee; while the men of Piltdown, Lloyds and Swanscombe derived from an African ape like that of Taungs? Is it not at least possible that the human types with the heavy brow ridges evolved from apes to men in Central Asia, in the way we described in an earlier article, while the men with smooth foreheads developed in Africa from an ancestor like the ape of Taungs?

At any rate, two things have become increasingly evident: (1) There is evidence from England, from Germany and from Palestine that there existed in Europe, a quarter of a million years ago, a type of man approximating to Homo sapiens, at least in his brain, more closely than the Neanderthals who were responsible for the Mousterian culture, which was much later; (2) we must assume that at some distant time many more

genera and species of humans existed than those of which we have found the remains. Only one species, Homo sapiens, has survived; the others have perished!

Returning to the monogenetic-polygenetic controversy, the writer is not inclined to believe that the facts mentioned are strong evidence for a polygenetic origin of the races of men, even though he will now mention more evidence, apparently in this direction. The ancient Peking man shows some characters resembling those of the modern Mongols. Certain recent African finds suggest the modern negroes; others forecast the modern Bushmen, Hottentots, Strandloopers and Koranna. At stations in Java and other places we see the pre-Australoid type. Anthropologists are not all agreed on the resemblances. But in any case, some of these resemblances can be explained in terms other than by direct lines of descent. In those cases where the evidence is that the fossil forms were of the H. sapiens type, the writer believes that direct or collateral descent is probable. But in the cases, such as Peking and Mongols, the Java forms and Australians, where the ancient forms were not of the same species, sapiens, as the modern, it is better to invoke the great biological principle of "parallel" or "convergent evolution".

Here again we recall bitter controversies. They waxed strong especially in respect to the contrasting mechanism of parallel evolution or diffusion of cultures. Sir Grafton Elliot Smith, and his disciple Perry, maintained that all modern civilization diffused from one center; and that place was Egypt. In Elliot Smith's and Perry's books, as the latter's "Children of the Sun", a central idea is diffusion of cultures born by a race which the Japanese emperor is held to exemplify today. These ideas we will discuss not only because of the general question of the origins of cultures and their authors, but because of the special connections of the Smith-Perry theories with the ancient use of red substances.

We shall end this installment with a twice-told story which concerns a red substance and an amber one whose color we "explained" in a previous issue. The story originated with the priests of the sun-god Re at Heliopolis, where the solar calendar originated, and is called The Destruction of Mankind. Re, who was born on the day of the flood of the Nile, when old, became angry because his subjects murmured against him, presumably because he did not want to be sacrificed, as kings had always been before that. He called a council of the gods, who advised him to slay the conspirators. Accordingly, he got Hathor, the mother goddess, his "Eye", to kill men. She did so in her lioness aspect. Unfortunately, once she began to kill men, she did not want to stop, and Re became alarmed. He sent messengers to the First Cataract to get a red substance (red ocher?), and this, mixed with beer, was poured on the ground during the night. When the goddess came in the morning to kill the survivors, she found the beer, and drank so much that she was unable any longer to recognize men; and thus the rest were saved.

This story is the prototype of that widespread group of tales of a great destruction of men, which occur, for example, in Genesis, in the form of the stories of the flood and the destruction of Sodom and Gomorrah. Here Perry notes that Re, the god, was not killed, like Osiris or Tammuz, who were originally kings and later worshipped as gods, when he was old. He was not regarded as a dead king, like those, but as a living king, who, having become old, is rejuvenated by the red blood of his people. The priests had argued that the blood of the victim would rejuvenate the king, that the king need not be killed for the good of the community when he became too old. In this episode, Perry argues, is the origin of the practice of offering slaves as human sacrifices instead of the king, and out of it the custom of warfare.

Perry then tells the bright idea with which the priests secured the kingship for themselves. It is easy to think of parallels in modern times (usurpation of power, sacrifice, warfare and all). We are sometimes ready to agree that the Magdalenian men, and Swanscombe man of a quarter of a million years ago, had brains in some respects the equal of ours. And the question rises: Did Hathor kill off the Neanderthals, and leave for those saved the suggestion of that mocking name "sapiens".

Meanwhile, you may recall the Choctaw legend of our second article in this series. The blue bird, with red eyes, that guided the righteous man who was saved from the deluge, became a beautiful woman, the mother of the new race of men. The combination red and blue has been a favorite of men since the oldest antiquity, and it is preserved, along with white (the symbol of purity), in our national flag. One sometimes wonders whether the women of America, that land among all others where hybrid vigor has its greatest opportunity of manifesting its effects, will bring forth a great new race of men and artists.

THE COLORQUERY AND VISIONNAIRE

Question No. 12. Why do leaves turn yellow, brown and russet in autumn?

Answer. In our answer to the earlier question whether the colors of cherry blossoms and beets are "chemical cousins," we discussed various classes of plant pigments, present in the cell-sap and in insoluble plastids. These were chlorophylls, carotinoids (carotenes and xanthophylls), flavones, xanthones, anthoxanthins and anthocyanins. It is now necessary to speak of these chemical individuals as they approach old age. Autumn coloring is due to disappearance of the green chlorophyll and changes occurring in the other pigments; these changes occur in two stages, "necrobiotic" and "post mortem." The former is characterized by a yellowing of the plastids and the latter by disappearance of the plastid pigments, the disintegration of the protoplasm and formation of brown, russet and black pigments as a result of oxidation of colorless, water-soluble, "chromogens." Often the chromogens are of the nature of the flavones, but colorless; they form, however, colored salts with alkalis. The oxidation is often accelerated by certain enzymes ("oxidases"). In some cases, the changes are not due wholly to new pigments, the plastids remaining unchanged or only slightly modified; or new modified carotinoids, flavones or anthocyanins may form in autumn. Many plants whose fruits or flowers are red or yellow remain more or less so in autumn. Yellow autumn leaves are due chiefly to (modified?) carotinoids, but probably also to flavones. Reddening is sometimes due to carotinoids, as lycopin and rhodoxanthin, but is mostly due to anthocyanin formation. This is the cause in the cases of the leaves of English ivy, privet and other evergreens, certain herbacious plants like London pride (a saxifrage), which retain their leaves in winter, and the autumn reddening of the Rosaceae. The darker colors are the result of the more deep-seated post-mortal oxidations mentioned above.

DELEGATES AND MEMBERS:

Please send news items to your Editor, Dr. I. H. Godlove, Box 386, duPont Co., Wilmington, Del.