

M. REA PAUL, CHAIRMAN  
105 YORK ST., BROOKLYN, N. Y.

D. B. JUDD, VICE-CHAIRMAN  
NATIONAL BUREAU OF STANDARDS  
WASHINGTON, D. C.

*KSG; Note*  
M. H. RORKE, TREASURER  
200 MADISON AVE., NEW YORK, N. Y.

## INTER-SOCIETY COLOR COUNCIL

R. G. MACDONALD, SECRETARY  
122 EAST 42ND ST., NEW YORK, N. Y.

Charles Bittinger, Editor for Art      I. H. Godlove, Chief Editor  
D. B. Judd, Editor for Science

### NEWS LETTER NO. 18

July, 1937

Note: The News Letter is issued from time to time by the Inter-Society Color Council to all members for the purpose of bringing to their attention the current activities of the Council and to serve in a clearing house capacity in keeping members informed concerning recent publications on color in the arts, sciences, industries and education.

The material for the News Letter is obtained from several sources, particularly from the representatives of member-bodies. It is hoped that each member-body representative will keep the News Letter in mind and furnish material that may be of interest. The basic color problems of all groups are alike and one industry can learn much from the others.

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All members are urged to send items of interest (similar to those in this News Letter) to I. H. Godlove, Editor, c/o E. I. du Pont de Nemours & Company, Inc., P. O. Box 386, Wilmington, Del.

ATTENTION: Individual Members of the Color Council!

Organization of Individual Members.

About one half of the ballots have already been received for voting delegates to represent the individual members of the Council. If you have not sent in your ballot, please do so immediately. They should be in the hands of the Vice Chairman, Deane B. Judd at the National Bureau of Standards, not later than August 5.

Dr. Judd appended the following communication from Marjorie S. Cautley to his letter transmitting this notice. "It would be of great interest to me, and probably to other members, if the profession or color interest of each individual member were clearly indicated on the list." Dr. Judd and the Editor would be glad to hear from the readers of the News Letter regarding suggestions for the preparation of such a list and its publication in the letter.

COLOR NAMES

Vote on the Inter-Society Color Council Tentative Plan. We have been informed by the Secretary that the vote favoring the acceptance and submission of the tentative plan for naming the various colors, to include extension and changes as recommended in the report of the Problems Committee, included seventeen ballots in the affirmative up to June 11th. This constitutes a majority in favor, with no votes against the plan having been received.

Note on the color names of the Textile Color Card Association of the United States. The Editor has received communications from the Bureau of Standards and from Mrs. Margaret Hayden Rorke with regard to the inclusion of the TCCA identification, in the tabulation which was started in the preceding News Letter, of the color names which have been standardized by that association. The Editor has not had an opportunity of consulting with Dr. Judd, or with Mrs. Rorke, who is the Managing Director of this association, and who is now in Europe, on the best way of incorporating this additional information. We are heartily in favor of doing so, and have inferred that the two persons named are likewise. We regret being unable to furnish this material with the current set of names; but it is our hope to supply it, making it retroactive, when it has been discussed with them.

It should be added that the reason we have not already given some information on the TCCA colors is that we did not have available the accurate experimental data necessary for so doing. The experimental basis of the tabulations was stated in News Letter No. 17. The first step is the determination of the Munsell notations of the Maerz and Paul colors (many of which, incidentally, were taken over from the color cards of the TCCA of the US). The second step is the translation to the Council's system by Dr. Judd and Mr. Kelly, research associates of the U. S. Pharmacopoeia, at the Bureau of Standards. Similar steps will need to be

taken for the TCCA names, at least whenever their exemplars in physical standards differ significantly from the corresponding ones in Maerz and Paul's Dictionary of Color. We hope to initiate such steps as soon as possible after Mrs. Rorke's return.

### THE COLOR QUERIES AND VISIONNAIRE

Question 6. There is no blue pigment in either the sky or the eyes of the Irish colleen. Why are they both blue?

Question 7. Why does smoke appear blue against a dark roof but yellowish-brown above it?

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#### MORE ON THE COLOR OF EGGS.

At the request of Miss Dorothy Nickerson, of the Bureau of Agricultural Economics at Washington, Mr. Paul Mandeville has been kind enough to send us a copy of his excellent article on the above subject, which we can recommend to your interest. The article is entitled: "The Fine Egg Trade --- Mixed Colors". It may be found in the April, 1937, number of the U. S. Egg and Poultry Magazine, published by the Institute of American Poultry Industries. The article is on pages 216-17, 242 and 244.

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#### OSTWALD'S "ER UND ICH"

Miss Nickerson also has sent us copy of a review of the book "He and I" by Wilhelm Ostwald, which appeared in a recent number of Textile Recorder (54, 54; No. 647; Feb. 6, 1937). As our available space is crowded, and we assume that most of our readers will have access to this journal, we do not reproduce it here. We will content ourselves with the comment that, having long known Miss Nickerson's sound judgment, we infer from the fact of her sending the review that the book may be well worth a reading, though we personally do not happen to favor many of Professor Ostwald's color ideas. Instead we shall quote in toto another letter from her, except for the superscript and the signature.

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#### DR. GIBSON'S "COLOR"

Miss Nickerson says: "Dr. Gibson has written an article on "The Analysis and Specification of Color" for the Journal of the Society of Motion Picture Engineers. I quote the summary below:

'Summary. -- A brief resume of the various methods used to describe, analyze, or specify colors, including color names, systems of material color standards, colorimeters, and spectrophotometric methods. The computation of colorimetric quantities from

spectrophotometric data is considered, together with methods of specification based thereon.

- I Introduction.
- II Color names.
- III Color systems.
  - (1) Maerz and Paul Dictionary of Color.
  - (2) Munsell Book of Color.
  - (3) Lovibond Tintometer glasses.
- IV Colorimeters.
  - (1) Dependent upon material color standards.
  - (2) Using spectrum primaries
  - (3) Filter photometers.
- V Spectrophotometric analysis.
- VI Colorimetric computations.
- VII Colorimetric specifications.
- VIII Color of illuminants.
- IX Conclusion."

"This article is one of the best of its sort that I have seen recently. It brings the subject to date --- all within 22 pages of text.... (This article) appears in the Journal of Motion Picture Engineers, 28, 388-410 (No.4; 1937)."

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#### Progress Report of the Inter-Society Color Council

#### SURVEY OF TERMS, TESTS AND PROBLEMS; A.S.T.M. Subcommittee IV.

We have received this report, dated February 25, 1937, and signed by A. W. Kenney, Chairman; M. Rea Paul, W. M. Scott, and H. M. Hancock. However, we already had on hand material for a very lengthy News letter. Therefore we shall ask you to exercise patience; and we shall reproduce it in our next number, which promises to be shorter.

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#### WASHINGTON, CHICAGO and now BOSTON?

At the suggestion of our Chairman, on April 28 Dr. Walter M. Scott called a dinner meeting at the Hotel Lenox, Boston, Massachusetts, which was attended by the following individuals:

Professor Arthur C. Hardy of Massachusetts Institute of Technology and Dr. M. G. Zigler of Wellesley College, representing color in Science;

Professor Frank Allen of the Massachusetts School of Art, and Mrs. E. K. Chamberlain of the Chamberlain School of Art, representing color in art;

Mr. Arthur W. Cornell, Chief Chemist, Forbes Lithograph Manufacturing Company, Miss M. T. Wessman and Miss Beatrice Bowry of Filene's Department Store, representing color in Industry.

Mr. M. Rea Paul and Dr. Scott also attended.

The object was to explain the aims and purposes of the Council, the work of the Chicago and Washington groups, and to offer those present and others the opportunity of organizing as a work committee to bring about the formation of a color conference group in Boston that would act as a branch or section of the Inter-Society Color Council.

The idea was received with considerable enthusiasm; and under Dr. Scott's direction, plans were made to establish such a group with the thought of calling the first meeting probably in the early fall.

COMMON COLOR NAMES, GROUP II

Correlation of Common Color Names, Maerz and Paul, Munsell and tentative Color Council Names.

M and P :	Common Name	:	Munsell	Inter-Society Color Council Tentative Name
18 B 7	Aquagreen	10.0 GY 7.1/4.5	Pale yellowish green	✓
35 I 3	Aquamarine	4.0 B 5.7/3.0	Pale Blue to light greenish blue	✓
4 A 4	Ashes of Rose(s)	8.0 RP 5.1/5.0	Weak to moderate purplish red	✓
53 K 10	Aster Purple	5.7 RP 3.0/10.0	Deep red purple	✓
7 C 11	Auburn (Gorevan, Tulipwood, Zuni Brown)	4.8 YR 3.4/3.7	Moderate Weak red brown	✓
(10 L 2)	Aureolin (see Cobalt Yellow)	5.0 Y 8.3/9.0	Moderate to Strong yellow	✓
1 G 10	Aurora (Aurora Orange)	6.8 R 6.3/9.0	Light to brilliant red	moderate no.
3 G 10	Aurora Red (Emberglow)	8.5 R 5.3/5.8	Red orange	
( 9 L 8)	Aurora Yellow (see Cadmium Yellow), (Daffodil Yellow, Radiant Yellow, Nasturtium Yellow, Orient Yellow)	6.0 YR 7.2/11.0	weak Moderate reddish	16
2 E 7	Aurore (Hydrangea Pink, Orient)	5.3 R 7.9/3.0	Moderate to strong orange	✓
8 A 12	Autumn	9.0 YR 2.5/2.0	Pale to light pink	weak to moderate
8 E 10	Autumn Brown (Seal, Seal Brown)	8.0 YR 3.0/2.0	Weak to dusky Brown	✓
22 K 7	Autumn Green (Spinach Green)	6.0 GY 4.7/5.0	Weak Brown	✓
*	Azure		Dusky to dark yellow green	✓
36 K 7	Azurite Blue (Air Blue, Blue Bice, Ceramic, Sanders Blue, Verditer Blue)	9.8 B 4.1/5.7	Moderate Blue	
35 E 2	Baby Blue	4.5 B 6.5/1.5	Light to medium bluish gray, pale blue	✓
1 C 8	Baby Pink	7.5 R 8.0/4.0	Light pink	Moderate
10 G 2	Barium Yellow (Colonial Buff)	5.0 Y 8.1/4.8	Weak yellow	✓
7 E 11	Bay (Malabar, Mummy Brown, Trotteur Tan)	3.7 YR 3.4/4.5	Moderate Weak red brown	✓
15 A 6	Beaver (Beaver Brown, Camel, Mushroom, Starling)	7.0 YR 4.1/1.5	Dark Brownish gray to weak brown	✓
11 C 2	Beige (Ecru)	5.0 Y 7.6/3.0	Weak yellow	✓
33 K 2	Beryl	3.8 B 6.3/5.2	Light greenish blue	✓

## COMMON COLOR NAMES, GROUP II

Page 2

33 H 2	Beryl Blue	5.0 B 7.2/3.8	Light greenish blue to light blue
25 J 5	Beryl Green	5.0 BG 6.3/6.0	Light blue green ✓
	Biscuit, (see Almond)		Pale
44 J 6	Bishop's Violet (Bishop's Purple)	9.0 P 3.7/6	Moderate Reddish purple ✓
14 K 9	Bismark Brown (Havana Brown, Bunny)	9.5 YR 4.4/4.0	Moderate yellowish ✓ Yellow brown
11 A 3	Bisque	6.5 YR 7.5/1.5	Pinkish gray, faint to very weak orange very pale orange, very pale brown ✓

(\*) Maerz and Paul state that this color is not standardized. The name is chiefly a literary term; loosely, it is any of several colors somewhat resembling that of the clear sky; some times, the variable colors of the pigments ultramarine blue, cobalt blue or smalt; more generally, merely blue.

checked & reported  
KLR - 7/22/39

COLOR IN PAINTING THROUGH THE AGES. II.

An old legend may be cited to account for the origin of painting. This legend has it that the first painting was by a girl who wished to preserve the outline of her lover always before her. She did it by cutting in a wall the outline of his silhouette with a sharp tool and filling in the outline with "solid" color. This legend serves to illustrate a fact which archaeologists have been coming to realize more and more during the last decade. Writers of the nineteenth century were inclined to scoff at such legendary tales as that of the great Flood, and the Epic of Gilgamesh, as mere fanciful fairy tales with little semblance of fact. Today, because of the excavations of the last ten or twelve years, we know not only that the Flood inundated the plain of Shinar, driving the Semites and the Elamites alike to the mountains, but we can point out the layer of alluvium it left and give its approximate date (about 6600 years ago; within a century). We would wander too far from our subject if we were to relate this interesting legend even in outline. But we know that the mythical king of Erech, called Gilgamesh, who was the central figure of many Sumerian legends and the hero of both Babylonian or Sumerian and Semitic epics, was very probably an actual historical king. The hero Etana, who attempted to mount to heaven on an eagle, became frightened and fell to his death, was also an actual king of Kish. Erech and Kish were the seats of the earliest dynasties in the land of the Tigris and the Euphrates, near the Persian Gulf, following the deluge. King lists have been found which relate the sequence of these early kings and city-states. In the excavations at Ur we find in the lowest layer a fine painted pottery (the al'Ubaid culture) similar to that of the earliest strata of Susa in Elam (modern Persia). Between this and the layer of the so-called "Uruk I" culture (Uruk is Erech) in which people lived in towns and were developing writing, is found a layer of flood deposit, no doubt that of the Deluge mentioned early in the king lists later drawn up. There were not only Sumerian and Akkadian versions of the great epic, but also Hittite and Hurrian; moreover, such later legends as the Greek one of Deucalion and Pyrrha. These were the king and queen of Thessaly, the only human pair that survived a great deluge sent by Zeus. They were commanded to restore the race of men by throwing the bones of their mother behind their backs. From the stones which they cast behind them (the earth was their mother) sprang men and women. In both the Biblical (Semitic) and the Babylonian (Sumero-Akkadian) versions, it is the last of ten heroes who is to preserve the race; but there is a difference. Not one of the ten names of the two sets are alike, and the cuneiform texts speaks of prediluvian kings, while the Bible deals with patriarchs, reflecting the two different civilizations. The Babylonian names remained constant for 2000 years; but the Biblical account came indirectly through the Hurrians, who preceded the Israelites in Palestine. The great-grandfather of Gilgamesh, who personifies immortality, and who cured Gilgamesh of a foul disease, telling him the story of the Deluge, was the Biblical Noah, the Hurrian Nahmaniel, the Sumerian Ziusudra, and the Greek Xisouthros. These

legends dealing with times which appeared to these ancient peoples as being of great antiquity, vaguely related to idea of immortality, were somewhat related to legends of a Great Mother, or Earth Mother, known to various ancient peoples by various names (Ishtar, Cybele, Rhea, Astarte, etc.) These legends are woven throughout the fabric of ancient religions, consequently are reflected in the art of the peoples. We shall have occasion many times to refer to these connections later in this series of articles.

Returning to the legend of the origin of painting, we hope it will be clear that we do not imply either its literal truth or the complete accuracy of the legends referred to later. But it is a fact that the first mural paintings were of the sort indicated: incised outlines filled in with what we call "flat" or "solid" colors, that is, without light and shade, uniform in hue, saturation and lightness. Actually, judging from what we know of the earliest men, there was little chance that the first painting was done by women. They were kept too busy by their masters, the men; in the very early ages which succeeded the great days of still earlier cave paintings; they made the pottery, tended the fires or scratched the earth in a rude agriculture, while their lords chipped flints for tools, implements or weapons, or fought other men or animals. Moreover, we shall very soon see that there were far different, and if not weightier, at least more pressing, motives for the earliest painting.

Note also that we spoke too of the first mural painting; for the first painting, certainly the first decoration, was not applied to walls alone. This brings us to a necessary consideration, viz., what scope shall we allow for the term "painting." Certainly today we could not restrict it to easel and mural painting; in a broader sense we follow good authority when we regard mosaic work and embroidery as painting in color. In earlier times there was the polychroming of statuary and the arrangement of glazed tiles for decoration; and if we go back to the beginnings of art, we must include other forms of painting. The painting of pottery, the variations in the types of which serve to characterize many early civilizations, of course must have begun after the beginnings of pottery itself; and pottery was a relatively late institution in man's history. It is found in cultural strata which stratigraphic methods, probably incorrect, dated about 17000 years ago; it is perhaps, roughly, half that old. The earliest mural painting in the caves may be dated conservatively at 22000 years ago. The practice of painting, as well as tattooing, the body was common among the cave-dwellers, and probably goes back much farther, as does the practice of burying the dead in red ocher. Earliest art, in a broad sense, included the decoration of tools, weapons and ceremonial objects.

It is because of these various rude beginnings, coupled with our belief that we cannot understand fully the use of color in the historic times and the present, unless we consider its use in the antecedent cultures, that we have determined to go back to

the earliest arts of man in our recitals of his use of color and its correlates. Western European art profited by Roman art; Roman art was the child of Greece; Greece had for its background Egypt; and even Egypt, in neolithic times, had contacts with and influences from the earliest civilizations, which in the last decade we have learned extended in a more or less uniform spread from Palestine and Asia Minor across Asia as far as India. In art as in other things, the present is the child of the past and the parent of the future. We shall, indeed, go back rapidly to times even before the probable date of the dawn artist, who, so far as we know now, was a member of the aurignacian race of upper paleolithic times, or in contact with the culture of that race, lending to or borrowing from it. The date of "lower Aurignacian" culture is, roughly, 100,000 B. C. in western and central Europe; it may have been earlier in Africa, from whence it probably came.

As we have given the legend of the first painting, it may be interesting to give another legend, that of the first people; that is, the first who survived after the flood; perhaps especially because colors are involved. We do so the more readily because, for some, it may serve to relieve the monotony of a long recital of names of races, cultures, dates and colors, as well as facts of historical background.

Along with a succession of cultures: Chellean, Acheulean, and so on, we have the races of men and their fossil predecessors; Java man, Kanam man, Piltdown man, Peking man, Heidelberg man, Solo man, etc.; - even Folsom man in America, a mere babe of 12000 years age. Later we shall give these names in tabular form. The latter ones are the names of places, or "stations", where the remains of the races have been found. The list of names alone is bewildering to the layman. We almost forgot to add "the Red Lady of Paviland," who was no lady at all. At Paviland cave in South Wales, a geologist found among the remains of extinct animals a skeleton, the bones of which were covered with red paint, the first known use of rouge on the body. This association with rouge perhaps misled people to regard the skeleton as that of a lady. It turned out to be that of a tall man, probably Aurignacian. This confusion is the opposite of that of the story we shall tell later concerning "Peking man." At present our long list of names and cultures - and we have given only a fraction of it - reminds us of another story. The reader may feel like the man who was dozing through an apparently interminable sermon dealing with all the major and minor prophets. When at last the sermonizer said "And now, what place shall we give to Habbakuk?" the listener arose in despair with the remark: "Habbakuk can have my place; I'm going home."

But we promised another legend. This is the Choctaw Indian legend of a flood, visited upon man because of his wickedness. A divinely prewarned prophet went from village to village proclaiming the coming of the deluge; but no one heeded him. Darkness, cold and thunder came and the food of the Indians became

mouldy and unfit to eat. Wild animals from the forest gathered around the camp fires. Great waters rushed over the land from the north and destroyed everything. The prophet alone was saved. He made a raft of sassafras logs, upon which he floated for many weeks. A blackbird circled over his raft but when the prophet asked it for help, it flew away. Then a bluebird, with red eyes, came and guided the prophet to an island in the direction of sunrise. The prophet landed and lay down in the mud to sleep. When he awoke, he found the island covered with all kinds of animals. Among them were the blackbird and the bluebird with red eyes. The blackbird became the raven, a bird of ill-omen ever afterwards; but the bluebird became a beautiful woman, the mother of the new race of men.

We shall let the reader judge how much of this legend has a basis in fact, reminding him only that the American Indian had to come east to reach America from Asia, his earliest home. Our purpose in introducing the legend here, apart from furnishing a lighter interlude, or prelude in a dry and ponderous listing of facts, is to introduce the ideas of migrations, forced by the exigencies of various circumstances, and the idea of omens of ill or of good-luck, or more generally, of superstition and magic. For the migrations of early peoples played a great part in the transmission of their cultures, and the interaction of one culture with another; and the influence of magic, inextricably interwoven with religion, had a profound effect on art. Thus, from the time of the Flood, the history of the peoples in the region of the earliest civilizations (i.e. in Sumer and Akkad just south and west of the Tigris, and Elam in the hills to the north and west) was one of constant warfare between the small city-states along with the greater war of Semites with Elamites. This struggle, which lasted for thousands of years, found first one of these city-states (Kish, Erech, Ur, Lagash, etc.), then another, in the ascendancy. During all these troubled times, the only general authority recognized in all of Sumer and the neighboring lands was that of the god Enlil, whose seat was at Nippur. When Urukagina, the last king of Lagash, who was a social reformer, introduced a new god, it may have caused a reaction so great as to hasten his overthrow by Zaggisi, the king of Umma, who restored the god Enlil. Zaggisi in his turn was overthrown by the great Sargon; and so the story goes. But these continuous political upheavals signify constant contacts of various groups of peoples, not all a homogeneous ethnical unit; and it is such a dynamic, rather than a static or conservative, society in which we may expect to find the greatest impetus to the progress of civilization and the development of art, in spite of the destructive effects of continuous warfare.

So far from being semi-mythical, as it once was, the First Dynasty of Ur, "has now become to us more familiar and substantial than many later periods." The date of the dynasty, said to have been the third after the flood, is about 3100 B.C. The author whom we have just quoted (Speiser) goes on to say that the so-called proto-dynastic graves at Ur of the time of Queen Shub-ad "have yielded finds of such exquisite beauty that the

remains of the First Dynasty disclose, on comparison, unmistakable signs of decadence." If the ancient kings who caused to be written the cuneiform texts had been interested in more than the citation of still more ancient kings (and thereby exalting their own distinguished lineage), they might have told an interesting story. The single reference to an event that occurred during the first post-diluvian (First Kish) dynasty is to one in the reign of the 22nd king, "who the land of Elam with his arms subdued." The annoying detail that disturbed the care-free existence of the demi-god kings was the necessity of teaching the hillbillies of Elam a lesson. It was singled out as the first political event after the Flood.

The stylistic evidence from the proto-dynastic graves at Ur revealed in the so-called "cylinder seals," disclose to us an amazing civilization, refined, literate and artistic, apparently full-grown at the dawn of history, which now has been pushed back another thousand years. While the archaeological discoveries have vindicated in part the scholarship of the authors of the cuneiform king-lists (which go back to about 4400 B.C., but were drawn up much later), they have also served to push back the beginnings of art. For we know that a highly stylized art must have been preceded by centuries of more naturalistic forms. Art was not born like Athena, who sprang forth, full-grown and in complete armor, from the head of Zeus. It may be noted that Athena, the goddess of war, was also the goddess of the useful arts. Perhaps the Greeks understood the invigorating effects on the arts of contacts, even if war-bred, with foreign stocks.

We have referred above to the connections of early art with magic and religion, which were perhaps at one stage one and the same. We shall discuss these things in more detail later. The earliest (Aurignacian) painters might well be described as magicians. Though not involving color, we may here refer also to the sculptured figurines, such as the famous limestone "Venus of Willendorf." This obese female figure has enormous pendant breasts, the steatopygic development of the hips found in present-day Hottentots, along with attenuated legs and mere traces of arms. It must be remembered that these figures were the work of a race of whose great artistic skill we shall relate more later. Such figurines, whether of women or cattle, when discovered in Mesopotamia, Egypt or the area of the Danube are generally referred to a fertility cult which originated in Asia Minor and was subsequently developed into the ritual of Cybele, the Great Mother. The obesity of these figures is attributed to the sympathetic magic of the fertility cult. They were executed at a time when the race was not sufficiently numerous; they desired an increase in their population. These figurines help to explain the magical nature of the cave paintings, particularly when we note that cave painting flourished when the climate was cold, wet and severe, and became stationary when it became moist and temperate, so that men no longer needed to procure the increase of game through magic. As the steppe horses and bison retreated to the north, the Aurignacians, in the summers, came out of the caves into the open, where the seasonal migrations of the animals gave them plentiful game. In the warmer period which followed

the middle phase (70,000 B. C.) of the last great European glacier, we find rude hunting lodges appearing in the pictures on the cavern walls.

The use of color was apparently regarded by the Aurignacian magicians as deadly, for it was reserved for the representative of dangerous animals such as the elephant, mammoth and rhinoceros. A second purpose of the magician gradually evolved. By selecting the females and young of the inoffensive species of game, and by rendering them lifelike by the use of internal lines, they hoped to augment the numbers of the less dangerous game. These practices are seen combined in the figure of a rhinoceros engraved with interior lines on the walls of the cave at Font de Gaume, in the Dordogne region of France. Here the body is completely washed over with red paint. At other times, the practice arose of painting animals without eyes, for an animal which could not see would be more easily stalked and slain.

The most striking characteristic of the best of this early art is its remarkable realism. Fancy was absolutely excluded. Whether represented alone or in groups, animals were depicted with a correctness to which we find no parallel in the art of primitive peoples who flourished in the thousands of years since the cave paintings. We say the best early art, for then, as now, there were good artists and poor artists. Then, as now, men may have been born with the artistic impulse; but no man was ever born an artist. He must then, as now, have had a certain peculiar endowment of special qualities and the opportunity to practice. It was an incentive to realism for the ancient artist to believe that his welfare, even his life, depended on his artistic effort; for he thought that the more accurate his drawing, the greater his power over the animal portrayed. Today we make hyperbolic use of the phrase "the magic of art"; ancient man actually believed in it and practiced it. We find him able to picture horses and stags in attitudes which only modern rapid photography has revealed to us. He must have been a great observer; he had ample opportunity to observe animals in flight. The artist of the reindeer age liked to represent animals in lively and picturesque attitudes; he was obviously in love with life and movement. This is perhaps easily understood; but a final characteristic of cave art reveals in the artist qualities which (in our first article) we attributed to Rembrandt, Velasquez and Leonardo and which today we often associate with great art. These are the attributes of reserve and economy. The cave artist did not waste time on useless details.

In the first article of this series, we said that we would show what painting, or art in painting, is by showing what it is not. We went to some pains to show that good painting does not strive merely for photographic accuracy. In view of the many eulogies written about the caveman's art (which do not bother to distinguish good cave art from bad), it might seem that our previous paragraph was a lapse. But we hope we have indicated in bare outline some of the characteristics which make the best cave art transcend mere exact literalness, which might be most remarkable, but not necessarily artistic, in such primitive cultures.

On the negative side, we might also raise several other questions as to the content of art in painting; for example: Is the story-telling, narrative, or literary value of a picture important? Is moralizing or sentimentalizing a proper field for painting? In Hollywood, mother-love and the tears of a child are rated "sure-fire stuff." Does technical proficiency, professional competence such as "mastery of the brush," constitute great painting? What is the importance of mere prettiness or beauty? Is the decorative quality, pleasingness of a simple sensuous character, the attractiveness of a simple pattern of harmonious color, an important desideratum?

We shall not seek to answer these questions at the present stage. Indeed, we have already partially answered them and shall answer them, when we do, chiefly by implication, rarely by explicit affirmation. We prefer rather to marshall before you some of the facts and let you decide for yourself. After all, our subject is the use of color; and we would rather wander not too distantly from the subject too often. Bearing this in mind, we shall proceed from our lengthy introduction to the main body of the subject in our subsequent numbers. We will begin at the very beginning, divide up all time up to the present into four great cycles, grossly unequal in point of duration, and trace the ascending and the "decadent" cycles of each. Obviously, the first of our four cycles may be labeled "Ancient Painting."

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Question 6 - There is no blue pigment in either the sky or the eyes of the Irish colleen. Why are they both blue?

Answer 6 - Although the common examples of color are due to wave length selection and absorption, as in the case of dyes, paint pigments, flowers, minerals, etc., that is not the sole cause of color. That might be called a "chemical" cause, due ultimately to the way the chemical bricks, which we call atoms, are built up in the chemical architectural structure, which we call molecules; but there are also less common, but often familiar, "physical" causes. In the chemical case, part of the light is lost by absorption, being converted to heat or other form of energy. In the physical cases, the light is still present to be seen, but it is divided into parts. Often one of the parts (of one color) can be seen on looking through the substance, the other part (of a different color) on looking at the substance. In the case of the sky the color is due to "scattering" of the light. Particles of moisture, if small enough, cause the light to be diffused in all directions, to be reflected and re-reflected by other particles. Minute dust motes also scatter light, and even the molecules of oxygen and nitrogen which compose air. Lord Rayleigh showed that the scattering is inversely as the wave length raised to the fourth power. This means that red light will be scattered only a fifth as much as blue light, having only two-thirds its wave length, while violet light will be scattered even more than blue light. Therefore, if there are enough dust, smoke and moisture particles small

enough, let alone air molecules, violet-blue light will be scattered while red will be transmitted. The blue light is clearly seen against the black background of empty space. More light of other color would make it hard to see the blue. The sunset colors are due to the light not scattered.

Blue eyes are blue for the same reason as the sky, not because they reflect the sky,--nor because we have smoke in our eyes. The blue of the eyes is due to the very minute particles suspended in the various media of the eye. The smaller the particles, the more intense the blue. That is why babies' eyes are so blue. As they grow older, the particles coalesce to coarser ones. Older people have a yellowish-brown pigment in back of the iris in varying amounts. The combinations of the browns and the blues in different proportions give green, hazel, brown and black eyes. The pigment usually does not develop at birth, hence blue eyes often become darker; but the reverse never occurs. Other instances of blues due to scattering are seen in skimmed milk, cigarette smoke, the purple-blue haze in mountains, the bluish grays obtained when white and black paint pigments are mixed, and those blue bird feathers which are not iridescent. The iridescent ones are not due to scattering.

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Question 7 - Why does smoke appear blue against a dark roof but yellowish-brown above it?

Answer 7 - This question is easily answered in the light of the answer to Question 6. Smoke particles of the right size; i.e., only the smallest of them are good light scatterers. The blue scattered light is seen against the dark background of the roof just as the blue of the sky is seen against the dark empty space. Above the roof the light comes to us through the smoke. We can readily see the transmitted light, which is faint red, orange and yellow against the blue background, while the blue scattered light is not seen against this background. In fact, by contrast with the blue, the transmission yellow is intensified.

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