Inter-Society Color Council *Newsletter*

NUMBER 216
January-February 1972

41ST ANNUAL MEETING REMINDER

The 41st Annual Meeting of the Inter-Society Color Council will be held at the Statler-Hilton Hotel, New York, N.Y., on Monday and Tuesday, March 20 and 21, 1972.

On Monday, March 20, open meetings of the ISCC Problems Subcommittees will be held. As in the past, members and friends of the Council are encouraged to attend this Monday session. Both morning and afternoon meetings will be held.

A separate announcement was sent to all ISCC members.

NORMAN MACBETH, SENIOR

At the 1967 annual meeting a new ISCC award was announced. The ISCC Board of Directors had accepted the offer of Norman Macbeth, Jr., our long-time treasurer, to establish an ISCC award in honor of his father Norman Macbeth, 1873-1936, the award to be given in recognition of recent important contributions in the field of color, preferably for those made within the five or ten years preceding the award. The ISCC-Macbeth Award will be presented for the first time at the 1972 annual meeting. At this time it therefore seems appropriate to share with our members recollections of the man in whose honor the award is named.

Norman Macbeth was born September 9, 1873 in Stayner, Ontario. He came to the United States from Canada in 1902 and after brief stops in Boston and New York settled in the Philadelphia area. While there he worked as lighting engineer for Welsbach and Westinghouse and in 1911 formed the Macbeth Arc Lamp Company. In 1915, when Artificial Daylighting Company was formed, he moved to New York City.

Prior to 1910 his first involvement was with the evaluation and correction of electric meters, at that time extremely inaccurate. He developed techniques for testing their accuracy. In 1908, while lighting engineer for the Welsbach Company, Camden, N.J. (1908-1911), during the time when gas and electricity were in competition for lighting, he developed an "Amber Light" gas mantle that reduced the excess green of the gas lighting, bringing its color closer to that of the warmer incandescent lamp color preferred for home lighting. He did much in that early period to create an interest in the use of illuminating engineering in connection with gas lighting; he wrote a Handbook on Gas Illumination and presented a number of papers at gas association conventions.

In 1910, after development in 1907 of a special arc lamp for photo-engravers' use, he invented the high-current-density white flame carbon arc. This led to the formation in 1911 of the Macbeth Arc Lamp Company under which this lamp earned a world reputation as leader in carbon arcs for photo-engraving, a reputation held until the 1950s when pulsed xenon and halogen tungsten took over. During this decade he organized an illuminating engineering department at the Westinghouse Lamp Company. In fact, during this period he carried on several activities simultaneously, for from 1912-1917 Norman Macbeth owned and edited Lighting Journal, at that time the only publication devoted exclusively to the advancement of the lighting industry. He invented the Macbeth Illuminometer -- one of his greater gifts to illuminating engineering -- patented in 1914 and produced by Leeds and Northrup, Philadelphia. He also began the experiments that led to the production of artificial daylight and, in 1915, to the formation of Artificial Daylighting Company, forerunner of the present Macbeth Corporation. With Ives he developed a glass known as the Ives-Brady glass, and developed and patented a circular slide rule for converting measurements of illumination and brightness. He developed and patented the use of high and low color temperature illuminants for testing metamerism. His interests were so wide, and his enthusiasm for Lighting Journal so great, that the consequent financial strain made it necessary for him to relinquish his interests in the Macbeth Arc Lamp Company in order to continue with the publishing venture. He continued with this until 1917 when he sold Lighting Journal to McGraw-Hill Publishing Company where it was combined with Electrical Merchandising and Electrical World.

In the period following 1920 Norman Macbeth's active association with the Illuminating Engineering Society, which he joined in 1906, continued and in 1927-1928 he became its president. Use of the Macbeth Illuminometer was further developed by addition of various

filters to allow measurement of the quantity and brightness of line sources such as mercury and sodium, and by including a colorimetry attachment. With Dr. H. P. Gage he developed the daylight glass subsequently known as Corning 5900, and he pioneered in development of surgical lamps of high intensity, equipping them with heat absorbing glass to remove infrared radiation. During this period use of Macbeth filtered-incandescent daylight lamps increased, particularly in the textile, graphic arts, and later in color motion picture fields where color matching and color fidelity was, and still is, an important part of any successful operation. He was an expert who became the trusted consultant in fields where color was a problem.

Norman Macbeth took an active part in formation of the Inter-Society Color Council. He was present at the February 26, 1931 preliminary conference in New York, and attended the first few annual meetings as one of the first two "cooperating associates," -- as individual members were called in those days. In 1934 he was appointed one of three IES delegates and in that capacity served until his death on September 2, 1936. He was named Honorary Member in 1968.

It was a privilege to know Norman Macbeth, for he was a man of great competence and integrity. We agree wholeheartedly with the following quotation taken from the 1936 IES Council resolution in its Memorial to him: "His exceptional ability, his clear judgment and wise counsel, combined with his loveable personality and high sense of honor commands the admiration, affection and respect of all those who had contact with him, and the memory of his sterling character will be an abiding inspiration to all who enjoyed his friendship."

The Inter-Society Color Council is proud to have an award named in honor of Norman Macbeth, one of its earliest and valued members, pioneer in the art and science of color and illumination.

Dorothy Nickerson

OPTIMUM REPRODUCTION OF COLOR

The Inter-Society Color Council has released the Proceedings of its 1971 Williamsburg Conference on the Optimum Reproduction of Color. This unique 236-page soft-cover book, with a bibliography of 113 references, contains twelve papers on the complex problems of color reproduction in television, photography, and the graphic arts.

Although the ability to specify the parameters for optimum color reproduction continues to elude the experts, acceptable color reproduction is apparent in all these media. Most of the technology is available to improve the level of existing quality, but the problem is to learn what technological changes will lead to improvements in color reproduction as determined by the viewer.

It was to explore this problem that the conference came about, and the Proceedings contains the latest scientific thinking in this area. The bibliography represents a comprehensive analysis of color reproduction from this point of view.

While the book is primarily oriented towards the research scientist, some papers contain information of a less technical nature and will appeal to those concerned with the day-to-day production of color reproductions. It is a useful book for all people interested in the reproduction of color, whether their field is printing, photography or television.

The price is $12.00, and the Proceedings can be ordered from the Information Services, Graphic Arts Research Center, Rochester Institute of Technology, 1 Lomb Memorial Drive, Rochester, New York 14623. Checks should be made payable to the Rochester Institute of Technology, and should accompany all orders. All ISCC members were sent free copies.

For further information contact: Dr. Fred W. Billmeyer, Jr., Secretary, Inter-Society Color Council, Rensselaer Polytechnic Institute, Troy, New York 12181.

INTERNATIONAL COLOR ASSOCIATION ANNOUNCES SECOND AIC CONGRESS "COLOUR 73" -- YORK, ENGLAND, 1973

The International Color Association (Association Internationale de la Couleur -- AIC) of which the Inter-Society Color Council is the United States member organization, announces that its second quadrennial conference "Colour 73" will be held in York, Great Britain, from 2nd to 6th July 1973. The venue will be the University of York, a modern campus about two miles from the center of the city.

There is ample and excellent accommodation available on the University Campus, so that delegates will be able to meet informally throughout the Conference. A very small amount of hotel accommodation has also been reserved in the City of York.

It is proposed to hold "Single Session" meetings in the mornings, at which invited lecturers will survey various aspects of color, to be followed by general discussion. In the afternoons, "Parallel Sessions" will be arranged at which contributed papers on more specialist aspects of color will be read and discussed. A call for papers will be made in the first circular which is to be prepared and circulated early in 1972.

York was for a long time the second city in England, and has many ancient and historic buildings. The Minster Church is famous for its stained glass windows. The surrounding country is some of the most lovely in Britain, with many places of great interest and charm. The industrial north is within an easy distance for those wanting to study British industry. An evening social program and a program for the ladies will be arranged.

The organizing committee, set up by The Colour Group (Great Britain), will function under a secretariat headed by Professor W. D. Wright. Further inquiries should be addressed to:

Professor W. D. Wright
(AIC Colour 73)
Applied Optics Section
Imperial College
London SW7 2BZ
England

or

Professor Fred W. Billmeyer, Jr.
Secretary, Inter-Society Color Council
Rensselaer Polytechnic Institute
Department of Chemistry
Troy, New York 12181

CANADIAN COLOR SOCIETY

For a number of years many Canadians interested in the field of color -- either from an industrial, artistic or scientific point of view -- have repeatedly indicated that a suitable Canadian organization should be formed within which Canadians could meet and discuss their color problems. Such organizations exist in other countries and have proven very successful to the community of engineers, artists, business men, and scientists interested in color.

An ad hoc steering committee now is actively working towards the formation of a Canadian Society for Color in Art, Industry, and Science. Such an organization will provide Canada with a much needed "melting pot" of interests where, for example, an artist, a psychologist, an engineer and a scientist might have the opportunity to get together and bring their respective backgrounds to bear on a color problem.

It is anticipated that the proposed Canadian Society for Color will hold regular meetings consisting of symposia, seminars and round-table discussions or "workshops" at various centers in Canada which would lead to a better understanding of color problems and help to resolve them.

The steering committee hopes to be able to invite all those interested to join the new Canadian Society for Color sometime in the Spring of 1972. Plans are being made to hold a National Research Council Symposium on Color sometime in May or early June of 1972 in Ottawa. The Canadian Society for Color will be founded on that occasion.

Anyone interested in these plans may contact the Chairman of the steering committee:

Dr. Gunter Wyszecki
National Research Council
Ottawa, Ontario
K1A OS1

TOWARDS THE DEVELOPMENT OF A COLOR-BASED COLOR ARCHIVE

Since the last discussions of this proposal, prior to 1966, the Cooper-Hewitt Museum's recent history has made it possible to re-assess its philosophy and programs. The move from the Cooper Union building to the Carnegie Mansion, made last summer, provides a new location with a great deal more space than before (9 East 90th Street, New York, N.Y. 10028).

Attendant on the move, a grant of substantial proportions from the New York State Council on the Arts is making it possible to carry on a series of "think tanks" involving the most creative minds in design and related fields, who will suggest and advise on many problems and help to formulate the Museum's future.

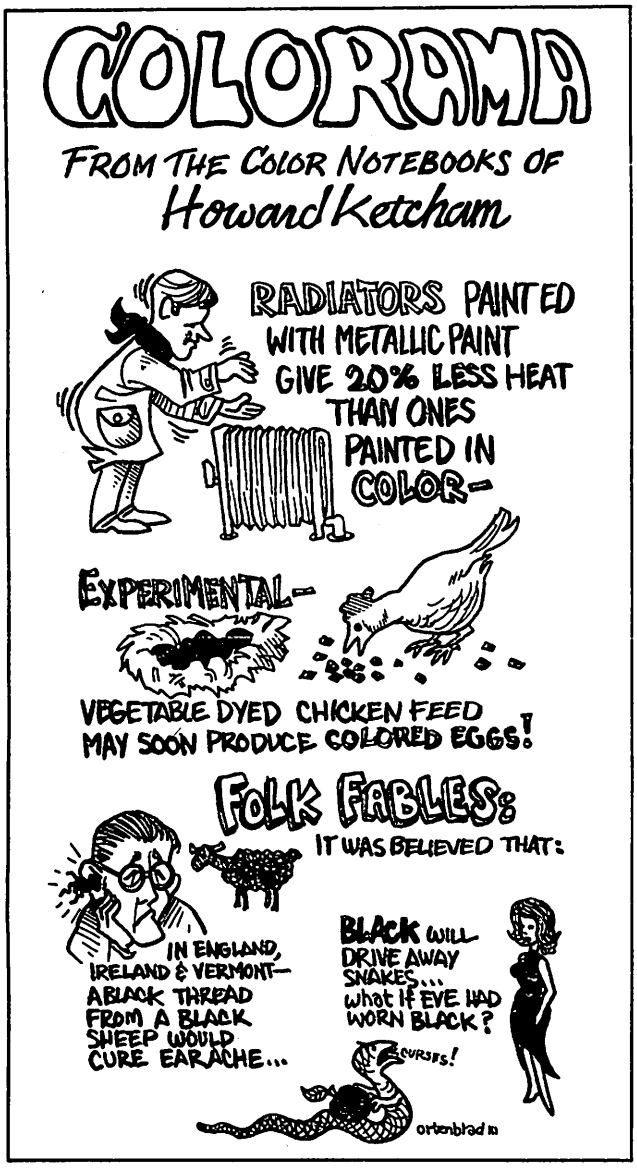
Two decisions already made from the findings have some bearing on our discussion here:

1. The Museum will involve itself heavily with education on the premises through lectures, workshops, classes and courses at every level. Some will be credit courses in conjunction with neighboring schools.

2. The Museum wishes to have bodies of material in quantity made readily accessible to provide several kinds of services and information through the use of retrieval systems of several sorts.

No all-encompassing archive of color exists at present, although bodies of specialist data exist in various places where research or work is actually taking place.

This Museum proposes, with the collaboration of the ISCC to gather a collection embracing pertinent material of all kinds in every area of color study and usage, with the intention of making it readily



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accessible to an interested public. Material will include books, visual and printed matter, color samples, manuscripts from the present and past; but no important example will be excluded because of dimension or size.

To bring such a collection about, the Museum will need the help of ISCC membership, both general and explicit. Bodies of important material probably are disappearing right now, and only a few specialists would recognize their importance. The Museum needs help in making the selections of material, for no one on the staff has sufficient and broad knowledge of what is of major importance. Sources of pertinent material for the collection and dissemination in selection will have to come from the ISCC. Documentation is also required. In this context, an appeal to the entire membership of the Council to give material now, instead of bequeathing, would provide for first-hand documentation from the donor.

The ISCC will also be necessary through advice and participation in the countless programs and courses which will emanate from the collections.

The Museum will provide space for archival material and its study, and methods for ready retrieval. Also it will maintain regular programs evolving from color interests, with guidance from ISCC in developing such. It will deal with color in exhibitions as feasible, but will never have a separate gallery permanently devoted to color, feeling that such an exhibition, necessarily limited, would tend to be more appropriate for a trade exposition.

The Museum intends to have a curator of design, a person who will have an all over involvement with collections, and of sufficient knowledge to deal intelligently with color interests in their incorporation with Museum programs and activities.

The ISCC cannot be looked upon as a body for financial support for this project. However, it is the Museum's hope that many member organizations may be approached to commit themselves to such support.

BRITISH COLOUR GROUP

Report on the 80th Meeting of the Group Held in December, 1971

The first half of the meeting was devoted to an account of the history and practice of Son et Lumiere, entitled "The quickness of the light deceives the ear" and given by Mr. P. Moore of Thorn Lighting Ltd. The speaker had long assumed that nearly everyone in this country knew what Son et Lumiere implied. In fact he was surprised to learn in a recent survey of passers-by, which he himself had conducted, that the name was correctly understood by only about one in ten people interviewed, and he illustrated the point with some telling excerpts of some of the conversations played back from tape recordings.

Mr. Moore then gave us a demonstration of a typical Son et Lumiere event the first ten minutes of the one given at Blenheim Palace using colour slides and tape recordings. He explained that although the purpose was as much entertainment as cultural or educational, the facts round which a Son et Lumiere show is built have to be historically accurate in the strictest sense. A Son et Lumiere event can be regarded as a sound-play (as developed in radio broadcasting) combined with a suitably synchronised display of lighting of the building and its immediate

surroundings. An interesting fact is that loudspeakers do not have to be located accurately at the supposed point of action: it is enough for spot lights to focus peoples attention on the actual place, and for the sound to be emitted from somewhere in the general area.

Son et Lumiere was invented as a medium in the early 1950's by an entrepreneur named Houdin, a descendant of the illusionist and escapologist known as "Houdini." The first event was staged at the Chateau de Chambord in the Loire Valley. The chateaux of the Loire Valley are world famous as examples of architecture, and the most famous of all, Chenonceaux, soon had Son et Lumiere also. A number of slides of Chenonceaux were shown, taken by day and during an event. There are now 25 chateaux on the Loire and over 100 in the region with Son et Lumiere.

In Britain the first event was at Greenwich in 1957, and this was staged with much help from French specialists. However, few subsequent Son et Lumiere shows in this country have used French advisors, for the medium was eagerly adopted by British enthusiasts. One of the interesting differences between French and British viewpoints concerns deliberate use of coloured lighting. When it was introduced into the British events it was viewed askance by the French pundits as being an unnecessary and rather artificial addition, and perhaps in rather doubtful taste.

The tubular fluorescent lamp is the most important type of source giving coloured lighting. Many people are surprised to learn that such lamps, under reliable control, can be dimmed down to extinction, and can also be run up slowly and continuously in a stable fashion from no light output to full output. This makes fluorescent tubes very versatile in use, and they can be used for all cases except where hard shadow or spot effects are wanted. In addition to the common range of "whites" varying from Warm White (3000K) to Colour Matching (6500K), such as are used in general lighting service, there is an extensive range of chromatic colours, some of them of fairly high purity. The most useful ones for Son et Lumiere are Blue, Green, Gold and Radar Red. A mixture of Blue and Gold lamps balanced to give a suitable net white illumination is often used as it is very effective for lighting the ornamentation on altars and vestments; heraldic devices such as coats-of-arms, and mosaics. The reason is that interestingly varigated highlights are seen in such cases. Another useful class of source is the dichroic lamp, which is a tungsten lamp with dichroic filter covering the front lens of the lamp. The main disadvantage is the uneven illumination field, but this can often be overcome by losing the "hot-spot" in a dark window aperture.

The full effect on the imagination in Son et Lumiere is only obtained when the visual and acoustic effects are both present and are synchronised to complement each other. The visual aspect if presented alone would make for less impact on the audience. Mr. Moore concluded by showing illustrations to his points from the events staged at Blenheim Palace, Rudland Castle and St. Paul's Cathedral. In fact St. Paul's and York Minster will be permanent installations whereas most Son et Lumiere events are presented for a limited period then dismantled.

In the discussion on his presentation, Mr. Moore was asked whether some of the lights were normally moved, and he explained that this was not usual because it required extra operators, one for each moving spot lamp, and economics ruled it out. Pulsation of the light was practicable however, and such things as gun-flashes could be simulated to help evoke a battle scene. Another questioner enquired whether the shows were fully automatic. This was so for the larger shows, but smaller ones were semi-automatic. One questioner was concerned that adequate attention was not paid to the effect of inadvertently destroying the architectural form of the building. Mr. Moore replied that Son et Lumiere was not to be confused with flood lighting; the aims were quite different. Another member thought Son et Lumiere was a popularised fairground type of spectacle, incapable of producing subtle effects for the more discerning viewer: a small audience at short range was essential for subtle effects.

The second part of the meeting was a lecture-demonstration called Lighting for Entertainment, by Mr. L. D. Newstead of Lightomotion Ltd. A better title was immediately given by the speaker: Kinetic Lighting which was more descriptive of the type of work his firm was involved with, namely night clubs, private clubs and discotheques. A large number of striking effects involving light and colour were shown, and it is not possible to describe the visual experiences they produced in any adequate way. It is also not easy to describe the precise optical means by which some of these effects were produced, for kinetic lighting is a highly competitive and trend-conscious area, and Mr. Newstead was understandably anxious to avoid giving away too many trade secrets. The use of specially modified projection, some with wide-angle lenses, was basic to most of the effects shown.

Immiscible coloured fluids in single and double cell filters placed in the usual slide position provided some entertaining effects. Getting the densities (gm/ml) almost equal allows any modest thermal gradient to cause movement and breaking up of the constituent layers. The addition of a kaleidoscope mirror-lens unit produces a quite different effect. Another class of effects was produced with special slides made from stained polyethylene or with etched designs and mounted between rotating crossed polarisers. With the same arrangement certain organic anisotropic materials gave rotating miniature "Haidinger's brushes" that were most

beautifully coloured.

To get the "total involvement" of the patrons, very large angular subtense displays are provided, and for the same reason the sound levels of the musical effects are very high indeed. Another class of effects is provided by sound-to-light converters. In one, signals from microphones are filtered into four frequency bands, and these separately modulate the outputs from four differently coloured lights. This was very effective when combined with a shimmering metal-foil screen with a suitably ornate pattern etched in. Another effect was obtained with a red spot lit by a laser beam whose position was modulated from the music. Stroboscopic lighting is widely used, the repetition frequency being fixed or variable. Ultra-violet lighting is well-known and also widely used, but nowadays it is usually flashed. Mr. Newstead concluded by mentioning the use of kinetic lighting in other media: theatre, cinema and particularly television.

In discussion, Mrs. Verity deplored the low aesthetic standard of the graphics used, apparently catering for rather moronic tastes, to which Mr. Newstead replied that his firm aimed to supply whatever was in demand. When asked whether the effects might find application in domestic lighting, Mr. Newstead was non-commital, but pointed out that kinetic lighting was being used in teaching partially deaf children. In reply to another question, Mr. Newstead stated that the laser beam was deflected by a mirror mounted on a simple electrical transducer of the moving-coil type. The question of safety arose in connection with strobe lighting at certain frequencies which gives rise to epileptic symptoms, but Mr. Newstead thought the danger was greatly exaggerated. However several members deplored his attitude on this and also on the low tastes that were both encouraged and catered for by suppliers of kinetic lighting.

The success of the meeting owed much to its venue in the demonstration theatre of Strand Electric Co. The refreshments provided so generously by the hosts afterwards were sufficiently stimulating to engender a very lively social concourse, so much so that members eventually had to be encouraged to depart homewards.

F.J.J.C.

Report on the 82nd Meeting of the Group Held in January, 1972

Dr. P. W. Trezona of the National Physical Laboratory gave the first paper on "The Effect of Rod Activity on Large-Field Colour Matching." She reminded us of the main features of the CIE (1931) system of colorimetry, based on observations with a bipartite field of 2^{o} subtense, and emphasised how dependent it was on the additivity principle for its linear transformations from the measured colour matching functions (c.m.f.s.) and in practical use for predicting colour matches from spectral power distribution data. She also reminded us how certain industrial needs led to the CIE adopting a large-field trichromatic system based on the 1964 Supplementary Standard Observer, and how measurements by a number of workers had shown that additivity did not hold in general for a 10^{o} subtense centrally viewed field.

An analysis in her Vision Research paper of 1970 showed that all the published discrepancies from additivity concerned the blue mechanism only, and the sense of these various discrepancies could be predicted by assuming that rod activity gives rise to extra response in the blue channel only, not all three as commonly supposed. Her hypothesis leads to rod activity giving an approximately achromatic sensation under scotopic conditions since the chromatically differentiated channels are not active below cone threshold. Rods add to the blue channel activity at levels above cone threshold, though this may be inhibited by blue cone activity. The model allows prediction of certain other features of human colour vision i.e. Maxwell Spot phenomena, the predominance of blue after-images under many conditions and the increased range of levels over which the Purkinje Shift occurs with tritanopes. The model is successful at explaining a large number of facts, but is not required for justifying the new colour matching technique described in the rest of the lecture.

Dr. Trezona then explained her original technique for achieving the unique tetrachromatic match, which is the one (from the family of tetrachromatic matches on a given stimulus which satisfy a trichromatic observer) which equates the rod contribution on each side of the bipartite matching field. The procedure is to make a trichromatic match at the experimental level adjusting the red, yellow and blue matching stimuli, to attenuate neutrally by means of a sector disc to a level just below cone threshold, and make a luminosity match using the fourth (cyan) stimulus. Successive repetition of this sequence has been found to lead to convergence to a unique match for test stimuli from all five possible spectral regions delimited by four matching stimuli, and for all observers so far tried. For spectral test stimuli, either one or two desaturating stimuli are needed for the unique tetrachromatic match depending on the spectral region. In each case, the match required can be successfully approached from the four extreme possible trichromatic starting points i.e. with one stimulus missing from the initial match in each case. In addition a pale pink test stimulus, which finally required no desaturation stimulus, also satisfied this test. This establishes the general validity of the technique.

Dr. Trezona has tested the unique tetrachromatic

match for additivity and compared it with trichromatic matches in two ways: by changing the luminance level using neutral attenuation, and by combining two stimuli each of which has been matched. No tetrachromatic match has so far broken down for any observer, whereas the trichromatic matches showed marked discrepancies. No Maxwell Spot has yet been seen with the tetrachromatic matches, apart from a very mild luminosity difference on one occasion.

In the discussion Drs. Ruddock and Weale expressed doubts as to whether rod contribution was confined to the blue channel in normal trichromats.

On this occasion, tea was arranged to follow the first lecture, and duly arrived in the lecture theater on a trolley. At the same time Dr. Trezona started to demonstrate on some equipment assembled for the purpose and brought up from the N.P.L. an example of a large-field trichromatic colour match which breaks down as luminance is varied. The result of these two operations going on together in close quarters with dimmed lighting was described later on in the meeting by the Chairman as the most animated and successful concourse he had ever experienced in a Colour Group Meeting. In fact the tea break lasted as long as was intended, so busy was the scene.

The second lecture was given by Dr. D. Regan of the University of Keele and was entitled "New Methods for Studying Human Colour Response." Dr. Regan explained how he became interested in temporal modulation of colour stimuli whilst a student at Imperial College, as a result of the work K. J. McCree was doing on the effect of staring fixedly at bipartite colorimeter fields. This suggested that a dynamic factor was involved in colour matching, and that it must be the interaction of this with the phenomenon associated with boundaries, gradients or edges that produced effective colour discrimination. There were over 3000 papers dealing with the commonest type of modulation of stimuli i.e. variation of luminance. These had in recent years been effectively summarised and systematised by the ideas of de Lange, especially as interpreted and applied by Kelly.

The analogous, but little known, type of modulation which interested Dr. Regan was modulation of wavelength of a monochromatic stimulus, either continuously e.g. sinusoidally, or discontinuously e.g. by pulsing. An important condition for valid results is to equalise the luminance as wavelength is varied. By continuously reducing the amplitude of modulation it is not difficult to determine a threshold of perception. In fact a curious difficulty exists in an observer telling whether a threshold modulation is of luminance or of wavelength. A separate psychological paradigm is needed to make the distinction. Using the same subjects and the same experimental equipment, a comparison was made between the conventional threshold luminance contrast vs frequency function (after de Lange) and the analogous threshold wavelength modulation vs frequency function. The different shapes of these functions suggested that different physiological mechanisms must be involved. By varying the mean wavelength instead of frequency a family of analogous wavelength discrimination curves could be produced: these had the feature that the long wave optimum of discrimination remained fixed in the yellow region of the spectrum whereas the short wave optimum shifted systematically from the blue to almost the green region as the frequency parameter increased. This suggested that the blue mechanism of vision was fundamentally different in its contrast-temporal relationships to the other mechanisms.

An analogue of Bloch's Law was shown to exist for wavelength shift and time reciprocity at threshold, the critical time limit being rather greater than for Bloch's Law and depending of wavelength.

Dr. Regan then discussed his attempts to unravel the mysteries of colour vision by the use of the electroencephalogram (EEG) technique. The technique is very unspecific compared to say the micro-electrode technique, for the scalp potentials arise from the activities of thousands of different types of brain cell, only a small proportion of which can be concerned with colour perception. To overcome the formidable signal to noise problem, advanced equipment involving narrow band phase-sensitive amplifiers were used locked-in to the modulation of the light signal. Results found are complicated and difficult to interpret. One implication is that in different frequency domain quite different physiological mechanisms are invoked. An area where this work could have useful implications is in heterochromatic photometry, and some data of Regan's on this topic was shown.

One point to arise from the discussion was that the results pertinent to heterochromatic photometry published by Siegfried (Science 1965) were invalid: not only were they misrepresented by his conclusions but a repeat study by Regan (Vision Research 1970) showed that Siegfried's observers were apparently atypical.

F.J.J.C.

JOSEPH TOWNSEND FUNK

Ironical, indignant, satirical are the feelings Joseph Townsend Funk appears to express in his assemblages and collages. In this he seems related to the Dada movement of half a century ago. Andre Breton, the memorable French Surrealist poet, in his Dada period around 1924 sounded the attitude of the Dadaists toward art. He said, "It would be an error to consider art as an end. The doctrine of art for art's sake . . . seems senseless to me . . . I believe that a picture or

sculpture . . . is justifiable only insofar as it is capable of advancing our abstract knowledge . . .". It was the intent of the Dada artists to parody the absurdities and inequities of Western European culture. It would appear that Mr. Funk is convinced that art should expand our abstract knowledge of the cultural continuum by making us aware of the anomalies and equivocations of our contemporary super-technological age. In this 3rd quarter of the 20th century Mr. Funk is not alone in reviving the attitude and the methods of the early Dadaists. Very much to the fore these days in the works of both American and European artists is a wave of cultural protest of which those Dadaist of the teens and early twenties must be considered the venerable prophets of which Mr. Funk would seem very much an heir.

John Maul

SYMPOSIUM ON NEW DEVELOPMENTS IN DYEING OF SYNTHETIC AND NATURAL FIBERS

On March 12, 1972, the Inter-Society Color Council and the Division of Cellulose, Wood and Fiber Chemistry of the American Chemical Society (a Member-Body of the ISCC) are jointly sponsoring a symposium on New Developments in Dyeing of Synthetic and Natural Fibers. The Symposium is being held as part of the American Chemical Society's spring meeting in Boston, Massachusetts.

Papers being presented are "Research in Textile Processes as Related to End-Product Performance," F. Fortress; "The Interaction of Diffusion and Chemical Reaction During Finishing and Dyeing of Textiles," P. Rys; "Polymeric Dye Retarders," M. E. Dullaghan and A. J. Ultree; "Modification of the Dyeing and Finishing Properties of Wool Through Internal Deposition of Polymers," H. L. Needles, Linda J. Sarsfield and Doreen M. Dowhaniuk; "Sorption of Cationic Dyes by Dispersions of 'Nomex' Nylon," H. E. Ulery; "Process for Dyeing Cellulosic Blended Fabrics with a Single Dye Type," R. J. Harper, E. J. Blanchard, J. T. Lofton and Gloria A. Gautreux; "The Removal and Fate of Color in the Textile Waste Stream," J. J. Porter; and "Application of Color Measurement Technology to Textile Dyeing," S. Commanday.

The two sessions of the Symposium are being chaired by Dr. Samuel M. Gerber, Chairman of the American Chemical Society's Delegation to the ISCC, and Dr. Roland E. Derby, Jr., Chairman of the ISCC's Problems Committee.

IES-IERI SEMINAR ON BIOLOGY AND LIGHT

An unique seminar to explore problems concerned with the biological effects of light was held at the United Engineering Center in New York City. Sponsored jointly by IES and IERI, the seminar brought together 16 distinguished biologists whose medical research work concerns the effect of light on a number of biological aspects other than vision. Also participating in the discussions were 15 prominent members of IES and IERI.

Under the general direction of C. L. Crouch, Director of Research, and Professor Everett M. Strong, Chairman of the Board of Trustees, for the Illuminating Engineering Research Institute, and Dr. R. M. Zabel, President of IES, the program presented papers in four main sessions.

It was clear from the open discussions that there is still much to learn about the effects (good and bad) of different wavelengths of the spectrum -- on people, on ethnic differences, on food reactions, and numerous other biological reactions to light. For the proper testing of the effects of light on skin disorders, and contributions to health aspects, biologists will need more information on the entire spectrum of light sources, and on their color characteristics.

Session on Physical Aspects of Interaction of Radiant Energy with Biologic Systems -- Dr. Frederick Urbach, Chairman.

Units and Measures; Systems and Devices -- by Daniel S. Berger, M.D., Temple University Skin and Cancer Hospital, Philadelphia, Pa.

Concepts of Action Spectra, Biologically Effective Spectra of Some Light Sources and their Implications -- by Frederick Urbach, M.D., Temple University Skin and Cancer Hospital.

Session on Interaction of Radiant Energy and the Integument -- Dr. F. Urbach, Chairman.

Erythema and Pigmentation -- by Dr. Daniel S. Berger.

Aging and Cancer -- By Dr. F. Urbach.

Light and Associated Diseases -- by Dr. F. Urbach.

Effect of Light on the Retina -- by Werner K. Noell, M.D., State University of New York, Buffalo, N.Y.

Session on Effect of Lighting on Body Constituents -- Dr. Jerold F. Lucey, Chairman.

Effect of Light on Bilirubin (Jaundice in premature babies) -- by Jerold F. Lucey, M.D., University of

Vermont Medical School, Burlington, Vermont; Thomas Sisson, M.D., Temple University, Philadelphia, Pa.; Joseph Krasner, Ph.D., State University of New York, Buffalo, N.Y.

Calcium Studies -- by Robert M. Neer, M.D., Massachusetts General Hospital, Boston, Mass.

Studies on Vitamin Deficiencies and Food Constituents -- by Marcus Karel, Ph.D., M.I.T.

Possible Effects of Light on Other Systems -- by Kendric C. Smith, Ph.D., Stanford University Medical School, Palo Alto, Calif.

Session on Indirect Effects of Light -- Dr. Richard J. Wurtman, Chairman.

Metabolic Functions -- by Russel J. Reiter, Ph.D., University of Rochester School of Medicine, Rochester, N.Y.

Endocrine Function and Circadian Rhythms -- by Richard J. Wurtman, M.D., Massachusetts Institute of Technology.

Studies on Growth -- by Virginia Fiske, Ph.D., Wellesley College, Wellesley, Mass.

Effect on Photoreceptors -- by William T. Ham, Jr., Ph.D., Virginia Medical College, Richmond, Va.

From Illuminating Engineering, May, 1970

ACS REPORT

The views of the members of the Inter-Society Color Council, American Chemical Society Delegation, as to possible participation by Society members in Inter-Society Color activities, were evaluated. A comprehensive list of possible areas of participation was assembled and the highlights of such possibilities include better definition of color specifications in chemical literature, better designation of dye structures by improvements in chemical nomenclature, both in the literature and in chemical abstracts, and many suggestions for future talks. One meeting of the delegation was held with limited attendance. A symposium entitled "Recent Advances in the Dyeing and Finishing of Natural and Synthetic Fibers" is scheduled for the Boston meeting of the American Chemical Society under joint sponsorship of the Division of Cellulose, etc., Chemistry and the Inter-Society Color Council.

During 1972, we will assess the continued interests of the present members of the American Chemical Society Delegation to the Inter-Society Color Council to determine their interest in participation and we will try to develop a program for active contribution.

It is my opinion that the American Chemical Society could contribute a great deal in terms of nomenclature and color definition, as well as in the formulation of interdisciplinary courses and symposia. Every effort to make this a solid contribution will be made.

S. M. Gerber
Chairman of Delegates

WHAT IS FSPT?

The Federation of Societies for Paint Technology (founded in 1922) is the non-profit cooperative technical society of the decorative and protective coatings industry. Its 6,000 members are affiliated with 25 local societies of the Federation located in the United States (22), Canada (2), and England (1). These members are chemical engineers, chemists, technologists, and supervisory production personnel actively engaged in or associated with the manufacturing of raw materials and formulation and production of paints and related coatings.

Primary objectives of the Federation are to promote education, research, and application of the sciences in the manufacture and use of paints and allied coatings and to perform a public service by the constant improvement of products and elimination of wasteful methods in manufacture.

GATF ANNUAL MEETING SCHEDULED

The 48th Annual Meetings of the Graphic Arts Technical Foundation will be held March 20-22, 1972, in Pittsburgh, Pa. A major change in the scheduling of the meetings has been made this year. The Education and Research programs have been combined so that they are being held simultaneously, instead of being spread over a five-day period. Members are offered a streamlined, three-day program, rather than the cumbersome five-day programs of previous years. Also, a portion of the Research program this year will be devoted to GATF Technical Services activities.

The meetings will be conducted at the Webster Hall Hotel and Mellon Institute of Carnegie-Mellon University, near the GATF Technical Center in the Oakland section of Pittsburgh.

For further information on the 48th Annual Meetings of GATF, contact: Special Programs Department, Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

TWENTY-FOUR FIRMS JOIN GATF DURING FOURTH QUARTER

Twenty-four graphic communications firms became members of the Graphic Arts Technical Foundation during the fourth quarter of 1971, GATF Executive Director William H. Webber announced today. The new firms include: Addison-Wesley Publishing Co., Menlo Park, Calif.; Butler Automatic, Inc., Canton, Mass.; Dryden Paper Co., Dryden, Ontario, Canada; Grain Processing Corp., Muscatine, Iowa; Greensboro Printing Co., Greensboro, N.C.; Holt Manufacturing Co., Inc., Burlington, N.C.; Trade Composition Co., Inc., Boston, Mass.; and West-Camp Press, Inc., Westerville, Ohio.

Also: Channing L. Bete Co., Inc., Greenfield, Mass.; Canadian Printing & Lithographic Co., Ltd., Montreal, Quebec, Canada; The Emerson Press, Inc., Cleveland, Ohio; Federal Lithograph Co., Washington, D.C.; Good Impressions, Inc., Washington, D.C.; and Novograph, Madrid, Spain. Others include: Ashcraft, Inc., Kansas City, Mo.; Bloomsburg Craftsmen, Inc., Bloomsburg, Pa.; The Continental Press, Inc., Elizabethtown, Pa.; Theo. Davis Sons, Inc., Zebulon, N.C.; The Editors Press, Inc., Hyattsville, Md.; Kalamazoo Label Co., Kalamazoo, Mich.; Liberty Photo Engraving Co., Chicago, Ill.; The Realty Programming Corp., St. Louis, Mo.; Valley Paperback Manufacturers, Inc., Dallas, Pa.; and Van Dyck Printing Co., North Haven, Conn.

SUN CHEMICAL'S GPI DIVISION OPENS RICHMOND FACILITIES

The General Printing Ink Division of Sun Chemical Corporation has announced the opening of its Richmond, Va., manufacturing facilities. The new branch of the international graphic technology company will blend and distribute GPI's complete line of quality inks to the graphic arts industry. It is the GPI Division's 31st plant.

BOOK REVIEWS

Physical Aspects of Colour

P. J. Bouma, 2nd English edition, brought up to date by W. deGroot, A. A. Kruithof and J. L. Ouweltjes, printed in the Netherlands 1971, published by Macmillan Co., Ltd. (London), part of the Philips Technical Library, 280 pp., price $20. (Macmillan Co., N.Y., on inquiry, reply that St. Martin's Press, 175 Fifth Ave., New York 10010, are agents in this country for Macmillan Co., Ltd. of London.)

As far as possible the order of treatment of the main subjects, and the wording of the first edition, is maintained. However, changes have been made to bring the names of quantities and technical terms, symbols and definitions, into accord with the latest CIE vocabulary and with ISO recommendations, based on the International System of Units (1960), and to take into consideration developments in colorimetry of the past twenty years. A revised reference list retains only papers of fundamental interest. New sections are added in some chapters, some sections are rewritten or expanded, and some subjects are shifted from one chapter to another. Chapter VI, Light Sources and Their Colour Coordinates in the CIE System, includes an illustration of the CIE x,y-triangle in color, and Chapter XIV, Practical Applications, contains illustrations of the principle of correcting separation negatives, and of the primaries for a color print. To find one's way around in the book, or use it as a reference book, there is a detailed table of contents which lists by title each of the 106 sections which make up its 14 chapters (106 vs 93 in the 1st ed.), and a subject index that defines terms, primarily from the CIE Vocabulary, and refers to sections of the book in which the subject is discussed.

The Bouma book in 1946/7 was a pioneer in the subject. With this second edition it takes its place on the shelf of the colorimetry specialist among a growing number of authoritative books on the subject.

Dorothy Nickerson

Optics, Painting and Photography

M. H. Pirenne, Cambridge University Press, 1970, 199 pp., Price $13.50

At first glance Dr. Pirenne's recent book "Optics, Painting and Photography" (Cambridge Univ. Press, 1970) may appear to have little relevance to the subject of color and, in fact, it contains little or nothing on the subject. For those interested in perception and the reproduction of natural scenes, however, it offers much food for thought.

The book starts with a meticulous examination of what is usually known as geometrical perspective and which he more properly calls "single point" (viewing, not vanishing) perspective. The thoroughness of this treatment is manifest from its inclusion of the separation of the nodal points of the eye lens and the fact that it does not rotate around its central point, facts which he demonstrates are of little importance. For many readers this part of the text will tell him "more than he wants to know" about the subject but it is good to have such an analysis and to know the results of it. It provides the solid ground on which considerations of perception must be built if they are to be valid, just as colorimetry does for color perception. The illustrations that accompany this dis-

cussion are outstanding; they make reading the text a rare pleasure for such a detailed approach. His heavy dependence on the pinhole camera as proof of his assertions certainly carries conviction but may make some optical experts wonder about his implied skepticism concerning modern corrected photographic lenses. It is, however, part of his desire for absolute proof and is very well done.

The remainder of the book is devoted to a discussion of why a person looking at a picture from any but the "correct" viewing point is not disturbed by the distortions that are thus produced. In brief, he concludes with Panofsky (who wrote the introduction) that this is due to the "subsidiary awareness" (Panofsky's phrase) of the surfact of the picture through the visibility of the "brush marks and the canvas." It is a little startling, for one brought up on photography, to find that after his complete reliance on photography in the first part of the subject he thus completely abandons it in the latter phases and concentrates wholly on painting. One is almost forced into the pun that this part of the book "lacks perspective."

The interests of our readers, however, will lie more in fact that he runs into the same fallacy with regard to perception that is encountered so often in the subject of color; that of confusing the physics of one phase of a situation with what an observer should see, overlooking the fact that the observer sees the whole situation. An observer does not need to see surface characteristics to know that he is looking at a two dimensional painting or photograph, nor that it is a reproduction and not the real thing. Neither is he fooled by a "trompe-l'oeil" -- his reaction is more one of surprise and pleasure at a "tours de force"! Pozzo's famous ceiling in the church of St. Ignazio in Rome which Pirenne so delightfully describes and illustrates is certainly the latter rather than the former. There is no indication that Pozzo intended to fool anyone or thought he had done so. Yet the sudden "opening up" of the ceiling to great heights when seen from the marked spot on the floor must be a powerful mystical experience; this may well have been the true effect Pozzo intended. Incidentally, Pirenne's note that most "trompe-l'oeil" paintings are of subjects with little actual depth should have warned him that perspective, which plays no part in such subjects, is only one (and often a very minor one) of the factors in a picture which make an observer see depth. The awareness of the surface, of which he speaks, more often has the effect, even when perspective is present, of decreasing the depth he sees rather than of preventing distortion. Pictures are not seen as distorted for the simple reason that they are objects. They suffer from, and are mentally corrected for, the same changes in shape as all other patterned two-dimensional objects. Anyone who has been forced to sit near a motion picture screen and off to one side knows that the very aggravated distortion so produced soon ceases to be annoying if the picture is interesting and that little is gained except comfort if he transfers to the center of the theater.

The problem posed to himself by an artist, just as it should be but seldom is by a photographer, is to produce a picture. The representation phase of the picture, even for representational painters, is necessarily secondary if he is to be considered an artist. The possibility that Canaletto traced his pictures from a "camera obscure" screen simply indicates that he would have been a good photographic artist if he had had the means.

I do not wish to belittle Pirenne's treatment, which is excellent within his implied postulates. It suffers, however, from the same sort of myopia that we often encounter in discussions of color perception. The color that is perceived from a given stimulus in a real scene cannot be predicted by the colorimetry of that stimulus alone and the statement that it is perceived as object color because of surface characteristics is still not sufficient to describe the color seen even when adaptation is taken into account. The whole situation must be considered before our colorimetry has any predictive value. The depth seen to be portrayed by a picture depends on far more things than the geometry of the reproduction and the knowledge that it is a picture, even when it is seen from the correct viewing point and is in the perfect one point perspective given by any good camera. Otherwise we could not have "flat" pictures or "flat" lighting.

Ralph M. Evans

Color Difference Equations

Bulletin Electrotechnical Laboratory, Vol. 35, No. 6 (1971), Tokyo, Japan, reports a study by Y. Sugiyama: Comparison of Different Color-Difference Equations by Rank Correlation Coefficients and Estimation of Their Confidence Intervals. Abstract: "In order to determine the best of the color-difference equations, the rank correlation coefficients between (a) the ranking judged by the "percent acceptance" of the data of Davidson-Friede and (b) the one computed by applying the same data to the nine color-difference equations were calculated, and the confidence intervals of the rank correlation coefficients were also estimated. As a result, Nickerson's equation belonging to the city-block model of Atteneave and color difference equations using MacAdam's g_{ij} belonging to the Riemann metric were found to be satisfactory."

As a part of international work related to current CIE color studies, this report from Japan is of more than usual interest. It particularly interests this reviewer that Dr. Sugiyama included the original 1936 Nickerson equation, based on the simple addition of small differences in Munsell hue, value, and chroma,

an equation developed on the basis of 1 value step = 2 chroma steps = 3 hue steps at chroma 5, which results in the formula: $\Delta E = (C/5)\ (2\Delta H) + 6(\Delta V) + 3(\Delta C)$. Few current studies include this simple non-Euclidean Munsell formula, which its author still thinks equals any of the formulas since proposed, including her own proposal based on Adams' chromatic value space. The Sugiyama study bears out this opinion for it ranks this simple Munsell formula as number 1 with a mean correlation coefficient of 0.635. Davidson-Friede ranked 0.629, then FMC (Friele-MacAdam-Chickering) at 0.591, Judd at 0.557, Adams-Nickerson at 0.549, Godlove-Adams at 0.557, the other three formulas (Godlove-Munsell, and two based on the DIN system) averaging at 0.498, 0.409, and 0.355, respectively.

The Sugiyama results differ little from those reported in 1944 by Nickerson and Stultz for 7 formulas (JOSA 34, 550-570). Three formulas were based on Munsell space (a special formula based on the samples studied, the 1936 Nickerson formula, and one a Balinkin variation adjusted to Euclidean space), resulting in average correlations of 0.63 for the special formula, 0.60 for the other two formulas. Also included were two forms of the Judd formula based on the uniform chromaticity scale diagram, each averaging 0.53, and formulas based on two forms of Adams' space, one chromatic-value, the other chromatic-valence, resulting in average correlations of 0.54 and 0.52, respectively.

Thus Sugiyama results compared to 1944 Nickerson-Stultz results give 0.63 vs. 0.60 for the Nickerson formula based on Munsell scales, 0.56 vs. 0.53 for the Judd formulas based on UCS space, and 0.55 vs. 0.54 for the Nickerson formula based on Adams' chromatic-value space. No MacAdam formula was included in the 1944 study, but for the Sugiyama study it averaged 0.59, close to those based on Munsell space. In 1944 the correlations for 12 individual observers varied from 0.40 to 0.83, averaging at 0.57, which is in the range of results for the better formulas.

These facts are a reminder of the relatively low level of individual correlations that may be expected, whether by visual or instrumental means, and of the fact that to achieve even this level it is necessary to maintain highly accurate sampling and extreme accuracy and precision in all color measurements. It is important to locate an "adequate sample," measure it accurately, and then isolate the pertinent variables for whatever color space the formula used is applicable. As pointed out in the 1944 report, "statistical methods of multiple correlation, perhaps curvilinear" (emphasis added) should make it possible to provide formulas for expressing color differences in which the constants are based on experiment.

Dorothy Nickerson

EYE OPENER

Can you believe what you see? In an exhibit called The Intelligent Eye, the brain and one of its outposts, the eye, are put to the test. Through a series of 30 experiments involving color, texture, perspective, motion and, underlying it all, light, it is vividly demonstrated that perception entails more than what meets the eye.

Exhibiting such a complex psychological and physiological subject is difficult, especially when many questions raised can't be fully answered. The exhibit's designers, Kissiloff & Wimmershoff Inc., in conjunction with Dennis Flanagan, editor of Scientific American, took a simplified and direct approach. "After extensive research," says Bill Kissiloff, "we decided that provoking the layman's interest in how we perceive the world around us, rather than presenting technical psycho-physiological explanations, was a more meaningful approach."

Utilizing well-known textbook experiments in visual illusions, they designed an exhibit for non-scientists which provides a better understanding of how science advances through investigation. Questions remain, but the educational value lies in the visitor's own discoveries.

Entering, the visitor finds himself in a "hall of mirrors," with a lighted, flat-black grid down the center. Lights, the grid, and the visitor are reverberated into the depths of the mirrors. His senses wake. His curiosity is aroused. The extraordinary realm of visual illusion is introduced, putting the slide orientation and exhibit-proper which follow in a more meaningful and real context.

"It's a 'hands on' exhibit," says Kissiloff. The experience demands constant participation. There are buttons to push, dials to turn and personal visual reactions to ponder. The power of "key-hole psychology" is also relied on to bring the visitor into direct contact with the presentation. In most cases, one is required to peer through a small window to view the experiment.

The exhibit was created as a traveling neighborhood museum. Each experiment is housed in a self-contained station which can be separated from the others if necessary, yet remain just as effective. The stations are color-coded to the type of phenomenon being viewed (color, texture, etc.) and carry clear, concise descriptions. Paneling, which encloses the entire exhibit and shields out extraneous stimuli, holds supplementary text and "non-moving" experiments which maintain the visitor's interest while waiting to operate an occupied station.

1972 Summer Program in Color Technology at Rensselaer

A summer program of three intensive courses in color technology is being offered for the eighth consecutive year by the Rensselaer Color Measurement Laboratory at Rensselaer Polytechnic Institute. The first course offered, Principles of Color Technology, will be conducted from July 10-14. Color Technology for Management, will be held July 20-21, and Advances in Color Technology, is scheduled for July 24-28.

The courses are under the direction of Dr. Fred W. Billmeyer, Jr., Professor of Analytical Chemistry at Rensselaer Polytechnic Institute. Assisting Professor Billmeyer will be Max Saltzman, Manager of Color Technology, Allied Chemical Corporation and Adjunct Professor of Chemistry at Rensselaer. Both Professor Billmeyer and Professor Saltzman have published widely in the field of color science, culminating in their book, "Principles of Color Technology" which will be used as the textbook in the courses. Other outstanding authorities on color science will present guest lectures in the areas of their specialties.

Principles of Color Technology is intended to provide both theory and practice in the description, specification and measurement of color. It will be of particular interest to industrial personnel responsible for color matching and color control. Both theoretical concepts and practical applications of the science of color will be emphasized. Typical commercial color measurement and computation equipment will be available for use by the individuals participating in the program. Laboratory sessions will be held daily for instrumental measurements, computations, and problem-solving.

The course will be of particular value to men without advanced degrees and to men whose practical experience in the field is a substitute for a college degree. Companies maintaining or planning color control laboratories will have the opportunity of increasing their efficiency and effectiveness by using the program to train staff members in the proper use of color measuring equipment and the interpretation and application of the results of such measurements.

For further information contact the Office of Continuing Studies, Color Technology Program, Rensselaer Polytechnic Institute, Troy, New York 12181.

Melvin Loos Memorial Scholarship

The Melvin Loos Memorial Scholarship has been established for young men and women seeking financial assistance to study graphic arts. The Scholarship is administered through the National Scholarship Trust Fund, an affiliate of the Graphic Arts Technical Foundation.

The award was established by his wife, Mrs. Loos and friends of the late Melvin Loos, who was for many years, Manager of the Printing Office of The Columbia University Press, and a well-known artist and typographer.

Open to anyone in the U.S., the scholarship is intended to give financial assistance to persons seeking formal schooling in the graphic arts or to those who seek additional education in graphic arts through non-credit courses of study.

GATF Orientation Program

The Graphic Arts Technical Foundation's Orientation Program, "Methods and Technology of the Graphic Communications Processes," will be presented at the GATF Technical Center, Pittsburgh, Pa., from March 5-10; May 7-12; and July 16-21.

The program, designed to meet the particular needs of those persons in management and other non-plant positions, is limited to 20 participants per session. Since the program is usually filled to capacity, early registration is advised.

Plans are being formulated to present the Orientation Program again in September, October and December, 1972.

To obtain a brochure describing the Orientation Program, contact the Special Programs Department, Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

NOTE:

The Council promotes color education by its association with the Cooper-Hewitt Museum. It recommends that intended gifts of historical significance, past or present, related to the artistic or scientific usage of color be brought to the attention of Christian Rohlfing, Cooper-Hewitt Museum, 9 East 90th Street, New York, New York 10028.

LAST MINUTE INSERT

Announcement of the AIC Colour Congress in York, England, 1973.

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