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The Association for Historical & Fine Art Photography

Portrait taken with the Periphery Camera

British Museum

CONTENTS

JOURNAL

COLOUR VISION HAZARDS

Dr Janet Voke

Defects in colour perception can arise during life as a result of general or ocular disease, or a side-effect of medication or as a consequence of toxic poisoning or head trauma. It is because a wide range of chemical agents *can* give rise to colour disturbances that the laboratory worker should be aware of this potential. Carbon disulphide, monoxide and tetrachloride, suphanilamide, thallium and lead, ethanolamine, manganese, mercury and hydrogen sulphide are examples of commonly used substances which can lead, with excess exposure, to signficiant loss in colour perception. Multple sclerosis, diabetes mellitus, anaemia, malnutrition, chronic liver disease, glaucoma, cataract and optic nerve degeneration are just a few examples from the more common conditions involved. Cranial trauma can lead to a temporary or permanent disturbance in colour perception. Excess of tobacco and/or alcohol can also affect colour perception. Since changes in colour vision can also be one of the first indications of disease (they often precede ophthalmoscopic signs in diabetes mellitus and visual field defects in glaucoma for instance) and acquired defects are generally progressive, it is important that the site or agent associated with this cause is identified early to avoid permanent damage.

The incidence of acquired colour vision defects varies considerably within the population. The elderly are most susceptible and males and females are affected equally unlike the inherited defects. The incidence could easily exceed that of inherited defects in a population sample restricted to people over fifty years of age, and such changes can be compounded with inherited defects.

The association between colour vision changes and disease has only been fully recognised in recent years. Red defects associated with smoking of the old fashioned tobacco "shag" accompanying tobacco amblyopia, were frequently reported in railway employees towards the end of the last century but the occupational significance of changes in colour vision has been grossly underestimated. This partly results from a failure by industry and the professions to screen for blue defects, since the majority of disturbances of blue/green vision are acquired ones and a great many of the acquired defects affect blue perception.

Except in the very early stages, most colour vision defects which come on gradually or suddenly, during life, are easily identifiable and involve a number of other abnormal visual symptoms, for instance reduced visual acuity, a constriction of the visual field either in general or confined to a specific region (scotoma) and poor adaptation to the dark. Since acquired defects are often confined to one eye or one part of the visual field they require very careful examination using monocular testing. Especially when the total visual field is involved, results on conventional tests may be anarchic. Frequently they are unstable so that test results are unpredictable and fluctuating, and it may not be possible to classify them into conventional groups.

A great many drugs can affect colour vision to some degree; some of the more well-known ones are listed in Table 1. The commonly encountered industrial and laboratory chemicals which can lead to disturbances in colour perception are listed in Table 2. Lyle (1974) gives a full list. Exactly how these agents interact with the physiological mechanisms is as yet uncertain; more understanding is at present possible for the effects of disease on colour discrimination. Table 3 lists some of the diseases which give rise to colour defects, often insidiously.

Because of the severe nature of most acquired defects of colour vision it is most important that affected individuals are not responsible for critical colour decisions in their daily work. Since a visual determination of end-points and reactions is a major part of the work in a chemical or medical

Table 1: Common drugs which produce significant changes in colour vision

Drug	*Use*	*Colour vision change*
Barbiturates	Hypnotic and sedative	Transient yellow-green defects
Chloroquine phosphate	Anti-malarial	Blue defect Central scotoma for red
Quinine	Anti-malarial Arthritis	Blue defect, then red-green defect
Cocaine	Anaesthetic and sympathomimetic	Enhances blue sensitivity, reduces red sensitivity
Digitalis		Red and green and blue defects
Oral contraceptives		Blue-green-yellow defects
Adrenaline	Cardiac stimulant, sympathomimetic	Enhances green sensitivity, reduces red/orange sensitivity
Atropine	Cyclopegic, miotic, anti-secretory	Reduced sensitivity to red
Caffeine (coffee, cola)		Reduced sensitivity to blue, enhances sensitivity to red
Trimethadione	Anti-epileptic	Red-yellow and blue-yellow defects
Tobacco		Red-green defect, particularly red. Can be permanent
Thallium		Red-green defect
Sulfonamides	Anti-bacterials	Some reduced discrimination of all colours Blue defects
Santonin		Reversibly red-green defect
Snake venoms		Blue defect
Chlortetracycline		Blue defect then green defect
Streptomycin	Antibiotic	Red-green defect
Furaltadone	Antibiotic	Red-green defect, Blue vision enhanced
Opium/morphine	Narcotic, analgesic	Red-green defect
Isoniazid Isonicotinic acid hydrazide	Anti-tuberculosis	
Rifampin		Red-green defect
Bromides	Sedatives	All defects

Table 2: Industrial/chemical agents which cause colour vision disturbances

Name	*Colour vision change*
Carbon disulfide or bisulfide	Central colour loss for red and green
Carbon monoxide	Transient colour visions changes, central scotoma for red
Carbon tetrachloride	Peripheral constriction of colour fields
Chlorodinitro benzene	Central scotoma for green
Dimethyl sulphate	All colours affected
Dinitro benzene (explosives)	Central loss for red and green
Ethyl glycol (antifreeze)	Blue, green and red
Ethyl alcohol	Red-green or blue-yellow or both, can be permanent
Methylene bromide (fire extinguishers)	Central scotoma for green
Methylene alcohol (as in methylated spirits)	Blue-yellow defect
Mercury	Small paracentral scotomas
Manganese	Red defects
Lead, also tetraethyl lead in petrol	Red-green or blue-yellow defects
Hydrogen sulphide	Red defect

Table 3: Diseases which cause colour vision disturbances

Systemic diseases	*Colour vision change*
Diabetes mellitus	Blue defects
Multiple sclerosis	Red-yellow defects
Pernicious anaemia	Green defect
Addison's disease	Blue-yellow defect
Vitamin A deficiency	
Congenital jaundice	Blue and green defects
Malnutrition	All colours
Spinal cerebellar ataxia	Red-green defect first then mostly green defect
Friedreick's ataxia	Red-green or blue-yellow defects
Brain tumour, trauma, concussion	Various
Vascular accidents (stroke)	Blue defect
Cerebral cortex disease	Blue defect
Cortical lesions	Red-green defect, blue defects
Syphilis	Blue defect
Alcoholism and cirrhosis of the liver	
Ocular diseases	*Colour vision change*
Retinal vascular conditions	Mostly blue-yellow type
Pigmentary disorders	Blue-yellow and red-green
Macular degeneration of retina	Mostly blue-yellow A colour vision defect can be an early sign
Retinal detachment	Mostly blue-yellow type
Glaucoma	Mostly blue-yellow
Cataract	Reduced sensitivity to blue and green Blue defects
Optic atrophy	Red-green defect, mostly green

laboratory, some care must be taken to ensure that those with disturbances in colour vision are screened from such procedures.

Age changes

Allowances must be made for the general deterioration in colour perception with age. Blue/green judgements cause particular difficulties to the over-fifty group and matching of whites and near-whites is also more troublesome. Tiffin and Kuhn (1942), in a very early study on the occupational problems of colour deficiency, reported a progressive deterioration of discrimination between red and green in subjects between the ages of twenty-five and fifty-five. Other more modern and scientific studies, however, such as Lakowski (1958, 1962) showed that only after sixty years were changes in red-green vision noticeable.

The blue-yellow and blue-green discrimination loss with age is well documented, (Lakowski 1958, 1962). By far the most important physiological change results from the gradual yellowing of the crystalline lens with age, which reduces the amount of light reaching the retina and absorbs blue light so that a form of blue blindness is simulated (Said and Weale, 1959). Changes in retinal pigmentation may take place to enhance this effect, and there is a general deterioration in retinal function in addition; a smaller pupil also tends to produce a selective absorption of blue light. In the ageing eye there is a tendency towards cataract, which itself causes reduced transmission and reduced sensitivity to blue light. Lakowski (1958) found that between the ages of sixteen and thirty-five years colour discrimination was at its best. For a population sample over fifty-five years of age the incidence of individuals with poor discrimination rose to thirty per cent. It is evident that the change is gradual in the fourth decade but becomes more rapid beyond the fifth. These changes must be considered in the light of the individual variations in the perception of colours by all so-called normal individuals.

Detection and diagnosis

Colour vision testing and advice is seldom easy in the industrial and occupational context, for it demands a realistic approach suited to the needs and requirements of the specific situation.

Screening for defective colour vision is a simple matter, there are excellent tests to separate out the eight per cent of men who have some degree of deficiency; the pseudoisochromatic (false colour) tests, of which the Ishihara is most widely known, serve this purpose adequately when used with an appropriate daylight source though they do not test for most acquired defects. In the occupational context, however, more is required. The severity of the defect is of far greater consequence industrially than the type. In the last two decades there has been a considerable improvement in the types of tests available. Diagnostic tests which indicate the severity and type of both inherited and acquired defects are now available at a modest price. Yet outdated and inferior tests remain in use.

Separation of the 'safe' defective from the 'unsafe' is most important. During the last war it was recognised that many pilots with a slight green handicap (the deuteranomalous group) were able to carry out flying duties adequately. A test was designed by US military medical personnel to separate individuals into the safe/unsafe category. This has now been modified considerably in Britain, after further evaluation and appears in a simple book format, The City University Test, marketed by Keeler Instruments, 24-28 Oval Road, London NW1. It is easy and quick for the layman to use and interpret and costs only a few pounds. More sophisticated tests are available.to indicate colour discrimination ability. One which uses a visual screener approach is the Lovibond Colour Vision Analyser produced by the Tintometer Company, Waterloo Road, Salisbury, Wiltshire. Scores given by a large number of colour defectives on both these tests were found to give a much better

correlation with practical ability than simple screening tests in the author's study. For colour analysis in the medical laboratory it would be advisable to exclude all colour defectives, but it is reasonable to give the individual a chance to show his ability, even despite a colour defective, before excluding them from work of this nature out of hand.

Thus trade tests, which simulate the job in question, are valuable. However since these can seldom be standardised great care must be taken to ensure that the conditions are similar to those typically encountered in practice, e.g. dirty cables, or resistors and poor illumination for electrical work. Colour vision lanterns play an important role in the examination of the colour perception of personnel for the armed services, the railways and civil aviation. Considerable care, however, is needed to obtain reliable and consistent results and the speed of presentation and sequence are important factors. Trade tests should always be used with a clinical test.

A more realistic screening procedure

It is true that great care and experience is needed to avoid rejecting the suitable and accepting the unsuitable but by a careful choice of a diagnostic test and a suitable pass/fail level a much more realistic screening procedure could be adopted, suited to the needs and requirements of the individual situation. Readers are referred to Voke (1980) for further details.

Colour vision defects are seldom treated with the seriousness they deserve. Confusion frequently surrounds the matter, in particular as to whose responsibility it is to take decisions and give advice. It is disturbing that many manufacturers take no measure to examine prospective employees with colour vision tests. Medical personnel are often poorly equipped to advise. Standardisation bodies have given little thought to the problems of the colour defective in the realm of colour coding, and there is little incentive to conform to colour coding standards by manufacturers since tolerance limits are rarely specified. Wide variations are typical, adding further difficulties of the colour defective population.

Although the inherited colour vision defects cannot be cured, some assistance can be provided for specific tasks such as indentifying colour codes, through the careful selection of a coloured filter. A magenta or red filter is most helpful, and success is most common among the green defectives. The idea dates back again to the colour genius James Clerk Maxwell who experimented with a red and green filter combination, and essentially involves discrimination through brightness differences.

The sensation of colour which is lacking in the colour defective can never be replaced, and it is perhaps unfortunate that the dimension of appreciation cannot be restored. The colour defective who needs to differentiate specific colours in the laboratory for analytical procedures should be encouraged to experiment for himself, firstly perhaps with a red toffee paper, which will often produce quite remarkable effects! Monocular viewing is sometimes most successful.

Human colour vision is remarkable not only for the wide discrimination of hues but also the ability to detect differences in the strength of a colour or saturation, and brightness differences. Normal observers are most sensitive to both hue and saturation changes in the yellow-green areas, and also in the blue-green areas.

Those with defective colour vision need special understanding because they are often unaware of their abnormality until an obvious error in colour judgement brings it to light. Perhaps the greatest service we can do for them is to eliminate the unfortunate misnomer 'colour blindness' which surprisingly in some respects has even more of a stigma in society today than total blindness.

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Dr Janet Voke is a research Scientist with a special interest and expertize in colour vision defects

12 THINGS TO REMEMBER

(1) The value of time
(2) The success of perseverance
(3) The pleasure of working
(4) The dignity of simplicity
(5) The worth of character
(6) The power of kindness
(7) The influence of example
(8) The obligation of duty
(9) The wisdom of economy
(10) The virtue of patience
(11) The joy of originating
(12) The profit of experience

DOORWAYS

Pitchford Hall Shropshire

R.C.H.M.E.

Easington Colliery Village County Durham

R.C.H.M.E.

PHOTOGRAPHY AT THE ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

Bob Skingle

The Royal Commission on the Historical Monuments of England, is the country's National body of Archaeological and Architectural survey and record. That is to say we are responsible for making records of Historic buildings, and Archaeological sites throughout England. These records can consist of written reports, measured drawings, and photographs.

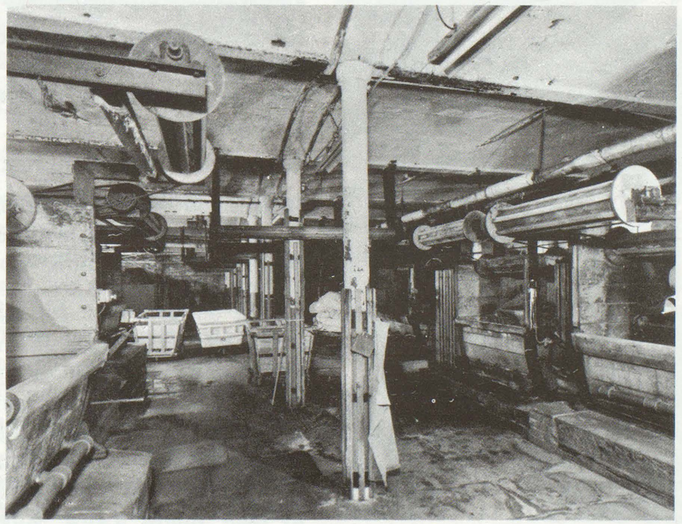
This work is carried out by regionally based staff, who undertake specific projects, and the emergency recording of archaeological sites and buildings under threat.

Many hundreds of historic buildings in England for example, are demolished or significantly altered every year, and part of the Commission's function is to identify the most important of these, and ensure that they are recorded for posterity.

Current field projects include National surveys of Non Comformist chapels, Gentry houses, Hospitals, and Farmsteads, a comprehensive survey of archaeological sites on Salisbury plain, and detailed recording of the buildings of the London Docklands. All these projects fit into a carefully planned recording strategy which places emphasis on areas that are inadequately recorded, and undergoing change.

The purpose of our work, is to provide information to a wide range of users via the National Monuments Record. Local authorities faced with planning applications, especially those involving listed building consent, use our records to find out what is known about the site or building concerned. Researchers, from students undertaking school projects, to university staff and graduates engaged in detailed studies, all draw upon the Commission's extensive archives.

Since it was set up in 1908, the Commission has regarded photography as one of the best ways to record the appearance of sites and monuments. Photographic recording was initially undertaken by Commission investigator staff, but the difficulties involved in trying to analyse a building historically, and at the same time photograph it to a standard which complemented the academic scholarship proved to be impossible.



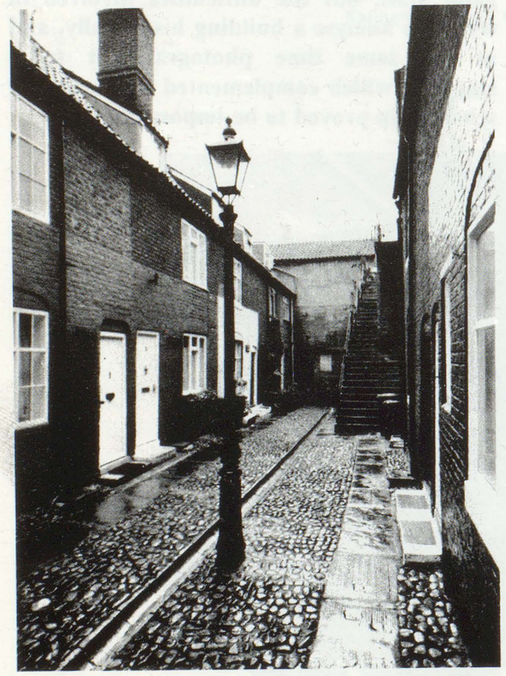
R.C.H.M.E.

Scouring shed West Vale Mills Elland West Yorks.

Photography for publication and the record was therefore treated as a separate discipline, and is now an important, and integral part of the Commission's work.

All work for the archive is mainly in b/w, we use colour only to show the use of colour in decoration, for example stained glass or mosaic tiling. Our main cameras are 4 x 5 Cambos, and each of the field staff carries one plus a tripod, a range of lenses, 50 or so dark slides, flash and tungsten equipment, stepladders and other ancillary equipment. We also have access to roll film cameras, in the shape of mamiya rz 67, and 35 mm cameras (the Nikon fm2). These tend not to be used so much though, as even with perspective control lenses, they are not as suitable for architectural photography as the 4 x 5 camera, i.e. with lift, swing and tilt movements.

We work on our own, in the field, generally being away from base for a week at a time. From York for example, we cover 19 counties, from the Scottish borders in the north, to Leicestershire across to Shropshire in the south. Photographers are expected to use initiative based on years of experience of field work to overcome problems encountered in the field.



R.C.H.M.E.

Linskill Square. Whitby at 8 am. on a rainy morning

One of the problems encountered by being away from base one week at a time is running out of film, or at least, film loaded into dark slides. As I said before we carry about 50 or so dark slides, but some would be fp4 plus, some are hp5 plus, some are colour negative. Reloading film often takes place in hotel bedrooms locked in wardrobes, or under beds, with a large dark cloth draped over windows, and under doors to stop stray light entering the room. Most changing bags are too small to accommodate a number of dark slides, and boxes of film.

The location photographer of course has no access to processing facilities, so we will usually not process our film until at least the week following our travels. We don't use Polaroid to assess exposures, as interiors tend to be lit using expendable flash, of which more later, and firing off a dozen or more bulbs simply to assess exposure is a very expensive way of working. Rather we rely on the field operator's experience and ability, his professionalism.

Having said all that, not actually seeing the film processed for a week after taking the pictures is probably responsible for all my grey hairs.

What else do we get up to .....

In an ideal world, all photographs are taken on clear sunny days, with nice crisp lighting, blue skies, and big fluffy clouds.

In practice, some of the work we do comes under the heading of emergency recording, which could mean the south transept of York Minster after the fire in 1984, for example. Quite often we can be photographing a building only days, or even hours before demolition commences. In these circumstances the photographs have to be taken, whatever the weather. The only weather conditions which defeat me are falling snow, or thick fog.

Otherwise, a u/v filter over the lens, a plastic bag over the camera, and try not to get water in the dark slide. Sometimes it's possible to stand in doorways, or under a tree. Sometimes you just get wet.

The really annoying thing is a photograph taken in heavy rain with a shutter speed of about 1/2 second merely looks rather atmospheric, instead of being regarded as a heroic triumph against water dripping off the end of your nose.

Pitchford Hall Shropshire

R.C.H.M.E.

In recent years the Northern office has been involved in many projects on textile mills, in east Cheshire, Greater Manchester and Yorkshire. In addition the Potteries and a project on Hospitals.

Most of these recent projects, with the exception of hospitals, have involved the interior photography of large open spaces, populated in the main by thin iron columns, offering no hiding place for lighting. Many such areas are also black with oil from years of leaking machinery, and presented great technical problems.

The Road Bridge Runcorn Widnes.

Analysis of building development requires considerable knowledge of architecture. A photographer is expected to spend time on first arriving on site, not only walking round checking on when the sun will be in the right position for any particular shot, so as to be able to time his photographs to make the best use of the light, but also to assess what needs to be photographed from an architectural point of view - stylistic details which could help to date the building, or changes in structure which might help to determine its historical development.

As new projects, and new subjects for photography come along, we have to acquire new skills and techniques, and adapt old ones, to complement the work of the architectural investigator field staff.

<u>Flash bulbs</u>

Many sites have no power, deserted industrial complexes, redundant churches, derelict houses, for example. Expendable flash bulbs

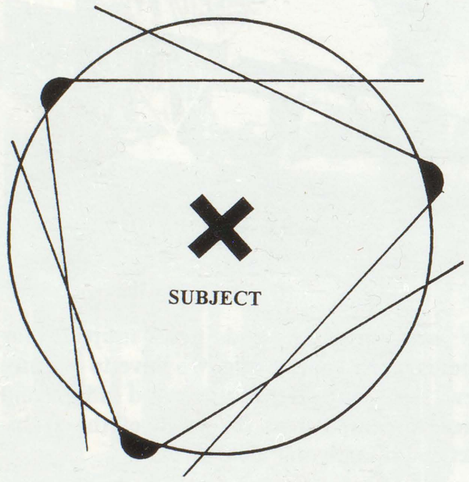
are often the only alternative light source. Guide number for clear bulbs is approximately 450. We have tried many different methods of triggering bulbs.

RCHME has recently developed a prototype imaging system, which allows the user to point to a map on a computer screen, and retrieve text information, images of buildings and archaeological monuments in their location. The prototype was developed with Attica Cybernetics to explore the possibilities of applying digital imaging technology, and elements of publishing to heritage information systems. The project took the historical buildings of York as its subject.

Bob Skingle is photographer with the Royal Commission on the Historical Monuments of England, based at York

TRIANGULAR LIGHTING

John Maltby



Triangular lighting remains virtually undisturbed irrespective of the camera position allowing the technical subject to be photographed from various angles under constant lighting conditions and with the same lighting effect.

The Association for Historical & Fine Art Photography
Founded 1985

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SLIDE DUPLICATION

Dave Lambert

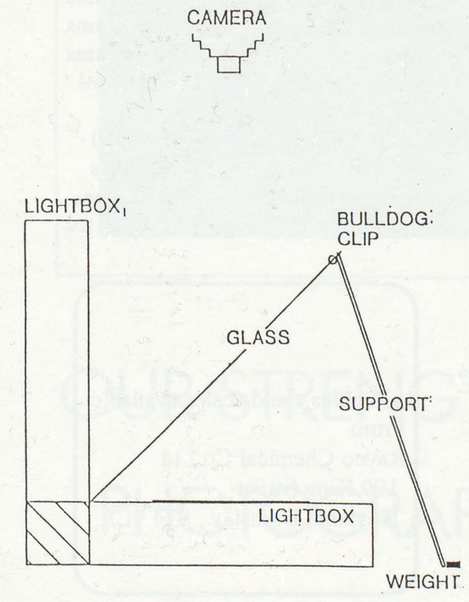
A FOLLOW-UP FROM HIS TALK AT THE 1993 CONFERENCE

The Tate Gallery has an active Press Office which requires literally thousands of prints and transparencies to be sent out as 'Press Releases' for all its exhibitions and shows. Dave Lambert has, over the years perfected a method whereby he can produce all the dupe transparencies required, at a fraction of the cost of going to the commercial sector. He has saved the Gallery more thousands of pounds that it can now count.

A more detailed instruction is shown here to enable members who missed the talk to make their own duplicates. The system has proved invaluable to the Tate Gallery Press Office - over 2000 6 x 7 dupes were made for the recent Picasso exhibition alone, for worldwide publicity and at huge savings.

6X7 DUPLICATE TRANSPARENCIES

The original is placed on a daylight lightbox beneath a copy camera as shown in the illustration.



A second lightbox is positioned at 90 degrees to the first lightbox. A sheet of glass is supported at 45 degrees between the 90 degree angle created by the two lightboxes. NB Top edge of glass must be black - use OHP or spirit based pen.

Upright lightbox intensity will need to be reduced by using paper. KENTMERE Light Grey' KENTHENE is satisfactory. Laminate it to prevent abrasions.

FILM STOCK Ektachrome 200 (EPD) or 100 Plus (EPP) (depending on the contrast of the original)

Experiments have shown that EKTACHROME 200 (EPD) works best on most originals. However, a low contrast original performs better with EKTACHROME 100 PLUS (EPP).

FILTRATION 82A + 5m (depending of course on lightbox)

The one advantage of using daylight film as opposed to duplicating stock is the consistent colour balance between batches. I am now using the same set-up to make 5 x 4 and 10 x 8 duplicates with great success.

Please do not hesitate to contact me at the Tate Gallery for any further advice.

TESTS WITH ABOVE FIMS

82A + 5M

To start your test.

TEST EXPOSURES

(200 ASA)

Size of Originals

10 x 8 in 1' @ 22

5 x 4 in 1' @ 16

6 x 7 cm 1' @ 11

35 mm 4' @ 16

PULL DEVELOPMENT BY 2/3 STOP DURING PROCESSING.

Dave Lambert is a photographer working at the Tate Gallery.

TWO BATH DEVELOPERS

Barry Thornton

Devised by H. Stoeckler for high contrast but may also be used for normal subjects. Care must be taken with very low constrast subjects when the need for extended development risks fog. Use at 21C approx. (not critical). Most films take same time. Start with 4 minutes in each bath and amend up or down to suit own printing preferences. Time and temperature is much less critical than single bath developers. Note: drain bath A well before pouring in bath B but do not rinse or stop bath in between. Use a rinse or stop bath after bath B. Agitation no more than once a minute. Bath A is very long lasting since little development occurs there. It is simply slightly reduced in volume as each film processed removes a little by absorption. Bath B, which is very quick and cheap to make, is "contaminated" with each usage with a little of bath A which oxidises very easily in this alkaline bath. It then discolours to a straw tint. It still works but not as well. It is better replaced. Usually a large quantity is made up originally since, unused, it keeps almost indefinitely.

BATH A (mix at about 40C)	
Metol	5 grams
Sodium Sulphite(Anhy)	100 grams
Water	1,000 ml
BATH B	
Borax	10gms
Water	1000ml

TWO BATH D76/ID11 DEVELOPER FOR GENERAL USE

Does not cope as well with very high contrast as the Stoeckler formula - especially in the prevention of halation - but copes better with low contrast and gives a fraction more speed. Method of mix and use exactly as the Stoeckler developer, but start with 5' + 5' timing and refine to match own preference.

Barry Thornton runs the Fine Print Photographers Workshop

BATH A

Water @ 40C approx.	750 ml
Metol	2 grams
Sodium Sulphite(Anhyd)	100 grams
Hydroquinone	5 grams
Potassium Bromide	1 gram
Water to make	1,000 ml
BATH B	
Water @ 40C (approx)	900 ml
Borax	30 grams
Water to make	1,000 ml

REFINED TWO BATH DEVELOPER FOR GENERAL USE

Slightly better definition and film speed than D76/ID11 two bath, and even better tonal rendering. Especially beneficial for faster films if development is increased for low contrast subjects to build up negative contrast. Usage exactly as the Stoeckler formula. Start at 5' + 5'.

BATH A

Water at 40C	900 ml
Metol	3.5 grams
Hydroquinone	2.25 grams
Sodium Sulphite (Anhyd)s	100 grams
Sodium Metabisulphite	0.5 grams
Potassium Bromide	1.5 grams
Phenidone	0.1 grams
Water to make	1,000 ml
BATH B	
Water at 40C	900ml
Borax	12gms
Sodium Carb (Anhydr)	5gms
Water to Make	1,000 ml

Chemicals and scales available
From
Rayco Chemical Co Ltd
199 King Street
Hoyland, Barnsley , S74 9LJ

PERIPHOTOGRAPHY

Ivor Kerslake

Adapted from a talk given to the Annual Conference of the AFAHPS on 5 October 1993.

Periphotography is basically the principal of attempting to photograph, without distortion, a larger portion of the surface of a cylindrical object than can be seen in one view and attempts to achieve this can be dated back as far as 1899 and experiments made by Fox Talbot.

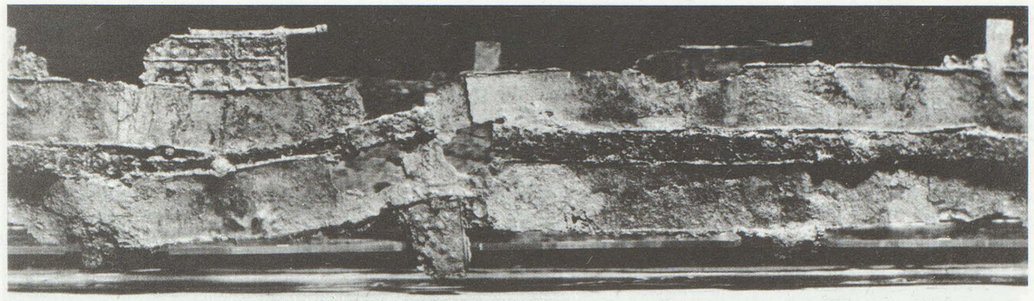
Arthur Hamilton-Smith, the Keeper of Greek and Roman Antiquities at the British Museum during the late 1800's, first had the idea of attempting to photograph continuous scenes on Greek painted vases and, in conjunction with an optical firm; Ross and Co., developed a camera that would enable them to do this.

As reported in the Photographic Journal in 1895, *"The general method employed is that of rolling the object along a smooth surface in front of the lens, while at the same time a narrow vertical slit is caused to travel at a suitable pace so that at each moment that point of the circumference is exposed which is for that instant at rest. As the object travels along at the same time that it revolves we are able to use an ordinary camera and darkslide with a fixed plate."*

This apparatus was called 'the cyclograph'. Further developments along the same theme were pursued spasmodically during the next 60 or so years, primarily though for industrial uses. During World War 2 the Shell Development Company in America produced a camera which could be used to photograph the surfaces of pistons from test engines. All of these systems employed the same basic principle of mechanical linkages between the object rotating mechanism and the film transport. In 1961 Shell Research Limited designed a new electrically operated camera system which, with some modifications and additions, became the machine we have at the British Museum today, the Research Engineers Periphery Camera. The British Museum purchased this model in 1972.

The Periphery Camera is comprised of 3 basic units, each mounted on a calibrated steel bench, although all can be removed to enable more unusual photographs to be taken. A rotating table, the purpose of which is to bring each strip of the object being photographed on to the centre line of the camera, is mounted at one end of the bench. At the other, the camera, embodying a mechanism to move a photographic film behind a stationary slit, in step with the moving image of the rotating object. The Periphery camera is completed by a control unit whose function is to start and stop the table and traverse mechanisms. The turntable consists of a 14 inch diameter cast aluminium base with a set of 4 conical stages to allow for different sized objects. This is driven by a motor with a 4 speed gearbox, the normal setting giving 1 complete revolution every 192 seconds which equates with the complete traversal of a 4 inch wide area of 5x4 inch film.

The camera, specially designed by Research Engineers Ltd for periphotography, is a basic two standard monorail system with a ground glass screen and interchangeable lens, mounted on to the bench by means of an adjustable vertical pillar. The traversing back clips on the camera and accepts a standard 5x4 inch double darkslide. The moving part of the camera back takes the form of an aluminium carriage which carries a spring-loaded back, geometrically mounted on a ground steel rod. A synchronous motor and gearbox assembly pulls the carriage across and a microswitch activated by a spring-loaded plunger cuts off the electrical supply to the motor at the end of the traverse. The width of the slit is adjustable by means of a calibrated disc and extends from 0.003 inches to 0.04 inches. The narrower the slit, the greater the definition over the surface of an irregularly shaped object. Charts are provided relating the camera setting to the diameter of the object for different lenses and turntable speeds in order to obtain the correct height/width



The Alkan Bucket, found in Kent 2nd Cent. BC showing wooden staves with bronze bands and handles — British Museum

ratio of the object.

Lighting is relatively simple as only a very narrow band is being exposed at one time and with experience we have found that it is possible to align the slit just to the side of the main illuminated area in order to lose harsh reflections.

The periphery camera, as designed and sometimes modified, can have many uses in addition to the precision engineering work for which if was primarily intended. Any object which can be supported and centred on the main turntable unit can be periphotographed, although at the British Museum we have experimented with larger additional platforms to accommodate much larger objects including people.

Although the camera has many uses, from police forensic work ie. unrolling fingerprints from cylindrical objects, and engineering projects such as comparing scoring on cylindrical objects, the use to the Museum, both in academic terms and to produce an alternative view of an object, is enormous. Painted vases can be unrolled to show complete scenes, inscriptions read, and the structure and composition of iron age torques can be viewed from a new perspective by the camera's flattening technique.

Ivor Kerslake is a Senior Photographer at the British Museum.

SUCCESS

The father of success is work.
The mother of success is ambition.
The oldest son is common sense.
Some of the boys are perseverance, honesty, thoroughness, foresight, enthusiasm and cooperation.
The oldest daughter is character, some of her sisters are cheerfulness, loyalty, courtesy, care, economy, sincerity and harmony.
The baby is opportunity.
Get acquainted with the "old man" and you will be able to get along pretty well with the rest of the family.

THE OBSERVER

R.C.H.M.E.

PHOTOGRAPHY OF STAINED GLASS

Terry Buchanan

The term "photography" is derived from the Greek, and its literal translation, "drawing with light", is an ideal definition of the process that originated in the nineteenth century. The description could equally be applied to an earlier art form, that of glass painting. The creators of stained glass were, and remain, masters of the art of painting with light. It is that essential element, light, that so closely links stained glass and the art of photography.

The photography of stained glass has two practical applications; the recording of information invaluable in restoration and conservation, and the interpretation of style and meaning. Modern photographic equipment and techniques are well suited to both functions.

Equipment

Professional photographers use cameras of the large format professional type, incorporating movements to correct verticals and producing each photograph on a 5 x 4 inch individual sheet of film for the reproduction of maximum information. 35 mm cameras are being used increasingly by historians of stained glass, and the professional photographer also finds 35 mm useful when lecture slides are needed, when longer focal length lenses are required for recording detail and where scaffolding is erected for the purpose of restoration.

Control over each of the functions of the camera is essential if the very best record is to be made and so the fully automatic, electronically controlled model of camera is often found to be less than ideal for this type of photography. The simpler, less expensive make of 35 mm single lens reflex camera, with its associated modestly priced lenses will prove to be more effective.

Because the subject is recorded by light transmission and not reflection, flash lighting or other forms of artificial lighting will not be needed, the exception being where the main purpose of the photographic record is to illustrate glass surface or constructional lead deterioration.

The Camera and Lenses

Basic requirements of the 35 mm single lens refex camera are interchangeability of lenses, a range of shutter settings at the slower speeds, from one second, a built-in exposure meter (preferably one with a small angle of acceptance) and delayed action setting.

A suitable range of lenses will allow almost any stained glass photographic project to be covered. A wide-angle lens of 28 mm focal length with a close focussing facility is essential when working from scaffolding erected for conservation purposes. A zoom lens covering a mid-range of 35 - 70 mm will enable the lens to be adjusted, from often restricted viewpoints, to fill the frame with a specific area of glass required for the record. A longer range zoom lens of 70 - 150 mm allows detail to be photographed in the often inaccessible areas of upper tracery. A long focal length lens of 200 mm or 300 mm, used at some distance from the glass will reduce the angle between window and camera viewpoint and so avoid the glass being obscured by deep-sectioned stone tracery.

If personal economies restrict the user to one lens, a mid-range zoom of 35 - 70 mm focal length would enable most subjects to be adequately recorded. For conservation and restoration records within the controllable conditions of a glass workshop, a standard macro lens can be recommended. The Nikon 55 mm macro lens can produce superb results. If expense is not an important factor, the addition to the range of lenses already suggested of a perspective control or "shift" lens will enable views of complete windows to be photographed without the unpleasant effect of convergence of verticals towards the top.

Accessories

There are certain basic accessories that

assist good photographic recording of stained glass. The first of these is a tripod. There is a common misconception that all a tripod does is to give sharper results when a slower shutter speed is being used. The tripod plays a far more important role in the creation of a permanent historical record, for it imposes discipline on the method of working. Once the camera is set up on the tripod, a constructive line of thought about what is required of the subject can be followed and the appropriate camera settings to obtain the result can be carefully considered. Where multiple copies are needed the photograph can be repeated precisely.

A cable release should be used with the camera on the tripod, although the delayed action function on the camera will serve a similar purpose, allowing any movement in the camera to settle down before the shutter opens.

A lens hood is useful where flare from windows adjacent to the one being photographed might affect the exposure, but with stained glass the actual light source is being photographed and so the lens hood does not perform the same function as it does with outdoor photography. To a certain extent filters can be used to modify the light coming through the glass; a neutral-density filter used with the wide-angle lenses when photographing excessively bright glass will enable a large aperture to be used, reducing depth of field and preventing distracting objects beyond the window from being too sharply defined. A polarising filter can reduce the glare from other buildings and roofs that come within the external area of the window being photographed.

A separate exposure meter, especially the spot meter type, can be used to give an average exposure reading where the density range of the glass is excessive, such as those windows that contain both deep red and clear glass. A small spirit level on the camera will ensure that the film plane is parallel to the glass and so reduce that possibility of distortion.

Film

The choice of film type is very important and must be related directly to what the final use of the photographic record will be.

Colour transparency film is possibly the most popular choice of material, replicating as it does the original stained glass even to the extent of being viewed in the same way, by transmitted light. Colour transparency film is ideal for projection to large groups, and yet it is small enough when each individual frame is mounted to enable a large number of images to be stored in a small space. It is also the directly viewable camera-made or primary image, not a secondary reproduction as with the negative-positive processes.

The fact that it is the primary record material is its greatest weakness, for it is more easily prone to irrecoverable damage and deterioration than the negative materials. Colour film is composed of dyes within separate layers of emulsion upon which the action of light and time will produce colour change and fading, not necessarily evenly within each of the layers. Kodachrome is one film that has a proven history of stability, established from 35 mm "Kodachromes" taken for the American Farm Security Administration in the mid 1930s.

Colour negative film from which prints can be made has the obvious advantage of requiring no special equipment to view the image. Prints can be made to a variety of sizes and can be stored easily, although separate storage will be required for negative and print. Dye fading will also occur with negative film, but this deterioration is not as easily discernable as it is with the directly subject-related colours of a transparency.

Black and white film is to be preferred where archive considerations are of primary importance and it can also be manipulated at exposure and subsequent development to produce a result containing an extreme range of detail. Some modern black and white emulsions (Ilford XP1) are dye based

or chromogenic, and work in a similar way to colour film, with the same degree of permanence.

The obvious impediment with black and white film is that it cannot record the vital and intrinsically artistic element of stained glass - colour. Colour film must, therefore, be the most serious contender in the choice of film, and the possibility of it being made to a high standard of permanence or being transferred to a more stable electronic imaging system must be hoped for in the ever advancing state of modern technology. Until such time, a good combination of materials to use would be Kodachrome transparency film printed on to one of the highly stable reversal emulsion papers such as Ilfochrome classic.

On Location

Stained glass *in situ* can present a multitude of problems in attempts to obtain an adequate photographic record: accumulation of dirt deposits, uneven or partially shadowed lighting (including shadow from protective mesh), obscuring by glazing bars or internal church fittings, lack of sufficient distance between subject and camera, restricted viewing angles - the list is frustratingly endless. Attempts can be made to reduce some of these problems, but their effects should not diminish the importance of making photographic records of stained glass *in situ.*

Ideally the best choice of lighting is the evenness of a bright but cloudy day. Direct and patchy sunlight on the glass will introduce unwanted colours. Centrally opposite a window is the best choice of viewpoint and from as high as is possible, using a chair, bench or pulpit to gain extra height. When photographing a large window with camera mounted on a tripod, the focus should be set at the central part of the window; with the camera slightly angled to include the top of the window, focus should be made even over the window as the aperture is reduced.

The exposure reading can be taken from a general area of glass somewhere between the darkest and lightest areas, and this can be more easily defined by looking at the window through half-closed eyes. Another method of exposure determination is to use a separate exposure meter and take readings from the lowest part of an accessible window facing the same area of skylight as the window being photographed. Select a very light piece of glass, but not clear, and a dark piece, but preferably not the deepest red. Take a reading from each of these pieces of glass and set the camera exposure mid-way between these two readings.

The choice of aperture should determine the exposure setting on the camera - too small an aperture and the unwanted details beyond the glass will be brought sharply into focus, too large an aperture and sufficient depth of field will not be obtained for a plane of focus to run from the bottom to the top of the window. Long exposure times will be assisted by the firm support of the tripod and the use of a cable release or the delayed action mechanism to trigger the shutter.

Once the general views have been taken, concentration can be applied to the details or close-ups. "Close-up" is possibly an incorrect term because these photographs are more easily obtained by moving the camera further away from the window and using the longest focal length lens. Where details can be obtained from scaffolding, then this opportunity should always be taken. After obtaining proper permission, safety must be the most important consideration, for both photographer and glass. Do not attempt to take too much equipment on to the scaffolding - the extra items can prove hazardous if tripped over or dislodged on to unwary persons below. Moving around on scaffolding with an extended tripod is also dangerous. Whilst the outer edge of the scaffold will comply with safety regulations of kick board and handrail, that part facing the glass will probably be entirely open. Very little pressure is required to damage a stained glass panel and a heavy fall could prove disastrous.

Most photographic details can be effectively

obtained from scaffolding using the wide-angle lens. If the tripod is set so that its central point directly beneath the camera is located over the same part of the scaffolding platform at each stage, possibly three board widths away from the glass, then it will introduce a simple scale system, enabling the finished prints to be assembled in a photographic reconstruction of the window without the necessity of having specially scaled prints made.

Observations

Some of the most difficult glass to photograph is etched clear glass. One way of experimenting here would be to photograph *in situ* glass when the external light conditions are dark, using flash lighting at an acute angle to the glass to bring the etched texture in to relief. Success has been achieved in photographing small pieces of glass in the workshop from which the painted detail has been "rubbed" or lost. With polarised light illuminating the surface of the glass and reflections from the rear, subdued by blacking material, specular reflection from the light will show minute differences in surface texture and reveal areas where the colouring medium has disappeared. Because of the critical factors involved, this method of photographic investigation is only really possible in the workshop studio.

Finally, it has been noticed when comparing original stained glass panels with their photographic records in black and white that some pieces of glass (usually the reds) which appear to the eye to be identical in colour and hue, are recorded markedly different in tone on the finished print. This observation could be important when black and white photographs are being used as the basis for conservation.

Storage

It is surprising how many photographs of stained glass taken in recent years are now unique records. Even conservation will in many instances mean some sort of alteration, increasing the historic value of an earlier photographic record. Storage of the record is therefore vitally important. The conditions that are deleterious in any archive environment are equally damaging to photographs. Material that is undergoing some form of change and in the process giving off chemical or solvent fumes should be kept well away: unseasoned timber for enclosure or shelving and newly painted or deteriorating paintwork are common environmental hazards from which photographic collections should be isolated.

Inert enamel or plastic containers are preferable for enclosures to hold 35 mm transparencies. Slide trays with a topcover usually prevent the intrusion of dust but allow air to circulate and the impressed numbering on the side of the tray gives an easy method of identification. Mounting transparencies between glass has in recent years been regarded as suspect, enclosing the transparency within an often damp micro atmosphere. Subjecting it to the intense heat of a projector lamp and the subsequent rapid fan cooling could also be doing harm. Only frequent checks of colour transparencies used in this way will prove or disprove this theory.

The basic criteria are, keep photographic records away from extremes of temperature and humidity, make sure the immediate enclosures are acid free and the outer enclosures are inert. Check the collection periodically. If problems arise, seek expert help as soon as possible.

Terry Buchanan is Head of Photography at the Royal Commission on the Historical Monuments of England and author of Photographing Historical Buildings for the Record

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