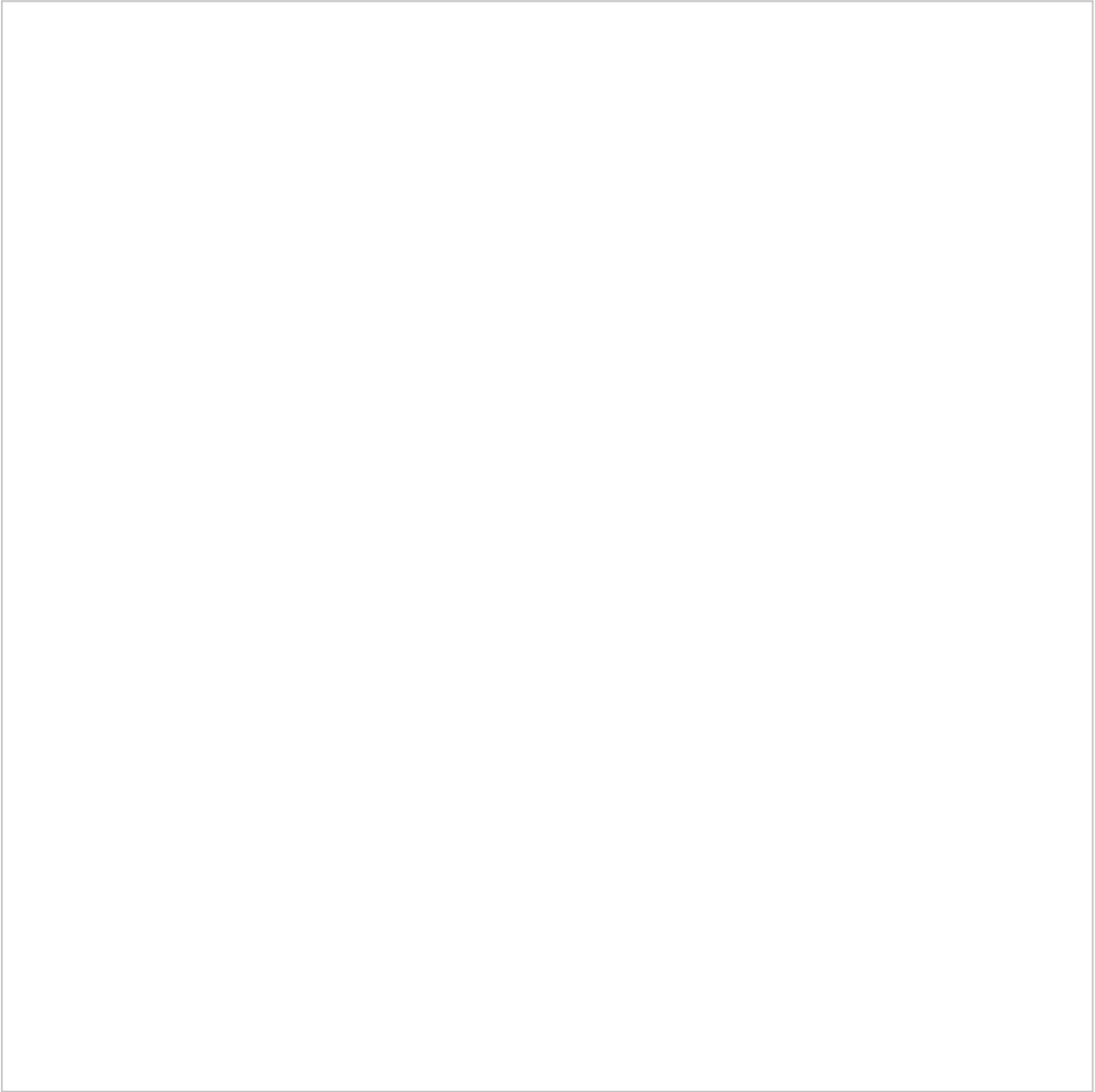


The Royal Photographic Society

# **HOLOGRAPHY GROUP**

**Newsletter      Spring 2004**



**Hologram by Inaki Beguiristain**

## Editorial

Well, here is another issue, this time heralding the spring. Already the asparagus is sprouting and the pigeons have a beady eye on my newly planted-out cauliflowers. At a recent meeting at the London Camera Club, two prominent British researchers into the more arcane realms of historical photographic processes showed us the results of their wizardry, and proved that there is yet life in the daguerreotype. As far as Group activities are concerned, we have been seeing fewer meetings now that overseas visitors are rare, but there is still plenty of home-grown talent around, as the report in this issue shows. We even have an official historian of holography at Glasgow University, Sean Johnston, whom some of you may have met. He will be reporting progress to the Group later this year. It is good to know that someone is keeping a record of the history of this important imaging technology, especially as the pioneers of holography who are still around and have stories to tell are no longer young.

The next conference on Holography in Art will definitely be happening next spring, and we have received another substantial grant from the Shearwater Foundation to subsidise it: this means that we will be able to invite a number of distinguished holographers from overseas to take part. Jonathan Ross, our Treasurer, has offered to stage an exhibition of holograms in his private gallery, to coincide with the conference, which will probably again be at the Royal College of Art.

I was reminded at the AGM, which is reported in this issue, that this is the twenty-first year of the Group's existence. During that time our meetings have been addressed by such luminaries as Emmett Leith, Yuri Denisyuk, Steve Benton and Tung Jeong, and our own Nick Phillips and Hans Bjelkhagen, as well as by many fine artists such as Fred Unterseher, Peter Miller, Sidney Dinsmore, Paula Dawson and John Kaufman, not forgetting Margaret Benyon, our first Chairman. With three conferences under our belt and another to come, and now with the support of the Shearwater Trust, that isn't a bad record. Let us hope the next twenty-one years will be equally fruitful.

Graham Saxby

## **Heliochromes, Daguerreotypes and Lippmann Photography Revisited.**

At a meeting of the Group on 28 February 2004 at the London Camera Club, David Burder and Darran Green gave a joint presentation of their investigations into some curious aspects of Victorian photography, in particular the persistent story of some daguerreotypes having shown images in natural colours. In case you might be wondering what this could have to do with holography, the colours in a Lippmann photograph are formed by interference, and the analogy with the principles of reflection holography is so close that Yuri Denisyuk actually started from Lippmann's principles in evolving the holographic technique that bears his name, and, indeed, called his early holograms 'Lippmann holograms'.

But what of daguerreotypes? Well, there was a rumour for many years that under certain circumstances some daguerreotype images did show traces of actual colour. Little real evidence of this has survived, and the practicalities of a process claimed to produce natural colours on a silvered copper plate are due to the Rev. Levi Hill, a man widely stigmatised as a charlatan. Yet Becquerel (he of radio isotope fame) had already obtained somewhat fugitive coloured images in silver chloride in 1848, and Nièpce de St-Victor evolved a variant of the daguerreotype process that became known as Heliochrome. Nièpce's method was to immerse a polished silver plate in a solution containing 5% copper (II) sulphate and 10% iron (III) chloride for a few minutes, until it turned a brownish grey. After rinsing and drying the plate was exposed for several hours in bright sunshine, after which the printed-out image was stabilised with a coating of a mixture of dextrin and lead chloride. Although written up in detail, the existence of natural colours using material apparently sensitive only to short-wave radiation resulted in a scepticism that has persisted to the present day.

David and Darran have taken up the cudgels on behalf of the pioneers, and after a considerable amount of experimental difficulty (not the least of which was obtaining suitable silvered surfaces), have produced images both by contact printing transparencies and straight photography (4 hours at f/45!). The colours are pale, but they are certainly there, and a lot less fugitive than original reports would suggest. The simplest explanation is that they result from the setting up of Bragg interference planes, as in a Lippmann photograph, but this is unlikely to be the full explanation, as the hues don't change as you change your viewing angle (close examination of

a specimen that David kindly sent me confirms this). One partly-baked theory is that the particles of colloidal silver formed during the exposure determine the colour by their size – though such a theory needs a lot more investigation. I hope someone will take it up. It is certainly puzzling. Incidentally, ordinary fixing processes destroy the whole image. Darran is preparing a paper on the subject, and it is expected to appear eventually in *The Imaging Science Journal*.

David regaled us with his own forays into the daguerreotype jungle, describing his building of a camera big enough to take a  $0.6 \times 1.2$  m plate, using thirty 4-inch wide-aperture lenses, for a TV programme. He has also produced stereoscopic pairs and even a lenticular stereogram on daguerreotype plates. All these were on view at the meeting.

One surprising outcome of David's research has been the discovery (or rediscovery) that the feeble printed-out daguerreotype image could be greatly intensified by a subsequent exposure under a ruby lith plate. This quasi-development process (also foreshadowed by Becquerel) proves much more efficient than the somewhat dangerous process using mercury fumes.

Graham Saxby

P.S. After writing the above I received a telephone call from David reminding me that polishing the heliochrome would improve the contrast and colour saturation. (This is something you daren't do with an ordinary daguerreotype.) David suggested using a piece of fur, but the only piece I could find was on my elderly cat, who was uncooperative, so I used a Kleenex tissue – and it worked.

## Department of Partly-Baked Ideas

Many years ago in the Armed Services it was a common practice among teleprinter operators to while away dreary night-duty hours by designing pictures drawn line by line with the machines. As these had only capital letters, all 'pixels' were the same size, about 1.5 by 3 mm, and the printed density depended on the particular symbol you typed: dark for a letter M, light for, say, a colon, and white for a space. For a full black you overtyped an X with an O. Some of these pictures were real works of art; I remember a splendid Madonna and Child image that arrived at our RAF station one Christmas. Electromechanical teleprinters have long gone, but standing on their shoulders is a new and sophisticated technique, the computer-generated hologram. The simplest form of this, at least in principle, uses a method broadly similar to that of the teleprinter, filling in rectangular pixels in a specific pattern to produce binary zone plates that focus light, forming an array of point images in space that together make up a holographic image. It takes a fairly complex computer program to produce even a moderately lifelike image, but it can be done.

The DPBI is fascinated by the one-to-one correspondence between the pattern coded in a hologram and the optical image it produces, and by the fact that it is possible, using a Fourier transform, to describe either one precisely, knowing the other. So a well-briefed computer programmer should be able to construct a hologram corresponding to any desired image, in three dimensions and even in colour.

Now this column, while to a large extent fanciful, always has a reasonably sound theoretical basis, and the DPBI wasn't altogether surprised, therefore, to come across an item in the journal *Laser Focus World* reporting some quasi-holographic images noticed in the reflection off a car bonnet by William Beaty, a research engineer at the University of Washington, Seattle; these had apparently been made by the circular movements of a somewhat scratchy polishing mitt. Beaty subsequently figured out a way to produce such holographic effects to order, using a pair of dividers and a small square of Perspex.

For example, to make the image of a letter V, you first mark out the V as a guide, then use the dividers to mark out a series of quarter-arc scratches, moving the fulcrum point a little along the line of the V for each scratch. The 'depth' of the image depends on the spacing of the scratches. The image is best observed by direct sunlight. You can produce quite complicated images using this method.

One interesting point is that you don't need a huge area of scratches. Beaty says that this is because the scratch pattern is analogous to the fringes of a rainbow hologram, which of course uses only a narrow strip of interference fringes. You can find out more on Beaty's website, [www.amasci.com/amateur/holo1.html](http://www.amasci.com/amateur/holo1.html). Apparently the idea isn't all that new: a scratch 'hologram' was displayed in Philadelphia in 1980, though the DPBI is doubtful whether the perpetrator knew exactly what was going on. In fact a full theoretical explanation is still needed, as the 'fringes' are a long way apart from one another compared with those on a genuine hologram. The DPBI has frequently had cause to declare 'You read it here first', but this time the idea seems to have been actually anticipated by several years.

## **Holography Group Committee**

### **Chairman**

Kevin Brown  
12 Chesson Road  
London. W14 9QX  
0207 610 1078

### **Secretary**

Bob Gibson  
12 Park Road, Chandlers Ford  
Eastleigh  
Hants. SO53 2EU  
023 8025 2171

### **Treasurer**

Jonathan Ross  
286 Earl's Court Road  
London  
SW5 9AS  
0207 370 2239

### **Newsletter Editor**

Graham Saxby  
3 Honor Avenue, Goldthorn Park  
Wolverhampton. WV4 5HF  
0190 234 1291

### **Committee Member**

Philip Gunton  
80 The Shrublands  
Horsford  
Norfolk  
NR10 3EL  
0160 389 0841

### **Committee Member**

George Jozsa  
81 South Knighton Road  
Leicester. LE2 3LS  
0116 270 9277

### **Committee Member**

Molly Gibson  
12 Park Road, Chandlers Ford  
Eastleigh  
Hants. SO53 2EU  
023 8025 2171

### **Webmaster**

Joyce Peck  
7 Magpie Close  
Flackwell Heath  
Bucks. HP10 9DZ  
0162 852 3076

### **Committee Member (co-opted)**

David Pizzanelli  
27 Kingston Road  
Leatherhead  
Surrey  
KT22 7SL  
0137 237 4254

### **Committee Member**

Jeff Blyth  
7 Bath Street  
Brighton  
Sussex  
BN1 3TB