The Royal Photographic Society

HOLOGRAPHY GROUP

Newsletter March 2003

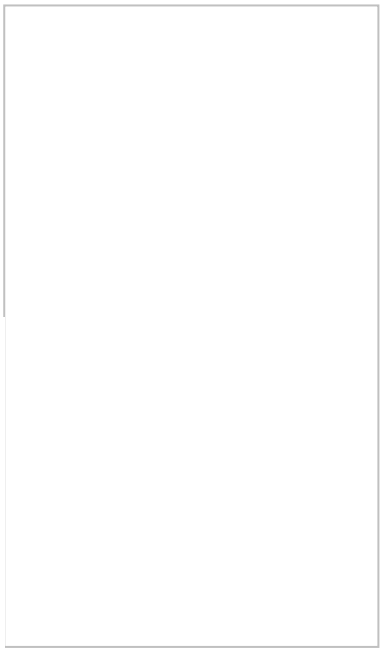

Photo: Hans Bjelkhagen

Paula Dawson at the Camera Club

Editorial

Welcome to another Newsletter. I suppose it's a little late to wish everyone a happy New Year, but as sunrise and sunset are palpably getting farther apart we can begin to look forward to another spring. I had hoped to get this edition out just after Christmas, but a number of things cropped up that couldn't be ignored, not the least of them being a detached retina that needed more than a simple spot welding job. After a dozen somewhat uncomfortable weeks things are more or less back in place, and I can begin to catch up on the arrears, this Newsletter of course being a top priority.

A number of things have happened since I last put finger to keyboard in this cause. Paula Dawson, holography's public face Down Under, is in Europe researching a major project in fine art, and we were fortunate enough to persuade her to tell us about it at a meeting in November in the London Camera Club, our usual meeting place. Unfortunately the date and venue coincided with a major upheaval in London's traffic situation, and many enthusiasts were unable to make it to the meeting. There is a report on the meeting in this issue. Also included is a short account of the Holopack: Holoprint 2002 Conference, contributed by Kevin Brown, and a report from Jonathan Ross about the exhibition at his gallery of work by Matthew Schreiber.

One piece of news none of us would have wished to hear is that Steve Benton has been seriously ill with a brain tumour. He has survived surgery, but is now having to undergo an intensive course of radio and chemotherapy. In spite of this he turned up at the recent SPIE symposium in California: you can't keep such a character down for long. I am sure we all wish him a swift recovery.

You can't be too careful these days. Philip Gunton has recently been kitting himself out with holographic processing chemicals. Somewhat to his surprise, Albion Chemicals refused to supply him with a litre of triethanolamine unless he first signed a document disclosing his proposed use of the product and a declaration that he would not use it for military purposes. As the substance in question is non-toxic and non-flammable, and has no industrial use other than in the manufacture of high-quality soap, this does seem a bit over the top.

Graham Saxby

Paula Dawson at the Camera Club

During November Paula Dawson, one of Australia's leading lights in display holography, was in London pursuing part of her latest academic venture, and kindly offered to tell the Group about it. The London Camera Club was booked for the meeting. Unfortunately, the date of the meeting coincided with the firefighters' strike. Kennington Tube Station was closed, and the extensive road works south of Waterloo added to the traffic chaos. (It took me fifty minutes to get to the meeting from Waterloo by taxi: I could have walked it in fifteen, and saved £10 into the bargain!) By the time the meeting was due to start only three of us had made it; but an hour or so later a further fifteen (including Paula herself) had struggled in from the shambles outside, so we were able to make a belated start.

Paula is noted not only for her artistic originality, but also for her imaginative approach to fashion: I remember one Lake Forest Symposium where she turned up to each successive session in progressively more outrageous garb. This time we were surprised by her appearance in a modest full-length white robe of seraphic mien. She began with a summary of her early work in Sydney, which most notably included an enormous hologram of an entire bar room. She also told us of a commission to produce a multi-media display round a statue of Christ at St Bridget's Church in Sydney, and of her moonlit hologram project featuring coral growths, sponsored by the Australian Research Council (and still incomplete). She also showed us a slide of a huge cache of pearls, in which just one pearl, illuminated by an undiverged laser beam, provided the reference beam.

She has been teaching drawing at Sydney University for the past twelve years, and is now engaged in a research project investigating the use of darkness in Renaissance painting. The three works specifically chosen for the study are by Giotto, Masaccio and Leonardo. We had had a foretaste of this work in the videotape Paula sent us for last year's conference, being unable to appear herself. This time she was able to fill in more of the detail, showing the way the artists had 'cheated' with the lighting in order to show off the draperies to better advantage. In this she had been assisted by the art historian John Gage (who was present at the meeting). He had bravely donned garments resembling those of the subjects of the paintings, and stood still for long periods while records were made of all the folds, their textures and shadows. The results showed the extent to which the apparent lighting of the paintings transcended reality in the cause of art. Paula said that the impression, particularly in the case of the Leonardo sketch, was almost as if the light was coming from inside the clothes, and that the painter was, as it were, shining darkness rather than light onto the folds. [I seem to have come across a somewhat similar concept in a Terry Pratchett novel.]

Matthew Schreiber
CPR Studies at Gallery 286

I invited Matthew Schreiber to come to London in November to present an exhibition of his holographic work in my gallery.

Matthew is a Miami-based artist whose current work is principally produced in the form of holographic stereograms – moving holograms derived from video and film based imagery. He trained at the Art Institute of Chicago and the Royal College of Art in London, and when not creating his own work he assists the celebrated light artist James Turrell on international projects.

Having met Matt when he was at the RCA and visited his studio in Miami in the summer of 2001, I was familiar with some of his earlier work, which had included laser transmission holograms, reflection holograms from pulse masters, and both achromatic and full colour stereograms presented in the form of nickel shims that he had made as Artist in Residence with Spatial Imaging in Richmond.

For his show at 286 he decided to make entirely new work, the elements of which were two ambitious stereograms, one comprising five double-sided white light transmission holograms mounted in a wooden base and set on two plinths, one at each end, and the other comprising seven plates in a similar configuration. These were arranged lengthwise down the centre of the gallery and illuminated from either side with one spotlight per plate. It looked stunning. The title of the work was *CPR Studies*
(CPR stands for 'cardiopulmonary resuscitation', i.e. artificial respiration). The experience was not unlike watching video art, only interactive. Instead of sitting passively you had to walk up and down in front of the work, and rather than having to watch it from beginning to end you could 'freeze frame' by moving your head from one side to the other – a much superior experience, to my mind.

In addition to the stereograms, Matt showed video, technical drawings, a lenticular image and a mind-boggling installation piece entitled *Contraption*, which needed to be seen to be believed. I derived great pleasure from watching the expressions on people's faces as they entered the gallery and saw a large blue balloon attached to a compressor and an array of white plastic plumber's tubing.

The artist made the following statement:

‘My subject of CPR has held my interest for the past year. I consider the work in this exhibition as finished pieces and as studies for a larger work to be completed in 2003. In July of 2002 I began an Artist Residency at Cold Spring Harbor Laboratory in New York. The lab (presided over by James Watson, as in Crick/Watson double-helix discovery) specialises in genetic research and neuroscience. At the lab I have begun research that will result in several short video interviews. In December I will return to the lab to start the second portion of research and clarify a collaborative project for the exhibition. CPR, and more specifically Life Support Systems, will be the focus of the work.’

I was thrilled with the work that Matt had produced. It was contemporary art of the most cutting-edge sort: experimental, technically superb, visually stimulating and with a strong emotional content – just the sort of work to dispel the most opinionated art critic’s preconceptions of holography. The problem was that hardly anybody came to see it. Despite my having sent out almost a thousand invitations, as well as press releases to all my media contacts, scarcely a hundred people made it to the show. I appreciate the difficulties of obtaining press coverage for events in less well-known public galleries, but it was disappointing that so few people on my list of known holophiles managed to see the work. It is not every day that one has the opportunity to see an exhibition of holographic art, let alone one of this standard, and I expected more people to make an effort. Sometimes I wonder if it is worthwhile continuing to put on exhibitions of holography, as I know nobody is going to buy anything; but I nevertheless feel compelled to do so. I need to put on at least one holography show a year just to satisfy my own desire to see people looking at holograms.

If you didn’t receive an invitation to see Matthew Schreiber’s exhibition, but would have liked to seen it, please send me an e-mail, and I will put you on the mailing list for future occasions. If you did receive one and failed to come, well, shame on you!

You can see pictures of this exhibition and previous holographic shows at Gallery 286 on my website www.holonet.khm.de/jross

Jonathan Ross

Holo-pack Holo-print 2002

This is a biannual conference concerned with commercial holography. This year it was organised for the first time by Reconnaissance International, represented at the meeting by Lewis Kontnik and Tim Patrick for the USA and Ian Lancaster for the UK. The conference attracted a record number of delegates, among them such well-known names as Chris Slinger of QinetiQ (formerly DERA), Hans Bjelkhagen from De Montfort University, the architect Russel Taylor, fine art holographer Melissa Crenshaw and David Pizzanelli from Light Impressions. The atmosphere was mostly optimistic, reporting the burgeoning importance of security holograms (16 million square metres of foil for the new Euro banknotes alone), but mixed with some gloom (share prices down by up to 50%, with corresponding pressure on research and development budgets). Another cause for concern was the spread of counterfeiting, particularly in China.

Among the subjects discussed in detail were the use of holographic decorative glass in buildings, advances in holographic head-up and helmet displays, applications of holographic optics in micro- and nanoengineering, digital synthesis of full-parallax stereograms in car body design, the lessons to be learnt from nature in the form of butterfly wings and the structure of insect compound eyes, progress in the design and production of embossing machinery and film, and the conservation of outdoor holographic displays. But as might be expected, the predominant interest was in the continuing war against the counterfeiters and the necessary counteraction by designing ever more complex images in security holograms. Kevin Brown has produced a full report, and you can read this in the ‘events’ section of our website.

Department of Partly-Baked Ideas

Whenever holography enthusiasts come across a newly marketed laser, the first thing they want to know is its coherence length. The DPB regularly attends photonics trade exhibitions, and has repeatedly noted that with any newly introduced laser, the one parameter (apart from the price) that never appears in the specification is the coherence length of the beam; moreover, coherence length invariably seems to be the one thing the staff on the stand know nothing about. The printing trade has long yearned for a laser emitting red, green and blue wavelengths simultaneously, and the latest product from the Cooke Corporation is a mixed gas laser that does just that. The three wavelengths form a triangle that covers almost the entire area of the CIE chromaticity diagram. The laser is called *White Knight.* [Inspired by the frontispiece to the first edition of *Practical Holography*? – Ed.] The makers claim that it is suitable for colour holography. But put away your chequebooks for the moment: on further enquiry

the coherence length turns out to be roughly 1 mm, just about OK for contact copies, but not for much else.

It is a curious situation. Any company with sufficient financial backing could easily design a system combining the beams of red, green and blue diode lasers into a pseudowhite beam with sufficient coherence length to make one-shot colour holograms a comparatively simple matter. The DPBI eagerly awaits the appearance of a sponsor for such an enterprise: it shouldn't cost a king's ransom, and it would make a lot of holographers very happy indeed.

Still on the subject of coherence length, one parameter that *is* sometimes specified is the frequency bandwidth of the laser beam. This can be related to the coherence length via the speed of light. A bandwidth of a few megahertzes represents a coherence length of more than a metre. Bandwidth figures are also related to the *coherence time*, which is the time the light takes to travel a distance equal to the coherence length. With a pulse laser this time is simply the pulse duration. As light travels about 300 mm (1 ft in old money) in 1 nanosecond (10^{-9} s), a 25 ns pulse has a theoretical maximum coherence length of about 7–8 m. The shortest pulses so far achieved are a few femtoseconds (10^{-15} s) in duration, which represents only one or two cycles. This inevitably means a huge bandwidth, amounting effectively to a short burst of white light. The implications of this for holography have long fascinated the DPBI, who many years ago wondered about the effect of two photons containing only a single wiggle each, interacting within an emulsion. The thought was at the time too mind-boggling to pursue, and the idea never got into print. (A pity: it would have been good to have been able to say 'You read it here first.') As it happened, other bakeries had similar ideas in their ovens. Emmett Leith, no less, used the principle to produce holographic images through a scattering medium (a piece of raw chicken breast), based on the premise that only the unscattered portion of the beam would reach the holographic emulsion at the same time as the reference pulse: the scattered beam would arrive too late. There are obvious medical possibilities in the technique. Nils Abramson used the principle to produce a dynamic image of a light pulse in flight, and developed the concept to throw new light on the principles of special relativity.

An interesting corollary is that because of the direct relation between coherence time and coherence length, exactly the same results are possible using a continuous-wave laser with a very low coherence length. (the rolling letter-box image you get in a simple Denisyuk hologram when the subject has slightly rotated during the exposure is a manifestation of this effect). So the DPBI is now considering a system using a white-light point source (either with or without a femtosecond shutter) to detect the precise location of the bones in its breakfast kipper. All that is needed is a suitable real-time recording material.

The K-K prize

When acting as pre-press editor of the newsletter, I rarely add any additional material, but I thought that you would all be delighted to know that Graham Saxby's most recent book *The Science of Imaging* (IoP Publications) received second prize in the Kraszna-Krausz Awards last month. More than 250 books had been entered. Andor Kraszna-Krausz (always known simply as 'K-K') founded Focal Press in the 1930s. Before he died in 1989 he set up a foundation to award prizes annually for books on photography and related imaging. Graham had also previously been awarded runner-up prize in 1992 for his book *Manual of Practical Holography*.

Bob Gibson