

The Royal Photographic Society

HOLOGRAPHY GROUP

Newsletter July 2001

Editorial

This issue of the Newsletter is a good deal later than I had intended it to be. The main cause has been my having to complete my new book *The Science of Imaging* (IoP Pubs, due out in the autumn) against a deadline that left me little time for anything else. The good news is that it is now in the hands of the publisher — and yes, there is a chapter on holography and an appendix on basic Fourier optics. More relevant news is both bad and good. The bad news is that the last copy of *Practical Holography* has gone, and Pearson Education, who have taken over what was Prentice-Hall, have no plans to reprint. The good news is that IoP Pubs has taken over the rights and has asked me to do a new edition. Once the formalities are settled I shall be putting out a general call to all holographers to make suggestions as to what new material should be incorporated in the new edition (which I hope will be less costly than the previous one); so if any of you have any suggestions, criticisms or discoveries of blunders in the previous edition (yes, I know about the typo on the first page — how many others have you spotted?) please get in touch. I would prefer a letter, but if that is too wearisome, you can ring me at 01902-341291 or e-mail me at graham.saxby@ukonline.co.uk. As much as anything, I would appreciate new addresses of suppliers of materials and equipment.

We are going to hold another introductory workshop on holography on Saturday 20 October, in the Midlands this time. The cost will be £25 as before, and you will be able to take away your own hologram, along with lots of advice on how to make more of them. Details are in the Newsletter.

There is more good and bad news about materials for holography. Although you can still get the range of Slavich materials from Amanda Ranalli, 13 Arlington Road, Southgate, London N14 5AS, Richard Birenheide has had to give up producing the BB material. The better news is that Mike Medora has taken over the business, and will be making and selling these excellent plates as soon as the equipment is set up and running.

The price of semiconductor lasers continues to fall and their quality to rise. While on holiday in Greece earlier this year I managed to buy one for the equivalent of £1.80! And that was with three silver oxide batteries thrown in: these alone cost over £1 each in the UK. More in the news section.

What's been happening recently?

As the RPS continues to seek a suitable base, the Advisory Board has been looking at ways forward for the Society in general. The Board consists of all the regional officers, and delegates from each special interest group — about 30 of us altogether. Following up an exhaustive questionnaire to Board members, and a membership survey sponsored by Kodak, a working party met at the Smethwick Photographic Society's rooms to discuss the results and make recommendations to the Council. The most important of these were:

1 On the general question of 'Where is the RPS going from here?'- This called for a clear vision statement from the RPS to inspire existing members and interest prospective members. The latter should all receive regional letters with their joining packages. All meetings should be open to non-members and ex-members.

2 Communications- Fuller development of the Website, with a 'chat room' for members (including overseas). The site should become a key area for communications.

3 Regional activities- Much more emphasis on these, with full liaison with Group activities. Council should provide guidelines for this. Activities should be arranged a year in advance wherever possible.

4 Professional and scientific membership- Already half the membership is either pro or semi-pro (Kodak report). The Society should promote professional membership by visits to colleges, stressing the special role of the RPS as distinct from other organizations. A planned campaign is needed to publicise the SIS qualifications, which are not sufficiently well known or understood in the scientific fraternity.

5 Community role- The RPS should seek a major media partner in reaching families and young photographers.

6 Members' wishes- The Kodak survey revealed that members' priorities were members' exhibitions, interesting speakers, distinctions workshops, technical workshops, social events and field trips. These activities should be given a high priority, with plenty of advance publicity.

Although we are a specialist Group we are all members of this splendid Society, and have its interests at heart. So do let me have any comments on the above.

Turning now to holography- the cost of setting up an amateur holographic studio continues to fall. You can make perfectly good single-beam reflection holograms with a cheapo laser pointer. If you remove the collimating optics, which usually consist of a simple anamorphic plastics lens, you will get an elliptical beam about $50^\circ \times 20^\circ$ usable area, about 3 mW power, and an absolutely clean beam (no need to spend £250 or more on a spatial filter set-up). The light is polarised parallel to the short axis of the ellipse. It needs a good warm up to stabilise, about 20 minutes, so you need a stable 4.5V power supply. A cycle lamp battery is fine, and lasts for ages. Once stable in temperature, the coherence length is around 10 cm. It isn't only suitable for chess pieces or seashells, either: you can make perfectly good interferograms with it, and the beam shape is ideal for single-beam bypass holograms. If you want to upgrade, Edmund Optics supply stabilised-output semiconductor lasers up to 25 mW, at about half the cost of a HeNe. Green and blue semiconductor lasers are on the market too, but they cost more.

The Cooke Corporation claims that its new RGB 'White Knight' laser covers almost the whole CIE chromaticity curve, and is suitable for full-colour holography. Personally, I am a little doubtful about this, as the red and green lines are both doubled. But it is a promising start. Further details from www.cookecorp.com/whatsnew/index.html.

Jeff Blyth reports that metol-ascorbate developer works better than the Russian formula for Slavich emulsions, and gives higher speed, but keep the pH down by using sodium carbonate as alkali rather than sodium hydroxide, as the emulsion is very soft. EDTA bleach and copper sulphate bleach both work well. (All these formulae are in my book *Practical Holography*.) By the way, the warning 'carcinogenic' on EDTA bottles is a mistake. It is perfectly safe. It is even used in certain foodstuffs. I understand that this unfortunate error caused some dismay in the USA, where in some cities lighting a cigarette in a restaurant invites a lynching.

Graham Saxby.

Another holography workshop coming up!

We have been hoping for the opportunity to offer another holography workshop for beginners for some time. Now the opportunity has arisen. The Smethwick Photographic Society has offered to hire us its premises for an all-day workshop on Saturday 20 October. We will be running it on similar lines to the previous one in Bath, but as there is much more room we can take up to 30 participants. There will be lectures and demonstrations of holographic techniques, and all participants will have the opportunity to make their own hologram to take away. As before, the cost will be £25. If you are interested, please telephone me, Graham Saxby, for details and joining information. The Smethwick PS clubhouse isn't in fact in Smethwick, but in Oldbury, another suburb on the west side of Birmingham. The building is The Old Schoolhouse, and it is within spitting distance of Junction 2 on the M5, and a short walk from Sandwell and Dudley railway station, a stop for all trains between Euston and Wolverhampton. The club has a licensed bar, and can provide meals (we have arranged ploughman's lunches, which I can heartily recommend). There is a travellers' hotel within walking distance, and this will possibly be offering two nights for the price of one in October.

If you do stay two nights, there are plenty of interesting goings on in the district. The biggest attraction is the Black Country Museum. This offers a whole Victorian Black Country village with a tram, a coal mine and a canal tunnel you can 'feet' your way through, contemporary craftsmen engraving glass, forging chains and so on. You can even buy real ale in the pub with old pennies (there is a money changer). It is a fascinating day's outing. If you are a music lover, there is another treat for you. Birmingham's Symphony Hall is undoubtedly the finest concert hall in the country — some say, in the world — and its new organ is being installed just now. There are dedicatory concerts on both the Friday and Saturday evenings, and a special demonstration matinee (mainly for young persons) on the Sunday. I shall certainly be there, having sponsored one of the giant 32-foot pipes.

As in the previous workshop, Bob and Molly Gibson will be demonstrating their equipment, and the methods they used to make the images that gained them their RPS distinctions. Jeff Blyth will be looking after the DIY hologram production line, and I shall be discussing the underlying principles and showing all the various types of hologram.

Book review — of sorts

Reviewers of technical books are fortunate people: they get to keep the books they review. The books can be quite expensive ones, too. Many journals (including the RPS Journal) feel that the book alone is adequate payment for the review; and they are usually right. My own reference library has been enriched in this way, sometimes by textbooks I would have needed to consult my bank manager about before buying.

It is a common belief among technical authors that reviewers seldom get past the cover blurb and the table of contents. I have certainly read reviews in which that opinion seems to have been justified, but in general reviewers are a pretty conscientious lot, and read every word from the publisher's colophon to the last word in the index. Moreover, the journals expect you to be able to prove you have done so by listing all the typos, howlers and other literary solecisms and infelicities. I was once taken to task by the editor of the BJP (not the present one) for writing a review that didn't contain a single adverse criticism (nor could it have done in that particular case). Some books, though, do contain surprising technical errors, and these can sometimes carry over from one edition to the next if a sharp-eyed editor or reviewer doesn't take notice. Earlier editions of *The Manual of Photography* contained several that seemed permanent fixtures, and I was delighted to be given the job of editing the eighth edition and having the opportunity to correct the worst of them.

One of the biggest problems in technical writing seems to be the limited ability of many professionals and academics to write clearly, succinctly and grammatically. As a free-lance editor I found some of the scripts I had to deal with infuriating. One script was so sloppily written that I had to rephrase almost every sentence in it — and the author had been on the editorial staff of a photographic publisher! It was with a sense of exasperation that I wrote in one review 'What this book clearly needed, and equally clearly did not get, was the services of a good sub-editor.'

I must have read and reviewed just about every book ever written on the subject of holography. They range from the unbelievably dense such as Sims's *Practical Volume Holography*, which makes *A Brief History of Time* look like Winnie-the-Pooh, to Fred Unterseher's *Holography Handbook*, which conceals its undoubted wisdom under a flippant style that must have deterred a generation of academics from taking it seriously. Holographers, artistic or academic, aren't in general front-runners in the communication stakes. As a result, publishers sometimes commission an established author in a different field to write on the subject. The results can be unfortunate. A couple of years ago I was sent a review copy of a book called *Holography for Photographers*, published by the American arm of Focal Press. The author had plainly had little experience of making holograms, and had even less theoretical background. Consequently, many of his proposed set-ups were totally unworkable.

He couldn't even explain how a spatial filter worked; much less show how to set one up. My own Focal Press book (which had won a Kraszna-Kraus award) had recently gone out of print (mainly, I think, due to serious overpricing), and as a truthful review would have put me in an embarrassing position, I had to refuse to review it (though I did let the publishers know, in no uncertain terms).

I hoped that it would be the last time that kind of thing could happen. But a few weeks ago I received another book: *Holograms and Holography*, by John R Vacca (who he?), published by Charles River at \$59.95 (yes, they also have haberdashers' prices in the great US of A). I opened it eagerly. Part 1 (Overview of Hologram Technology) began with the usual eulogy in short sentences with no verbs and plenty of exclamation marks. The author then plunged into a discussion on the nature of light. To my surprise I learned that a photon is like a black hole, but from the side it looks like a sine wave. Apparently, when this black hole hits a silver iodide molecule it swirls its energy into it like a wind-up toy. When you put the result into the developer it grabs the oxygen [sic] and tarnishes the silver. That's why photographic negatives are black.

As I read this incompetent twaddle my heart sank. But there was worse to come. The next subject to be tackled was interferometry. This chapter consisted of a description of the efforts of two experimenters (he calls them 'researchers' ad nauseam) to produce a holographic interferogram of a 'penny' (a one-cent piece), using first liquid nitrogen and then a blowlamp, eventually setting the whole experiment on fire. I kept waiting for the punch line, but it never came. It was absolutely straight-faced, and there was no further explanation of interferometry, nor indeed of what the 'researchers' were actually trying to do.

A brief chapter on types of commercial hologram says nothing either new or interesting. But then things suddenly take off. We have a long, long account of how to design and commission a commercial hologram, well written too. At this point I checked the author's CV. He had previously written 29 books, all of them about information technology and systems design. The next section covered embossing masters, and read like a manufacturer's manual for users of a particular set of machinery. The references seemed to confirm this. In the subsequent chapters on selling holographic art, holograms on the Web and holographic storage systems the style varied so much that I became suspicious, particularly as his lists of references had only one or two names, with a string of *ibids*. When I came to the phrase 'we found that...' rather than 'it has been found that...', I dug out some of the references. Yes, the whole lot had been lifted, word for word, from the references themselves. As far as I could see, the only original material in the whole book was the rubbish at the beginning. How this script got past the technical editor is beyond my comprehension. I shall not be reviewing this book for any periodicals.

Graham Saxby

Department of Partly-Baked Ideas

In the Spring 1987 issue of *holosphere*, the DPBI had been musing over the lens-like properties of a hologram, and the possibility of using these properties to manipulate the position of the image, having noted that in large rainbow holograms made with a diverging reference beam and replayed (flipped, of course) with another diverging beam, a real image protruded well into the space in front of the hologram, much farther than it would do had collimated beams been used throughout. If you make a first-generation hologram using a strongly diverging reference beam, then replay the hologram using a collimated beam, you can send the image right back to infinity (this is the principle underlying George Stroke's so-called lensless Fourier-transform hologram). By using instead a strongly *converging* reference beam, you should be able to produce a real image in one step. Indeed, with a beam geometry that has been sufficiently carefully calculated, this image could be, as it were, a mirror image of the original object. But would it be orthoscopic or pseudoscopic? Could a transfer hologram be made using this principle, and if so, what would be its optical properties? The problem was left as an exercise for the student, as they say. I never did hear anything about this last proposal, but a whole raft of ideas for one-step real images both with and without the help of large lenses began to appear soon afterwards.

Ed Wesly, sage of the Museum of Holography, came up with his own PBI in the same issue, following some work by Jeff Blyth on the possible counterfeiting of security holograms and its prevention. He suggested that it would be possible to replicate CDs by simply fixing a film to the disc and making an in-line Denisyuk hologram (the pattern of CD grooves is well within the resolution capabilities of holographic film). Better still, simply play the disc and let the laser in the player do the exposing! Although the laser beam is in the near infrared, the holographic emulsion is sensitive in this region. If the exposure were insufficient, the disc could be played several times. As far as I know, nobody has tried this yet.

Deep Shadows? An exhibition by Andrew Pepper at Gallery 286

Gallery 286 is the basement of Jonathan Ross's house at 286 Earls Court Road, London. Jonathan mounts regular exhibitions of modern art, and this one is timed to coincide with the Chelsea Arts Festival. If this Newsletter reaches you before the end of July you will still have time to visit the exhibition provided you contact Jonathan first, on 020 7370 2239.

Andy Pepper has been combining holography with sculpture in light-driven three-dimensional pieces for more than twenty years. In this exhibition, entitled 'Deep Shadows?' the main work is 'Sight Lines' produced specially for this gallery. The holograms are mounted horizontally at near floor level on steel plates that have been allowed to oxidise in patterns to which the holographic images of liquid surfaces match. Other displays include a curved image forming a composition with its own shadow. Altogether a very thought-provoking show.