

# Fingerprint and Footwear Forensics Newsletter

May 2008 Publication No.26/08



**Home Office**  
Scientific  
Development Branch

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## PROGRAMME UPDATE

### Programme Update

The programme for the Fingerprint and Footwear Forensics team has been agreed for 2008. In establishing a strategy for the next three years, we have been mindful of a number of changes in the forensic environment, which could have a significant impact on the work of the team. The establishment of the NPIA and a forensic strategy for the police as well as the new role of Forensic Regulator could influence the contribution expected from the FFF Programme.

Until there is further guidance, we will pursue the plans agreed for 2008/9. We will continue to work closely with the Footwear Board and its R&D Group to pursue the priorities identified for the footwear project. The powder suspension project is continuing, as well as further work on the use of light sources. Our User Group has identified and prioritised a number of feasibility studies. These will enable us to cover a variety of small studies covering particular issues brought to our attention by the User Group, the National Scientific Support Laboratories' Group or by individual forces.

If you have any questions, please feel free to contact us: details are on the final page of the Newsletter.

### Is Yellow the New Green?

In December HOSDB tested two prototype lasers from Coherent, a 2 watt 460nm blue laser and a 3 watt 577nm yellow laser. These lasers are based on the successful 532nm Tracer system.



*The two prototype lasers*

These two prototype lasers were compared with a 5 watt 532nm Revelation laser made by Laser Innovations and a Quaser 101 (this is a converted Quaser 100 - see April 2005 newsletter). Fifty-six items, including plastic bags, glass, and plastic and cardboard packaging, were examined for latent fingerprints with all four systems.

The 460nm blue laser was least successful at finding latent fingerprints, but was more effective at visualizing a wider range of forensic evidence than the other lasers, in particular stains and fibres. However it is believed that shorter wavelengths should be even more effective in this respect.

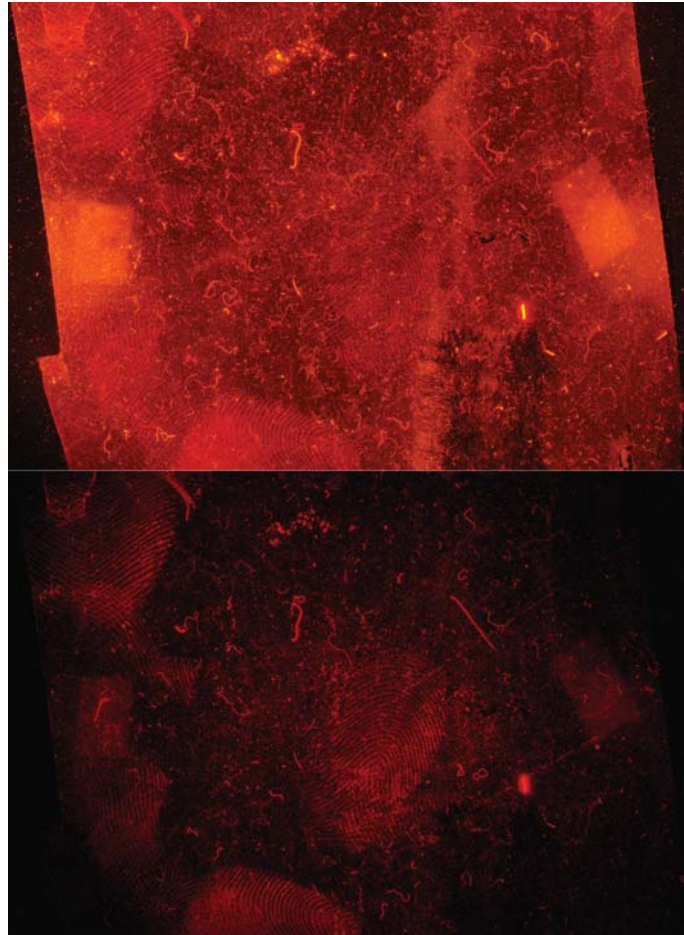
The 577nm yellow laser visualized more fingerprints than any other light source in the comparison, eight of which were not found using the other light sources. However, while the 532nm green laser visualized fewer total fingerprints it found three that were not found using other light sources.

The 577nm yellow laser also proved to be extremely effective at visualizing fingerprints on adhesive tapes treated with basic violet 3. It is recommended that all adhesive surfaces from serious crimes are treated with basic violet 3 after either being treated with powder suspensions or superglue. Basic violet 3 will develop extra fingerprints not visualized by the other processes.

	577 laser 3W	532 laser 5W	Q101 G and G/Y	460 laser 2W
Items examined	56	56	56	56
No fingerprints total	20	15	16	2
No unique fingerprints	8	3	0	1



*Fingerprint on a chair leg visualized with the 532nm laser (top) and 577nm laser (bottom)*



*A piece of adhesive tape treated with BV3 with fluorescence excited with 532nm laser (top) and 577nm laser (bottom)*

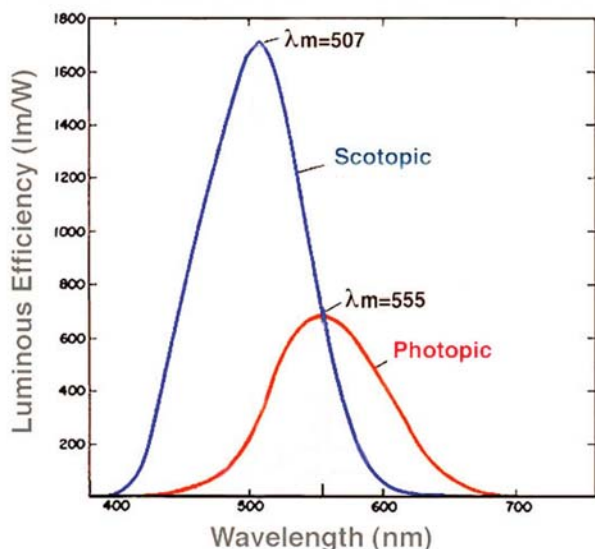


There are however a couple of difficulties to be overcome in order to use the 577nm yellow laser effectively.

Firstly, the operator is required to use red (593 Quaser/ RG610 Schott) goggles for safety and to be able to see the fluorescence produced when chemicals are excited by yellow light. Unfortunately human eyes are relatively insensitive to dim red light and weakly fluorescing fingerprints of this colour may be easily missed unless the eyes are fully dark adapted, which can take up to 30 minutes in relative darkness. It is possible to use this time to carry out fluorescence examination using shorter wavelengths for excitation where the fluorescence is likely to be bright eg BY40 or DFO. However, the effectiveness of fluorescence examination will always be greater if practitioners are dark-adapted. Dark adaption is destroyed if eyes are exposed to a bright blue, green or yellow light for a fraction of a second.

The graph below shows the difference between Scotopic (Night or Dark Vision) and Photopic (Day or Colour Vision). Photopic vision is the results of signals from the three cone receptors in the eye and gives us colour vision. Scotopic vision is the result of signals from the rod receptors, which are more sensitive to intensity but have no spectral separation, so night vision is monochromatic.

Secondly, the metering in digital cameras is set as closely as possible to the response of the human eye, but as both CCD and CMOS sensors are very much more sensitive to red light than the eye the camera's meter will give readings so that the resultant images are between 2 and 4 stops over-exposed. Most, if not all, digital cameras will only automatically correct a maximum of 3 stops over or under exposure so if the over-exposure is more than this the camera will have to be used in full manual mode.



*The Scotopic and Photopic curves of spectral luminous efficacy*

Interestingly these difficulties may be overcome by using the second to negate the first. It is possible to take advantage of digital systems greater response to weak red light to search for fluorescent fingerprints at these wavelengths using a live capture system such as IRIS. This should ensure ease of searching so fewer fingerprints should be missed.

HOSDB will have a 577nm yellow laser by the time you are reading this. It is our intention to conduct some in-house comparisons and to loan this out to police forces so that real comparison data with other light sources may be collected and recommendations made in due course.

### Training the Trainers

In December Helen and Vaughn met with the trainers at NPIA Harperley Hall to train them in all the new aspects of fingerprint and footwear mark development and recording of crime scene marks. These developments should be incorporated into the revised FERRT course available in a few months



*HOSDB training the trainers*

### Val Bowman on Secondment

Val started a minimum six month secondment to NPIA in February working on police science and technology strategy. She will be working at NPIA for three days every week until August 08.

### Sinem Mehmet Joins the Team

Sinem Mehmet joined HOSDB on 21 January as the new Laboratory Technician on a two year contract, after two years working as a trainee biomedical scientist in histology. Her interest in fingerprints came from working at the British Transport Police as a Fingerprint Development Technician.

## EQUIPMENT UPDATE

### Powder Suspensions

Sirchie have recently introduced two new premixed powder suspensions – Adhesive-Side Developer Dark and Adhesive-Side Developer Light. The dark is Iron (Fe)-based so is not recommended for adhesive tapes, but may be used on non-porous surfaces, in line with previous recommendations (see November 2007 newsletter). The light is titanium dioxide (TiO<sub>2</sub>)-based and should only be used on dark non-porous surfaces after the appropriate powder.



The new Sirchie powder suspensions

### Acid violet 17

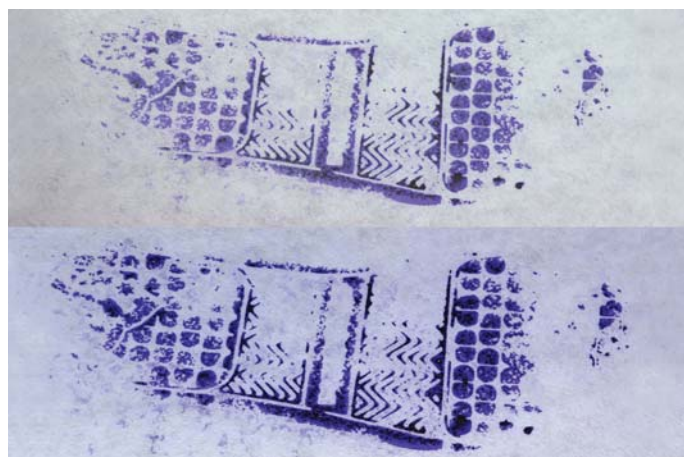
Acid violet 17 purchased from Keystone or DH Scientific during 2006/7 may have been the wrong grade of dye, weaker than that recommended by HOSDB. They have been wrongly supplying the food grade which is diluted with a type of sugar. If police forces have dye that looks a pale mauve colour (left) rather than a dark, almost black, purple colour (right) then they should use it at three times the concentration it says in the manual – 6g per litre.



Acid violet 17 - the food grade (left) and the correct strength (right)

Articles already treated with weaker formulations of acid violet 17 may be retreated with the formulation given above.

Keystone and DH Scientific have confirmed they now have the correct grade of dye so this should not happen again. It is also available from Sigma-Aldrich under the product name Coomassie Violet R200 product number 210579 (This is different from that stated in the MoFDT as they have changed their supplier). All dyes can be characterized by their Colour Index name and number, in this case Acid violet 17 and 42650

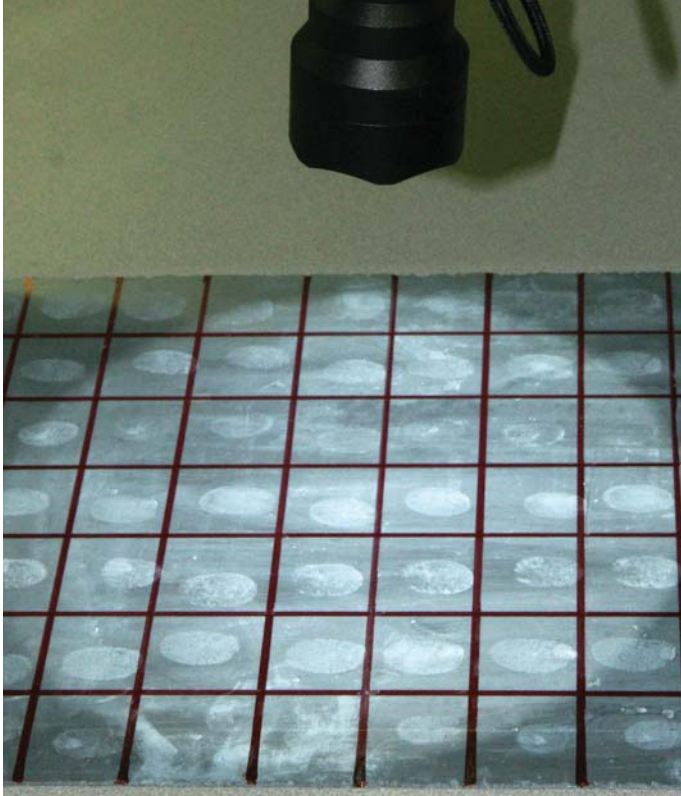


Footwear impressions stained with the two types of acid violet 17, the food grade (top) and the correct strength (bottom)



### Let There be Light

HOSDB has recently discovered a small battery-powered torch that, once the reflector is removed, gives diffuse even lighting with two brightnesses at reasonable cost (£92+VAT). Lighting of this type is extremely useful for visualizing fingerprints of low contrast with the surface.



*See how even the beam of the Tiablo A9 is, once the reflector has been removed.*

If you do not already own a light source that will do this the Tiablo A9 is available from InovaTech 020 8220 8000.

### IRIS Manufacture

In our April 2007 Newsletter we indicated that IRIS manufacture at HOSDB had ceased and that we may consider seeking potential third party manufacturers for the system. After reviewing options and the processes that we are obliged to enter into to identify a manufacturer (who would have to set up for manufacture of the system without guarantee of any further sales), we have elected not to pursue this route. As stated previously, we do not intend to manufacture any more IRIS systems at HOSDB, but if any force does want to purchase a system we will make the engineering drawings available to them so that they can identify an appropriate engineering company to manufacture the workstation via standard force purchasing procedures. The software and builds of computers to operate the system can be obtained from Perceptive Solutions, who are the third party selected for support of the existing IRIS systems.

### COMMUNICATIONS

#### Footwear Newsletter

A separate newsletter dealing with footwear issues will have been published by the time you receive this – Publication number 24/08.

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<http://scienceandresearch.homeoffice.gov.uk/publications/fingerprint-publications>

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ISBN 978-1-84726-668-2