

# ILLUMIN

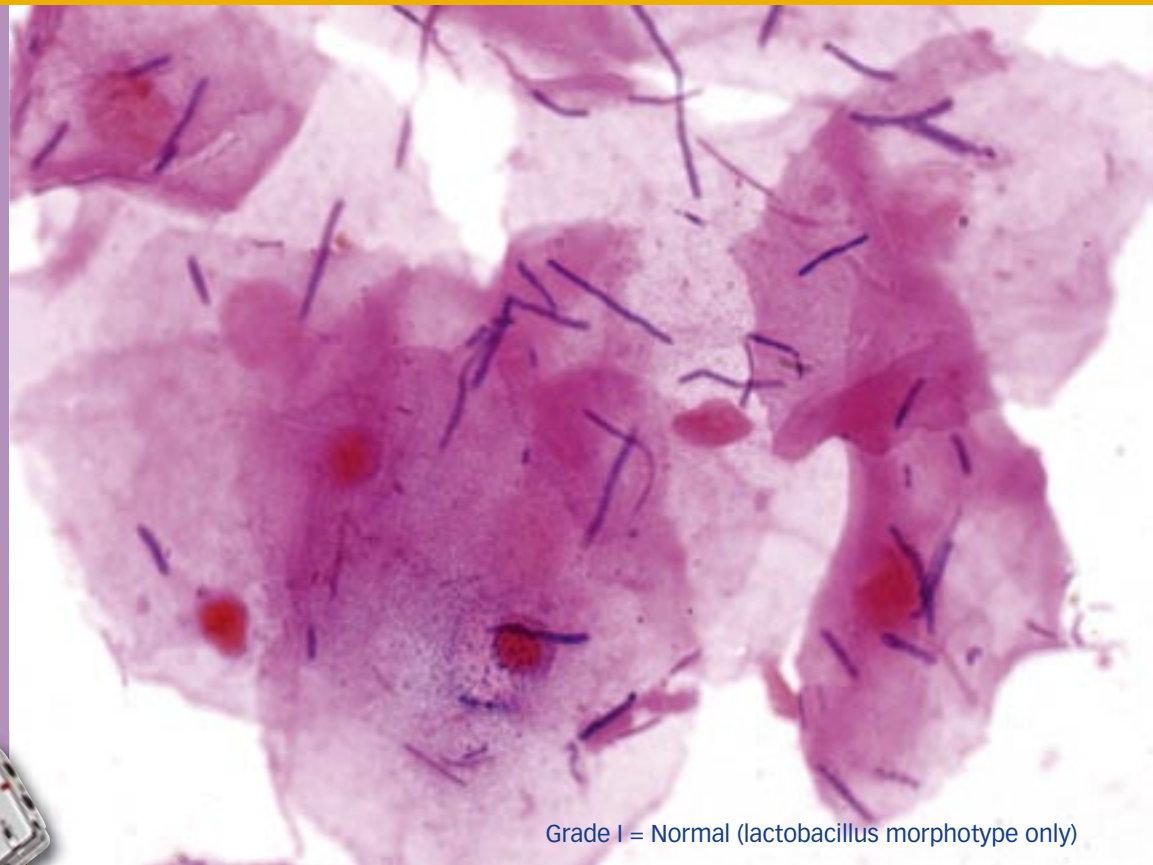
The newsletter for microscope users

## Welcome

This issue of Illumin8 is specifically for medical laboratory scientists and for future issues we would like to know what you want to read about. Moreover, if you are doing any interesting research, or have a great microscopy tip, then send an email to

[microscopy@olympus.uk.com](mailto:microscopy@olympus.uk.com)

or fill in the reply paid card. You can also use these to request your own copy of 'Illumin8' as well as the handy 'Illumination' leaflets and objective poster. We hope you enjoy this issue and don't miss our competition to win a WS-300M voice recorder with built-in MP3 player.



Grade I = Normal (lactobacillus morphotype only)

Gram stained smear showing normal vaginal flora (courtesy of Prof. Cathy Ison and the British Association of Sexual Health & HIV)

## Warts 'n' all

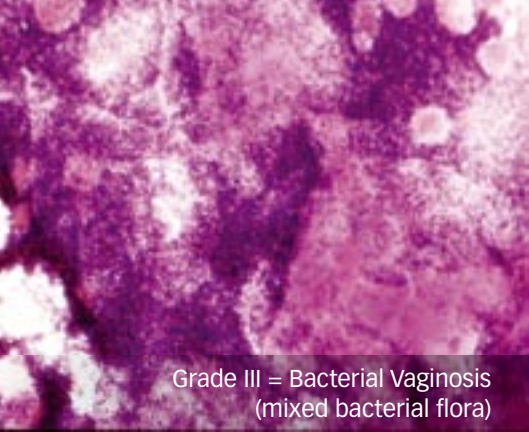
### IN THIS ISSUE

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*With the rapidly increasing occurrence of sexually transmitted infections and diseases (STIs) such as chlamydia and gonorrhoea, has come immense pressure on the NHS genito-urinary medicine (GUM) and sexual health clinics. As a result, it is proving more and more difficult to provide drop-in services, with appointments becoming the only source of care. With millions of pounds pledged by the Government, the situation may resolve itself through increased staffing and facilities. In the meantime, cases of STIs have spiralled out of control. Beating the backlog will require some committed work from the GU teams and consequently, many hours of microscope work by doctors, nurses and support staff. Consistency is an issue especially when many microscope-based diagnoses are not simple 'yes or no' answers. Rather they are based on grading systems and can be overly subjective without extensive training and quality assurance (QA) procedures.*

### Training and QA

Professor Cathy Ison, Director of the Sexually Transmitted Bacteria Reference Laboratory SRMD, Health Protection Agency said, "There have been attempts to establish external QA for STI clinics, but the lack of internal QA in many has precluded this from happening." Cathy continued, "Unlike most cytology services, the staff at sexual health clinics are required to complete many other tasks on top of the smear screening and therefore QA can only be accomplished amongst the milieu of other such processes." Without extensive QA, it is essential that staff have access to training, "Microscopes are not simple tools to use, they require a decent level of knowledge in order to screen consistently and correctly", added Cathy. As a result, the Bacterial Special Interest Group (BSIG) of the British Association for Sexual Health and HIV (BASHH), holds regular training sessions and has produced a comprehensive book on the use of microscopes for the diagnosis of



Grade III = Bacterial Vaginosis  
(mixed bacterial flora)

*Gram stained smear showing mixed bacterial flora indicative of bacterial vaginosis (courtesy of Prof. Cathy Ison and the British Association of Sexual Health & HIV)*

STIs. Cathy said of the training, "We have run the training sessions for about nine years now covering processes such as microscope set-up and specific screening techniques for STIs. The 32 places available are always oversubscribed so we know there is a continuing and growing need for further courses. The BSIG has recently introduced a dark ground microscopy course to disseminate expertise for the diagnosis of infectious syphilis, a skill that had been largely lost over many years."

#### QA in action

At the Royal Cornwall Hospital, Treliske, Dr Frances Keane and colleagues have developed

an internal QA system which uses actual smears from their patients as examples. Each month a slide set is collated from interesting cases encountered through routine clinic work. All nurses providing the routine microscopy service read the slides and the slide set is then reviewed at monthly feedback meetings. In this way, the accuracy of diagnosis across different members of the team can be assessed and any issues resolved quickly.

Frances said, "This system was established in 2003 for bacterial vaginosis (BV) but now stretches across all gram stain samples." She continued, "Now that the QA system has been running for a few years we have a process in place that everyone contributes to and gains from. This is good for both the clinical staff and the patients." Frances concluded, "Microscopes are integral tools in the diagnosis of STIs, as they provide a quick and relatively easy method of producing near patient results. It is essential though, for more extensive QA to be established to maximise diagnostic consistency."

#### Keeping clear objectives

Establishing and maintaining training and QA in the multi-functional environment of STI clinics can be difficult, but is essential if the spiralling numbers of infections are to be brought under control. It is also important to provide the correct equipment to enable screening to be

carried out over extended periods of time. This not only requires ergonomically correct microscopes, but also optics that produce high quality images. A microscope may be comfortable to sit at and control, but if the image isn't clear then staff will suffer from eye strain. Olympus upgraded its BX45 microscope with UIS2 optical components to meet exacting requirements and produce the optimal clarity and resolution at any magnification. The UIS2 objectives feature excellent aberration correction with superb field flatness making cell and cell-component differentiation much clearer.

The BX45 hosts a plethora of features to make long-term microscope use far more comfortable. This greatly reduces stress and strain, improving screening efficiency and consistency. The eyepiece can be adjusted from 0° (horizontal) to 25° and moved towards the user by up to 45mm. The stage position has been lowered and all commonly used controls are within easy reach of an arm resting on the desk.

To find out more about the Olympus BX2 microscopes or other Olympus products, fill in the reply paid card or email [microscopy@olympus.uk.com](mailto:microscopy@olympus.uk.com)

## Smile, you're on uncooled camera!

With the rapid growth of the consumer digital camera market came a huge investment in technology. This has benefited microscope users due to a reduction in the cost of specialised digital cameras with a concomitant increase in resolution and speed. Capturing digital images is now therefore a quick, easy and worthwhile process, especially with cameras such as the CVIIIu (ColorView III uncooled) from the Olympus company - Soft Imaging System. The CVIIIu features 5 Mega Pixels with a generous dynamic range, fast frame rates and colour binning.

To find out more about this product, fill in the reply paid card or email

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## Getting back to basics

Biomedical scientists from Birmingham's City Hospital recently did this at an IBMS CPD accredited training course from Olympus. The course covered: basic microscope optics, Koehler illumination as well as day-to-day cleaning and maintenance. Jenny Stoddart, Chief BMS at the hospital, organised the event, "We identified a definite need for some microscope training and with Olympus sorting the CPD points, we were even more pleased with the result." Jenny continued, "Trainee BMSs are now assisting staff with their microscope set-up, Koehler illumination and maintenance, a point that shows how effective the training has been."

If you would like to talk to Olympus about similar courses, please fill in the reply paid card or email [microscopy@olympus.uk.com](mailto:microscopy@olympus.uk.com)





The author, Brian J. Ford.  
Image courtesy of Andrew Webb.

# Mysteries of the Blood Clot

By B J Ford

During his research on Leeuwenhoek, the author imaged his own blood through the Leeuwenhoek microscope at Utrecht University. Note the lobed nucleus (top right) inside a white cell - a remarkable result from single-lens microscope. Find out more about Leeuwenhoek on the back page.

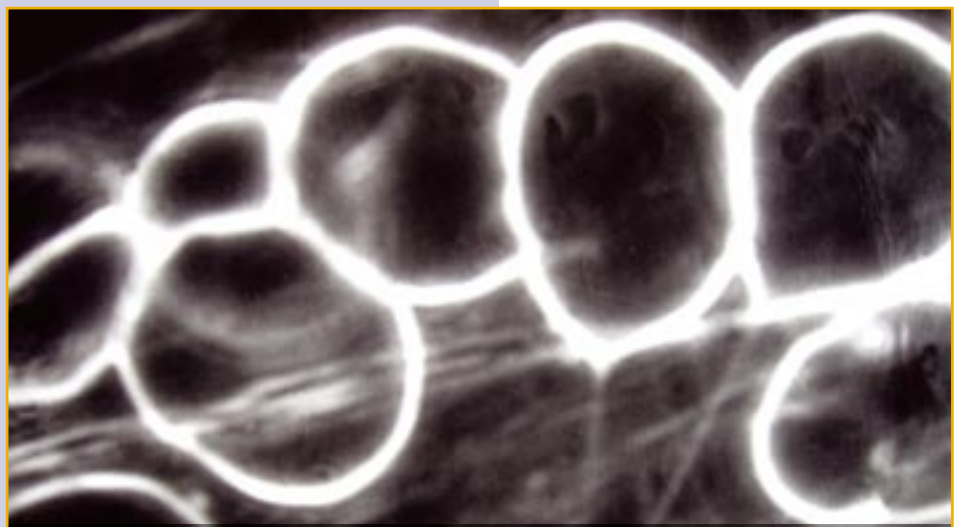
How can blood clot? This question was with me as a teenager, when I had a year in the most junior capacity imaginable at the Medical Research Council. Yes, it's easy to imagine the fibrin threads enmeshing erythrocytes in a test-tube on the bench, but that didn't explain what happens in life.

If a blood vessel has been damaged, then blood flows out at speed. If fibrin threads are hanging downstream from the wound, they can't form a seal. Conventional explanations couldn't explain the sealing of a broken blood vessel. I set up some trials using single drops of blood on a microscope slide. To distribute the cells, I diluted the blood sample with saline and added a coverslip. My observations revealed something that had never been recorded before:

The fibrin threads were catching onto the erythrocytes. The red cells became held on a thread much like balloons on a string. I named them penderocytes, from the Greek (literally, 'suspended cells'). Using dark ground microscopy I was able to visualise these fibrin threads when they were still too tenuous to be truly resolved. The pictures were striking and the results were published by the Royal Microscopical Society. Moreover they were also published in the 'highlights' section of the International Yearbook of Science and Technology opposite a picture sent back from the moon by an American space-craft, and were widely reported in the press. That doesn't often happen for microscopy.

Sometime afterwards, I was met by a pioneering heart surgeon, Mr Tom Rosser, who was losing patients through a post-operative condition called tamponade. This was due to blood leaking from a sutured heart into the pericardium. In time, I derived a 'penderocyte test' on a glass slide. It could predict patients in which clotting was defective, making tamponade increasingly likely. I reasoned that the erythrocytes suffered surface trauma as they were rolled across the discs of a by-pass perfusion pump; as a result they were less able to adhere to the fibrin threads. Clotting failure, we began to conclude, was related to erythrocyte trauma – and a consequent lack of penderocytes.

Professor Brian J Ford is a scientist, broadcaster, writer and lecturer. His prolific research work means he spends many hours looking into the microscopic world either through modern compound microscopes or one of van Leeuwenhoek's 17th century masterpieces. He was recently awarded a NESTA Fellowship in London, presented with the inaugural Köhler medal in America for his work in microscopy and, in 2005, was nominated by the Astronomer Royal and Sir Sam Edwards (former Chairman of the science research Council) for the prestigious Faraday Medal of the Royal Society in London. He can be contacted via his website: [www.brianjford.com](http://www.brianjford.com)



The prize-winning micrograph shows erythrocytes clearly attached to fibrin threads. The appearance, like a balloon on a string, led to the term 'penderocyte' (suspended cell).



# Win an Olympus WS-300M voice recorder with MP3/WAV playback

With each issue of *Illumin8* we give you the chance to win a prize. This time by correctly answering the three questions and returning the completed reply paid card by 31st March, you could win an Olympus WS-300M voice recorder.

**Question 1:** Which Olympus microscope has a low stage for screening?

**Question 2:** How many mega pixels does the CV800 digital microscope camera feature?

**Question 3:** What did van Leeuwenhoek originally train as?

**We would like to congratulate Dr David Howse of The Welding Institute for winning the DPS1 binoculars from the last issue of *Illumin8*.**

## SHORT TIPS

### Are you **in the dark**?

**Dark ground (or darkfield) microscopy is an underrated contrast technique which can produce striking images for minimal outlay. Here are some hints and tips on using this revealing technique**



A spectacular darkfield photomicrograph of the diatom *Arachnoidiscus ehrenbergi*. Courtesy of Mortimer Abramowitz

- If the focal plane of the specimen cannot be located using normal brightfield you may not find the darkfield image either. To focus, try closing the condenser aperture fully in brightfield mode. Remember to open all irises before moving to darkfield.
- Darkfield illumination will show up any dirt, dust and bubbles, so use clean slides and cover slips.
- Remember to avoid using objectives with numerical apertures that are too high for the darkfield condenser unless an iris is fitted.

For further hints and tips, the 'Illumination' leaflets from Olympus can be yours by filling-in and returning the reply paid card or by emailing [microscopy@olympus.uk.com](mailto:microscopy@olympus.uk.com)

## Little Animalcules

*Through the eye of an untrained scientist:* Anthony van Leeuwenhoek was an unlikely champion of microscopy. He was born in Delft, Holland on 24th October 1632 and was trained as a draper. He also assumed minor civic roles to make himself financially secure, which allowed him to investigate the properties of magnifying lenses. By 1671, at the age of 39, van Leeuwenhoek had perfected a unique ability to produce ultra-fine spherical lenses. To use these effectively, he placed them between two small sheets of metal with tiny holes and a crude arrangement to hold and focus samples. By the time he died in

1723, it is estimated that he made 550 instruments and such was his skill that he achieved magnifications of up to 500x and resolutions of down to 1µm.

As a result of his fine craftsmanship, van Leeuwenhoek was not only able to identify details never before possible on organisms, but also to see 'little animalcules' that weren't previously visible. His great sagacity drove him to investigate and meticulously record almost everything he could. Sometimes he reported facts that were already known, but since he had no formal science or language background he had no knowledge or pre-conception of them – this sometimes made his discoveries all the more remarkable and groundbreaking. He was the first person to see a great number of organisms and cells making very meticulous observations of them, including, most importantly, bacteria, erythrocytes and spermatozoa. His voluminous output on the sperm of many

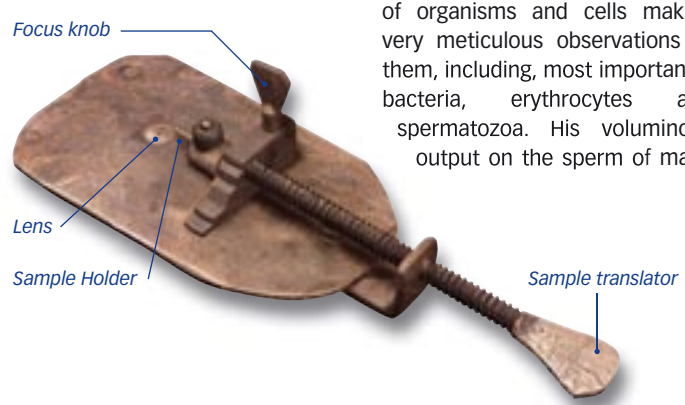


Image courtesy of Michael W Davidson, Florida State University.

animals led him to suggest, against the widely accepted views of Harvey, that semen conveyed sperm to the egg as an essential part of reproduction.

Van Leeuwenhoek conveyed his work to the world via personal letters to the Royal Society in London or other key scientists. Most of these were published in the Philosophical Proceedings of the Royal Society. Although his microscope is not the predecessor of modern microscopes, his skills and rational conclusions are the bases of modern investigations. In 1716 van Leeuwenhoek said, "...my work, which I've done for a long time, was not pursued in order to gain the praise I now enjoy, but chiefly from a craving after knowledge, which I notice resides in me more than in most other men. And therewithal, whenever I found out anything remarkable, I have thought it my duty to put down my discovery on paper, so that all ingenious people might be informed thereof."

One of Anthony van Leeuwenhoek's amazing microscopes. Image courtesy of Michael W Davidson, Florida State University.



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