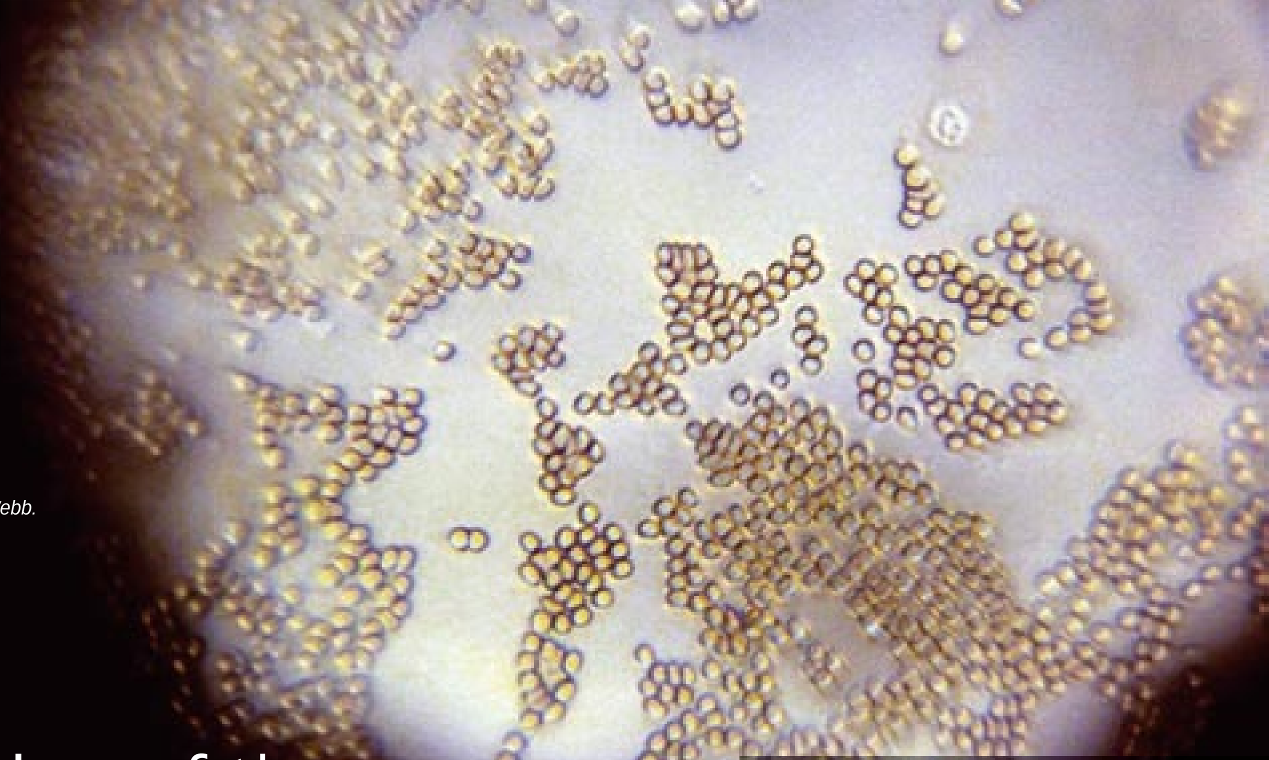
The author, Brian J. Ford.
Image courtesy of Andrew Webb.

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.

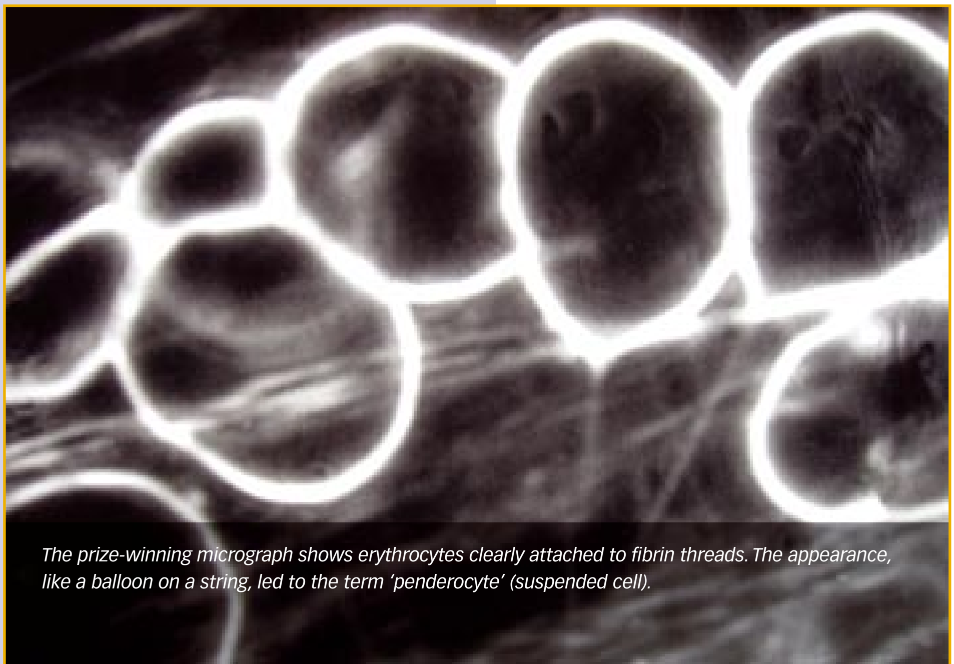
How can blood clot? The question was with me as a teenager, when I had a year in the most junior capacity imaginable at the Medical Research Council. Yes, it's easy to imagine the fibrin threads enmeshing erythrocytes in a test-tube on the bench, but that didn't explain what happens in life.

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 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 and 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 sees him spend many hours looking into the microscopic world either through modern compound microscopes or one of van Leeuwenhoek's 17 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 has been 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***



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).