Image of the Year 2018

Meet Johann Swanepoel
Could you tell us about the image?
It’s an image of a mosquito larva taken at 400x magnification, showing the bottom part of its mouth. The spikes you see form the mouth brushes of the larva, which it uses for feeding. The brushes move around and create a water current that moves food particles into the mouth of the larva. These brushes are tiny, only a fraction of a millimeter.

How did you develop the idea for this image?
Microscopy is just a hobby for me; I regularly look at water samples that I collect from ponds and lakes. In this case I took samples from a lake in Johannesburg to look at through the microscope in the hope of discovering something new. In one of the samples I saw a few of these larvae, so I had a closer look at them and took a number of photos – and this was the best one.

How did you create this image?
I used my Olympus BX53 microscope with differential interference contrast (DIC) lighting fitted to it and a Canon EOS 6D camera. DIC uses prisms to give you better contrast, which is particularly helpful when your samples are transparent. The wavelength-dependent retardation of light creates different interference colors, so the background will be a certain color and your specimen will show different variations of that color.

When you capture images at 400x magnification, your depth of field is really low, so with a 3D object, only a small part of it will be in focus. To get a perfectly focused image you can take a lot of photographs – all focused at different depths – and use software to stack those images together to form one final image. That way the combined depth of field of the images is enough to get the entire sample in focus and not just one slice through it.

It can be quite difficult to get the whole specimen in focus; this particular image consists of 16 images stacked together. You can either stitch the images taken at different depths together manually or use specialized software. To create this image I used a software package called Zerene Stacker.

When did you start using microscopes to create art?
I studied microbiology many years ago, but then went on to work in IT, so I never really used microscopy during my career. A few years ago I got interested in macrophotography and started taking pictures, simply using a DSLR camera and a macro lens. Then about three years ago I decided I wanted to get closer to certain subjects that I was photographing, so I decided to buy myself a microscope.

It sort of escalated from there, because it really brought all my passions together into one hobby. I build websites and I do a lot of coding and Photoshop work for my day-to-day job. It’s great to be able to combine that with microbiology and photography through the image stacking – I haven’t got bored of it in the last three years!

Why did you pick this image?
I’ve always really liked that image. It’s my personal favorite and I use it for my Facebook page. Nevertheless, it was a difficult decision, because you could only enter three images. It was nice to see that my personal favorite was the one that won the award! Movement of the subjects will ruin the final image.
Have you always had an interest in looking at the microscopic world?
Yes, definitely. The nice thing about it is that you can always discover something new – something you’ve never seen before. And the crazy thing is, there are new things to discover all around us. You can pick up a water sample everywhere and the amount of life in there that you can’t see with the naked eye is just incredible.

What are you currently working on?
I'm currently doing a lot of photo stacking of insects, which are fairly large. To get a perfectly focused image, I normally take over 200 photos so I would like to automate this process. I bought a Raspberry Pi with a motor and wrote a program that will turn the focus by a fraction, take a photo, turn it again, and so on.

If I can automate this process, I'll be able to zoom through the subject and have all the images taken for me without manually changing the focus every time. With 200 images I'd be able to capture larger 3D objects such as a fly’s head and still get really sharp images.