NEAR INFRARED MICROSCOPY PART 1

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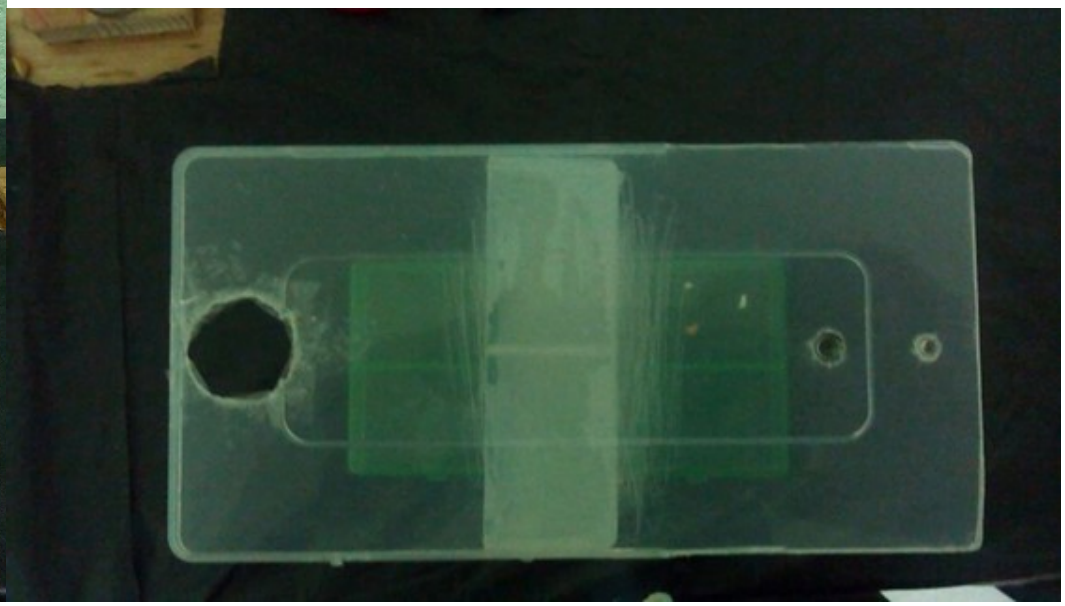
INTRODUCTION:

Last month I presented an article about the features of a video camera that I bought from a Japanese-Korean manufacturer with the properties of allowing the passage of near infrared light and with the advantage of viewing through some substances, mainly plastic or plastic-like objects. I mentioned at the end of the article that the purpose was to apply it to microscopy, because if viewing the macro world in the near infrared spectrum is good, viewing subjects in the micro world should be great, so I tried the application of that camera and I got beautiful results. See below.

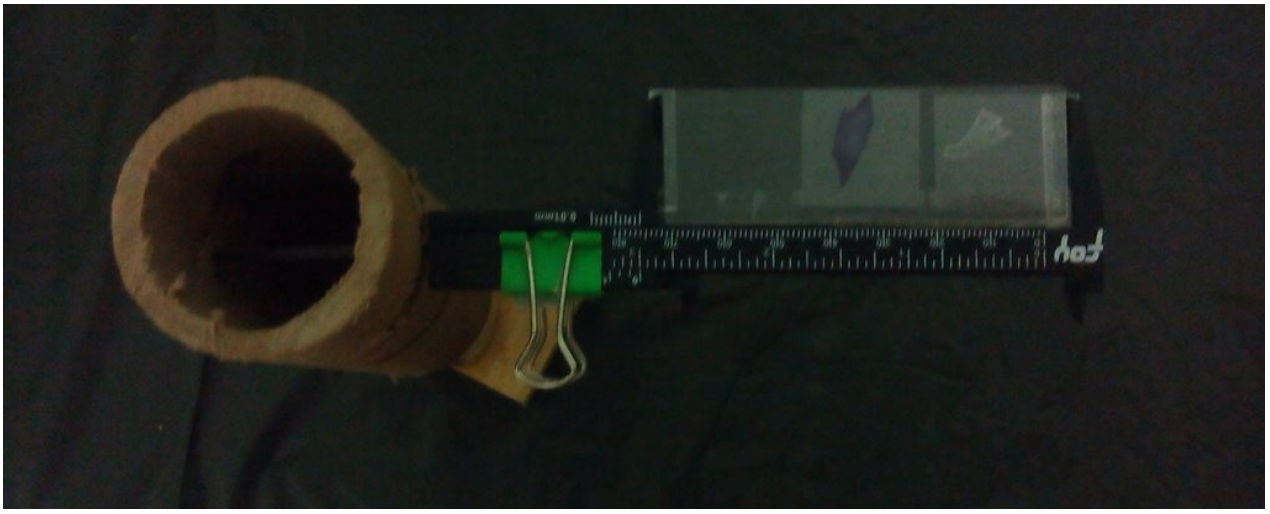
DEVELOPMENT:

I tried the camera first by removing the head of the microscope and placing it directly in the space below this head. Nevertheless it had two main problems; first the LED of the camera for infrared illumination was blocked by the microscope and the second problem was that it had to be zoomed in a lot with certain distortion of the image.

So I decided to create “my own” infrared microscope out of the microscope that I already have; for that reason I removed two of the objectives of my microscope, the 4x and 10x; then I built a sort of platform that can hold the objectives. Since the goal was to allow the infrared LED to brightly illuminate the sample I built it with transparent materials and for that purpose I used one cover and two containers of those plastic boxes that children used to carry their pencils to school. I opened a hole to the cover of 2.3 cm just to allow the lens of the objective to pass and that the same hole might hold the whole objective. Like this:



And for supporting the sample I used two tubes that come with aluminum foil and a small plastic caliper like this:



I built a support for the camera since it has to be adjusted to the height of the objective. I also used a pair of tubes from aluminum foil to build the holder and glued it to a table with cyanoacrylate so thatit may carry the weight of the camera like this:

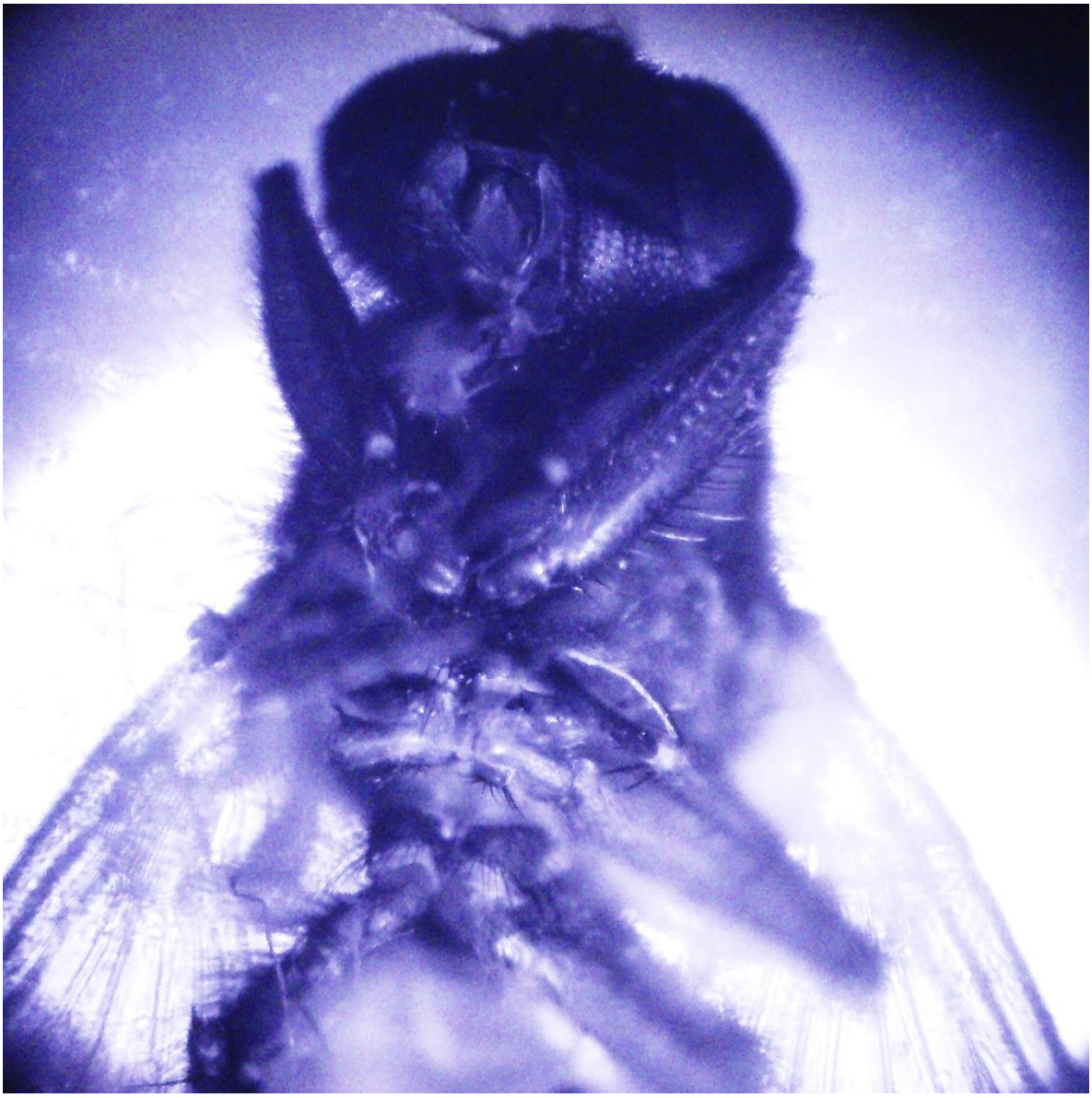
Some elastic with Velcro at the ends was used to hold the camera vertically without damaging it.

When it was all finally assembled it looked like this:

With this method of using the camera it is possible to take advantage of the infrared LED of the camera. I placed in front of the lens the PF4 filter that came with the camera and that is intended for inside viewing. It states in the specifications of the camera that light emitted by the LED reaches a distance of at least 1.5 m, so there is sufficient to reach the sample.

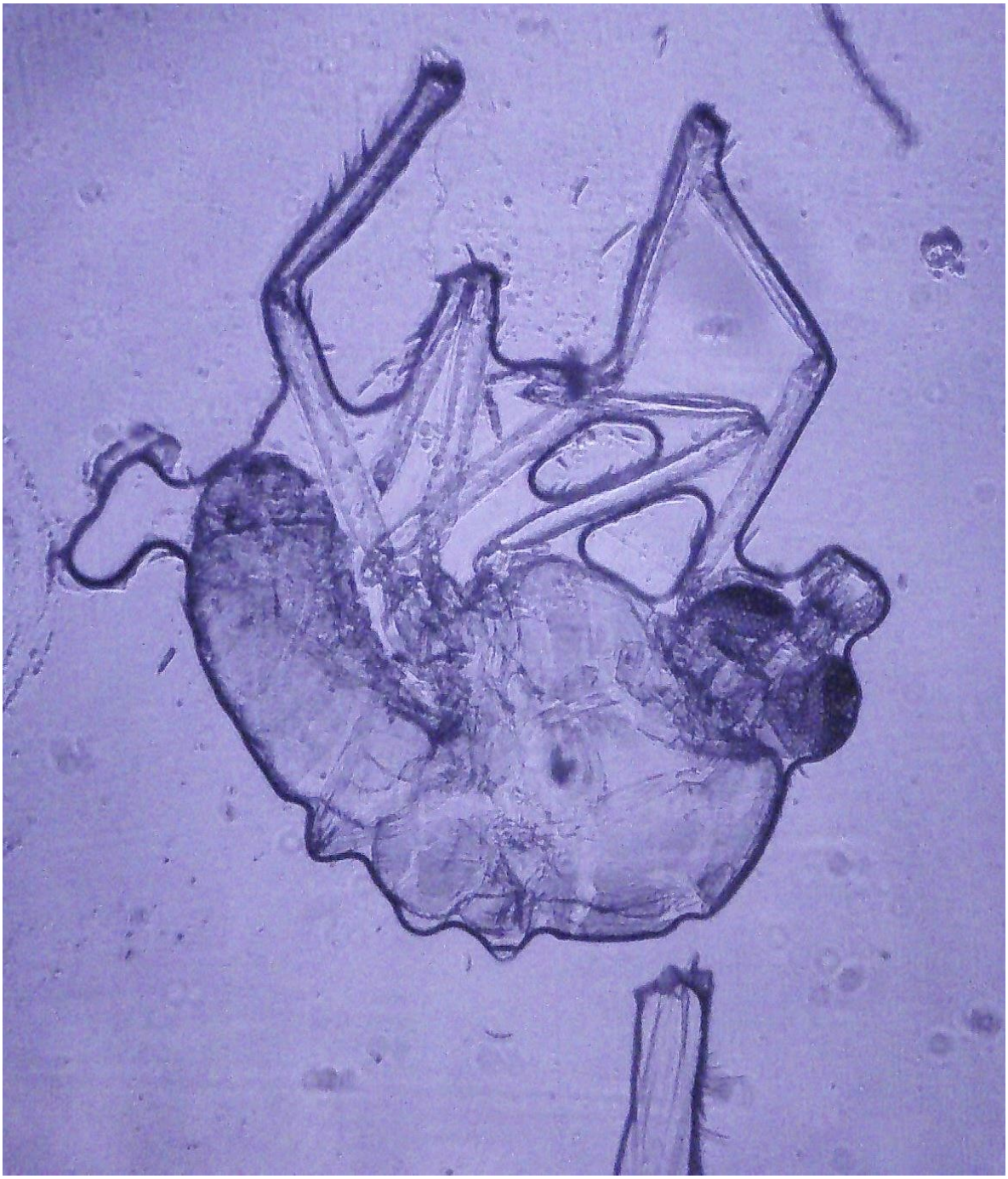
How do I know it works? Well because I turned off the light of the room I am working in and despite of this I can see the sample illuminated on the screen of the camera without any light but the infrared light. It revealed more details than either epi-illumination or a brightfield illumination would show in those conditions. So in this way I have made my first approach to study near infrared microscopy.

RESULTS:

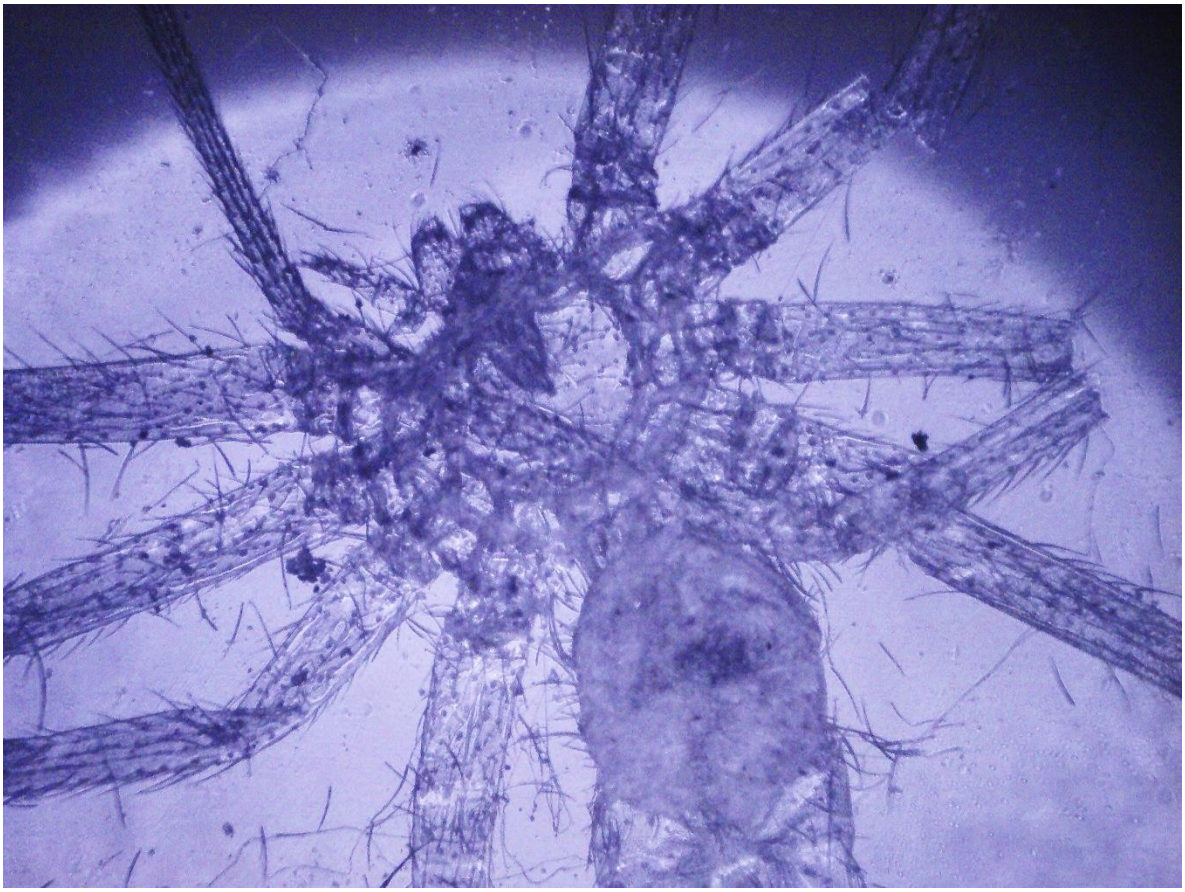


A fly 4x

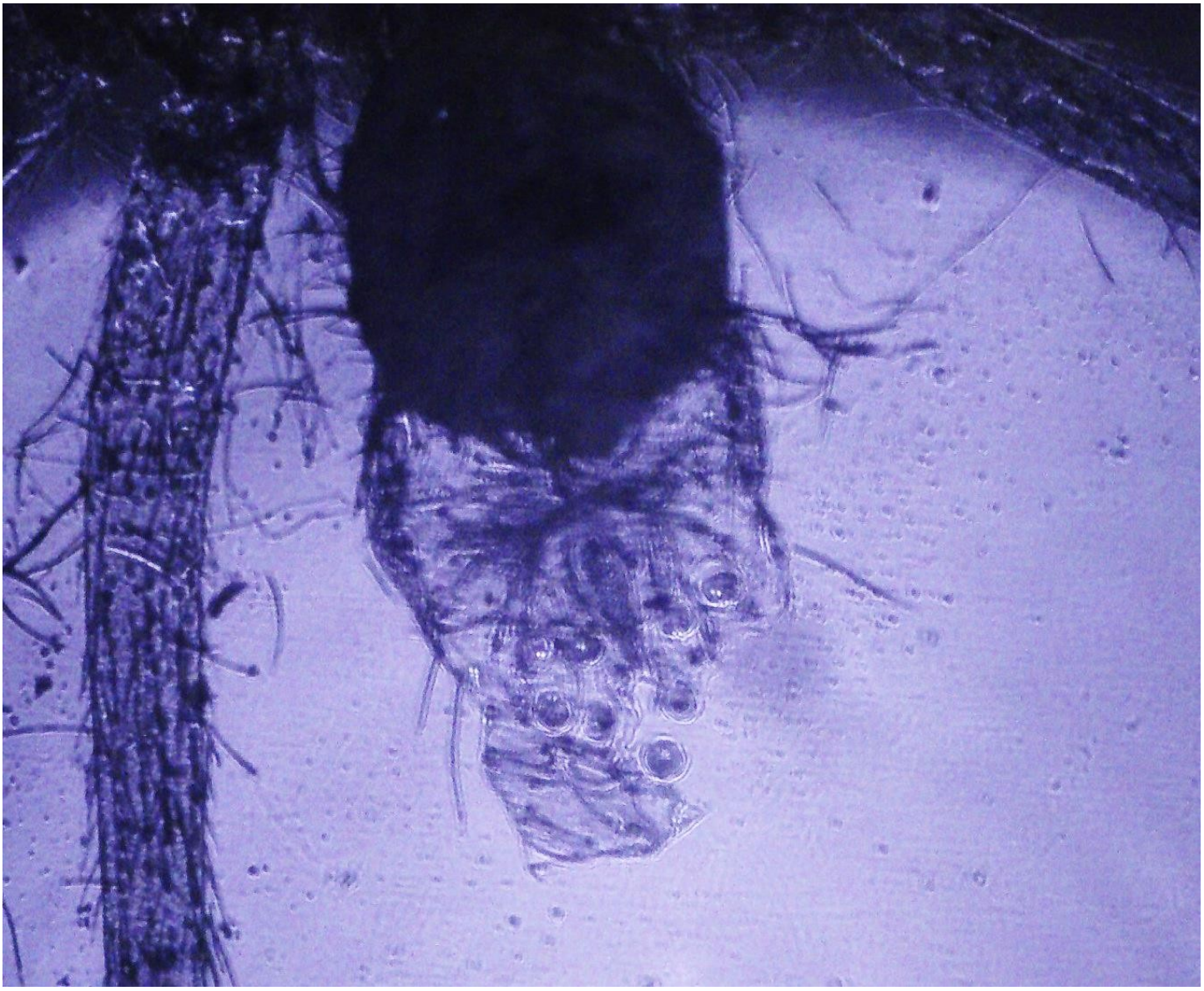
Part of a fly 4x



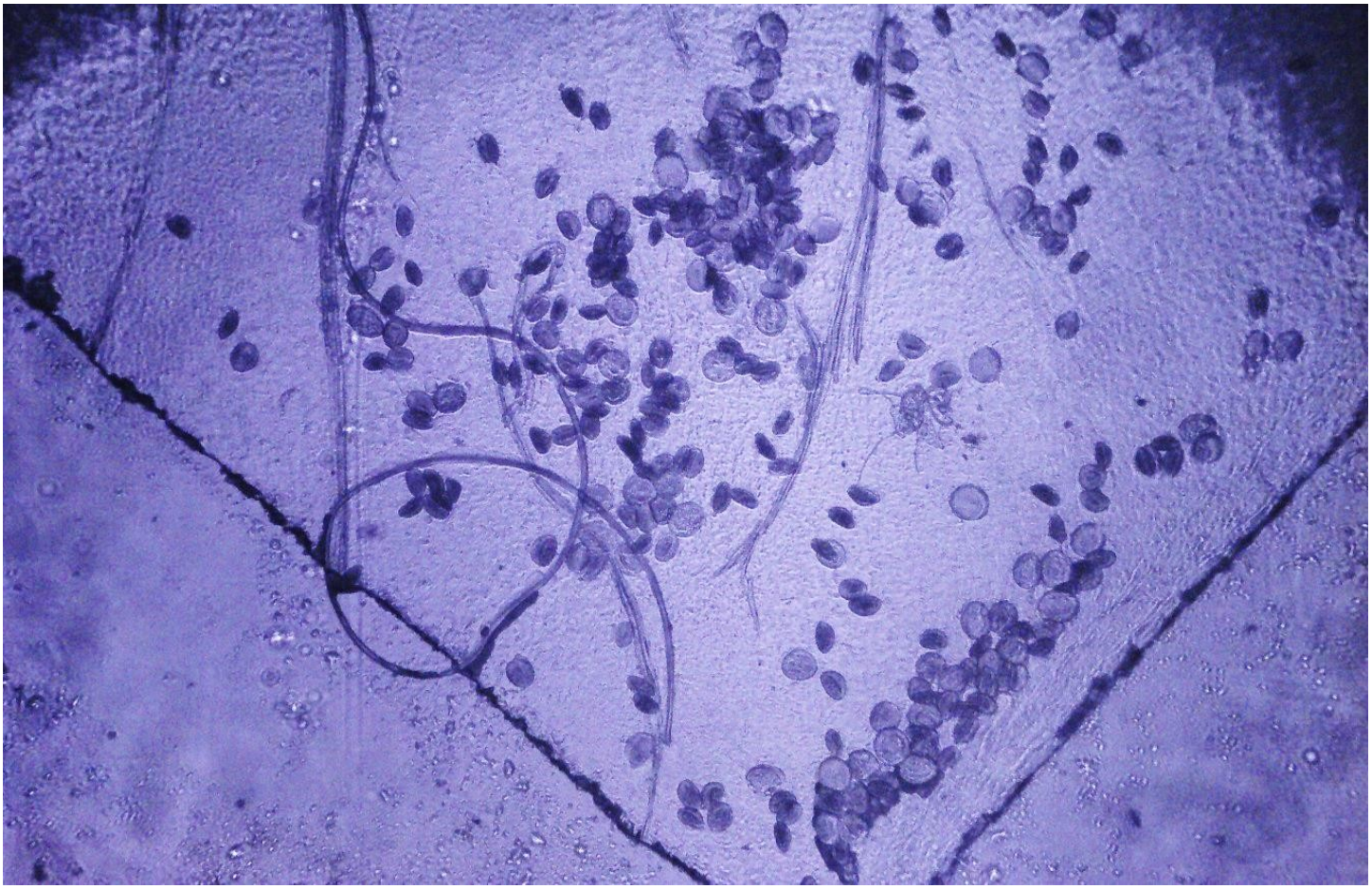
Mosquito 4x



Spider 4x

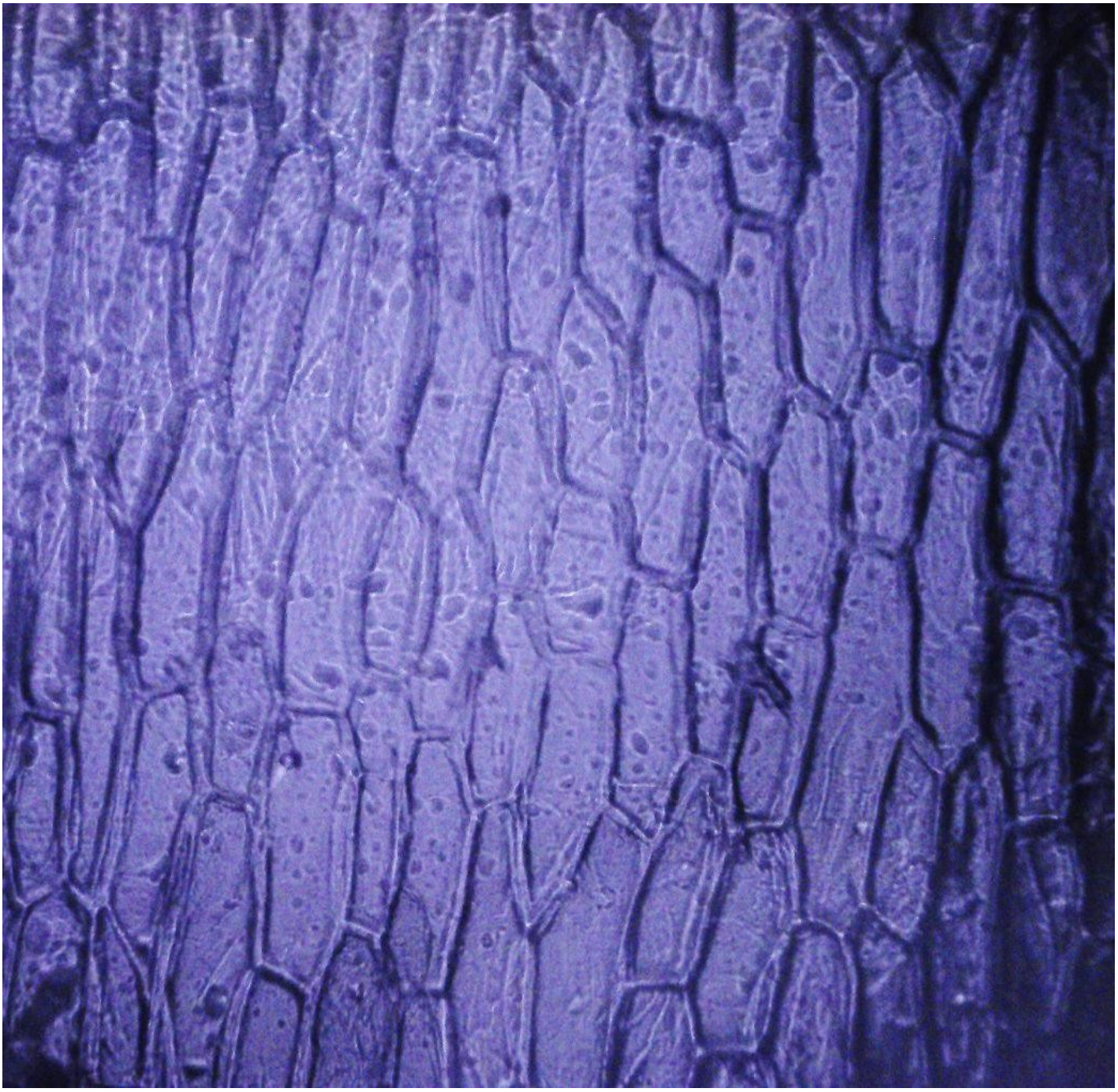


Spider’s pouch 4x



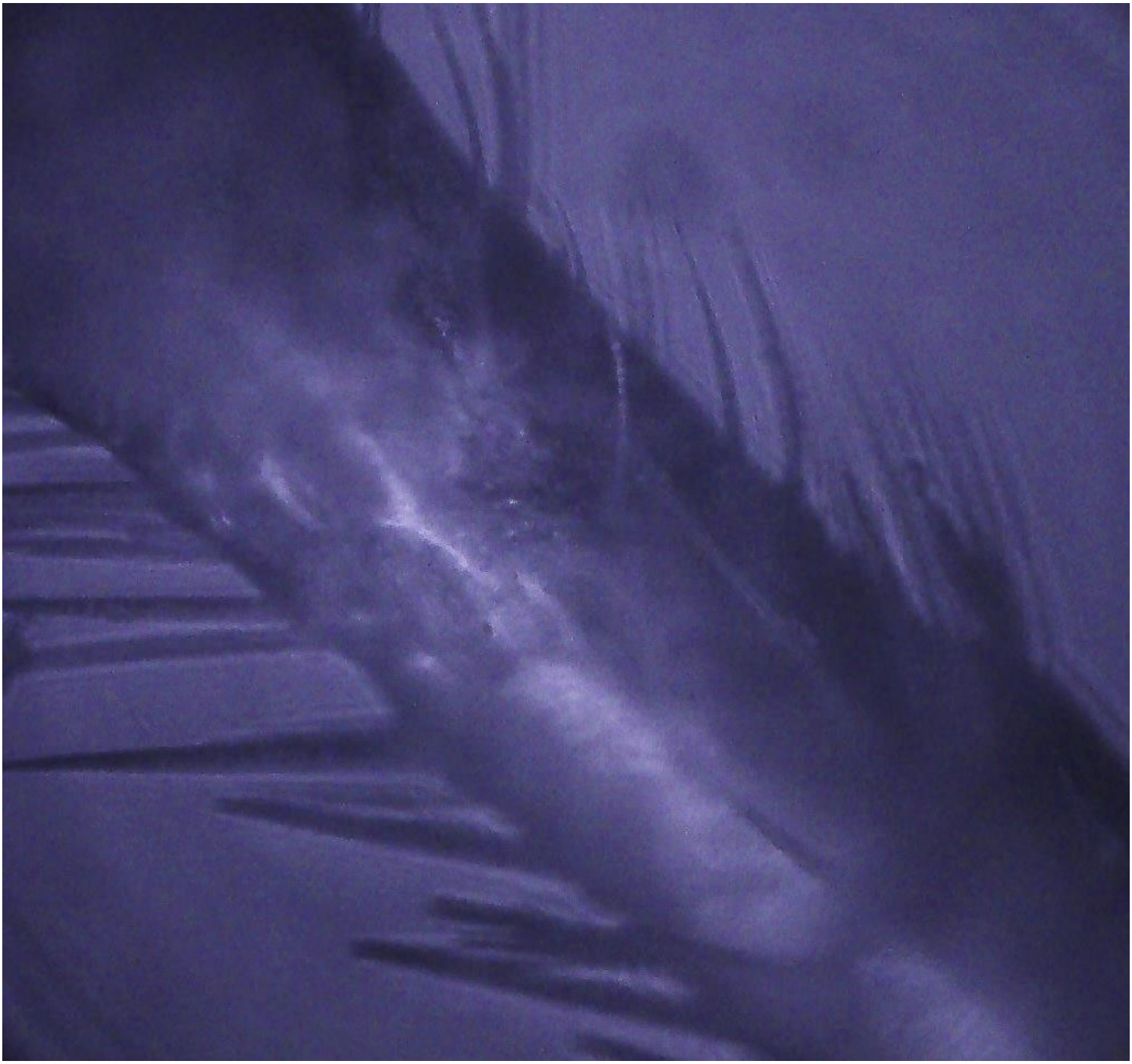
Pollen of Lyly 4x

Part of a sim card 4x

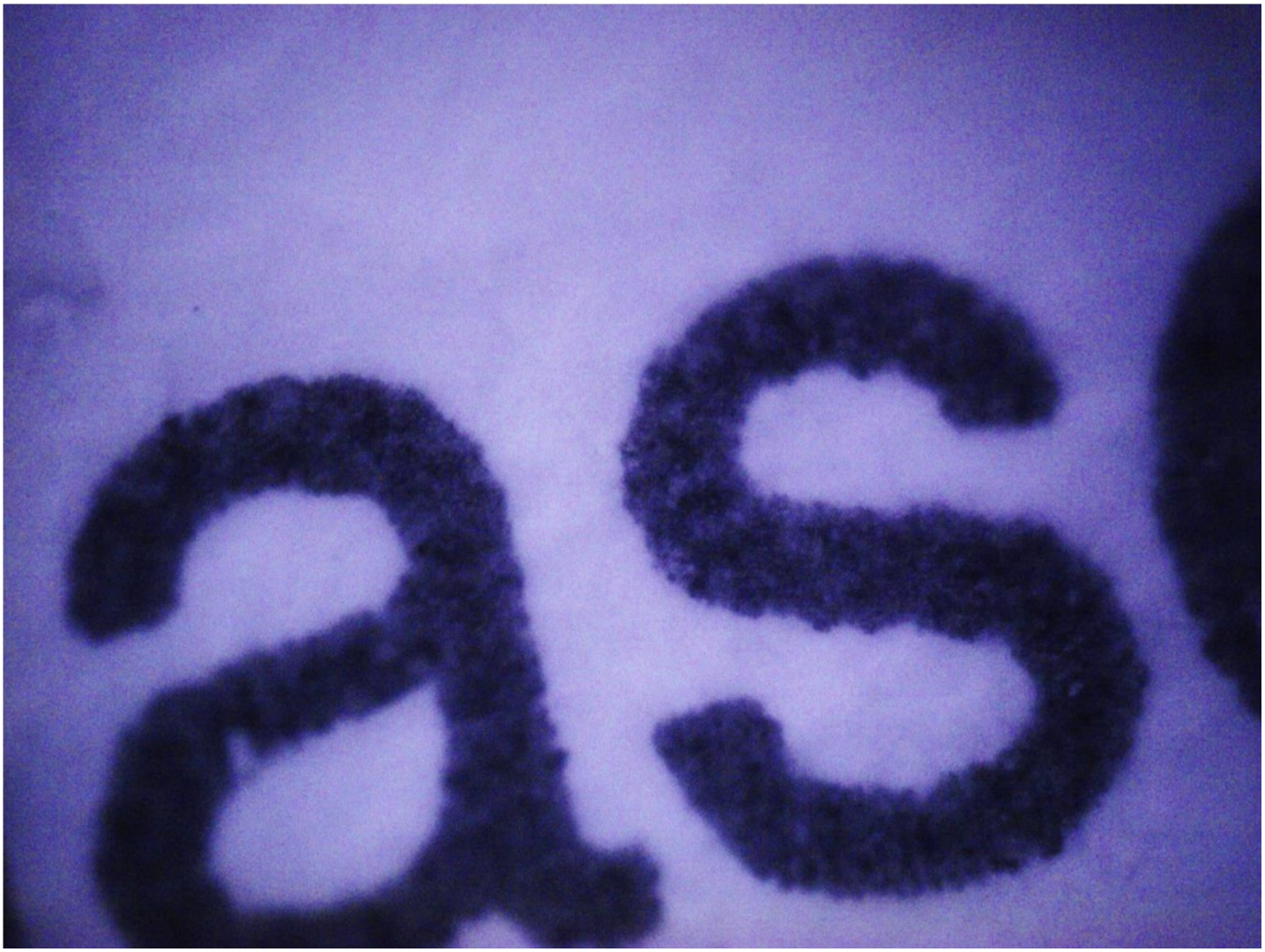


Onion 10x

Wing of *Psycoda* 10x

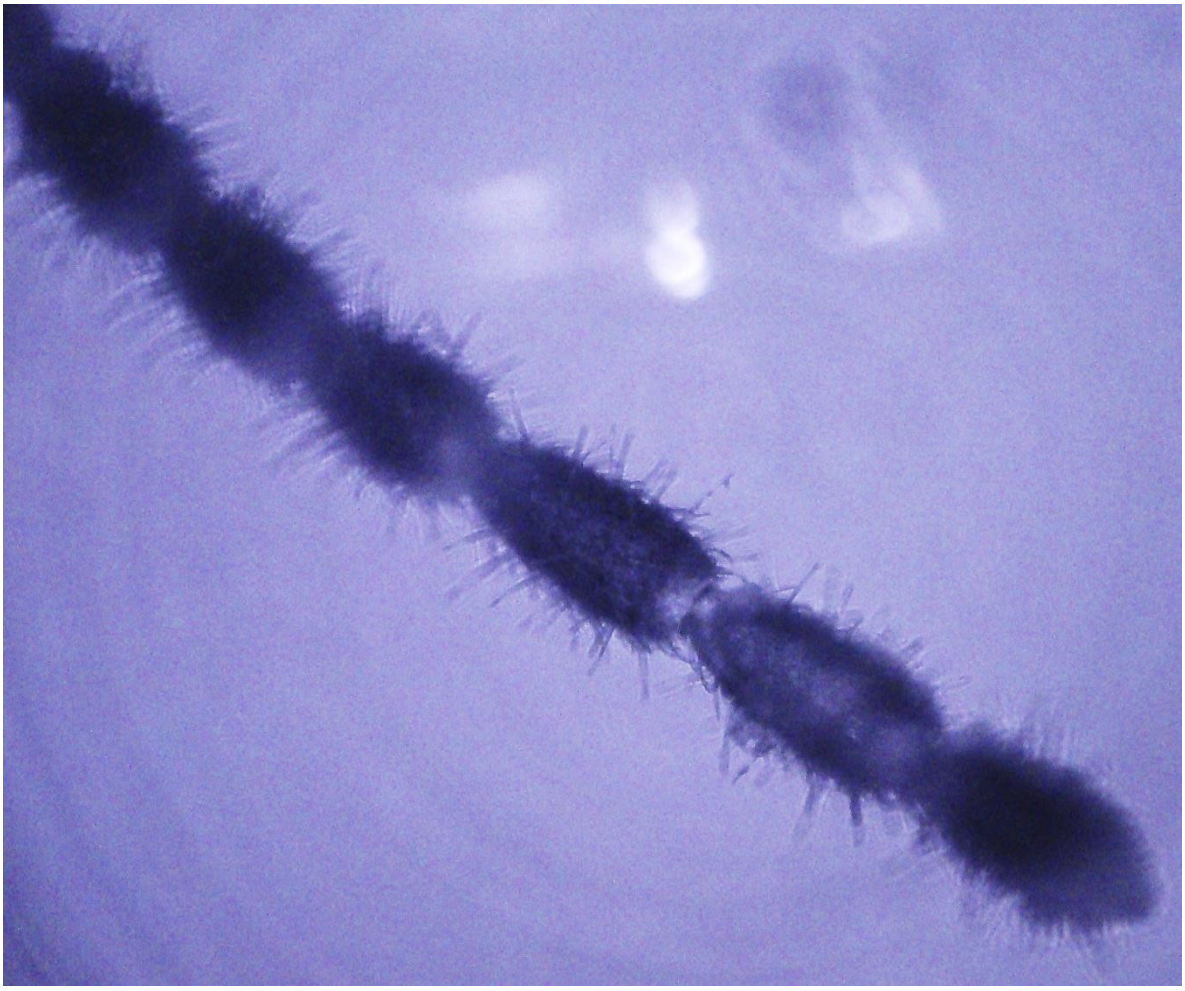


Part of a beetle leg

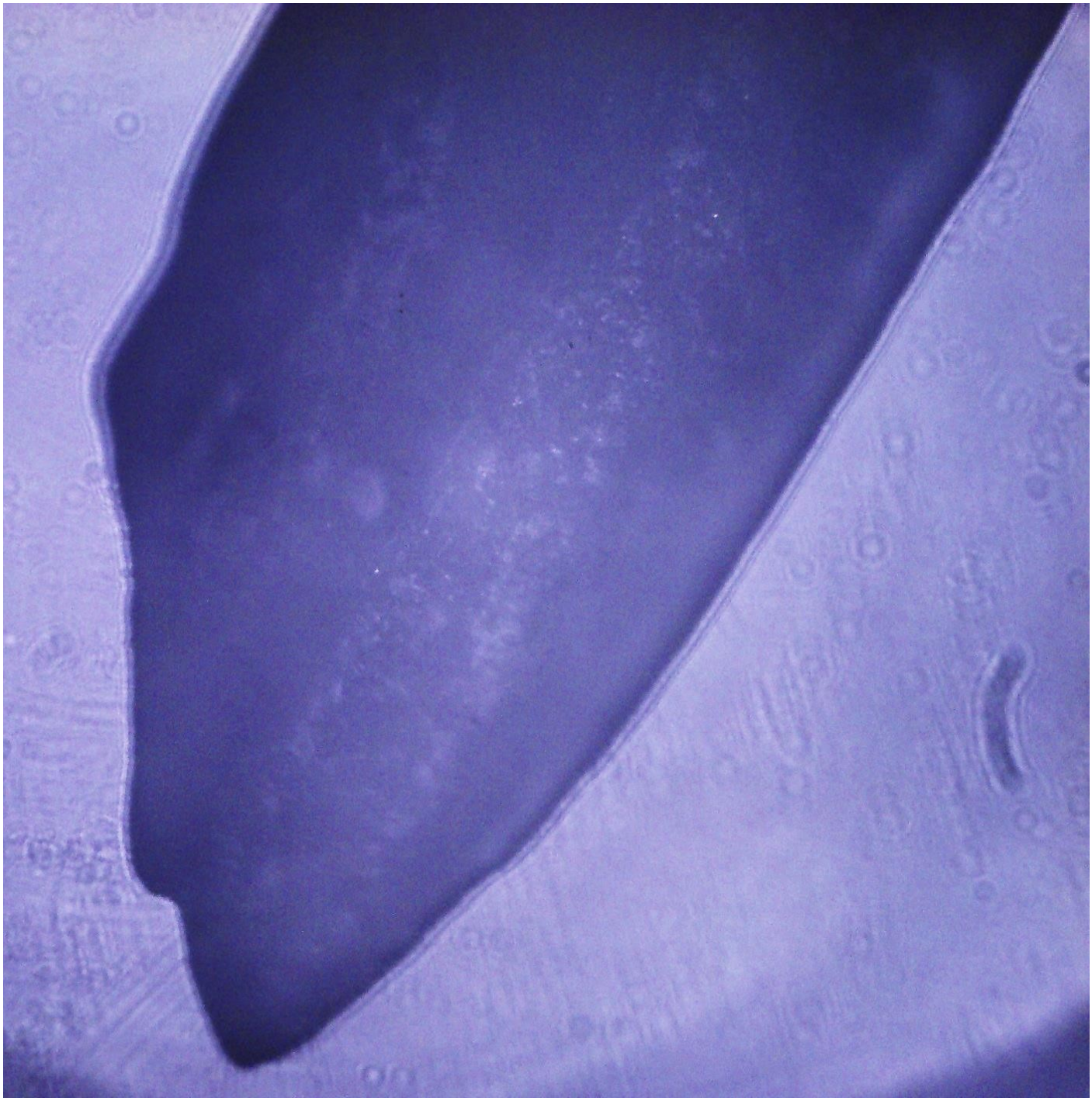


Letters of the word 'Panasonic' on a battery package 10x

Pincers of *Forficula auricularia*



Antenna of *Forficula auricularia* 10x



Part of a rice grain 4x

CONCLUSION:

As I mentioned above, this is my first approach to near infrared microscopy and since I used the properties of the camera it is reflected near infrared i.e. is epi-near infrared illumination. It works very well because it reveals details that in thick samples such as some of the ones above that would be almost impossible by transmitted brightfield microscopy. **Out of these observations I believe that if I could modify a special conventional microscope camera by removing the infrared filter, it would be possible to mount it directly on the microscope without removing the objectives and illuminated by LEDs to form a low cost near infrared microscope.** Would any reader like to try it?

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(Above in anti-spam format. Copy string to email software, remove spaces and manually insert the capitalised characters.)

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