

TRANSMITTED NEAR INFRARED (NIR) LIGHTING.

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INTRODUCTION:

Inspired once more by one of the outstanding works of David Walker about the use of near infrared (NIR), I mean [Simple experiments with video image capture using a near infra-red light source](#), published in October 2005, I decided to try transmitted near infrared lighting.

I have worked in previous articles of mine with two approaches to NIR to illuminate microscope samples using a camera with the properties of passing this type of illumination. In the [first case](#) illuminating a sample from above with the built in NIR LED of the camera. [The second case](#) by using the base illuminator of the microscope (visible light blocked by a filter) and the NIR function turned on to illuminate the sample, producing reflected NIR illumination in both situations.

Today I am going to present transmitted NIR illumination with a NIR LED.

Transmitted lighting of samples is almost the rule for the majority of compound microscopes on the market, possible reasons for this is that it's a cheap form for illuminating since it just needs below the stage a light source that may be a halogen bulb or an LED and a condenser. Also probably because most microscopes are intended for biological observations and biological samples are most of the time transparent and/or translucent so it is easy to illuminate them from below.

Transmitted illumination can be made with any source of any type of lighting with variable results depending on the sample to be observed and NIR is not the exception for this.

DEVELOPMENT:

For doing transmitted NIR lighting I used a NIR infrared LED that I purchased at the local electronic shop and that is extremely cheap at less than half a dollar. It was powered by a pair of AA batteries connected with crocodile clip wires and dimmed as necessary with a variable resistor, also very cheap.

I held the NIR LED on a piece of cardboard and for lifting and lowering as necessary I used a support that I made with a pair of pieces of cardboard pipes. To reach the space below the stage of the microscope, inserted horizontally in one of the pipes was a plastic caliper that I do not use any more, although it can be any other thing that can hold the cardboard with the LED.

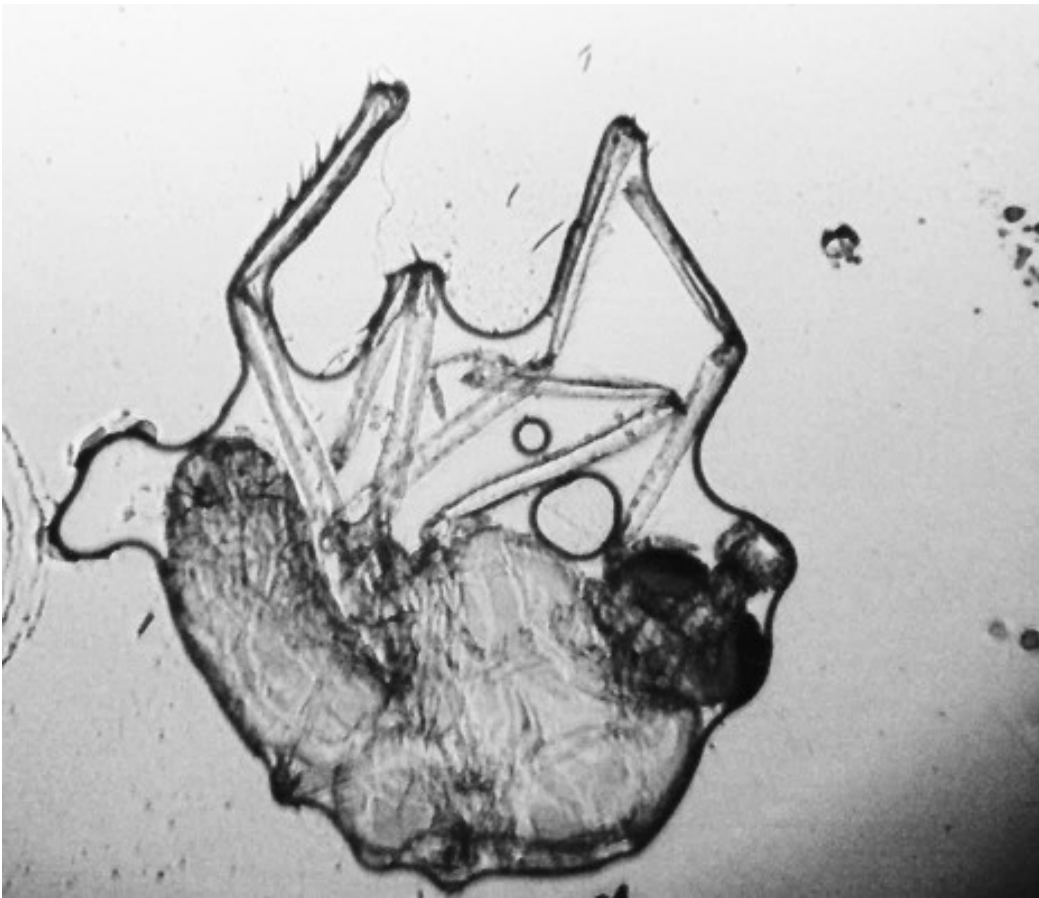


With the camera that allows NIR to pass with the NIR filter place in front of lenses at the top of the microscope, once the head of the eyepieces was removed the camera was held with another support as shown in the pictures.

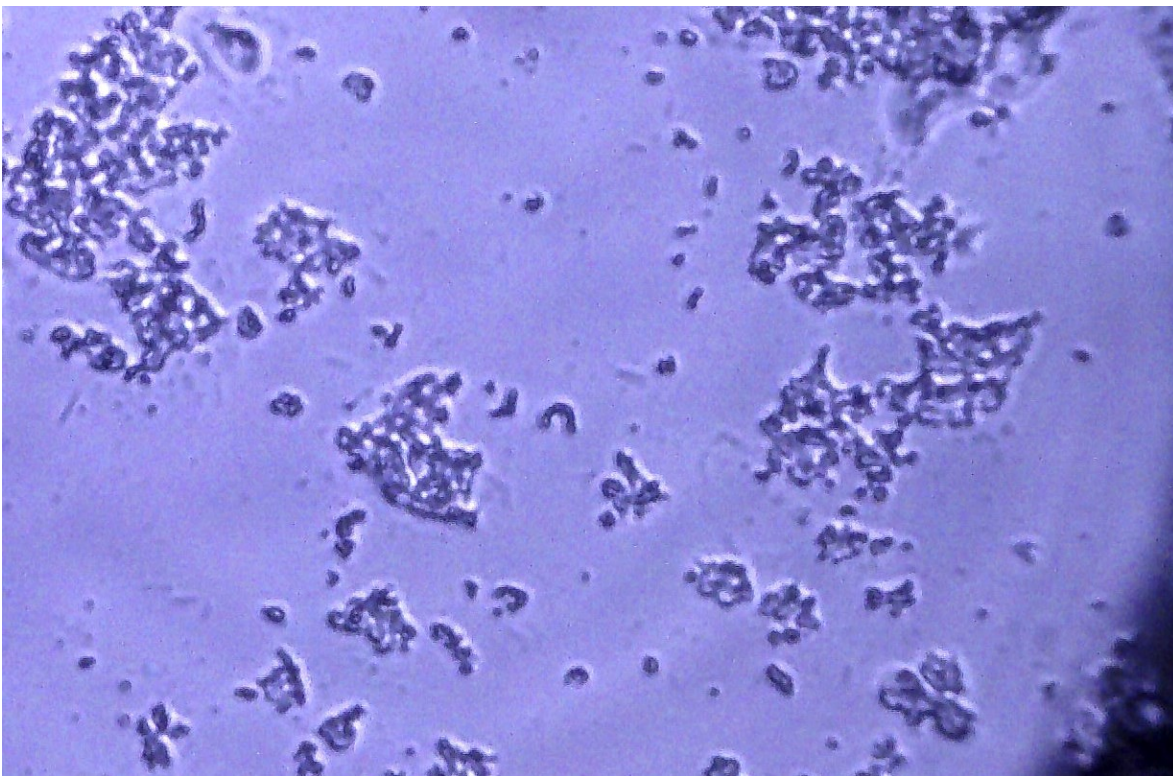


This time just transparent and/or translucent samples were used.

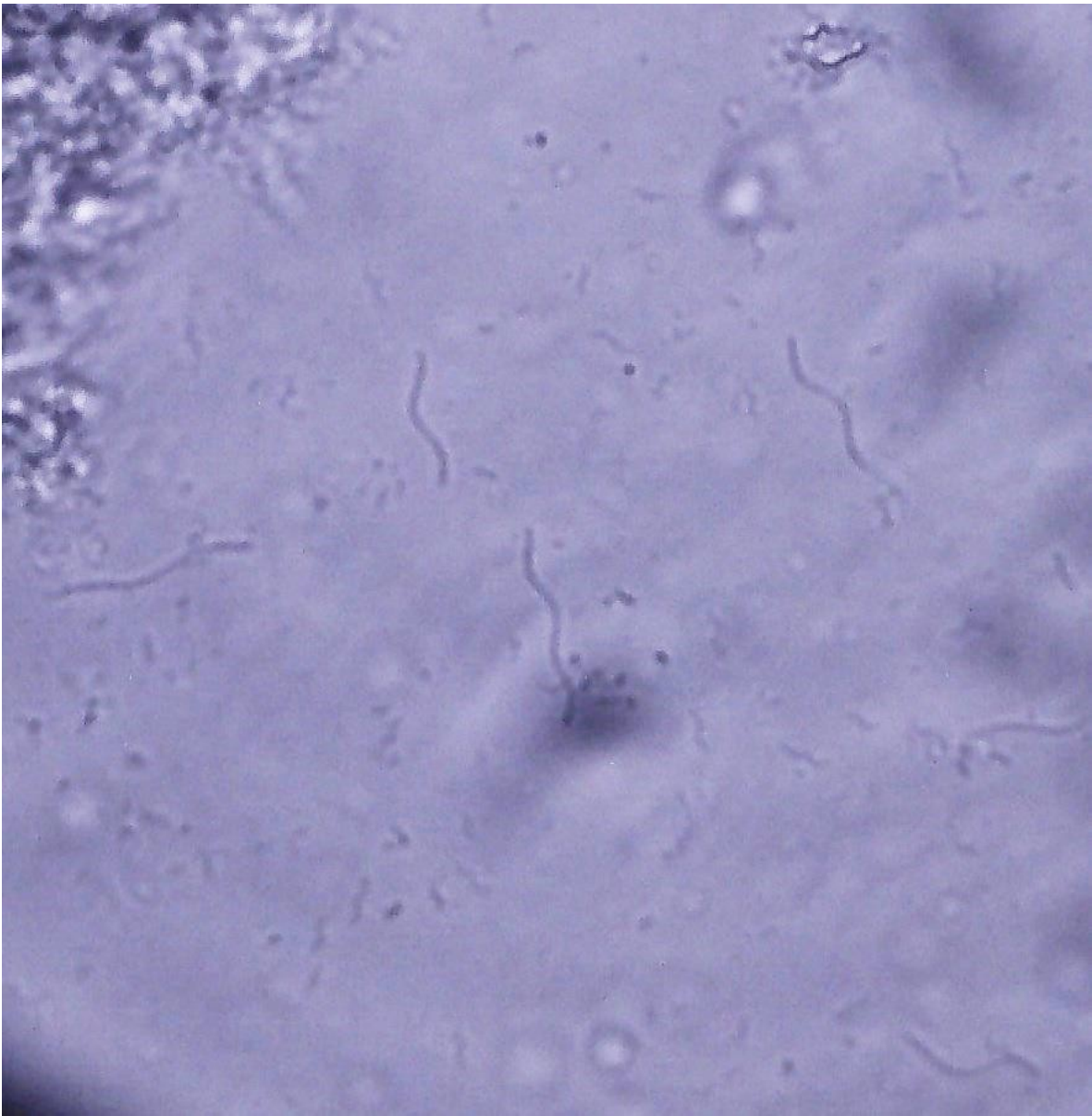
RESULTS:



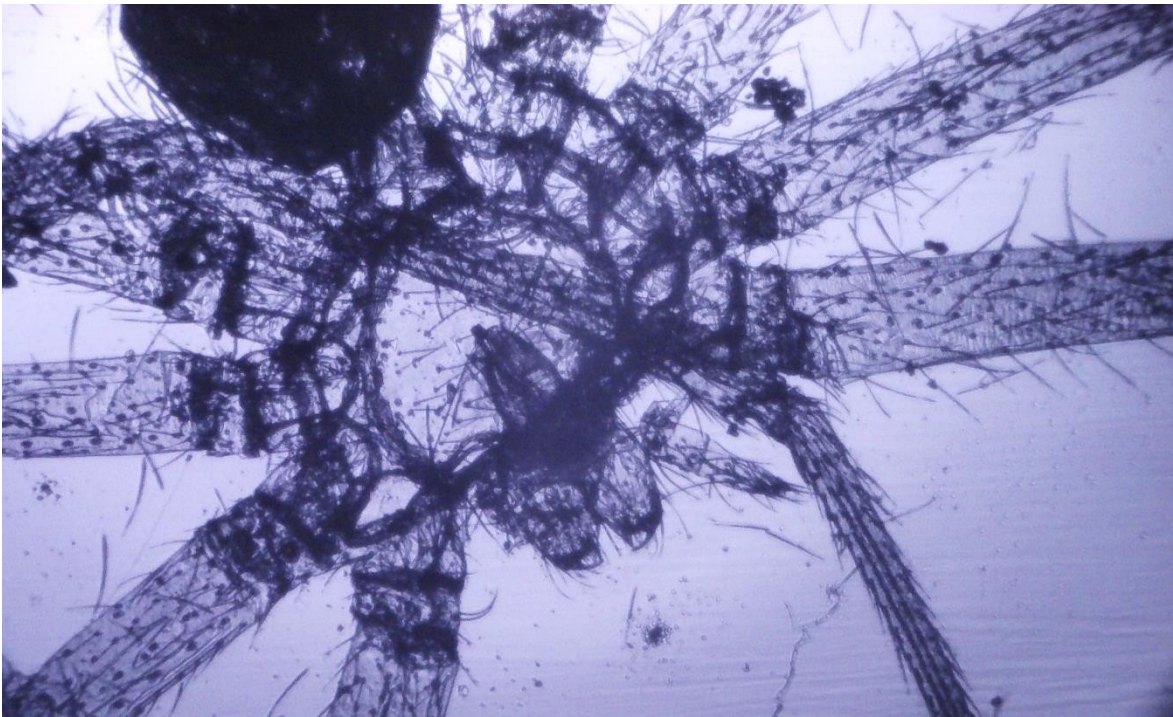
Mosquito 4x (desaturated for converting it into a negative picture as shown below)



Streptococcus of yogurt 40x



Spirillum 40x



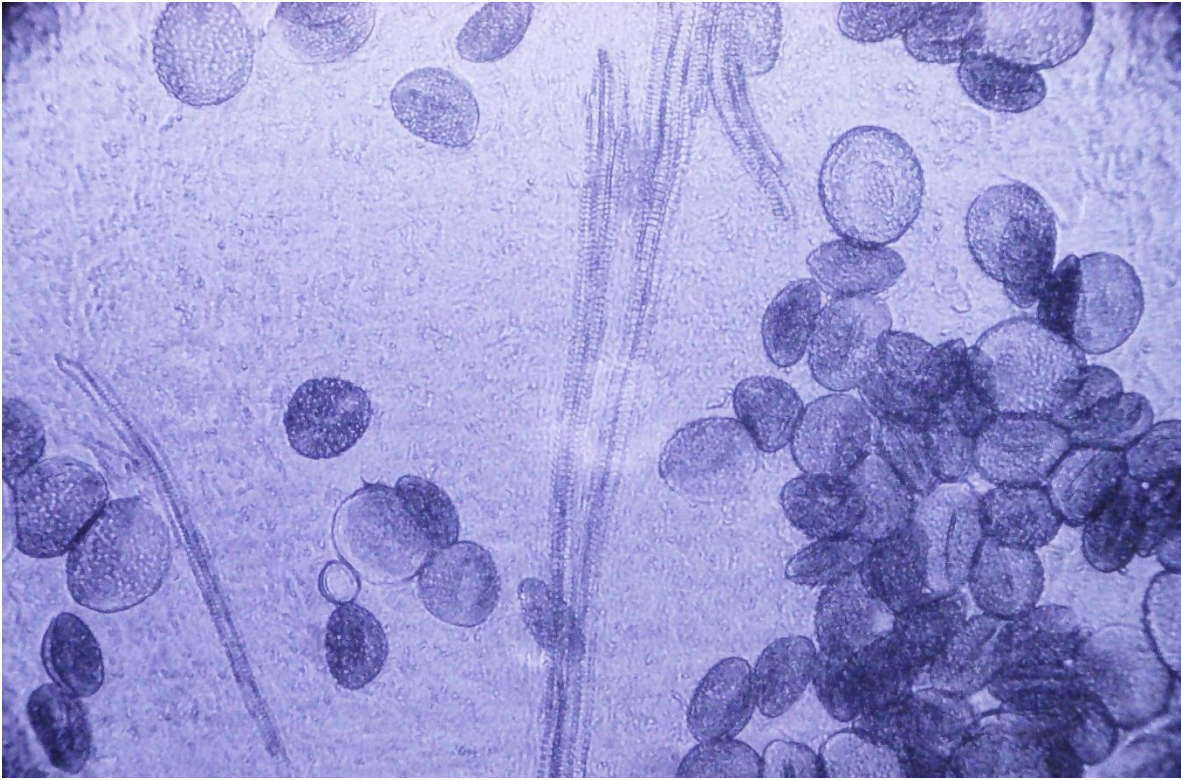
Spider 4x



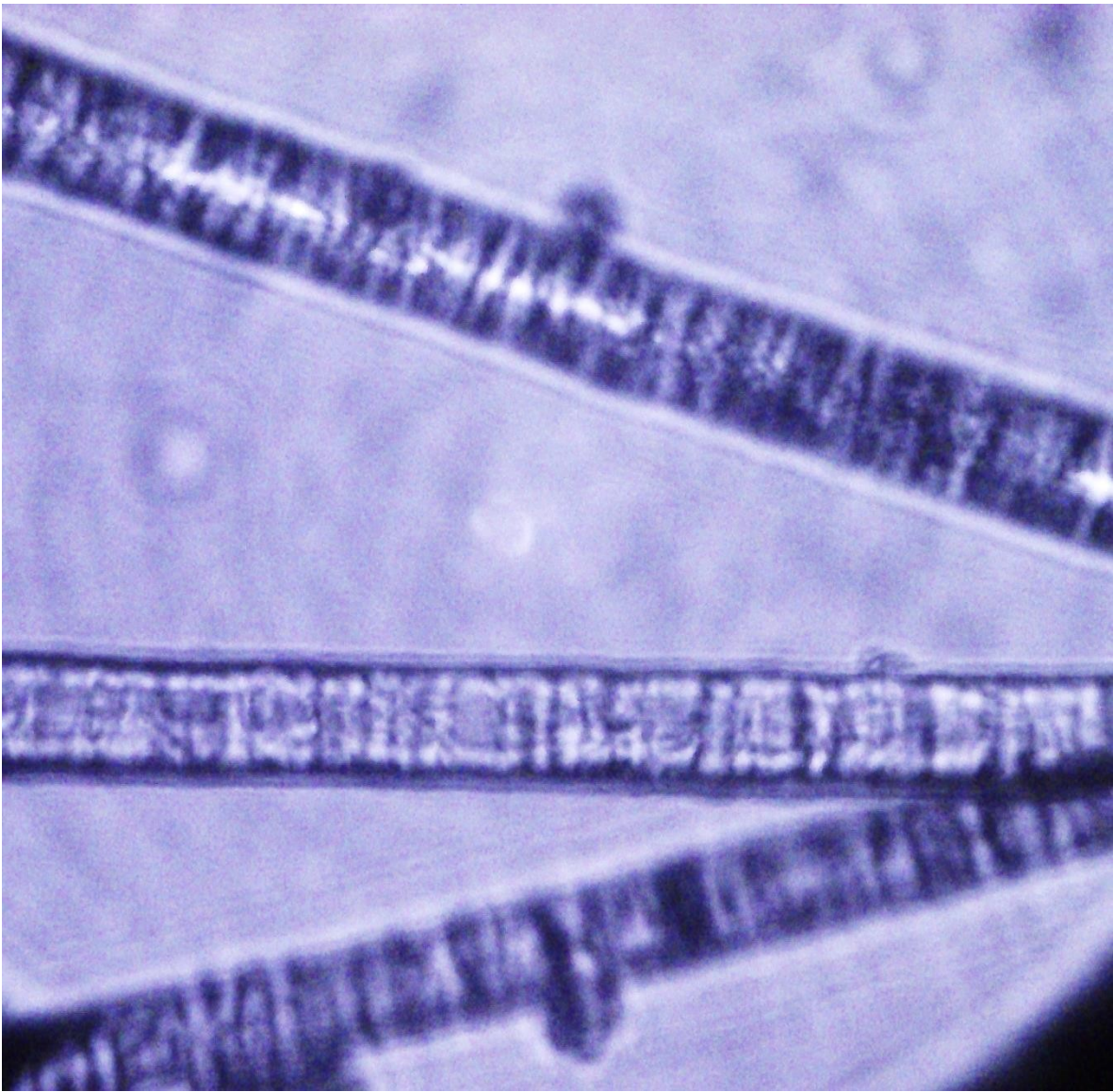
Psicoda wing 4x



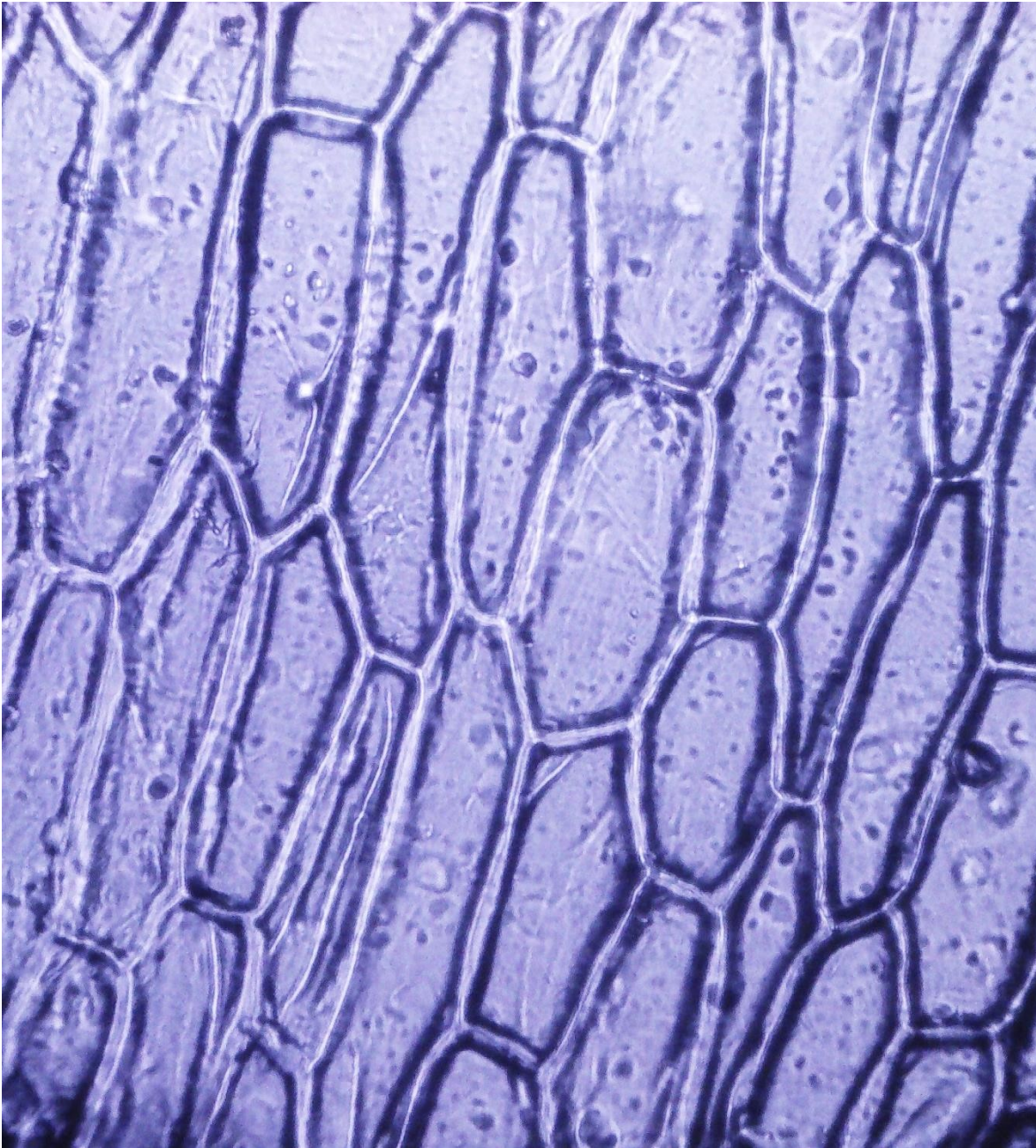
Spider pouch 4x



Lily pollen 10x



Dog fur 40x



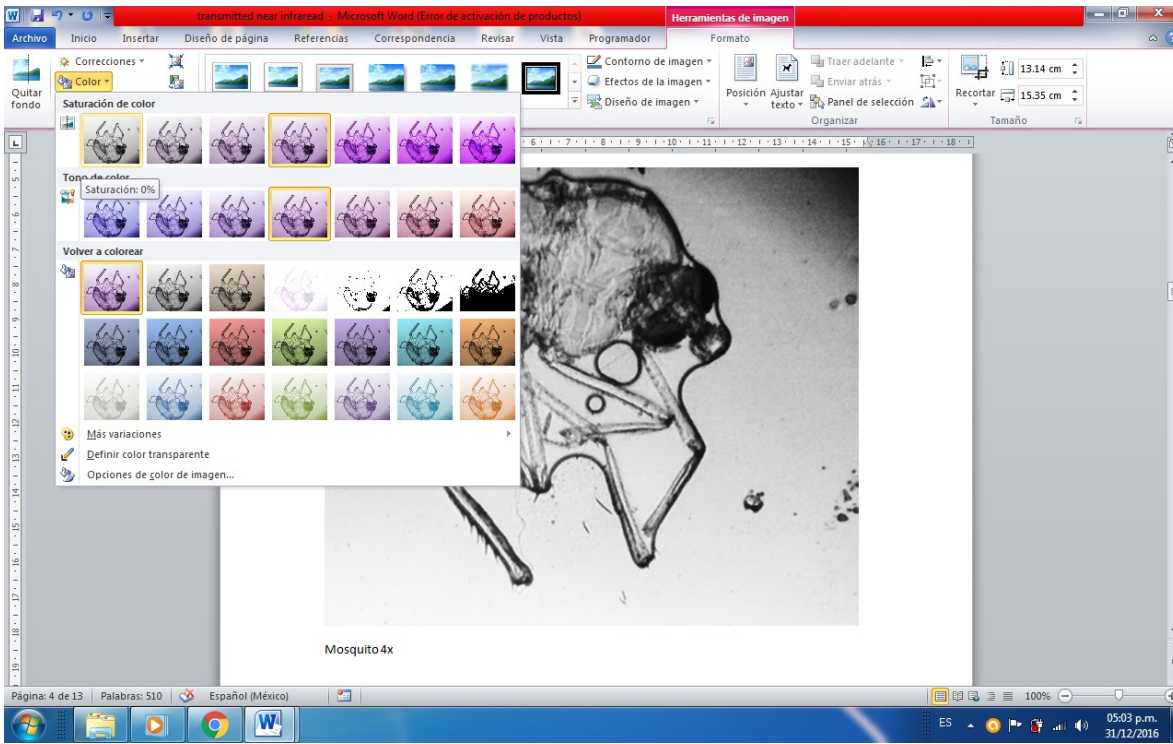
Onion 40x

Note:

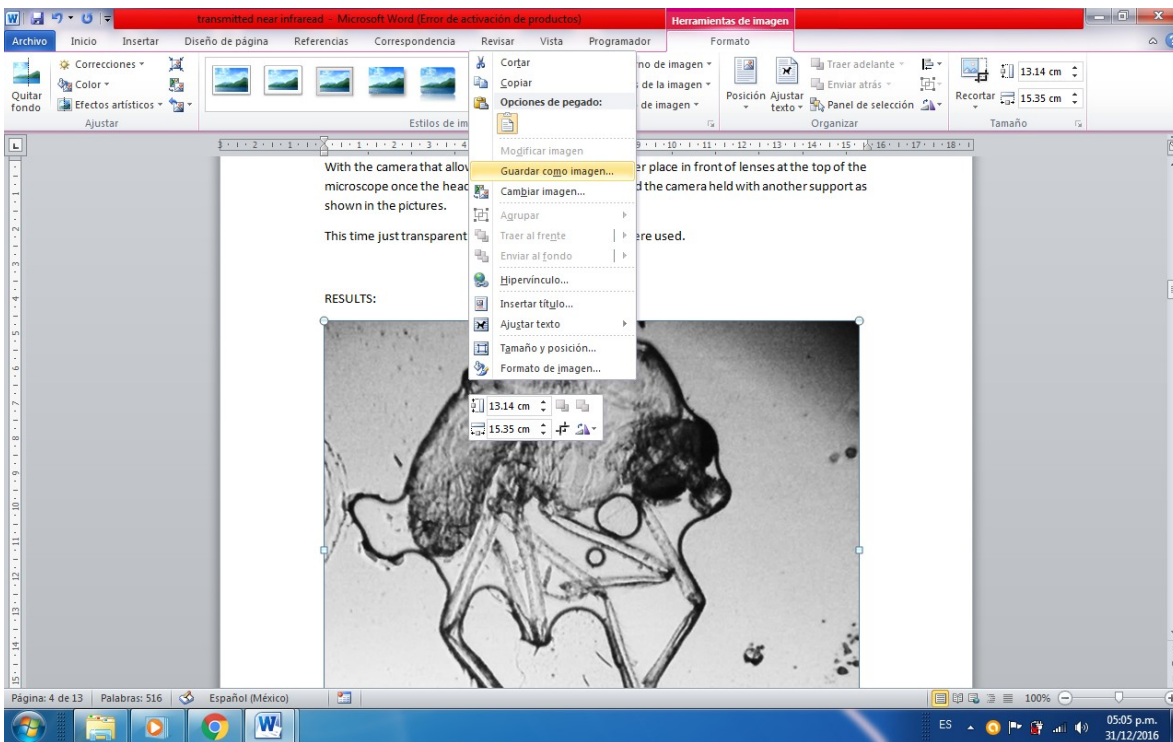
As it is mentioned by David Walker in the article [Six whole mount insect slides](#), NIR images are flat and if desired can be transformed into negative images to emphasize the image

it can be converted this way:

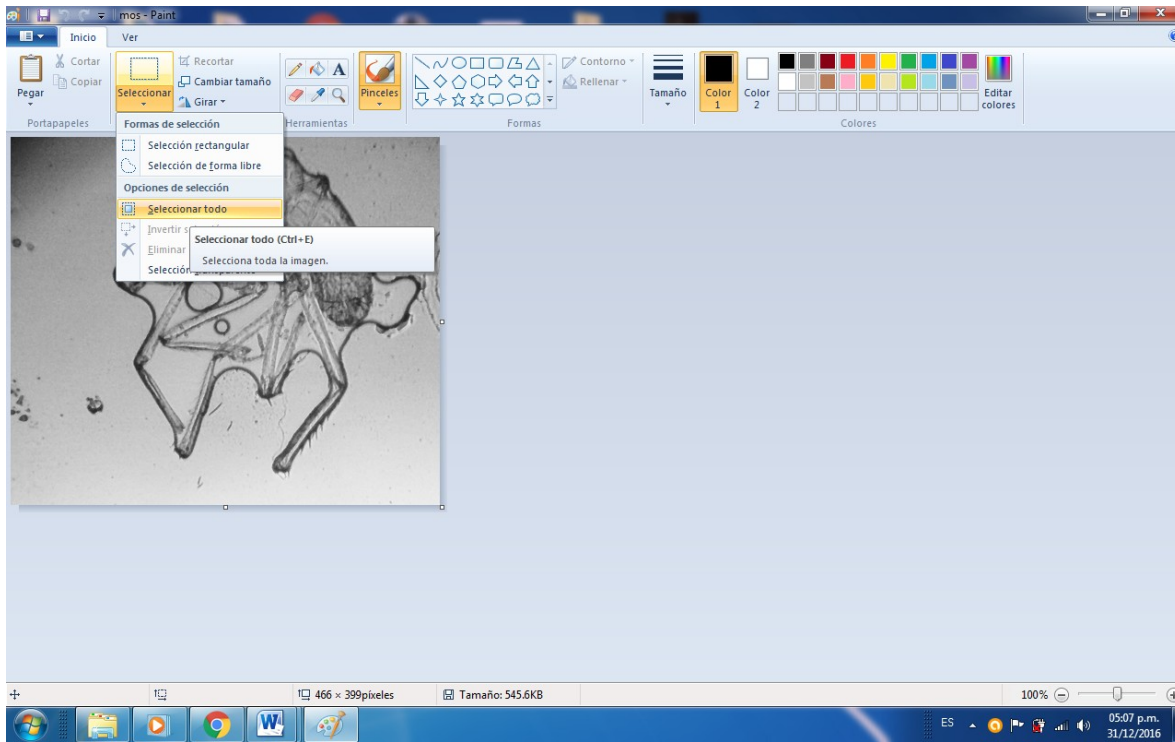
First I turn the image to black and white desaturating it.



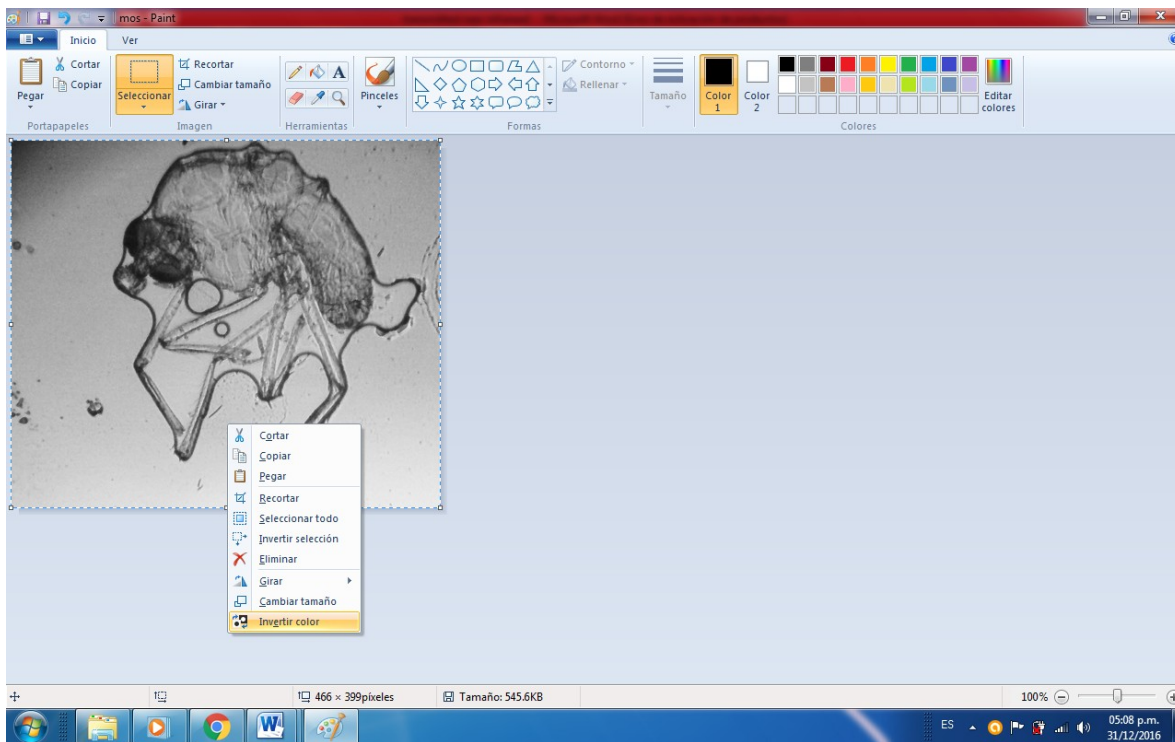
Then kept as a new image.

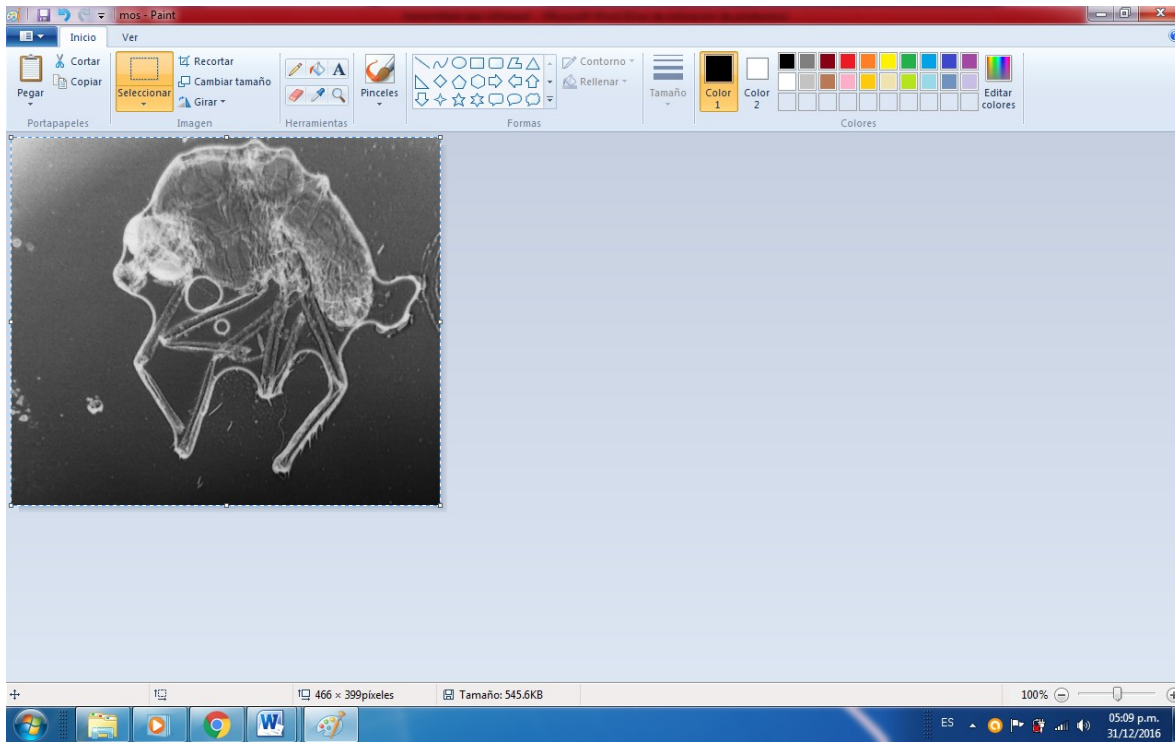


After that it should be opened with Paint and select the whole image.



Then go to invert color.

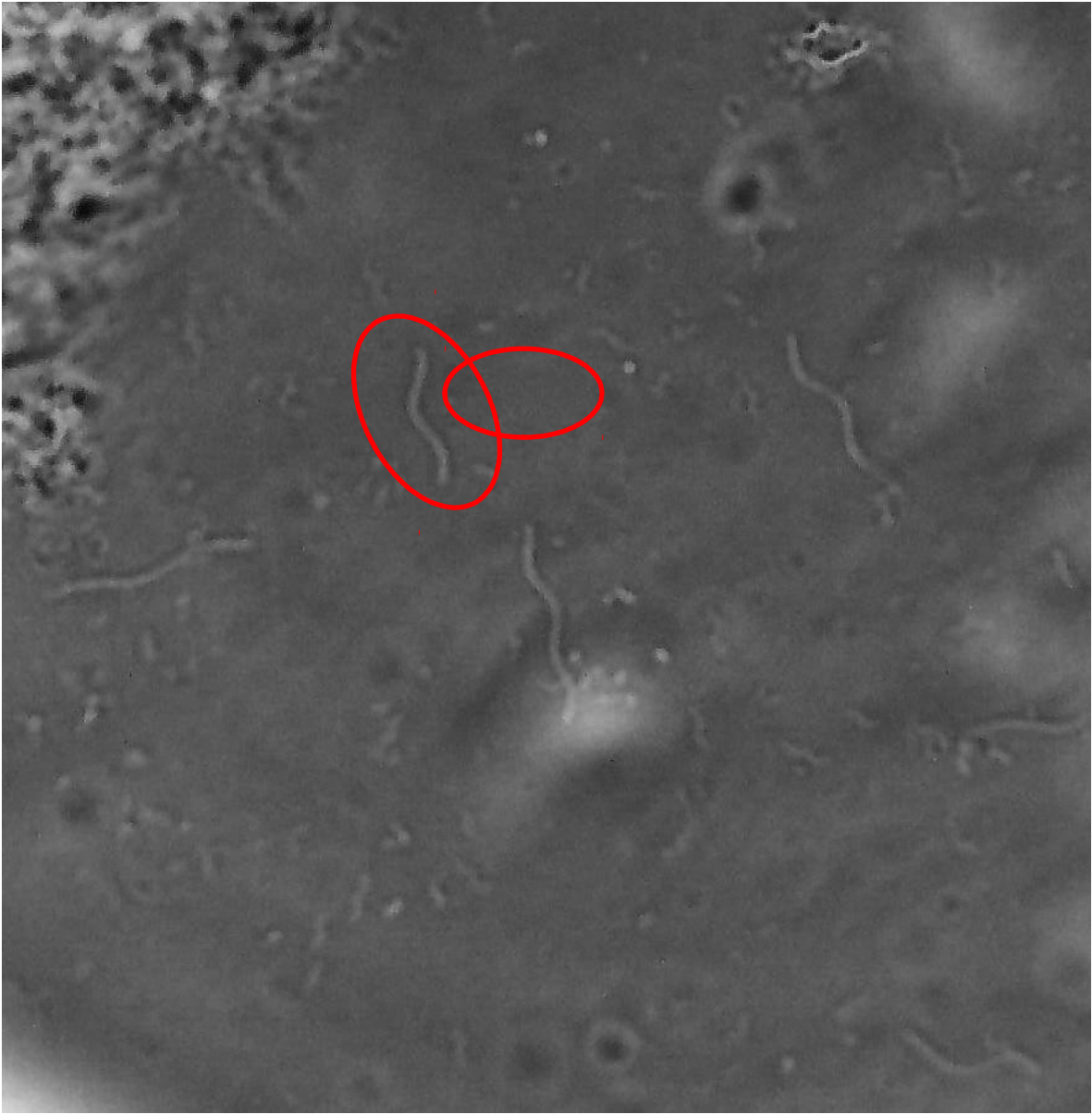


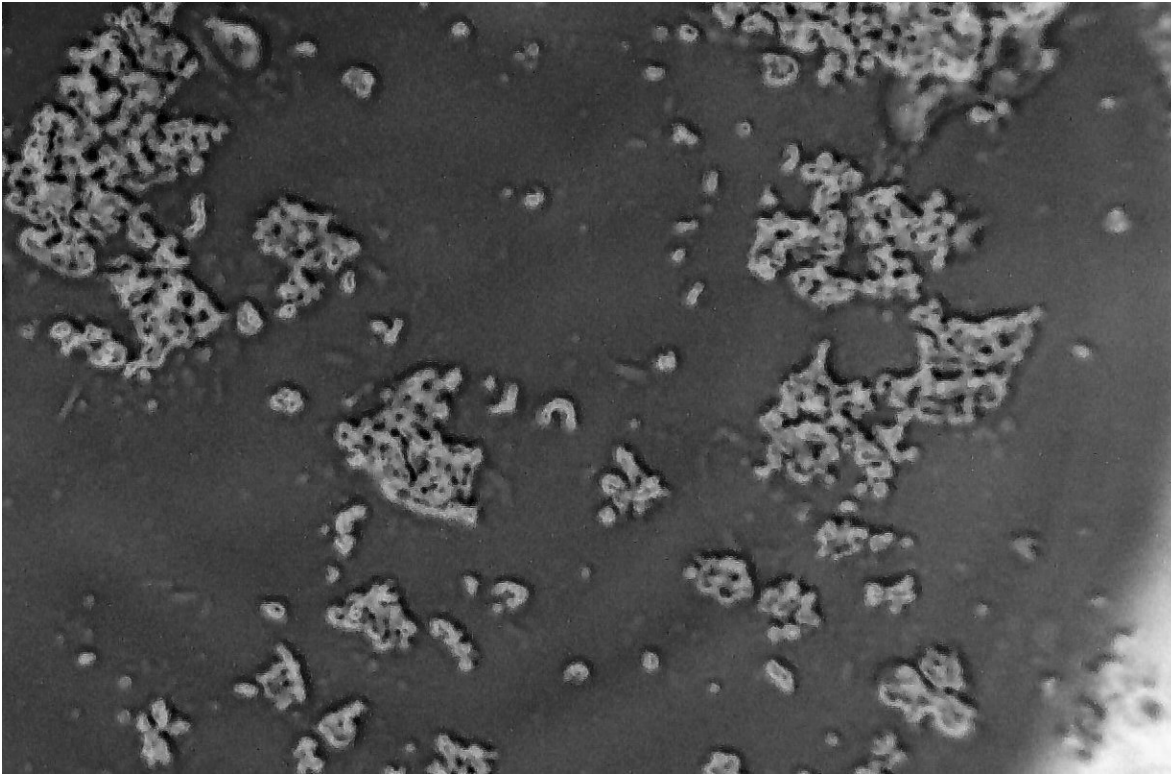


I prefer them the way they are produced by the NIR camera.

Conclusion:

As can be seen with the exposition above it is possible and with very good results to use NIR lighting for transmitted observation even with bacteria using the 40x and 100x objectives





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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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