



Newsletter of the

New York Microscopical Society

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September 2019

Editor (646) 334-0344

Volume 33 Number 3

Microscopes on the East River:

NYMS collaborates with iDig2Learn to bring the microscopical perspective to the Light House Park on Roosevelt Island.



A beautiful August 18th found a crew of NYMS members enjoying an excursion to Roosevelt Island in the East River, taking in the views of the Manhattan and Queens skylines and gathering a variety of creatures and objects for micro-exploration with visitors and residents of the island. The day was part of a series hosted by iDig2Learn on the island, NYMS supported by providing microscopes and volunteer staff.

iDig2Learn's Goal to "reinforce in school science curriculum by allowing children to experience nature outdoors, learn the origin of food and understand how plants aid daily life" provides some nice linkages with the NYMS goal of "education in all phases of microscopy," taking a close look at nature.

Collection started on the West side of the island with a plankton tow on the incoming tide. Then gathering some seeds from a Butterfly Garden, a cicada molt from a tree, lichens, and some nice cyanobacteria from a wet area in the park.



Continued on Page 3.

The Mission of the New York Microscopical Society

is the promotion of theoretical and applied microscopy and the promotion of education and interest in all phases of microscopy.

A not-for-profit Educational Organization, (nyms.org)

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Annual:
 Junior (under age 18)\$10
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 (payable within the year)

To avoid missing notices:
 Notify Mel Pollinger if you have changed your address, phone or email.

Awards Given by the New York Microscopical Society

The New York Microscopical Society takes great pleasure in recognizing and rewarding individuals who have contributed to either the activities of the society or to furthering microscopy.

These awards are described in our website and in a pdf file for our email newsletter recipients. All members are eligible to nominate individuals for these various awards, and are encouraged to do so.

John A. Reffner, Awards Committee Chairperson

Committee Members:
 Jan Hinsch
 Peter Diaczuk
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To Order Your NYMS Lapel Pins

Send a check in the amount of \$12.00 per pin to:

New York Microscopical Society
 c/o Mel Pollinger, 18-04 Hillery Street, Fair Lawn, NJ 07410.

To avoid shipping & handling charges, pins may be purchased directly at any NYMS meeting for \$10.00.

Jay Holmes, Newsletter Editor
 3657 Broadway, Apt 2C
 New York, NY 10031

Continued on Page 3.

Early NYMS arrivals enjoyed a little picnic and chat on the west side of the park. Christina Delfico of iDig2Learn worked with the Parks staff to set-up three tables, and a generator for back-up on our battery power for scopes and fiber-optic lighting. The tables were set up in the shade of a beautiful willow tree on the east side of the park as the incoming tide started to push up some impressive white water between us and the Queens shoreline. Christina also brought along some fossil shark teeth that were extremely popular under the little monocular dissection microscopes.

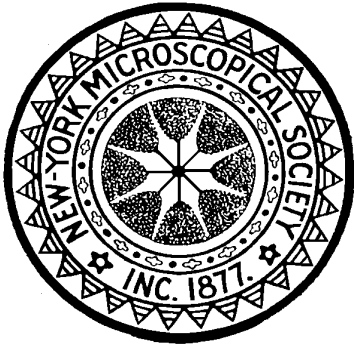
The NYMS crew of Sally Warring, Guy de Baere and Jay Holmes, plus Christina opened up shop at 2:00 to a constant flow of

participants for the following 3 hours. We had a wide range of types of microscopes, compound light stands, monocular dissection microscopes, a Nikon Model H field microscope and Sally's Cambridge Optics Newton Nm-1 field microscope with her iPhone attached, which was a great hit! (See bottom photo).

NYMS celebrated Van Leeuwenhoek Day in Morningside Park in September and will be collaborating with Georgia Silvera Seamans of Washington Square Park Eco Projects for a "Pop-up Microscopy" event on October 2nd. More details to come. If you would like to join the fun contact the outreach crew Sally or Jay.

Clockwise from upper left: Guy de Baere assisting visitors with the plankton specimens. Guy de Baere and Sally Warring supporting visitor, Christina Delfico with a cluster at the shark teeth, Sally operating the Newton.





New York Microscopical Society

Please send with payment directly to:

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Fair Lawn, NJ 07410-5207

Please Print

I hereby apply for membership in the New York Microscopical Society

Name: (Dr., Ms., Mr., Mrs.).....Nickname:.....

Home Address:.....

Phone: (home or mobile).....Fax:Email:.....

Work Information: Company Name.....Work Address:.....

Work Phone:Email:.....

Would you prefer to receive NYMS mail at home? at work? by email (*best way*)?

Principal work or interest in microscopy:.....

Would you like information about NYMS committees? Yes No Awards Membership

Education Library Finance Curator Housing Program Publications History

Academic and Honorary Degrees:

Degree Conferring Institution Date

Scientific Publications.....

Membership in Scientific Societies.....

Date of birth (optional if over 18)

I have enclosed a check for \$..... to cover my application fees for membership.
{Annual \$30, Supporting \$60, Life \$500 (payable within the year), Corporate \$175 (includes one advertisement in NYMS News), Junior \$5 (under 18 years old), Student (over 18) \$20.}

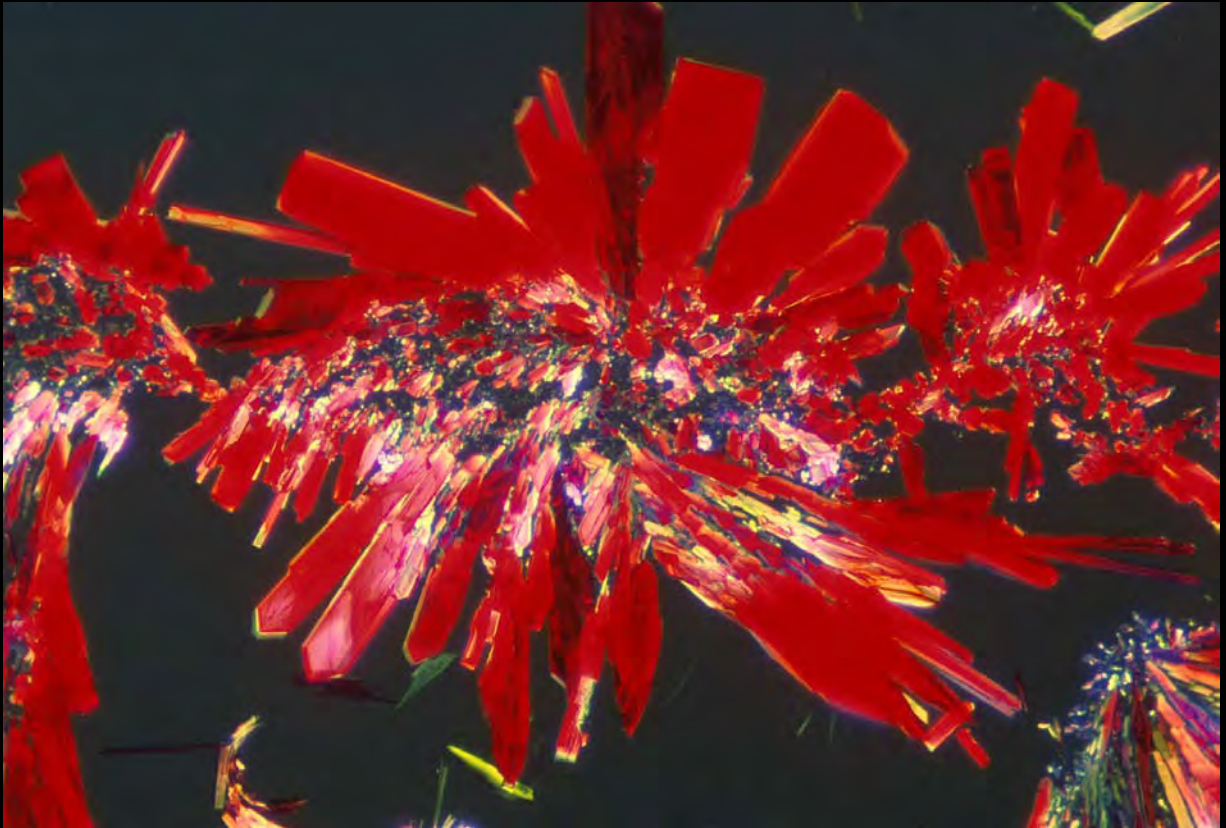
I understand portions of the above information may be used in NYMS publications.

I would prefer my home work address/phone included in the NYMS Directory

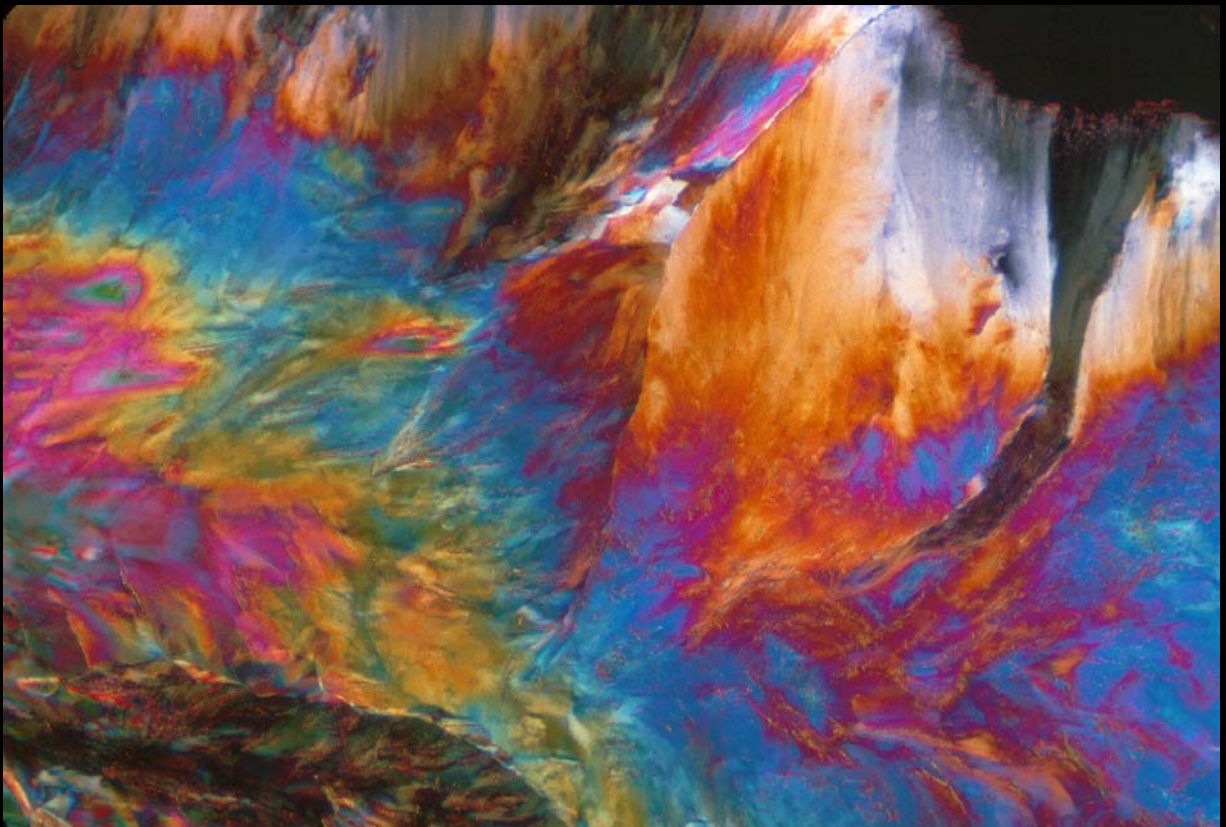
Signature.....Date.....

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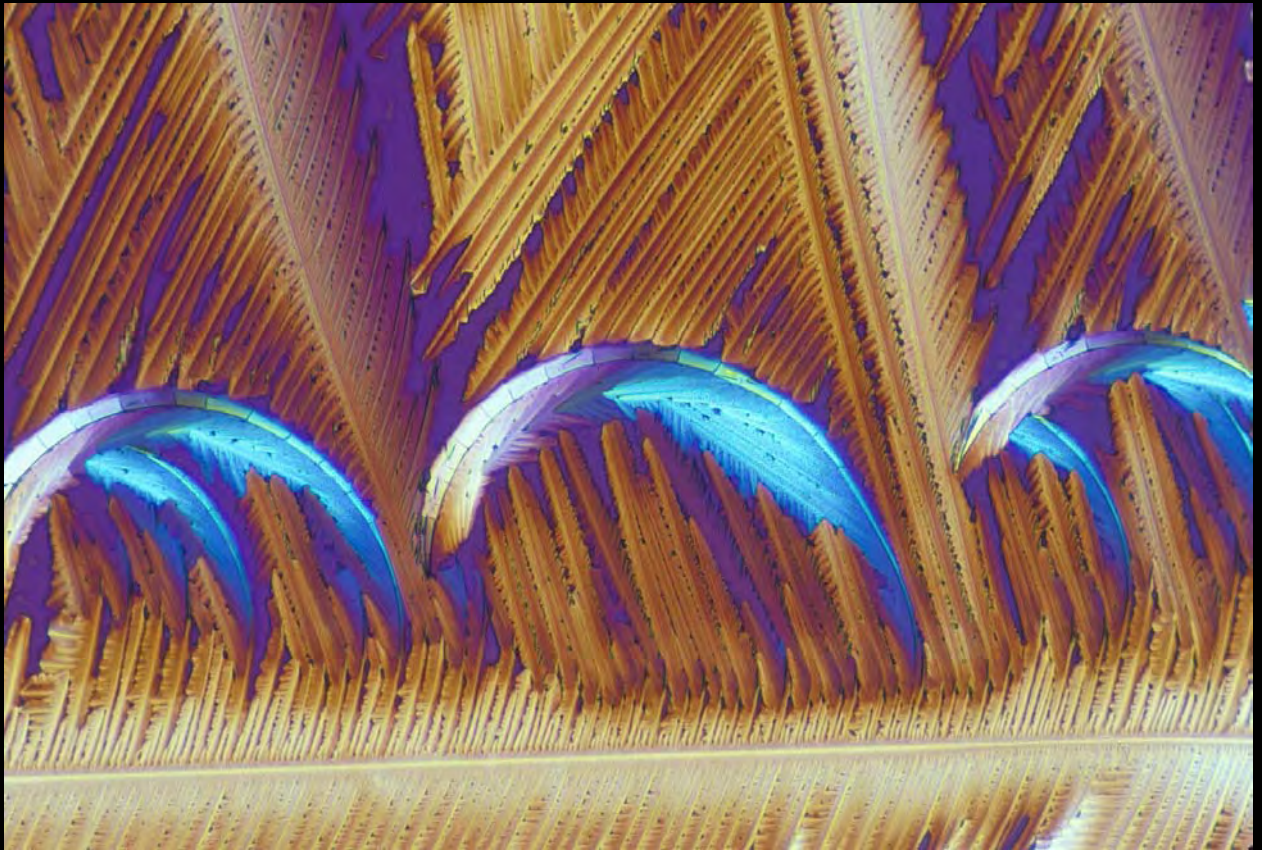
Polarized-light photomicrographs of some chemical crystallizations. Preparations and imaging by Mel Pollinger



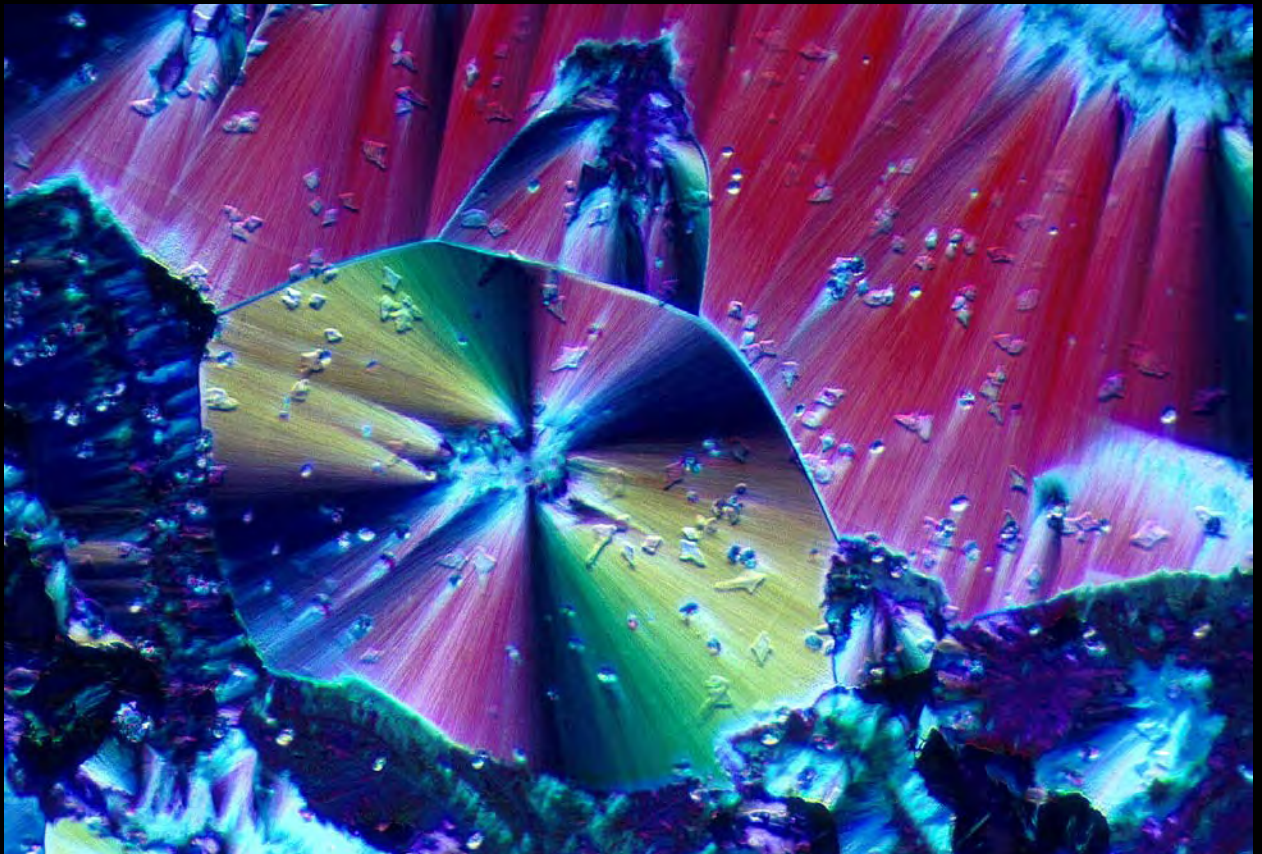
Cyanocobalamin 100x P1783118



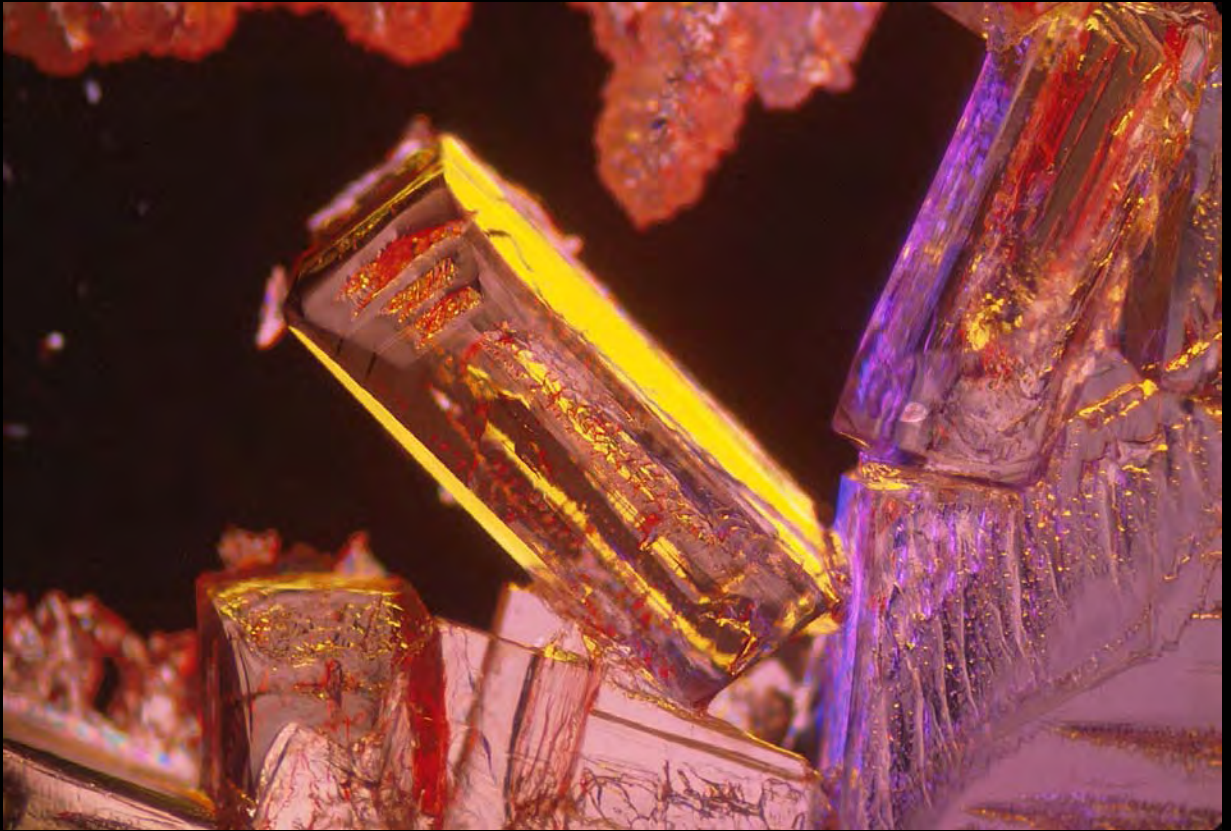
Folic acid, 100x P1751010



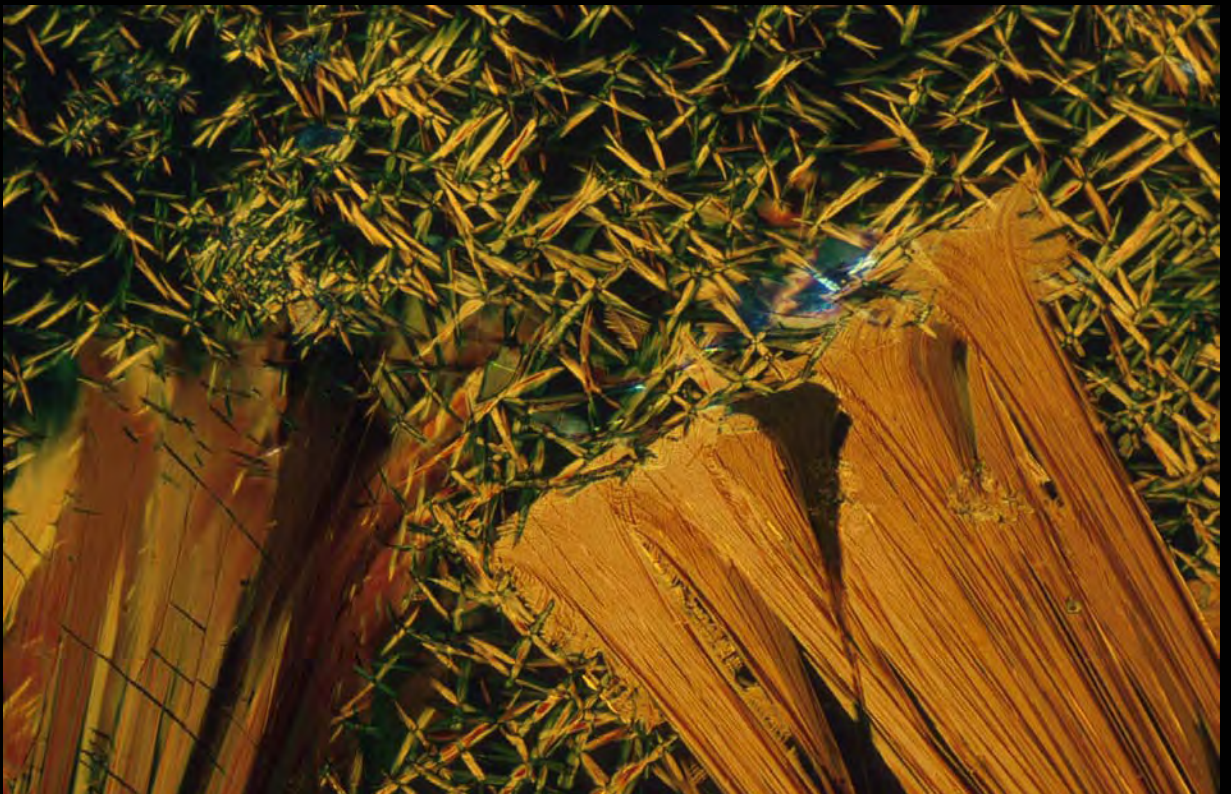
Homocystine, 200x P1722613



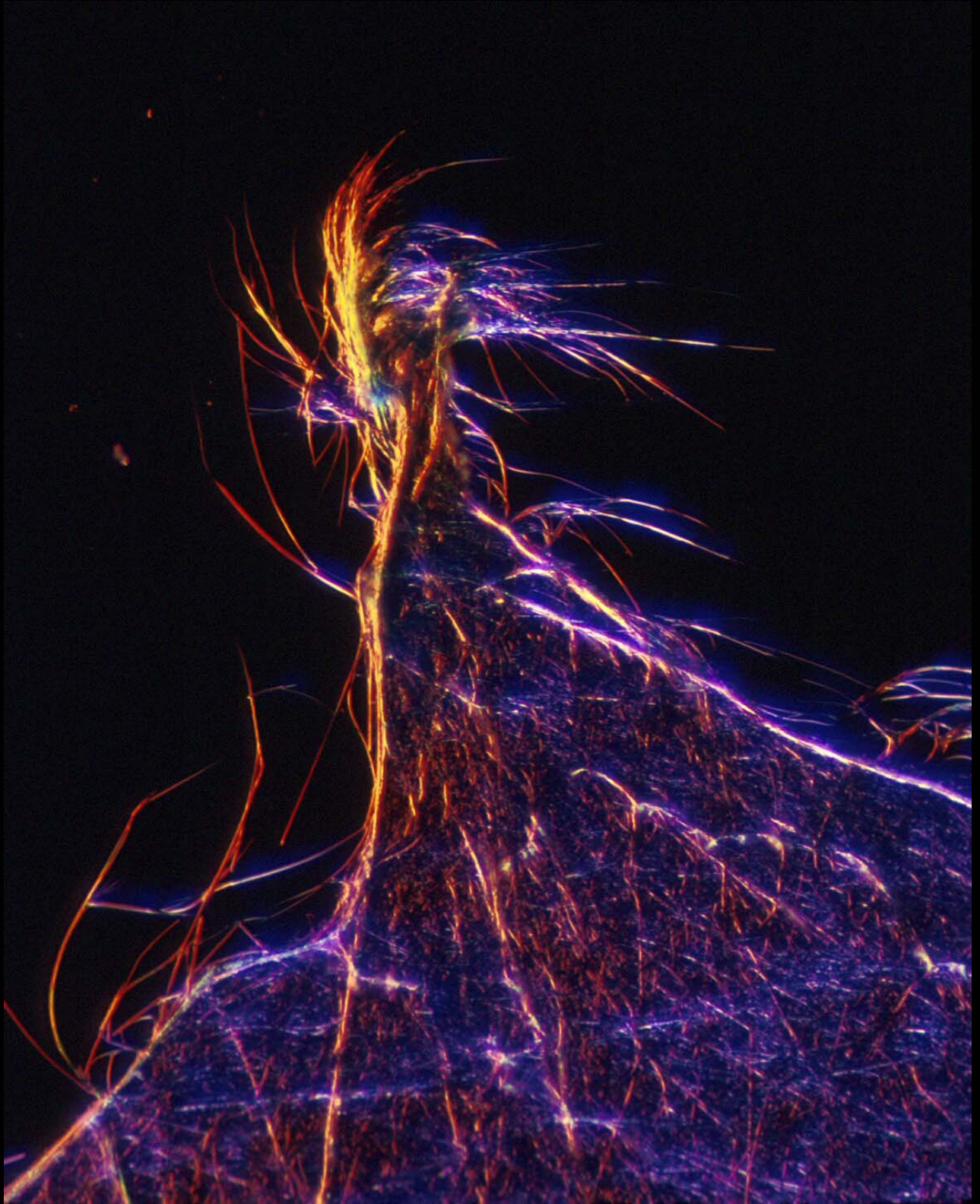
Insulin, 200x P1472613



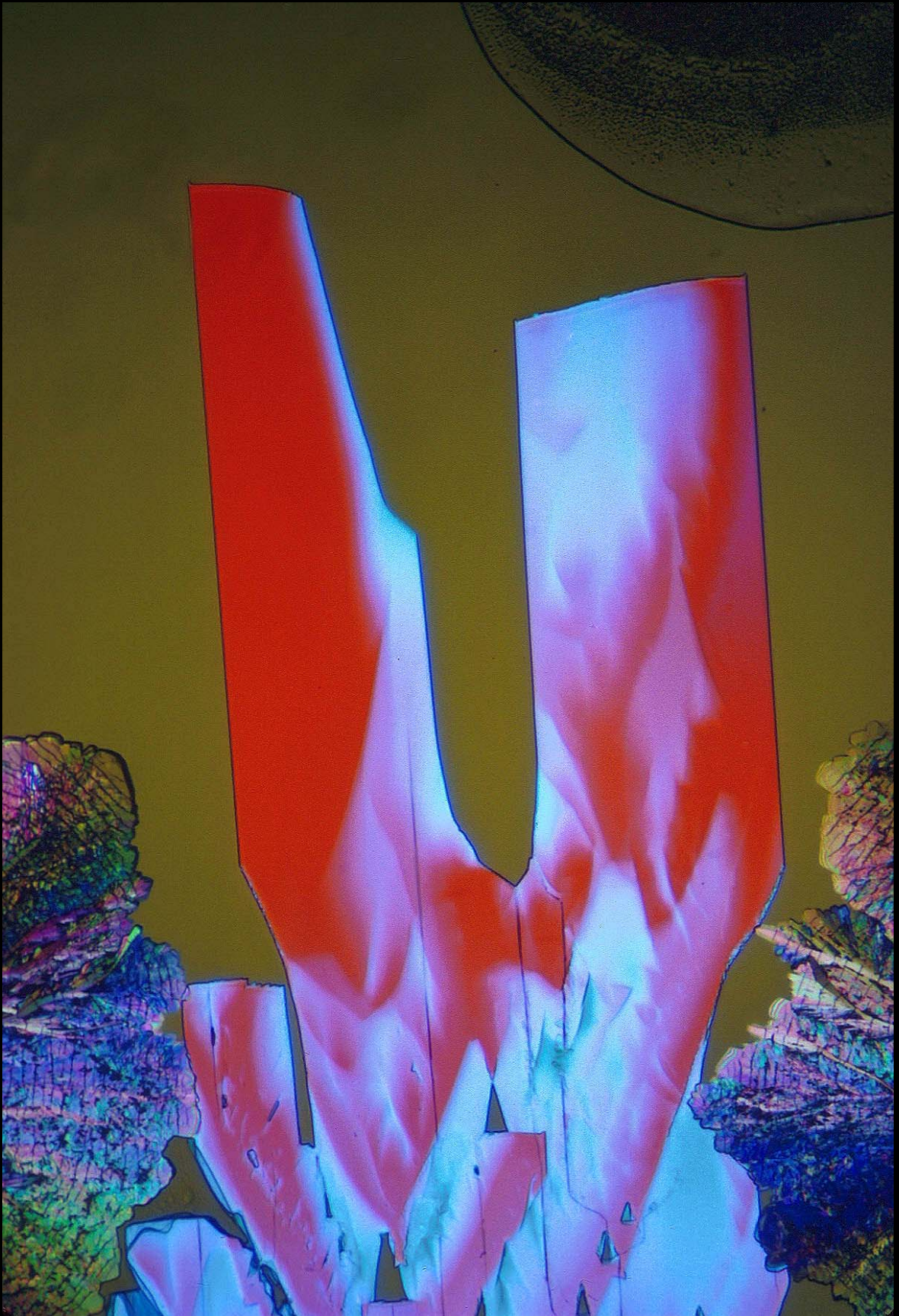
Pyridoxine HCl, 40x P1761414



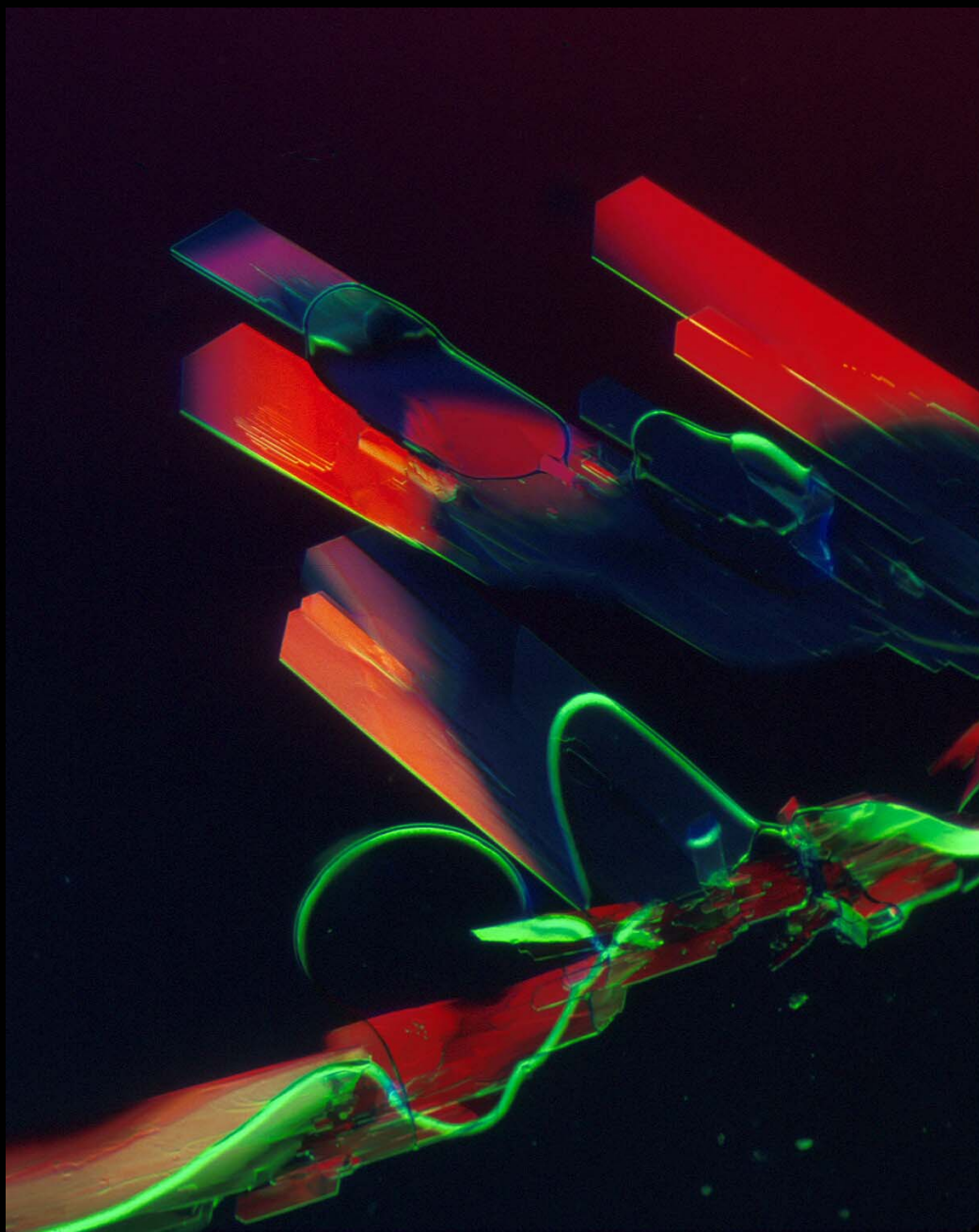
Phenobarbital, 100x, P1521008D



L-Phenylalanine, 100x, P1510311D



Aspirin, 50x, P1250911



L-Valine100xP1510318D

Microcosmos

Comparing stomata & epidermal cells between different species of plants (with a Foldscope)

Posted by JHOLMES on JULY 9, 2019



Fig 1. The lab: Foldscope kit and container of a variety of collected leaves.

Collecting & Preparing a sample

After reading the post by KAVITHA (<https://microcosmos.foldscope.com/?p=160084>) about stomata, I had a question: Do all stomata look the same? So over the weekend, while visiting my sister and parents, we went on a Stomata Expedition! We collected several different sorts of leaves, placing them in a plastic tub to keep them from drying out, and took them inside to examine them with the Foldscope!

The leaf is too thick and contains too many layers of cells to clearly see the stomata on the lower surface of the leaf, so we must peel the lower surface off of the leaf. We found the best way to do this was to fold the leaf so that the bottom surface of the leaf is on the outside of the fold.



Fig 2. Folded leaf of *Dichanthelium latifolium*, Broad-leaved Panic Grass, bottom side out.

The next step is to pinch the edge of the fold between your fingernails and try to peel the bottom layer of the leaf down, away from the fold.



Fig 3. This pulled away little skin of the leaf still has some of the green inner cells (the spongy mesophyll) on it. We will scrape that off so we just have the clear epidermal cells, with the stomata, on the slide.

I used my thumbnail to lightly scrape the green mesophyll off the inner side of the peel and then placed the thin, single cell thick, layer of leaf epidermis on a slide with a little water, then covered it with a cover slip.



Fig 4. The thin scraped peel is slightly curled as it dries quickly in the air.



Fig 5. Here you can faintly see the very clear peel under the coverslip. It is greener to the left where I didn't get the green mesophyll peeled off.

We had a variety of plants that we collected from the side of the road and around the house. And made peels of each. I will add a picture of each plant in the field and what the stomata look like through the Foldscope.



Fig 6. *Dichanthelium latifolium*, Broad-Leaved Panic Grass, a monocot.

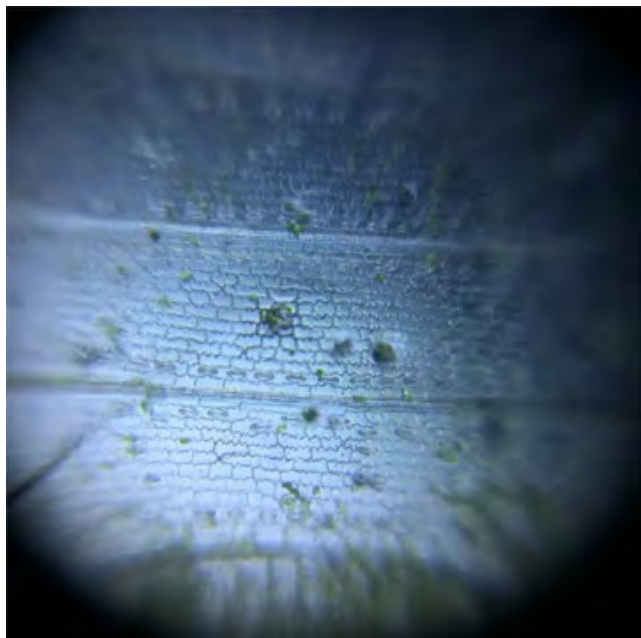


Fig 7. *Dichanthelium latifolium*, Broad-Leaved Panic Grass. In this one the stomata (the little oval things) appear in rows on either side of a rib in the leaf. Can you see them? there are 4 nicely visible rows in the middle 1/3 of the photo and others that are a little blurry towards the top and bottom.



Fig 8. This is the Garlic Chive, *Allium tuberosum*, my sister pulled from her garden. I didn't get a photo of it growing outside. It is another monocot.

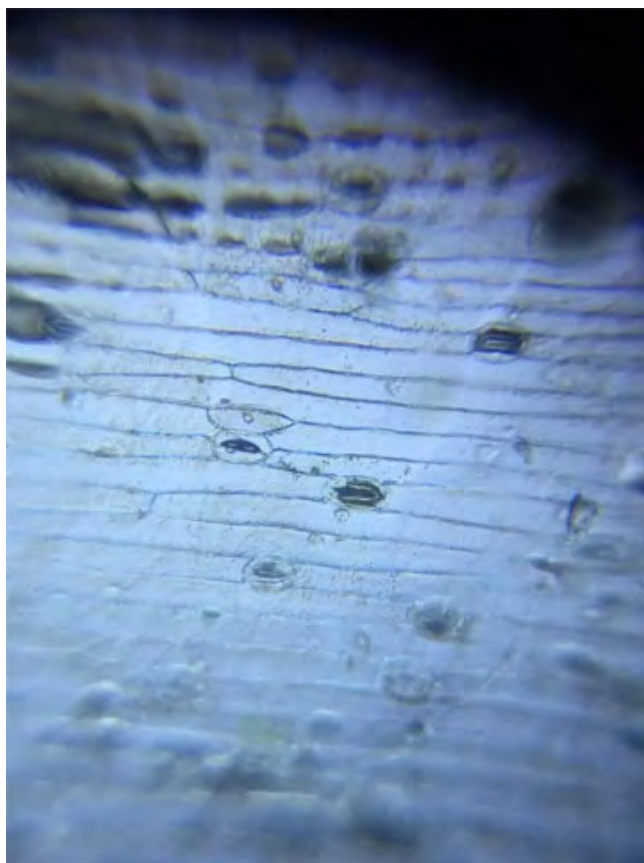


Fig 9. Epidermis of *Allium tuberosum*. The things that look like little mouths are the stomata. This image is zoomed in a little more on my phone, so they look a little bigger. How is this leaf similar to the first leaf? Can you see the small round dots inside some of the longer cells? These are cell nuclei. There are 3 or 4 nicely visible near the center of the image. Pretty cool!



Fig 10. This one is *Celastrus orbiculatus* commonly known as Oriental Bittersweet around here. These leaves are broad, not long and slender like the previous two. This plant is in the eudicots, meaning it has a seed with two halves like a bean or a pea.



Fig 12. *Plantago major*, broadleaf plantain, another eudicot. What do you think the epidermal cells and stomata will look like?

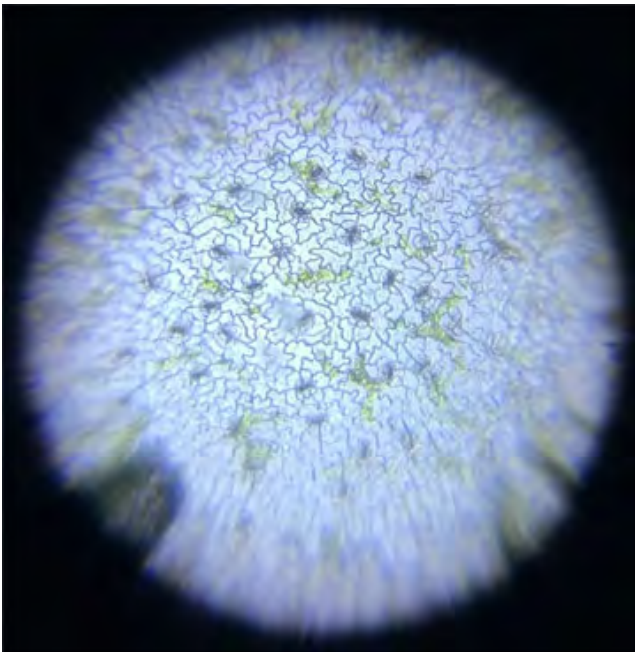


Fig 11. What do you notice first about this leaf? The first thing that I noticed was NO ROWS! This one looks pretty messy! And the cells of the leaf are not generally rectangles and lined up like bricks, they are like puzzle pieces and appear fairly randomly arranged.

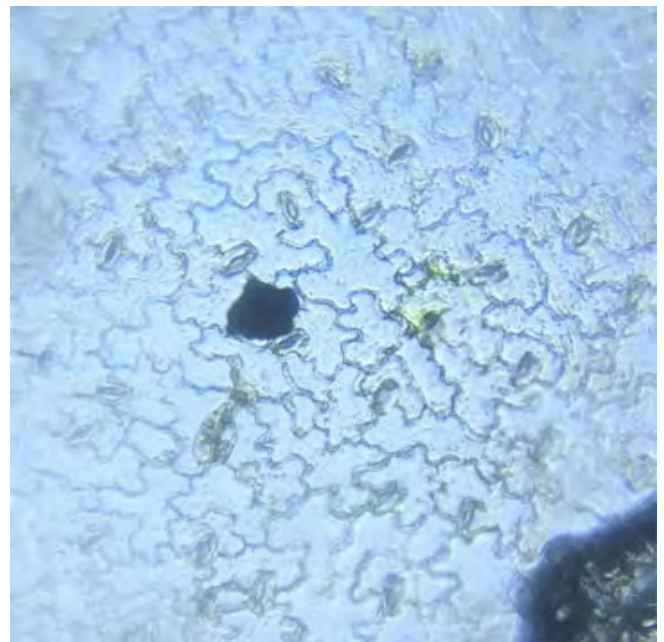


Fig 13. *Plantago major*, broadleaf plantain, epidermal cells and stomata. Which do these look most similar to, *Celastrus orbiculatus* or *Allium tuberosum* above?



Fig 14. I like the look of this little flower that was growing in the yard. It is called *Prunella vulgaris*, or Common Selfheal. It is another eudicot, guess what?



Fig 16. Last plant! This one is *Lysimachia quadrifolia*, the Whorled Loosestrife. Look at the leaf, which group do you think that it might be in? What do you think the epidermis might look like?

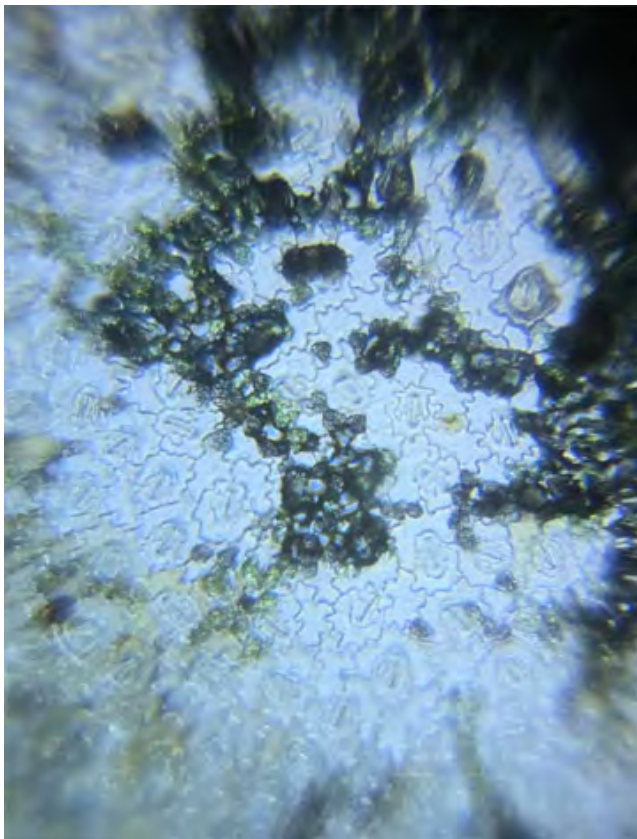


Fig 15. *Prunella vulgaris* has sort of random puzzle piece cells, like the other eudicots, but what do you notice about the stomata here? I think there are LOTS more on this leaf than the other eudicots. I wonder why? The green/dark blobs in here are some of the mesophyll cells that I did not remove.

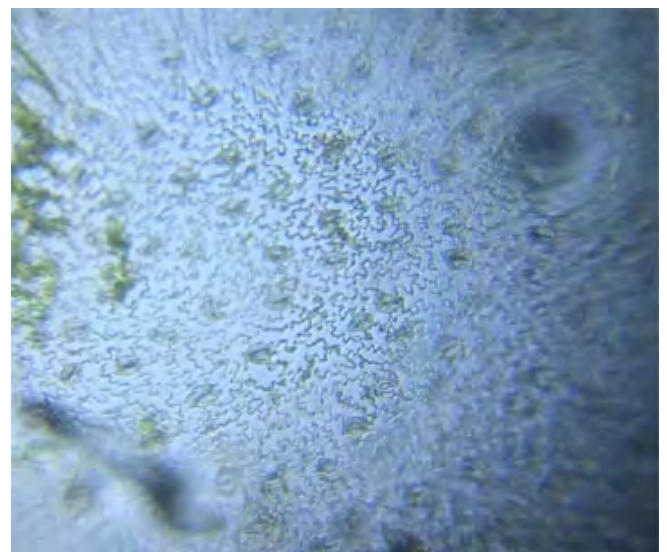


Fig 17. The Epidermis of the *Lysimachia quadrifolia*, Whorled Loosestrife. With the puzzle piece shaped cells and the scattered stomata, similar to the other eudicots.

So the answer to my question was, at this magnification, the stomata look fairly similar between the plants, but they are arranged very differently in different larger groups of plants and between species within these large groups of plants. There seemed to be some leaves with MANY stomata and some with not so many. And the shapes and arrangement of epidermal cells seem to be particular to whether the plant was a monocot or a eudicot.

What questions do you have about these observations? What would you look at next?

I found this Foldscope Exdedition great fun. A few things that I learned were, scraping the mesophyll cells off helps, they are thick and can make focusing tricky. I also learned that the focus can shift a bit when I go from viewing with my eye to taking a picture with the phone, so that takes a few tries, and then toss out the poorly focused images. Cropping out the out-of-focus parts around the edge is helpful, but it is hard to get a sense of how big things are relative to each other if different images are cropped differently.

For this project I was using glass slides and coverslips, the Foldscope LED illuminator directed straight through the lens, and an iPhone 6, mostly at full frame for photographing, then cropped. I used a knife to trim the leaf material so the piece that was left was just a thin piece of epidermis.

2 Comments



DORITHOCKMAN says:
July 11, 2019 at 11:33 am

This is such a good idea! I am denitely going to give it a go!



MANANSURI says:
July 11, 2019 at 12:02 pm

I am de nitely going to try this! Thank you for laying out the procedure!! :-)

Related posts on Microcosmos:

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