Huron River Watershed Council

Microplastics in our Streams

Paul Steen's initial explorations into a world of plastic

MiCorps Conference 2019

What are microplastics?

HRWC's social media/awareness campaign

- Three 60-second videos placed on Facebook, Instagram, and YouTube in 2019 (60,000 people reached)

Huron River Watershed Council

We know from the scientific literature…

Huron River Watershed Council

- They are in every aquatic system
- They have a high prevalence and density in the ocean and Great Lakes.
- They are in drinking water, bottled water, and beer, and presumably everything then, that is made of water.
- Microplastics are in dust.
- We consume a credit card worth of plastic each week (food and water, average across the world)
- Microplastic found in every stool sample from people in 8 countries around the world.
- 2016 USGS report says the Huron has the highest microplastic count of the major Great Lake tributaries.

We still don't really know…

- What all of this plastic does to the human body or to ecosystems.
- Evidence for: Obstruction of digestive system (insects). Free floating pollutants (PCBs, PAHs, heavy metals) adhere to plastic surfaces "toxic rafts". Plastic leachate can be endocrine-disrupters (affecting hormones).
- Severity of Primary Sources
  - Likely sources: Washing machines; wastewater treatment plants; degrading trash in the environment; pipes; drinking water treatment filters?
- Not really an issue for river folks: microbeads from soaps. They have been banned. HRWC has seen them a few times in river samples.

Huron River Watershed Council

HRWC and Microplastics

Problem

- We know the Huron has high amounts of microplastics (USGS study)
- We don't know where it is all coming from
- Developed sampling technique are for big water, not creeks

Goal

- Scale down Great Lakes boat sampling to tiny creeks and medium river
- Sample across the Huron River Watershed
- Identify rivers/tributaries that are higher in plastics. "Hotspots"

Procedure

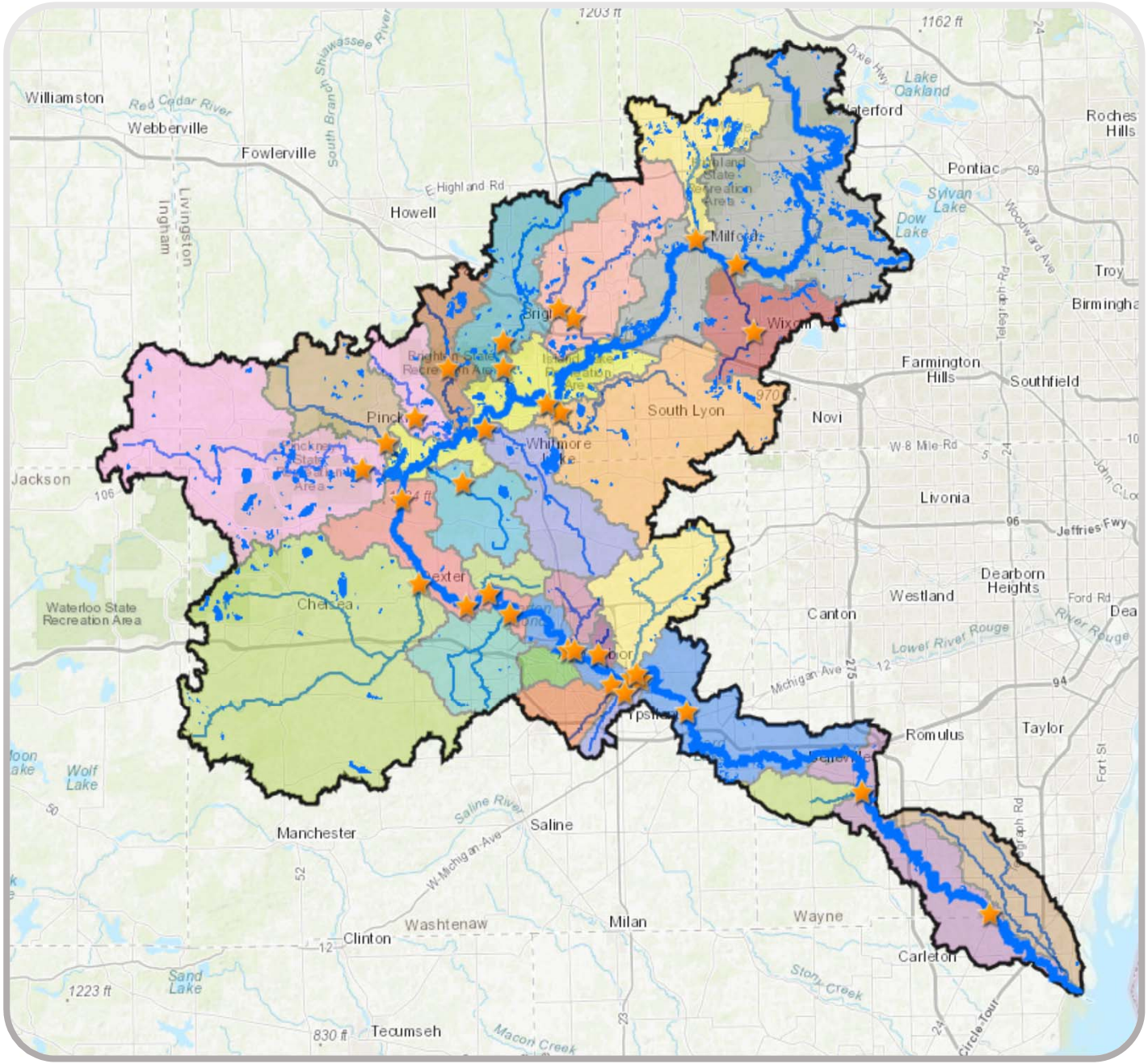
1000 gallons of water flow through a net and solids are captured in a device at the end. Solids are rinsed into a sample container with about 2 L of river water.

Sampling 32 locations from around the watershed; 2 samples each. Goal: Test procedures, locate hotspots

Huron River Watershed Council

Huron River Watershed

Samples in all major creeks, close to mouth, and several in the main branch of the River.

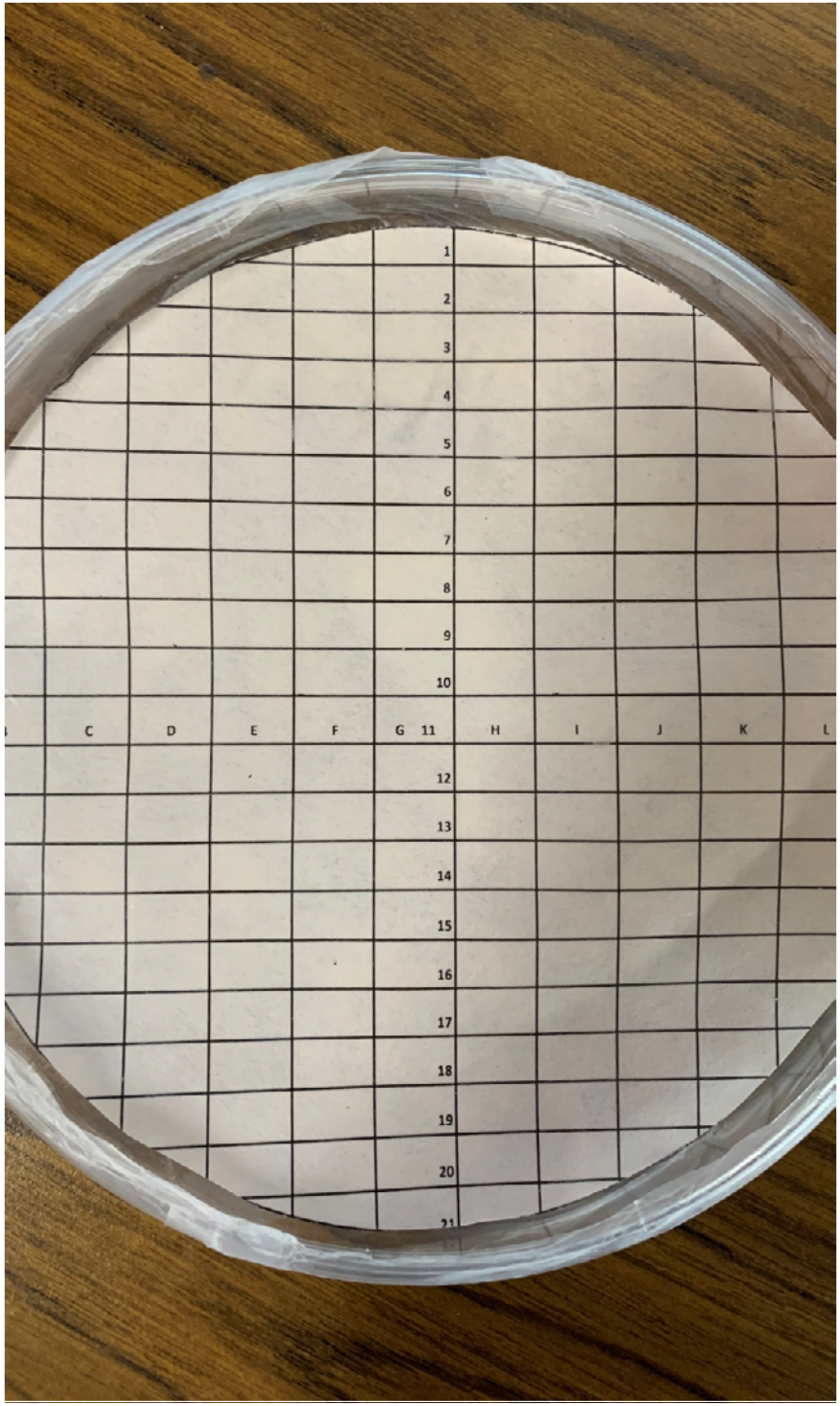


Contamination

A new filter is checked up and cleaned under a microscope for contamination.

Dust usually drops 1-10 plastics fibers on a clean filter over a several hour period.

Throughout the lab process, filters are kept covered as much as possible.

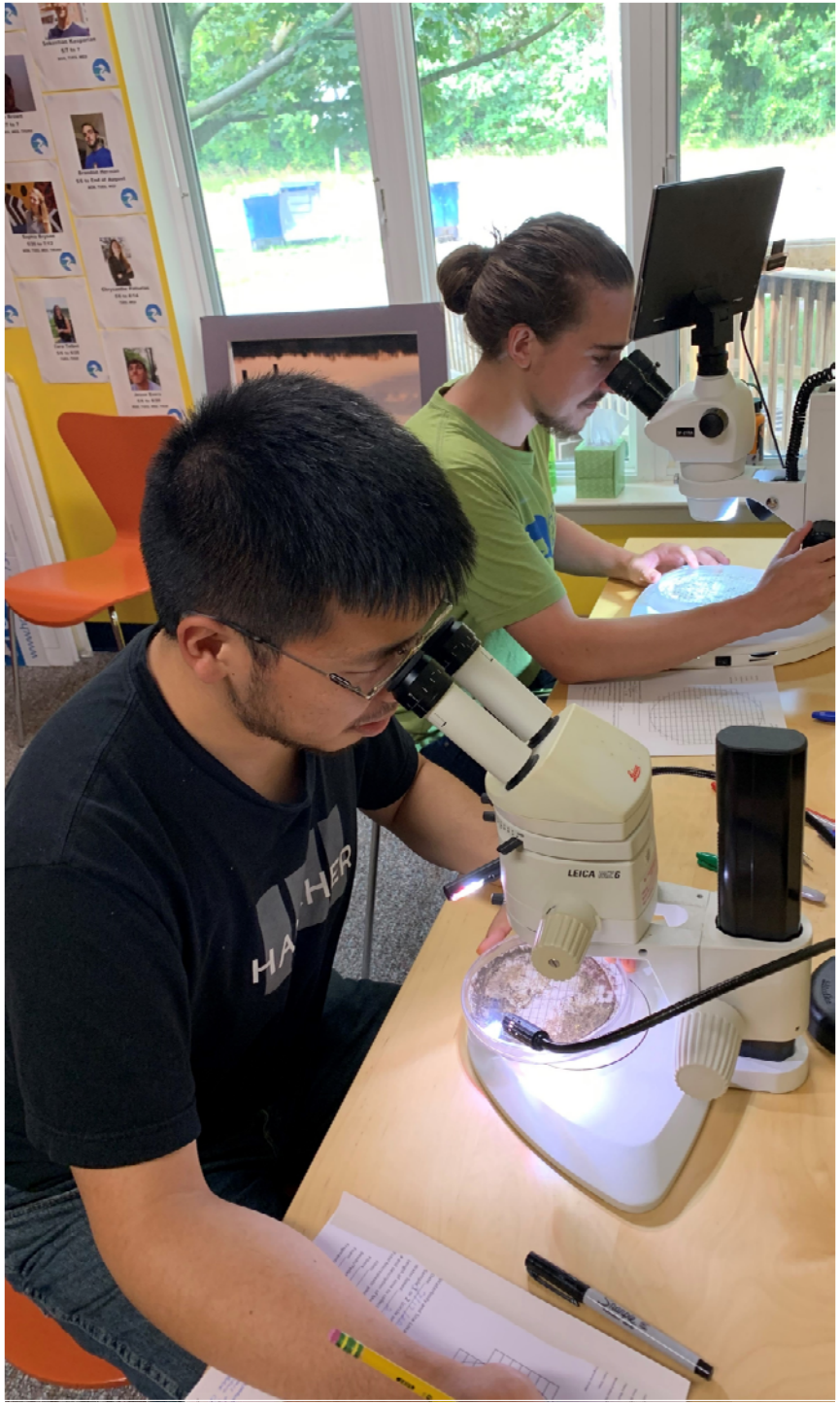


Filter

Sample is filtered through a funnel and onto filter paper. Dried on a hot plate.

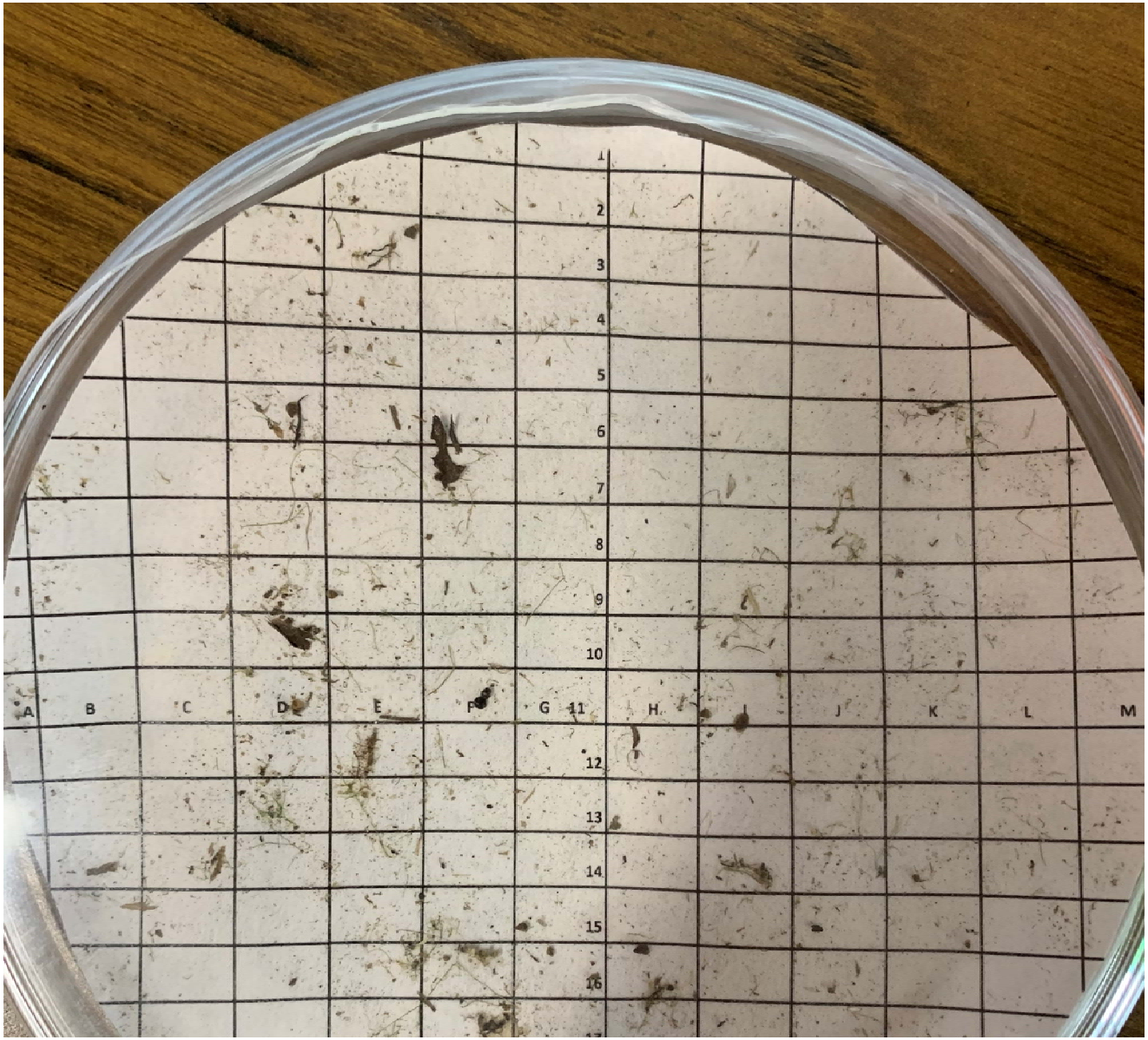
Count

Filter paper is studied under a scope and # and type of plastic pieces recorded.



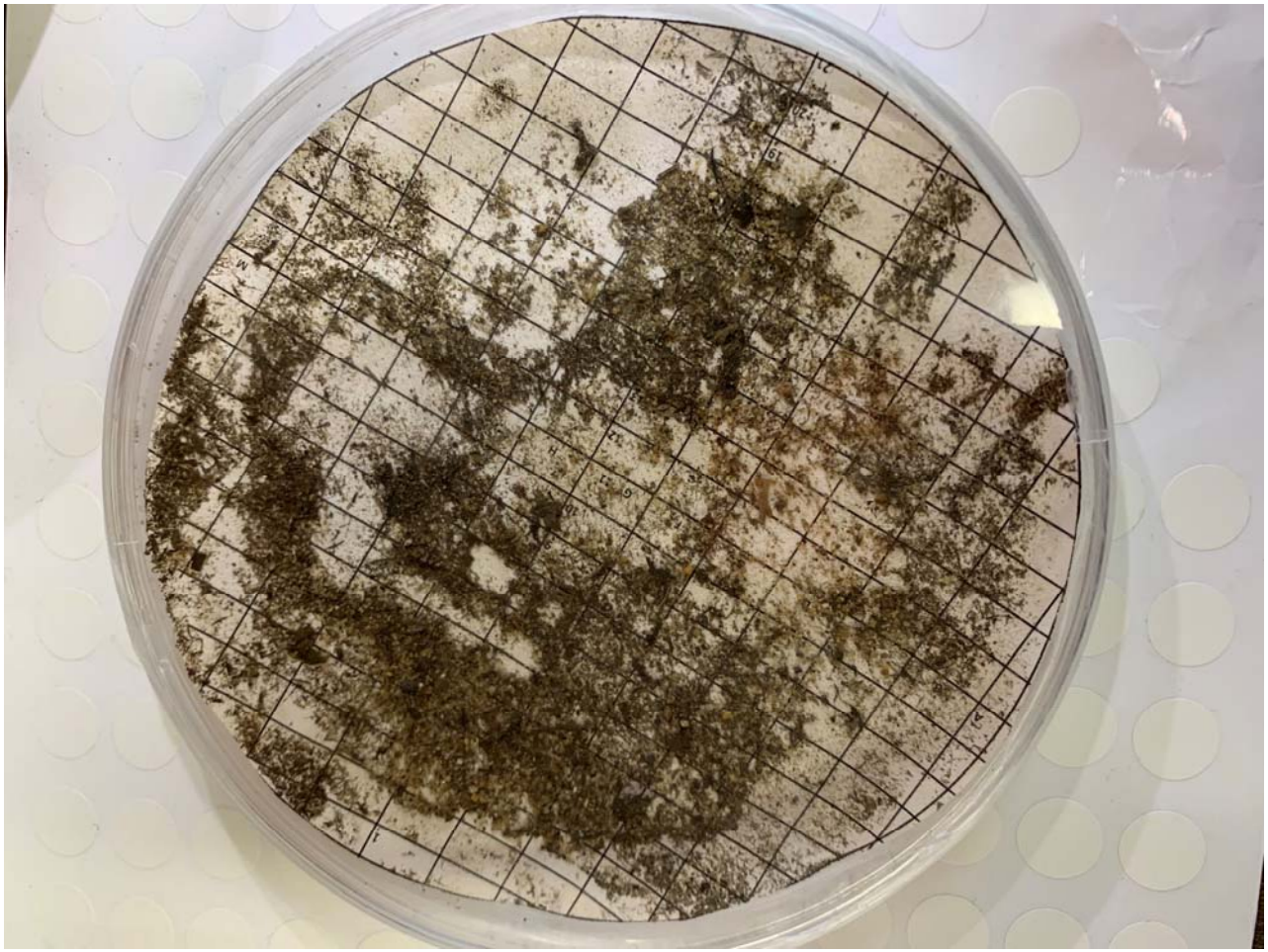
Site 35: Millers Creek @Glazier Way

- Very clear water
- Baseflow measurement



Site 37: Portage Creek: Dexter-Townhall Rd

- Baseflow measurement
- Moderate sediment load



How to clean our equipment?

Morphed into

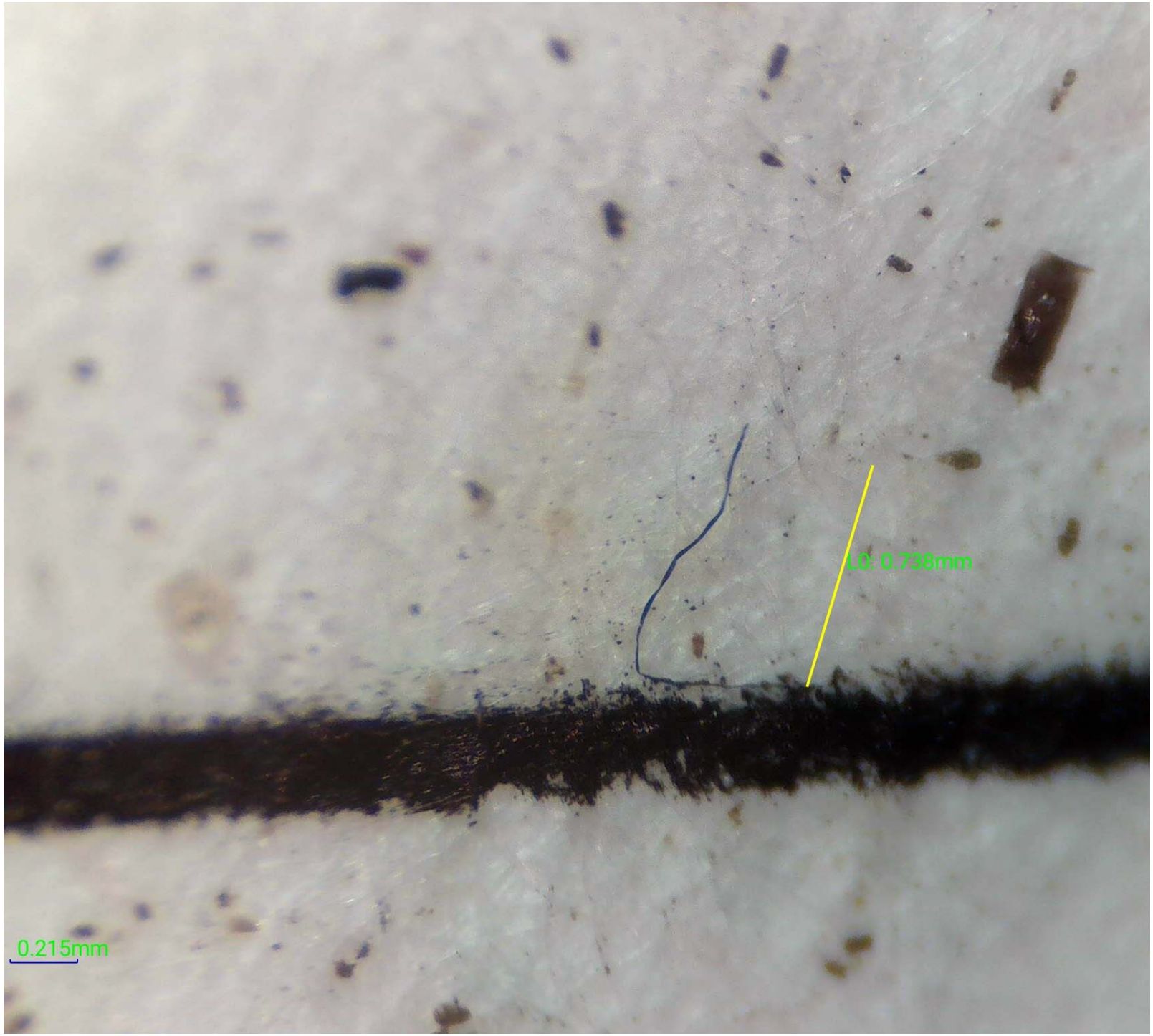
How bad is the drinking water anyway?

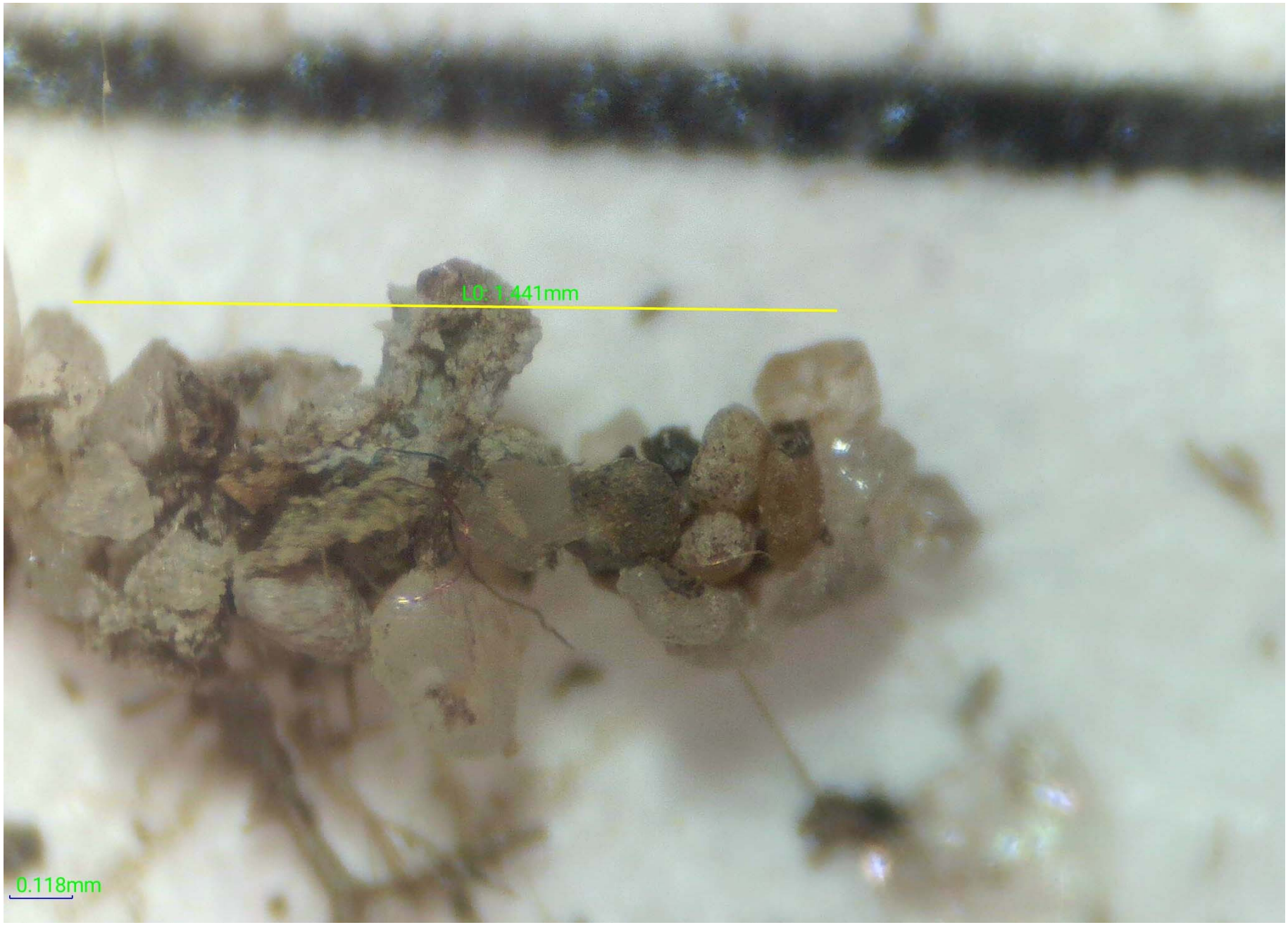
	Count of Sample #1	Count of Sample #2
1. Air only (3 hours left out)	2	3
2. 2L Tap Water	27	16
3: 2L Distilled Water	6	1
4: 2L Spring Water	2	11
5: 2L Jason's House	3	9
6: 2L Jason's Mom's House	3	2
7: 2L Bottled Kroger	13	13

Take-aways:

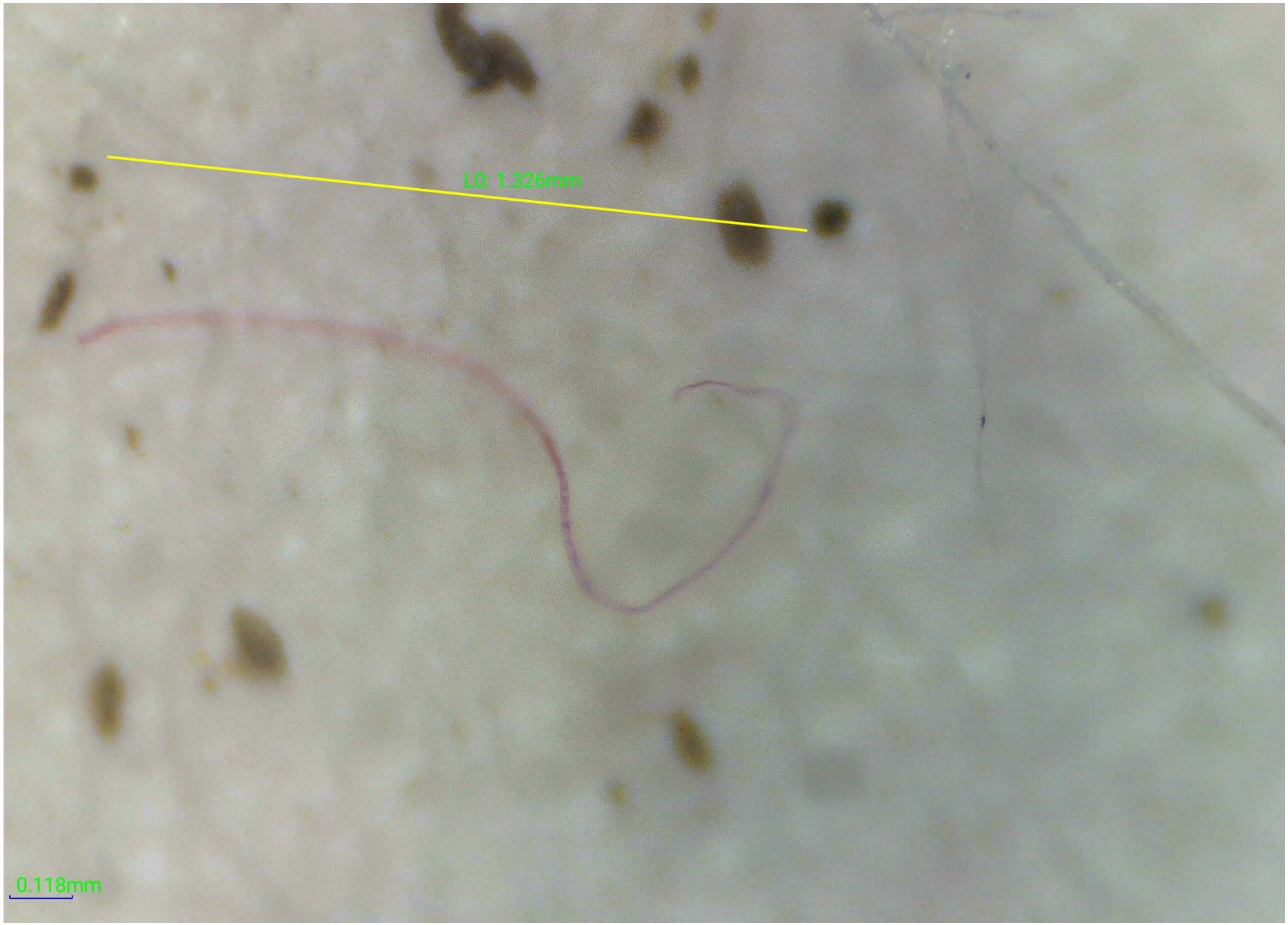
- Use distilled water and not tap water to rinse the equipment.
- Air contamination is minor, perhaps negligible if we keep the samples covered.
- Wow, there is a lot of microplastics in my office's tap water (I need to do more samples)

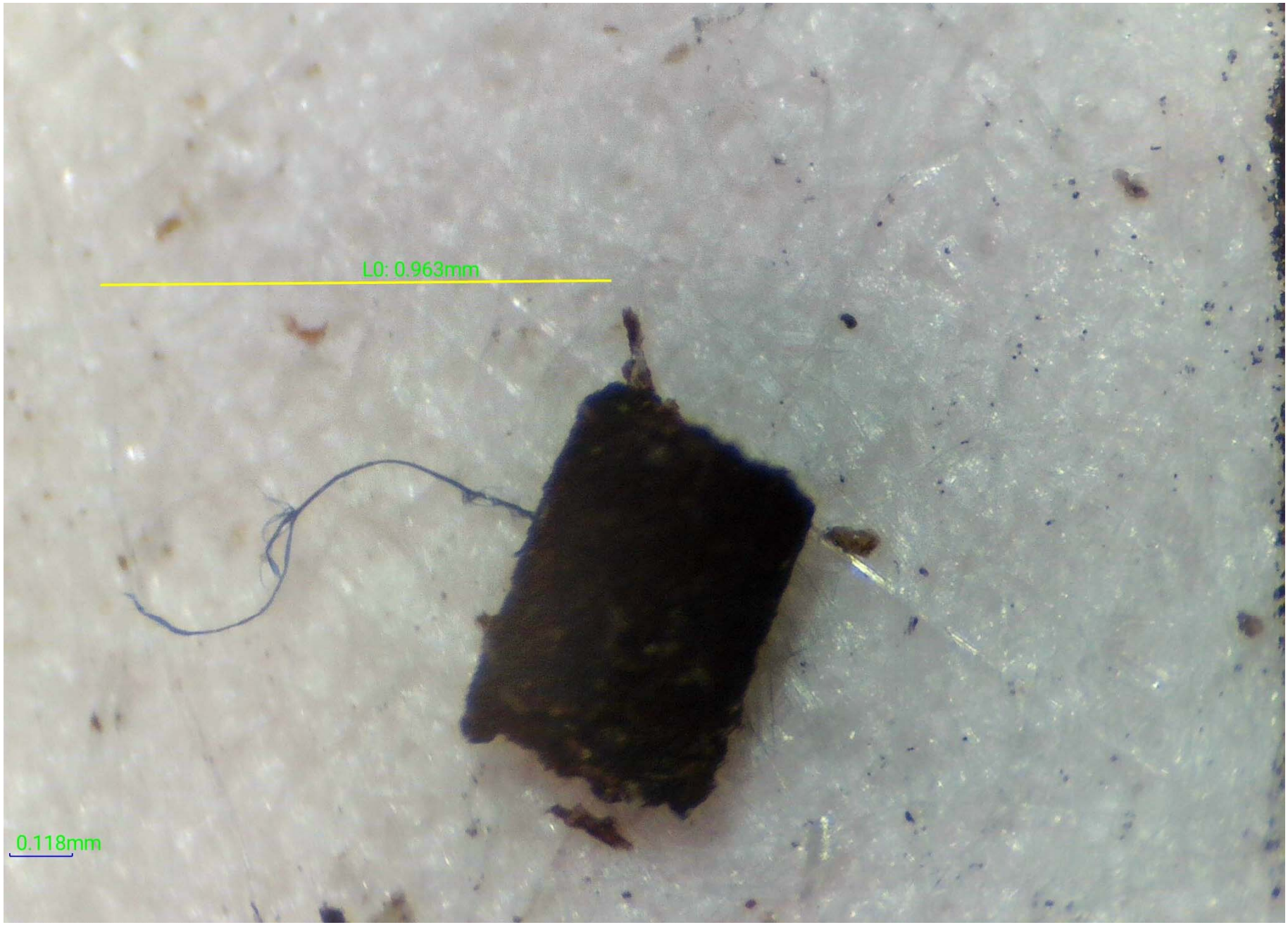

L0: 0.881mm


L0: 0.738mm
0.215mm

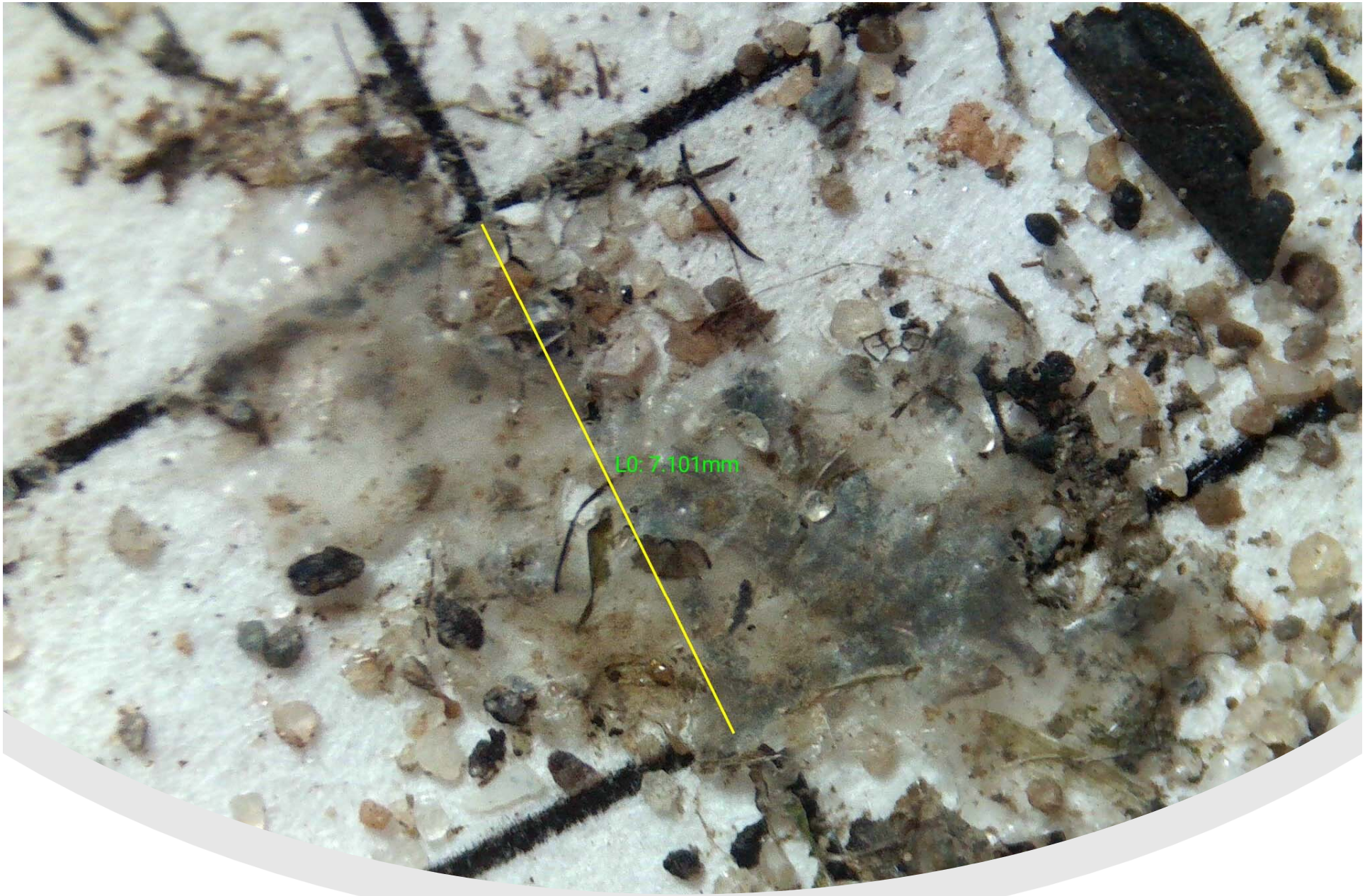

L0: 1.441mm
0.118mm

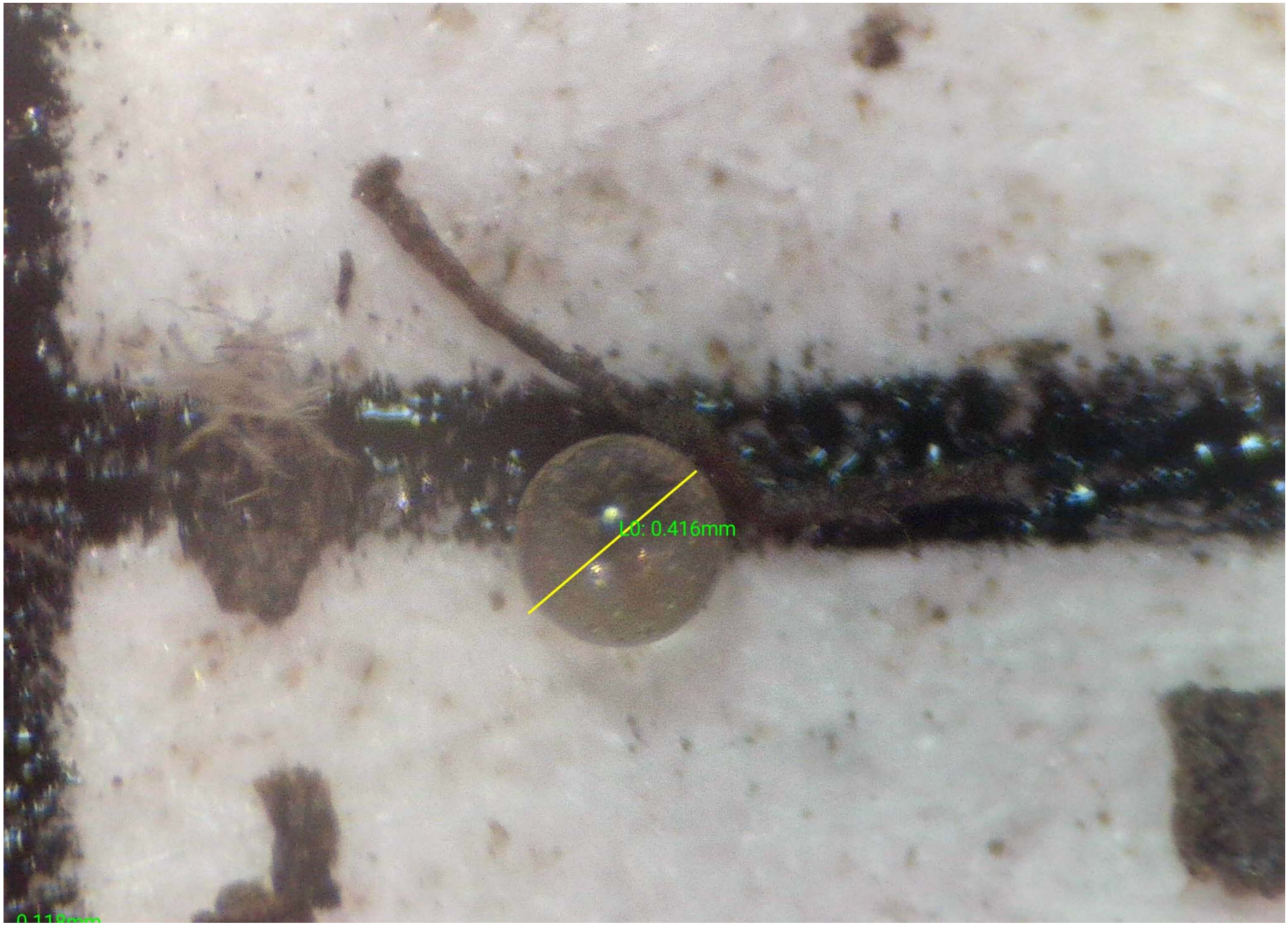

L0: 1.093mm
0.118mm

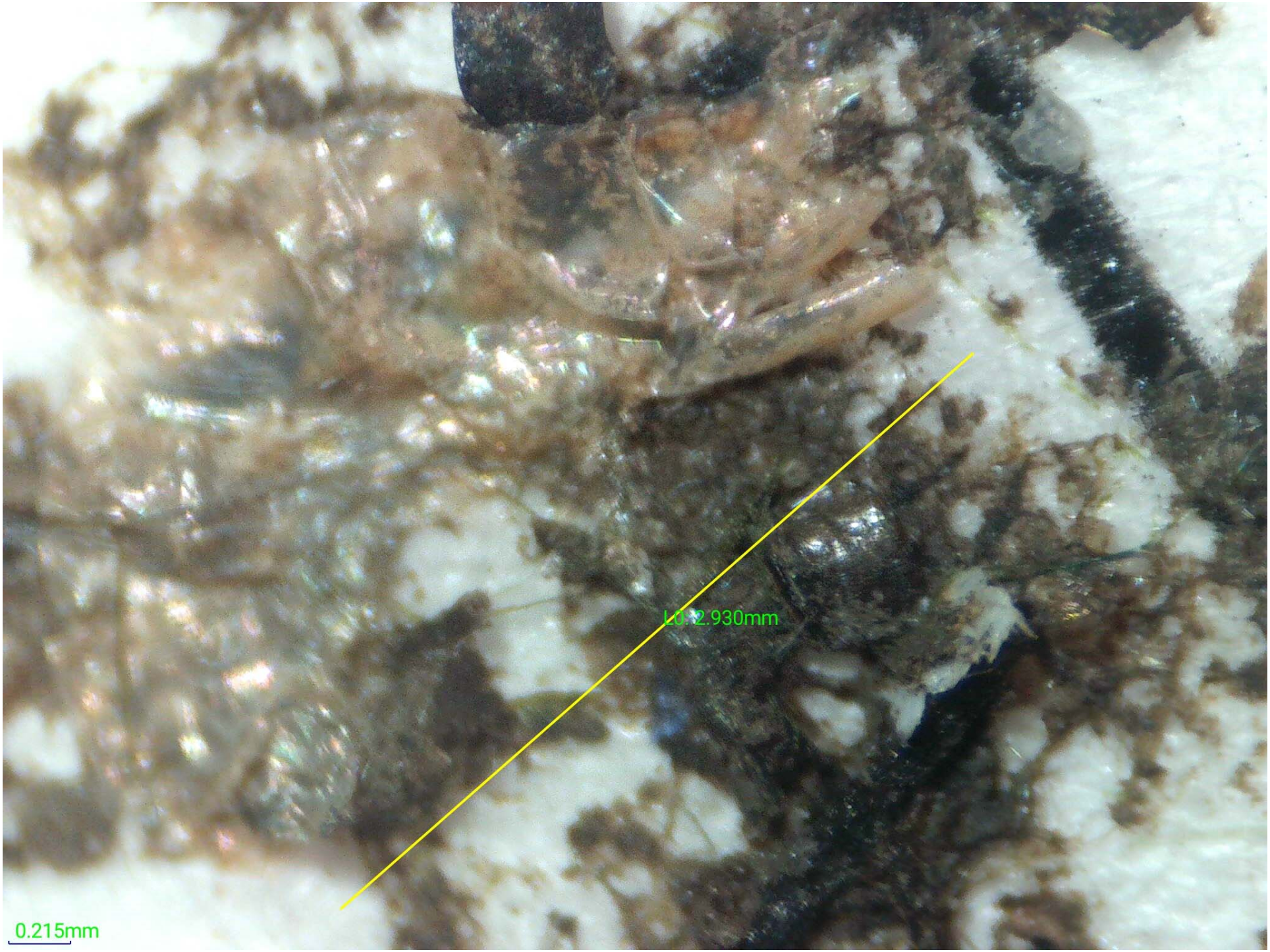

L0: 1.326mm
0.118mm

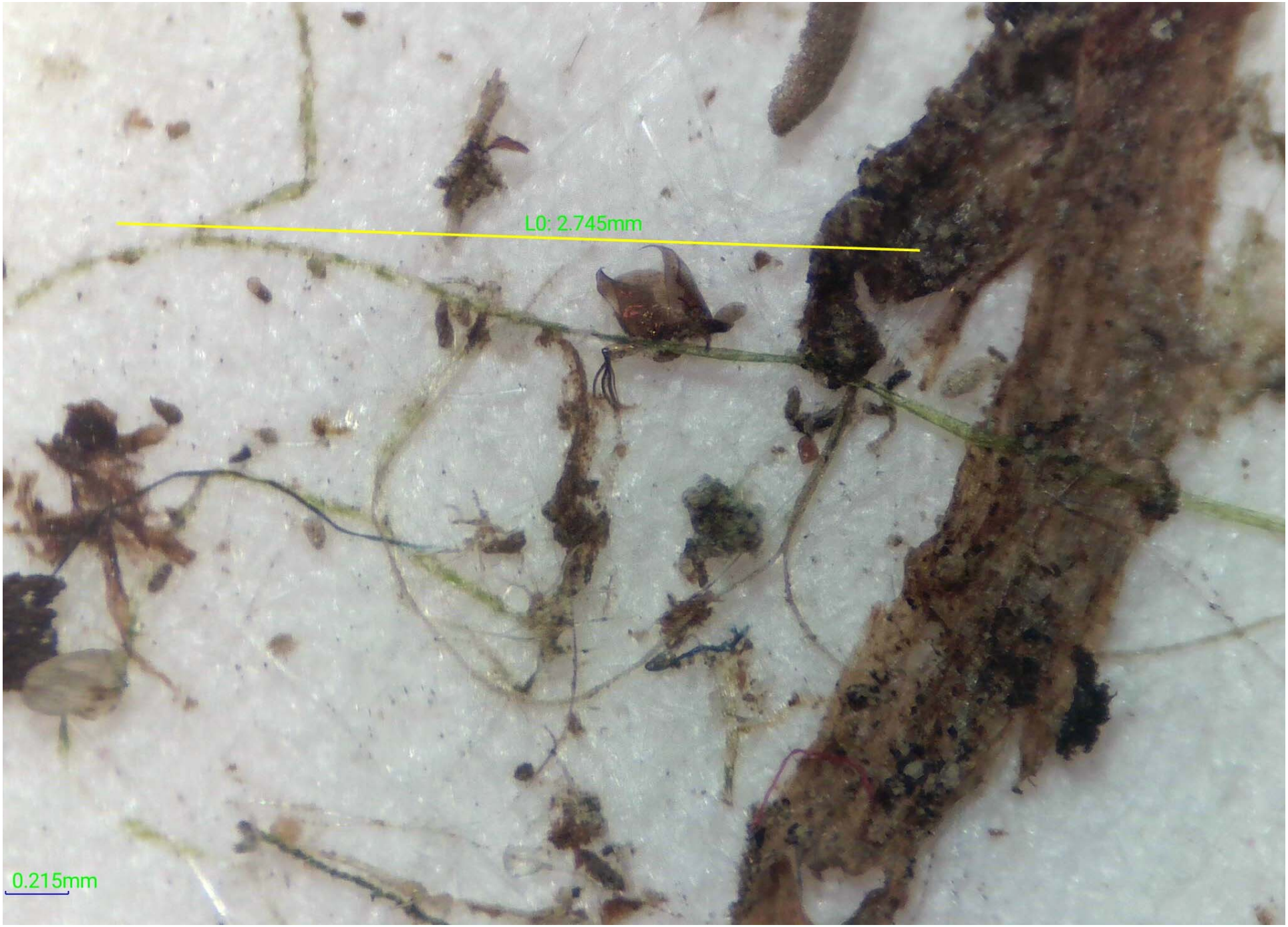

L0: 0.963mm
0.118mm

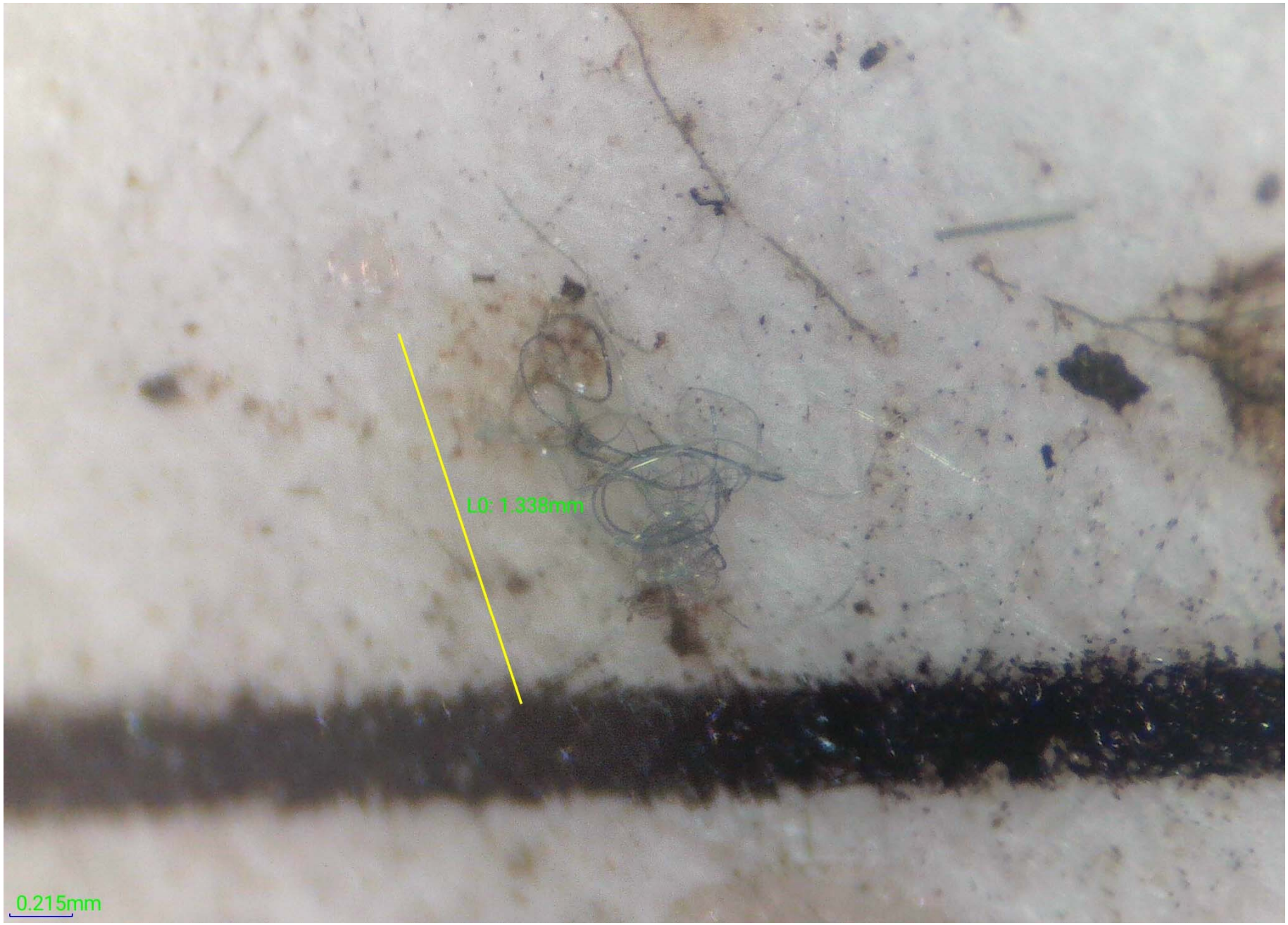

L0: 0.131mm
0.118mm

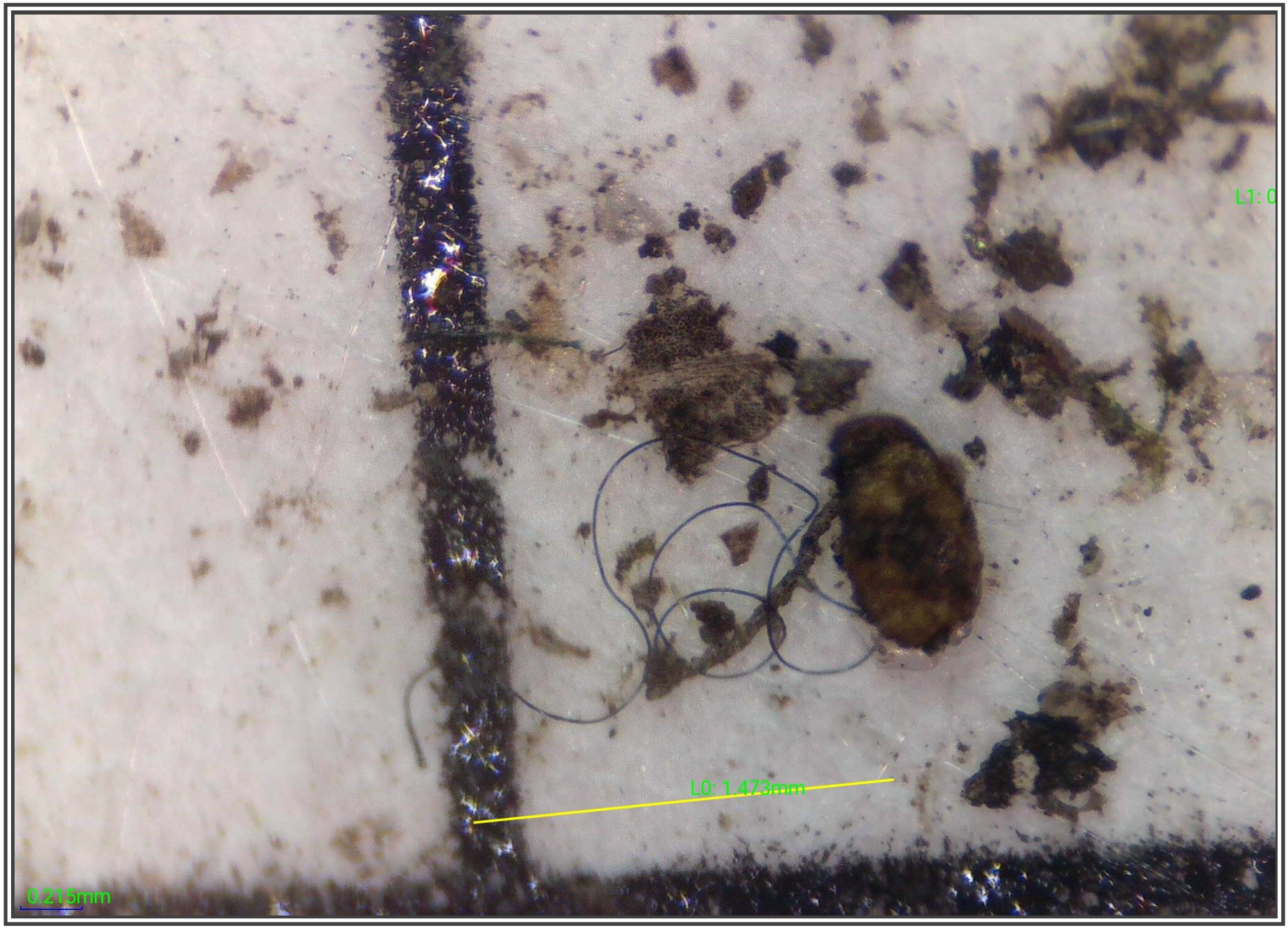

L0: 7.101mm


L0: 0.416mm


L0: 2.930mm
0.215mm

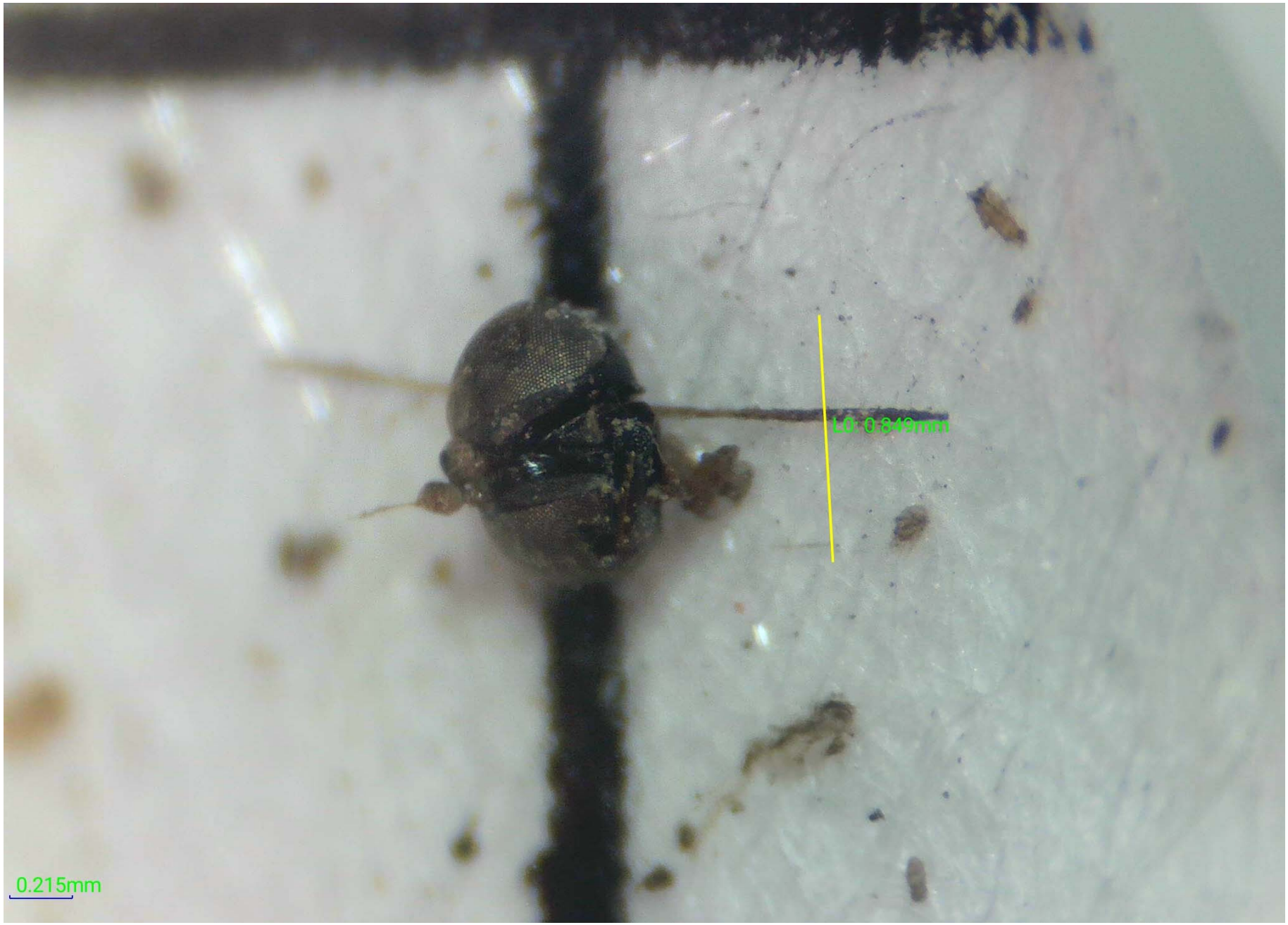

L0: 2.745mm
0.215mm

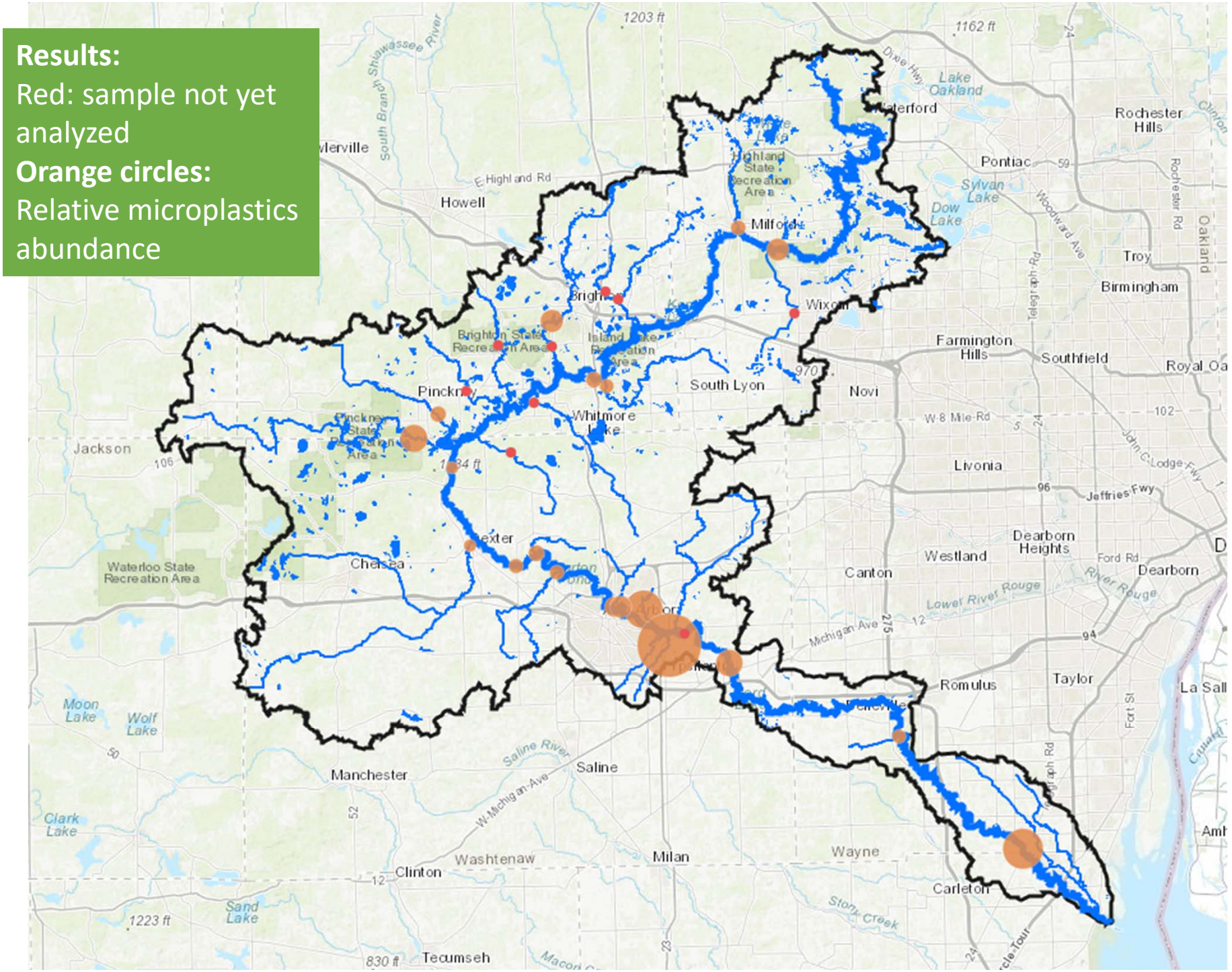

L0: 1.338mm
0.215mm

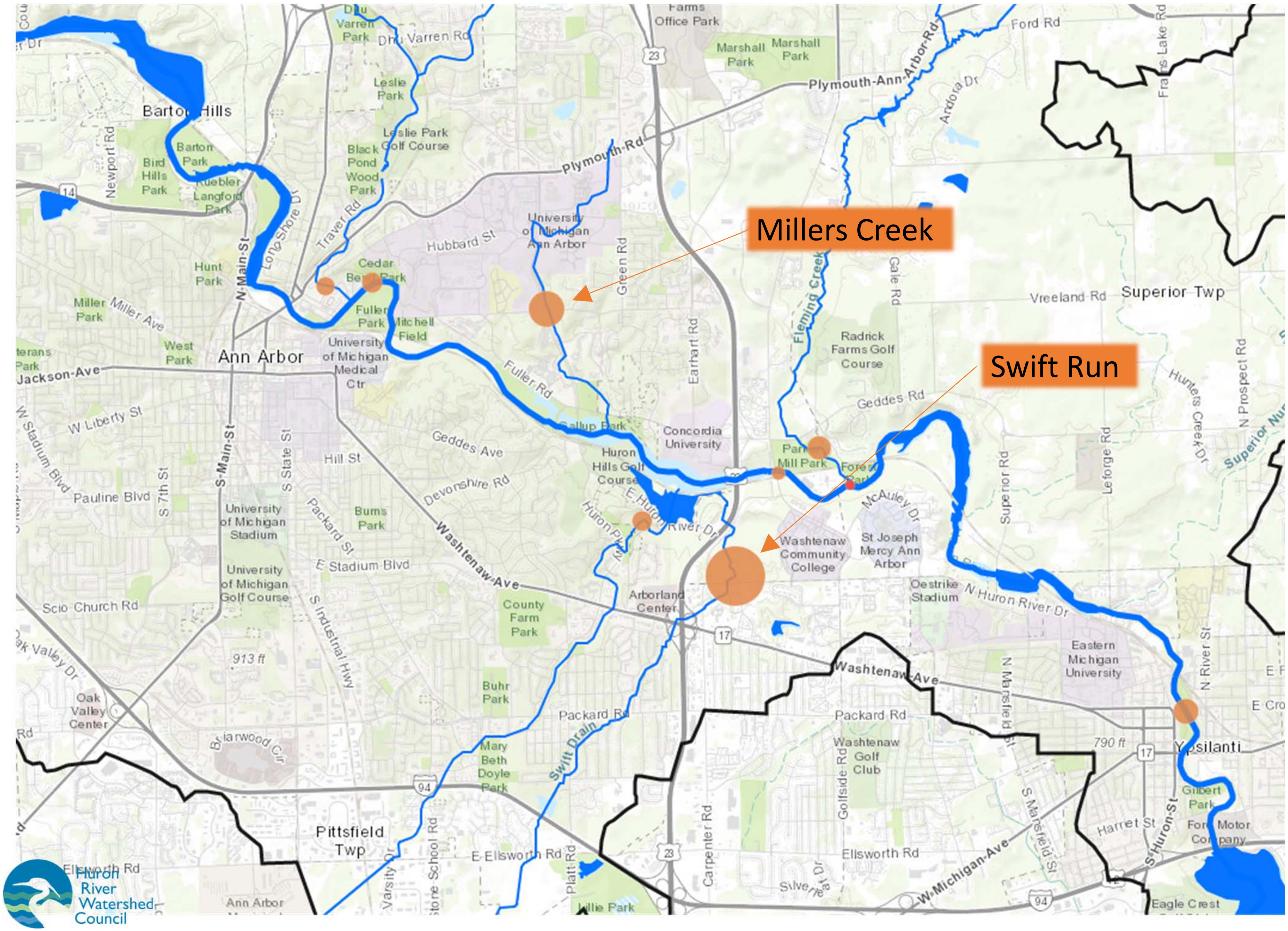

L1: 0
L0: 1.473mm
0.215mm


L0: 0.965mm
0.215mm


L0: 7.510mm
0.828mm


L0: 0.849mm
0.215mm


Results:
Red: sample not yet analyzed
Orange circles:
Relative microplastics abundance
Howell
Milford
Brighton
Wixom
South Lyon
Pinckney
Whitmore Lake
Chelsea
Dexter
Manchester
Saline
Milan
Clinton
Tecumseh
Pontiac
Rochester Hills
Troy
Birmingham
Farmington Hills
Southfield
Novi
Livonia
Westland
Canton
Dearborn Heights
Dearborn
Romulus
Taylor
Carleton
Jackson
Waterloo State Recreation Area
Highland State Recreation Area
Brighton State Recreation Area
Island Lake Recreation Area
Pinckney State Recreation Area
Sylvan Lake
Dow Lake
Lake Oakland
Moon Lake
Wolf Lake
Clark Lake
Sand Lake
Saline River
Lower River Rouge
Stony Creek
1203 ft
1162 ft
1223 ft
830 ft


Millers Creek
Swift Run
Barton Hills
Barton Park
Bird Hills Park
Kuebler Langford Park
Leslie Park
Leslie Park Golf Course
Black Pond Wood Park
Dhu Varren Rd
Plymouth Rd
Plymouth-Ann Arbor Rd
Marshall Park
Marshall Park
Farms Office Park
Ford Rd
University of Michigan Ann Arbor
Hubbard St
Cedar Bend Park
Fuller Park
Mitchell Field
Green Rd
Earhart Rd
Fleming Creek
Gale Rd
Vreeland Rd
Superior Twp
Radrick Farms Golf Course
Geddes Rd
Hunt Park
Miller Park
Miller Ave
West Park
Ann Arbor
University of Michigan Medical Ctr
Jackson Ave
W Liberty St
Fuller Rd
Gallup Park
Concordia University
Huron Hills Golf Course
Parker Mill Park
Forest Park
McAuley Dr
Geddes Ave
Hill St
Devonshire Rd
Pauline Blvd
S Main St
S State St
S 7th St
University of Michigan Stadium
Burns Park
Washtenaw Ave
E Stadium Blvd
Packard St
University of Michigan Golf Course
Scio Church Rd
S Industrial Hwy
County Farm Park
Arborland Center
Washtenaw Community College
St Joseph Mercy Ann Arbor
Oestrike Stadium
N Huron River Dr
Eastern Michigan University
Superior Rd
Leforge Rd
Hunters Creek Dr
N Prospect Rd
913 ft
Oak Valley Center
Briarwood Cir
Buhr Park
Packard Rd
Mary Beth Doyle Park
Swift Drain
Washtenaw Golf Club
Golfside Rd
N Mansfield St
790 ft
Ypsilanti
N River St
Gilbert Park
Ford Motor Company
Harriet St
S Huron St
Pittsfield Twp
E Ellsworth Rd
Ellsworth Rd
Platt Rd
Carpenter Rd
Stone School Rd
Varsity Dr
W Michigan Ave
Eagle Crest
Huron River Watershed Council

Initial take-aways

1. We were able to scale down Big Lake sampling to creeks, and it seems to work.

2. We absolutely have plenty of plastic flowing through our systems.

3. I accidently discovered that microplastics are more concentrated in our drinking water vs. environmental water by a factor of somewhere between 100-500x. (Needs more work).

4. There is a lot of variation in between samples at the same site. Weather and flow are going to make a big difference in results. Sample more at hotspots; many samples throughout the summer.

5. Processing samples is very time consuming, and the project needs dedicated funding to do it justice and produce more solid results.

Huron River Watershed Council