

# Diagnosis of Gastrointestinal Parasites in Camelids and Small Ruminants

Stephen R. Purdy, DVM  
Director of Camelid Studies  
UMass Amherst

# Learning objectives

- ▶ To perform a diagnostic fecal examination for gastrointestinal parasites
- ▶ To identify the eggs or ova of the common camelid and small ruminant gastrointestinal parasites

# Fecal Testing

## Modified Wisconsin Procedure

- ▶ Collect fresh feces- 1 or 2 lubricated, gloved fingers in the rectum or ground collection immediately after defecation.
- ▶ Mix feces- add 10 ml of concentrated sugar solution (specific gravity 1.33 made by adding 2.75 cups of sugar to 1 pint of very hot or boiling water) to a 15 ml tube.
- ▶ Add feces to raise the level to 12 ml (approximately **2 grams** of feces).

- ▶ Pour entire mixture into a cup and mix well to release eggs/oocysts from the feces.
- ▶ Filter out the big pieces through a gauze pad or tea strainer and add back into a centrifuge tube.
- ▶ Fill the tube to the top and centrifuge for 10 minutes with a slide cover slip on if you are using a swinging bucket centrifuge.

- ▶ Fill tube to approximately 1/4 inch below the top and centrifuge for 10 minutes if using a fixed rotor centrifuge
- ▶ Top off tube with sugar solution, add cover slip, and wait 10 more minutes.
- ▶ Apply the cover slip to a glass slide and view.
- ▶ The total number of eggs/oocysts counted is per 2 grams of feces.
- ▶ Divide the final number by 2 to calculate the **EPG (egg per gram) or OPG (oocyst per gram for coccidia) count.**

# Tips for viewing parasite eggs

- ▶ start viewing slides on low power (10X objective- yellow).
- ▶ If you are having trouble finding the proper focus depth, move the slide so that the edge of the cover slip is directly under the lens (directly above the center of the light) and focus on that using the course and then the fine focus knob.
- ▶ When you have this initial focusing done, you next focus at the level of the air bubbles.



- ▶ That is where the parasite eggs and coccidia oocysts will be found.
- ▶ Adjust the light intensity so that you can easily see the slide without being blinded or without peering into the darkness.
- ▶ Do not get discouraged at first- everyone needs to practice to learn this.
- ▶ Repetition is the key.

# Parasite terminology

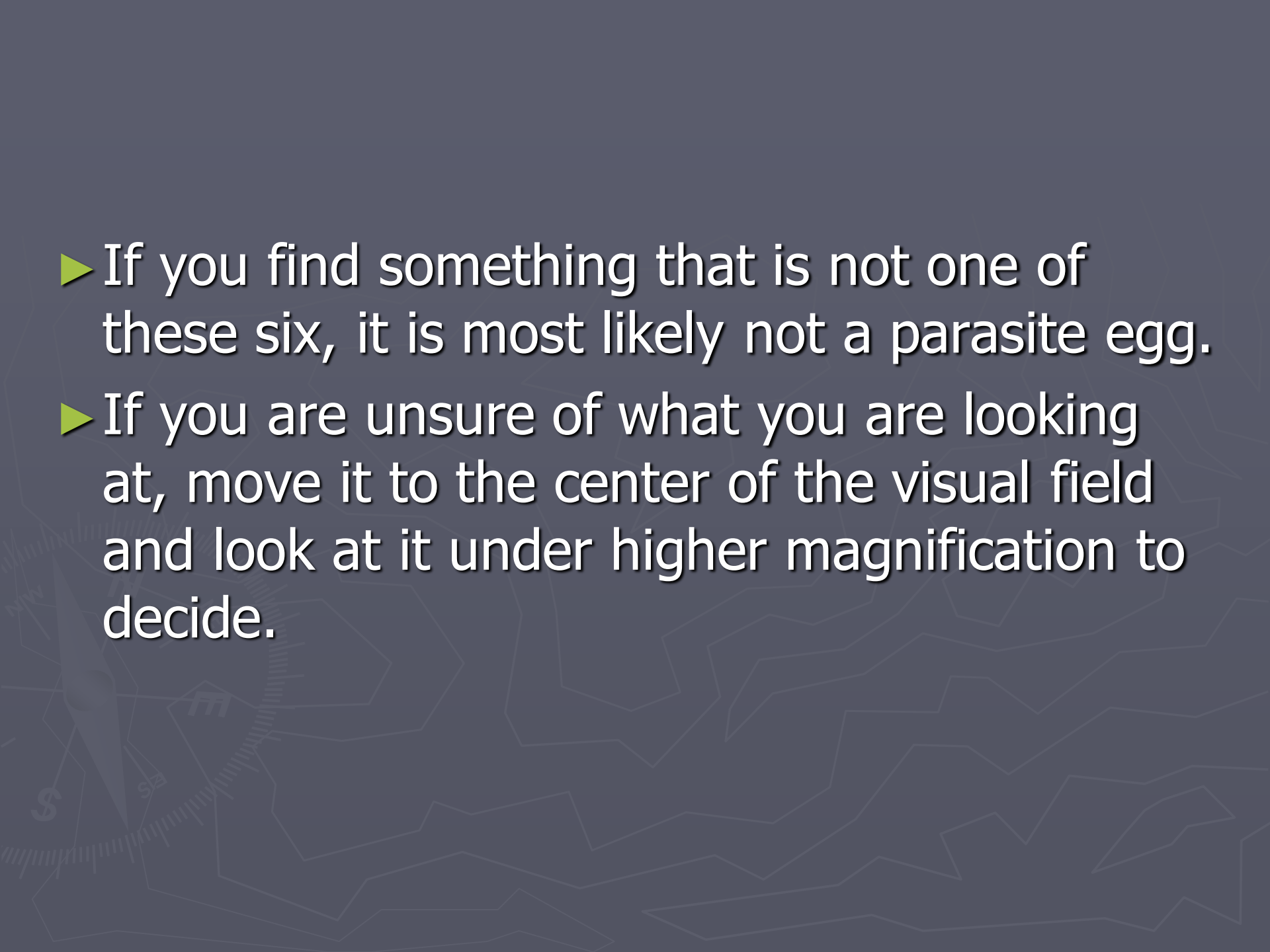
- ▶ Nematode= roundworm, non-segmented
  - Strongyles- *eggs all look the same*, can be differentiated by growing larvae but not usually done- includes *Haemonchus contortus* (blood sucking “barber pole worm”)
  - *Nematodirus*- largest egg; distinctive “shell”; can survive on pasture over winter to hatch in the spring
  - Whipworms (*Trichuris*)- oval eggs with “doors” on the ends



- ▶ Cestode= tapeworm, *Monezia*; eggs often not seen in fecals as they are passed in white segments which are visible on feces
- ▶ Coccidia- are not worms but are protozoa; microscopic
  - Small coccidia- *Eimeria* species; oval shaped like a fried egg with a big yolk
  - *Eimeria macusaniensis*= *E. mac* (camelids only)- the big one; five times larger than small coccidia; pear shaped and two toned brown in color.

# 3 size groups of parasite eggs/ova

- ▶ Large one = *Nematodirus*
- ▶ Medium size group has strongyles, *E. mac*, whipworms, and tapeworms.
- ▶ All have distinctive shapes to differentiate which you are looking at.
- ▶ The small one is the small coccidia.
- ▶ It is the parasite that takes the most time to get used to finding at low power.

- 
- The background is a dark gray with a faint, light gray graphic. On the left side, there is a compass rose with a needle pointing towards the top-left. Below the compass rose, there is a ruler with markings. The text is white with a slight shadow effect.
- ▶ If you find something that is not one of these six, it is most likely not a parasite egg.
  - ▶ If you are unsure of what you are looking at, move it to the center of the visual field and look at it under higher magnification to decide.

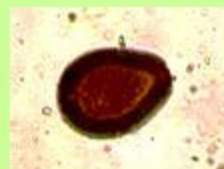
# Camelid Parasite Eggs

## 400X magnification “high power”

Nematodirus



E. mac



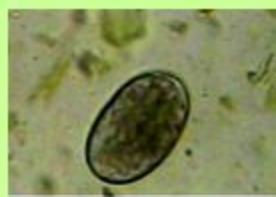
big coccidia

Tapeworm

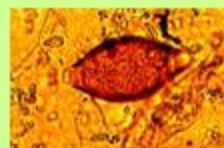


small  
coccidia

strongyle



Whipworm



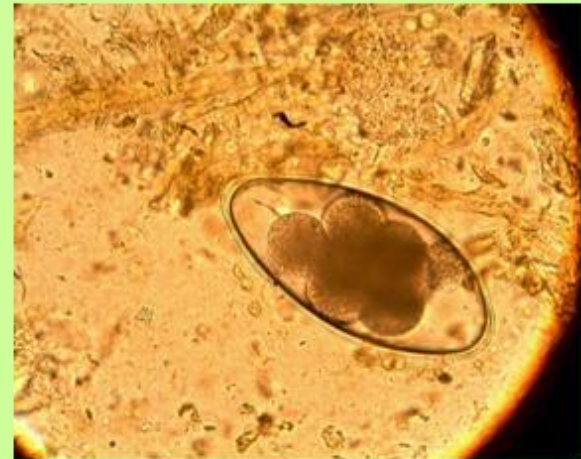


# 400X magnification “high power”

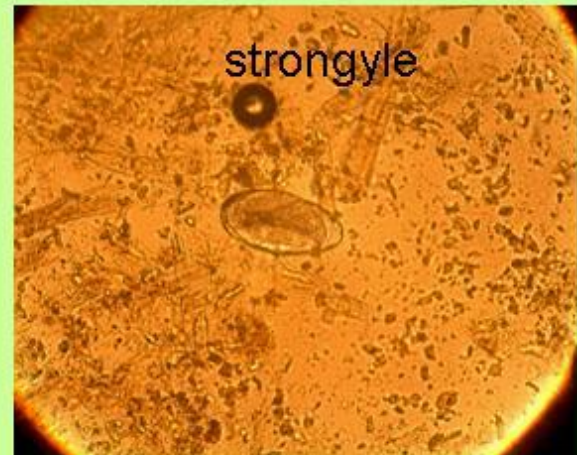
coccidia



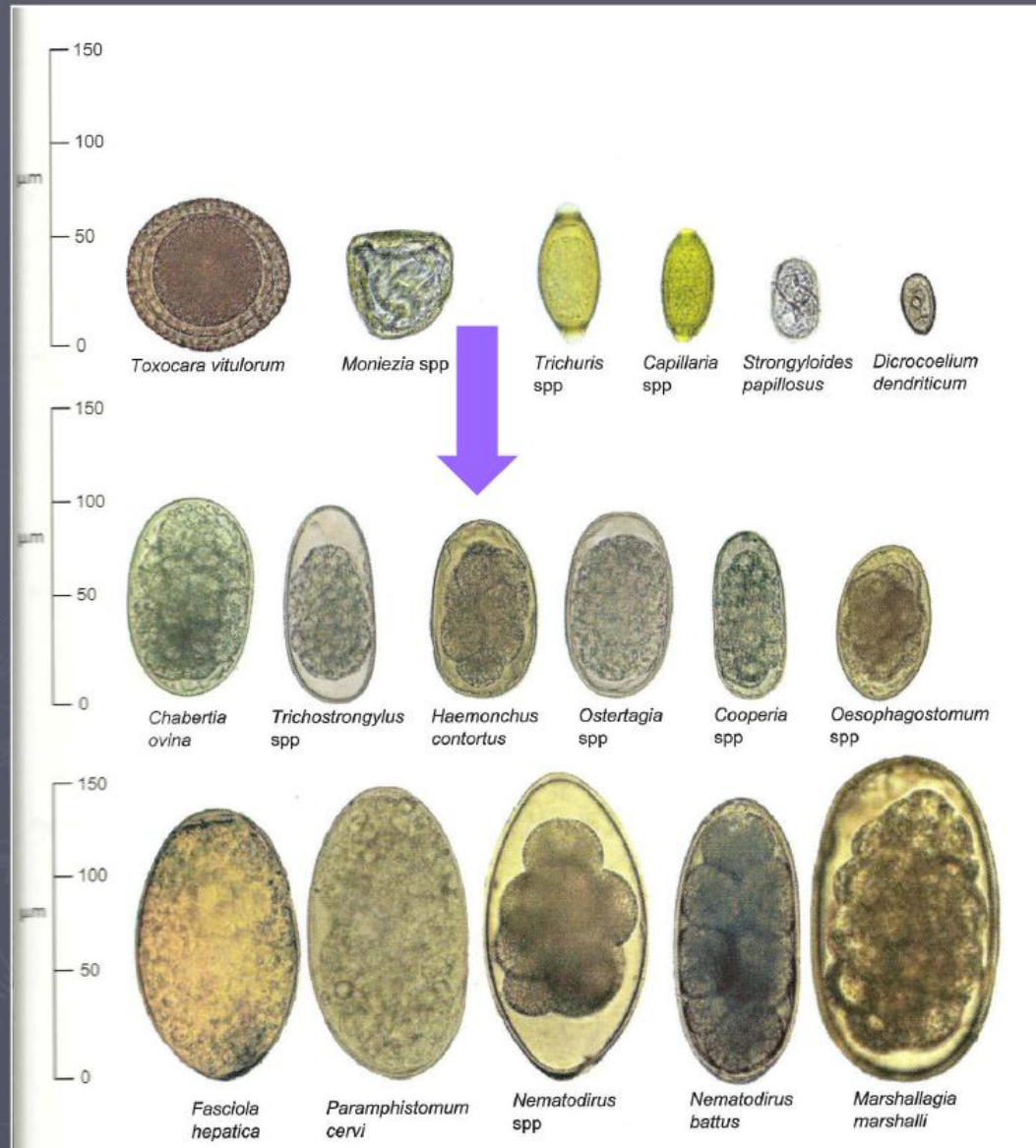
Nematodirus



strongyle

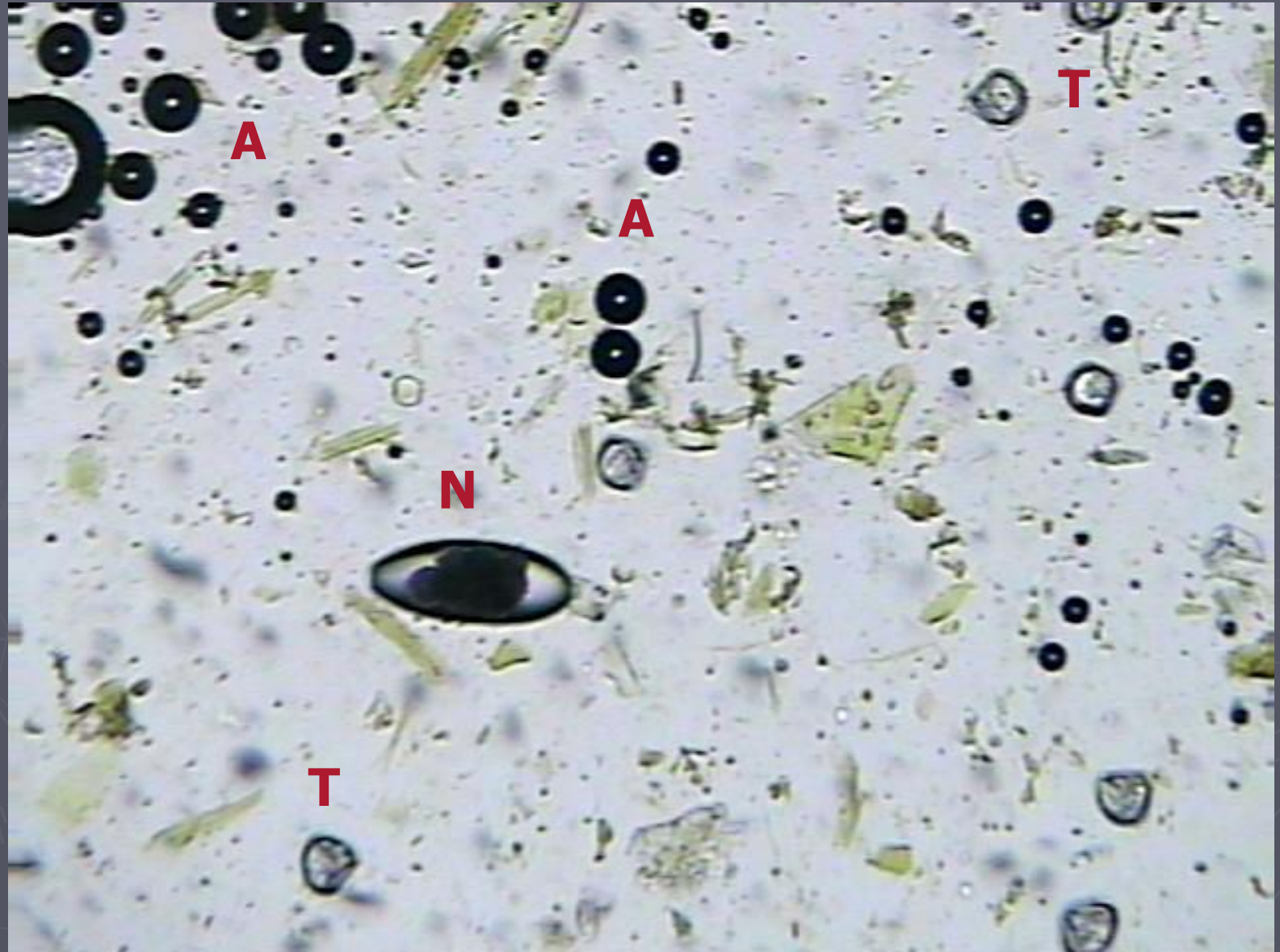


# Ruminant Parasite Eggs





***Nematodirus* (N) and *Monezia* (tapeworm)  
(T) eggs; air bubbles (A) (100x)**



***Nematodirus* and *Monezia* (tapeworm)  
eggs (1000x magnification)**





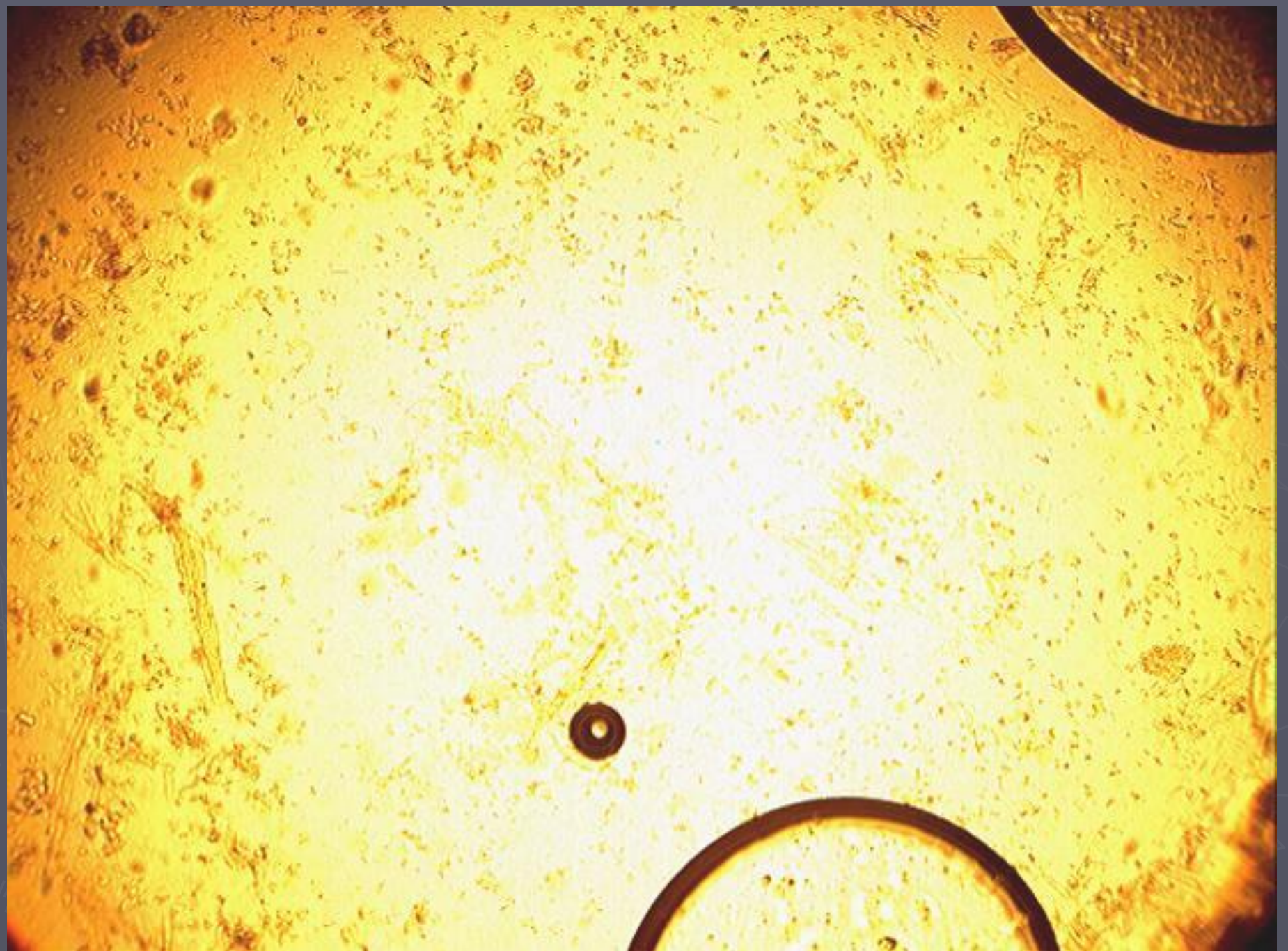
# Pseudo-parasites



# Pseudo-parasites



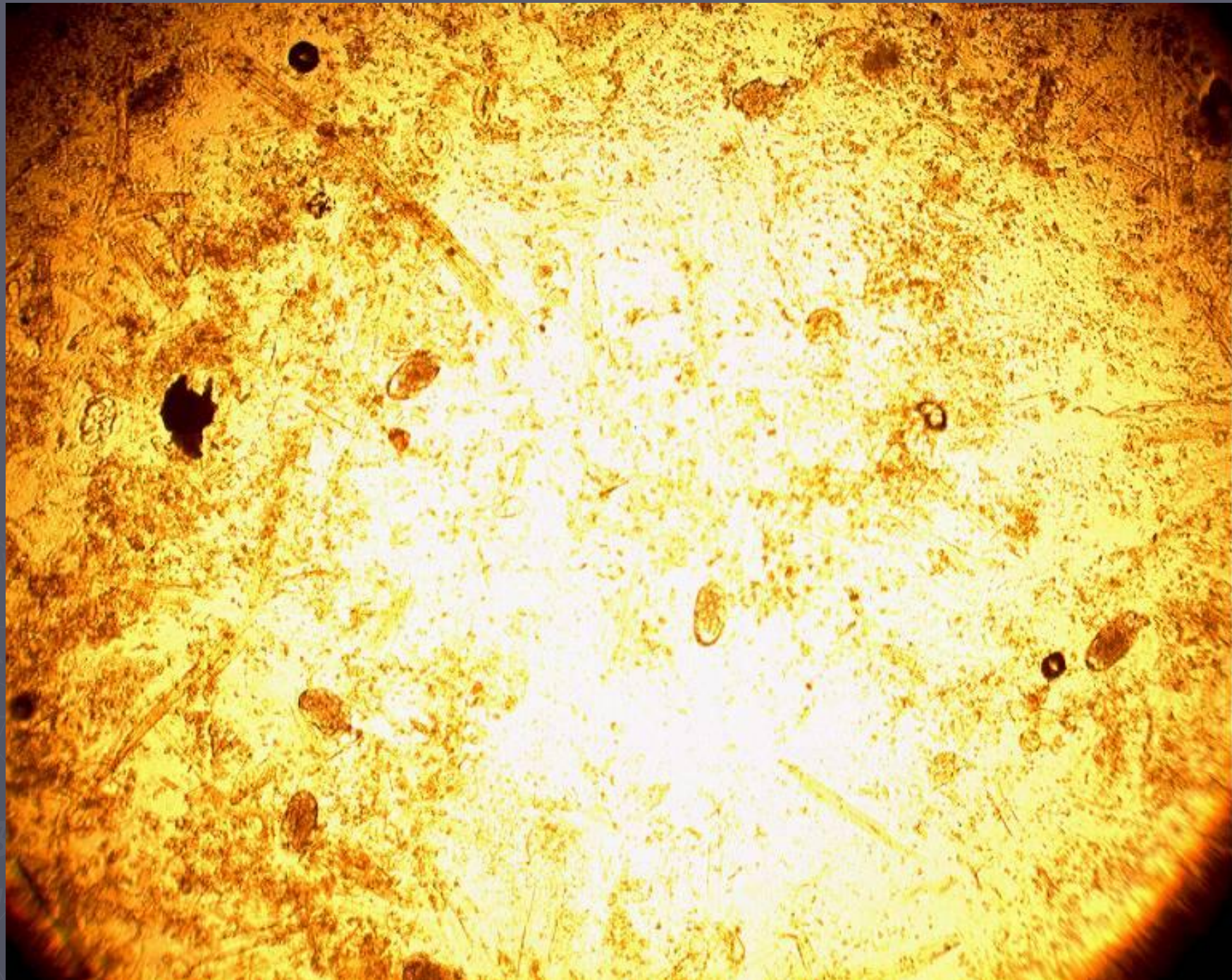




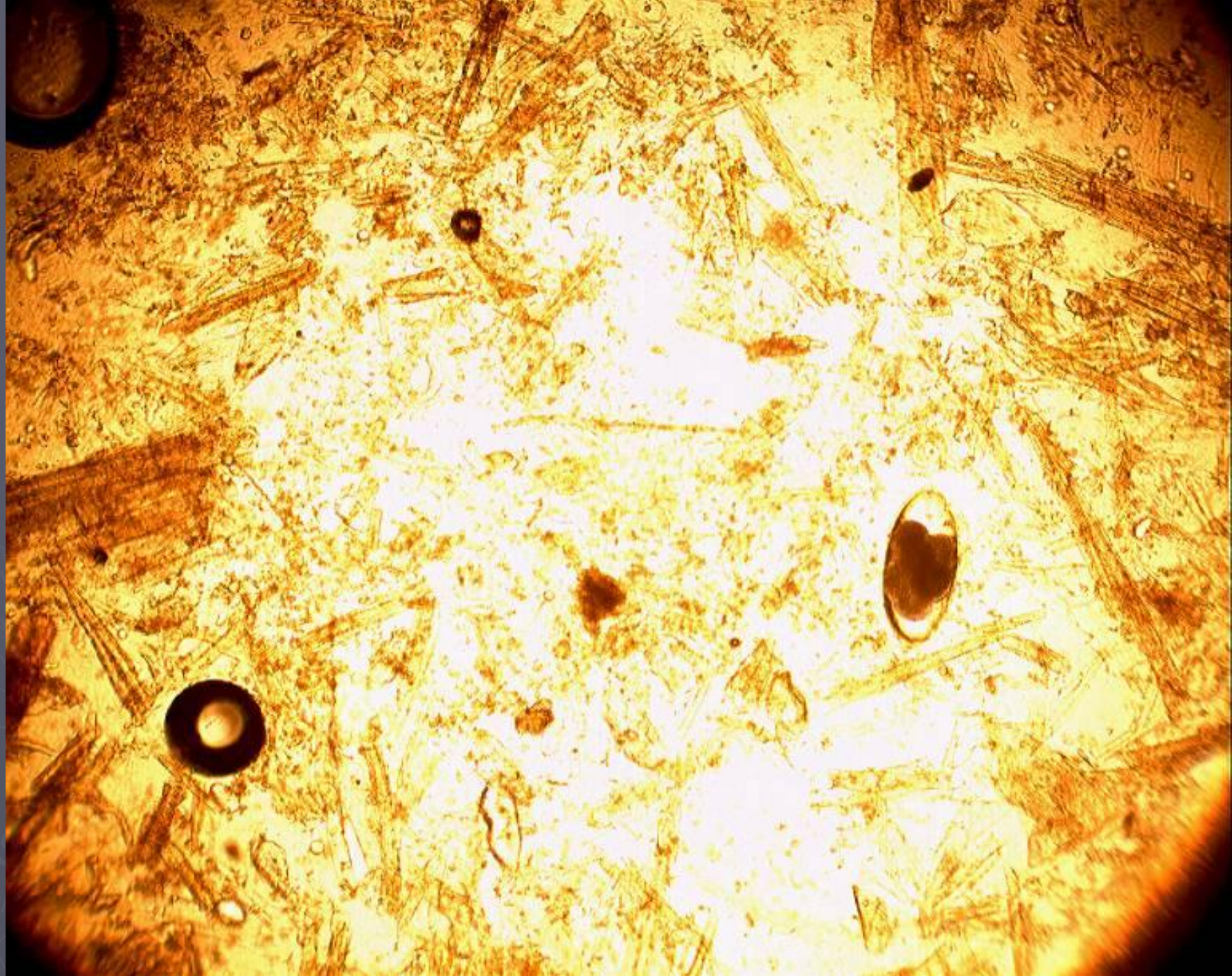




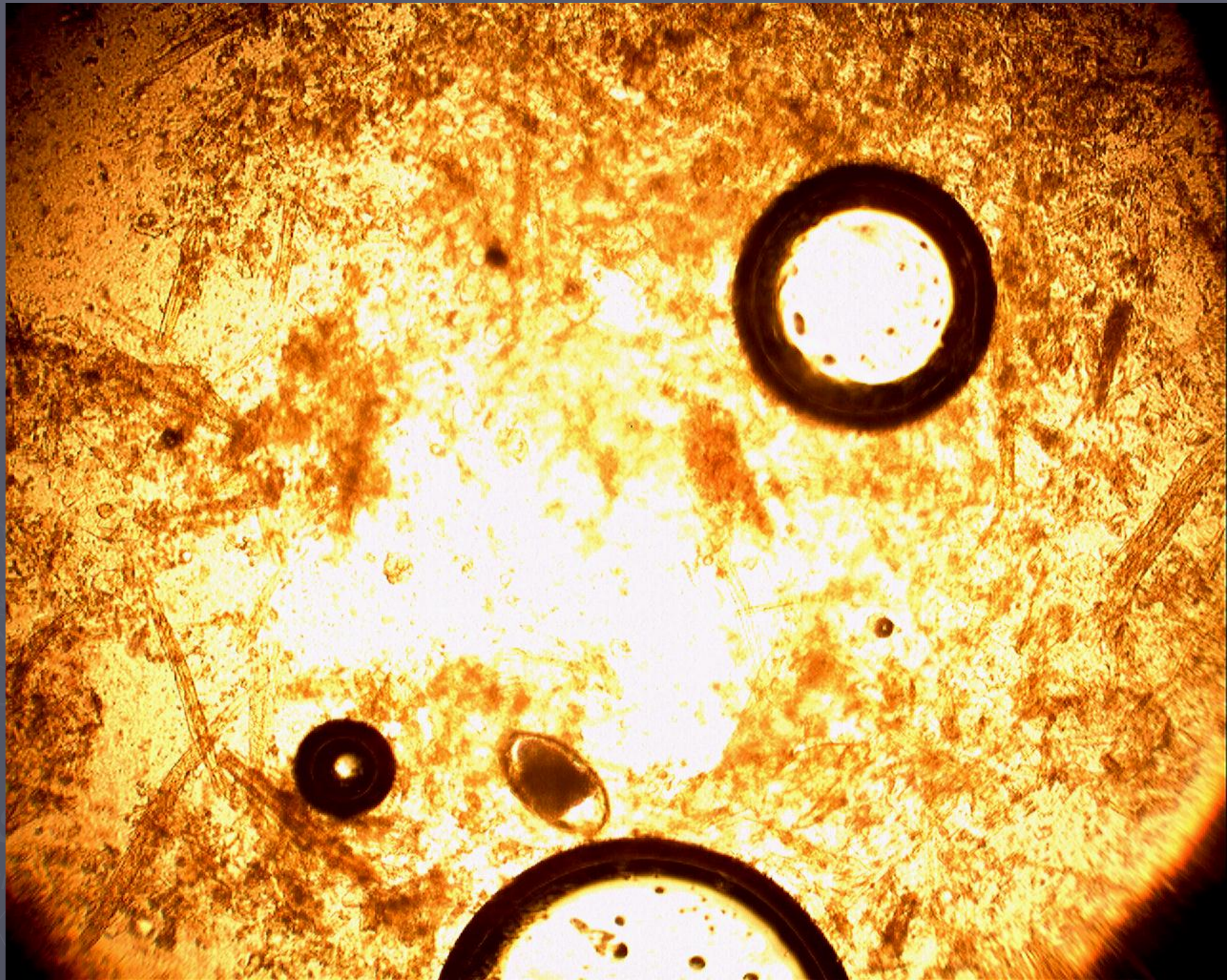




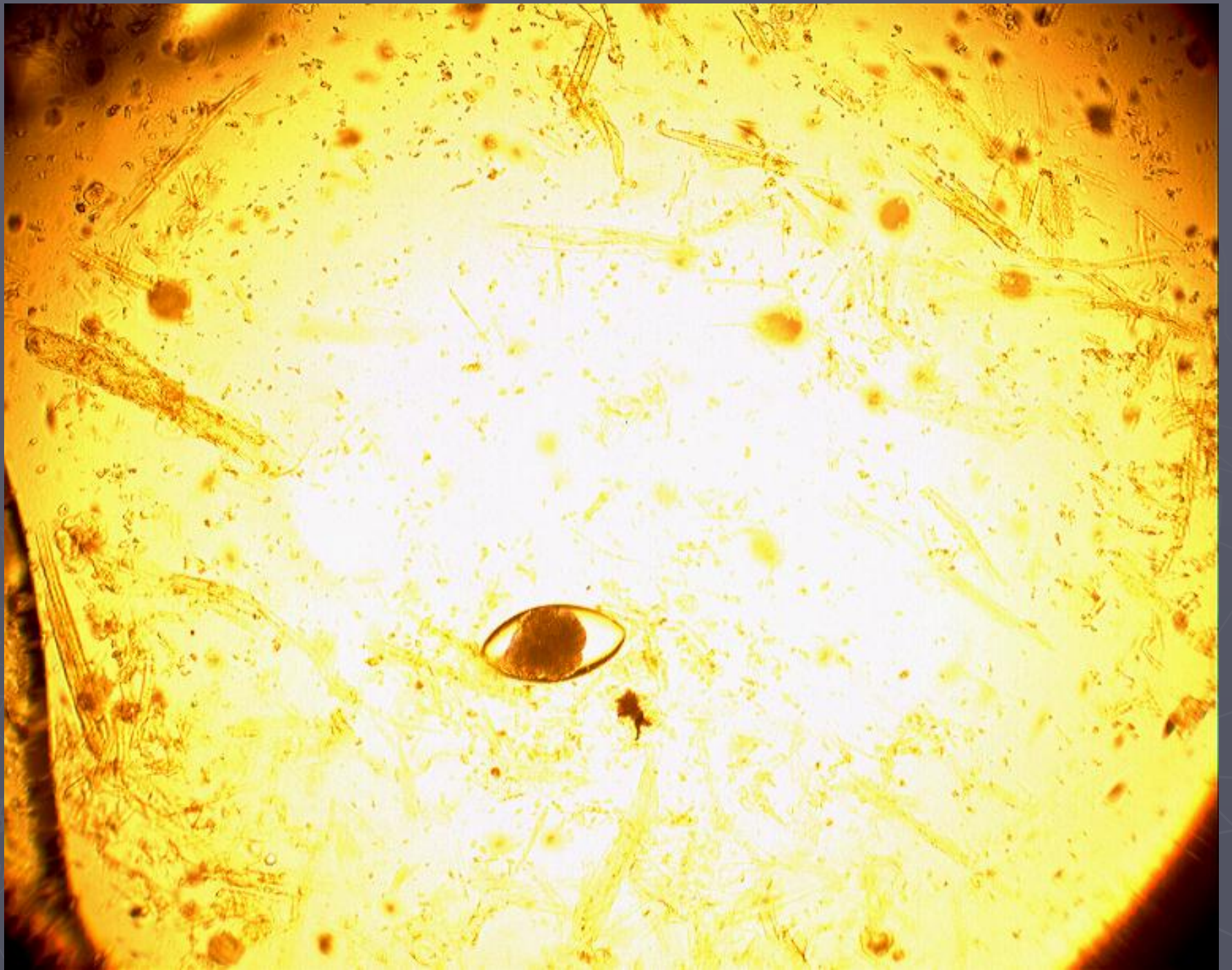




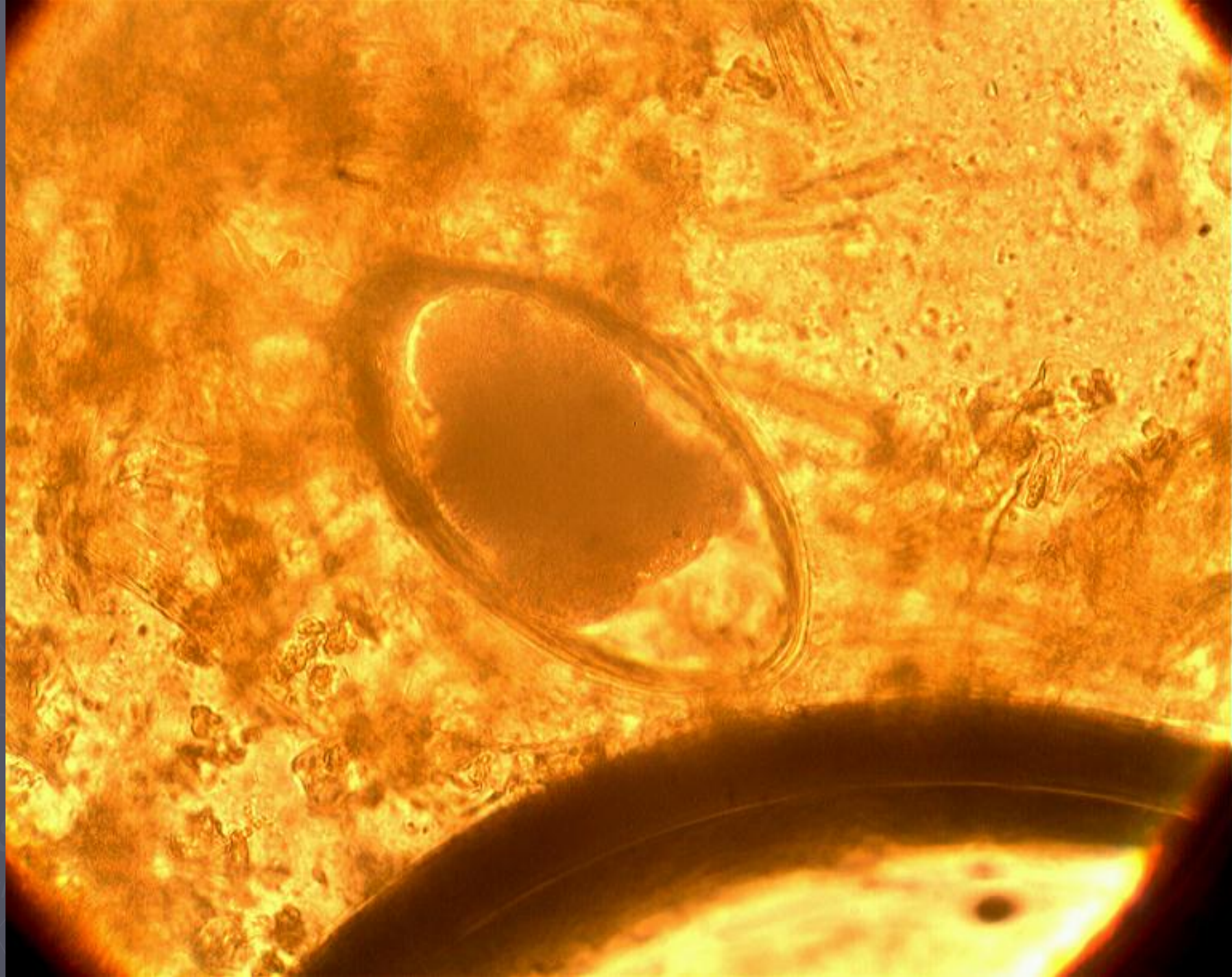




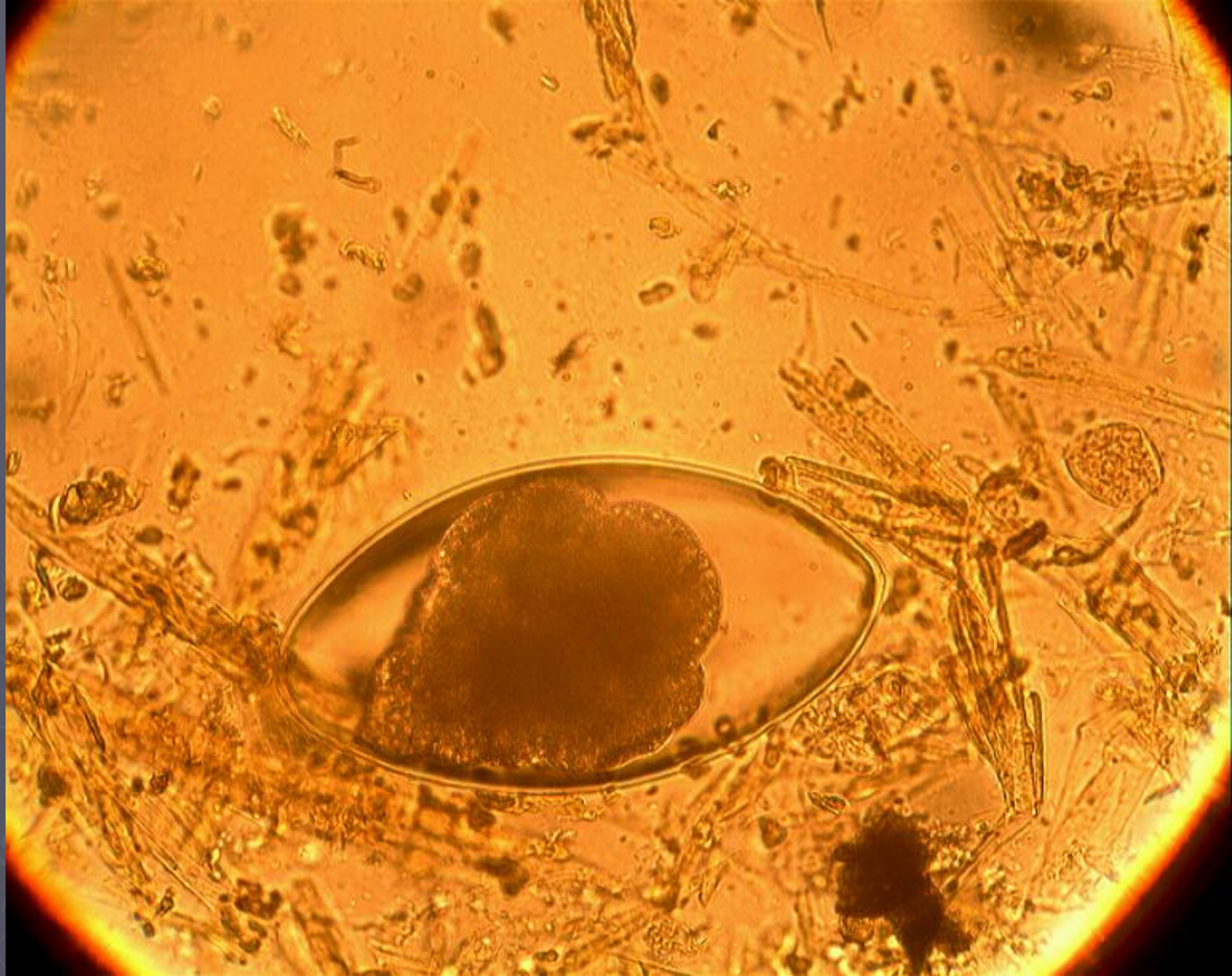




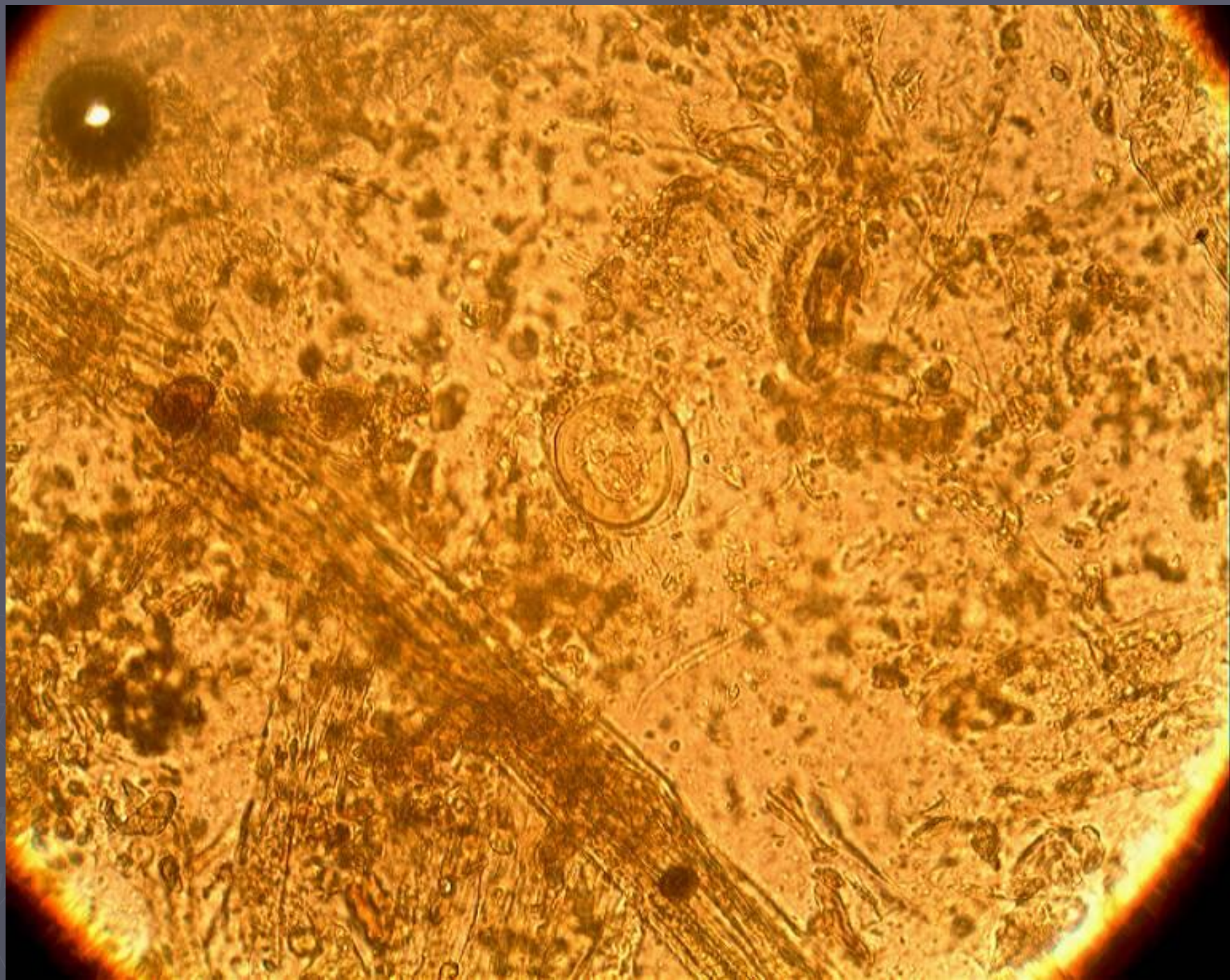




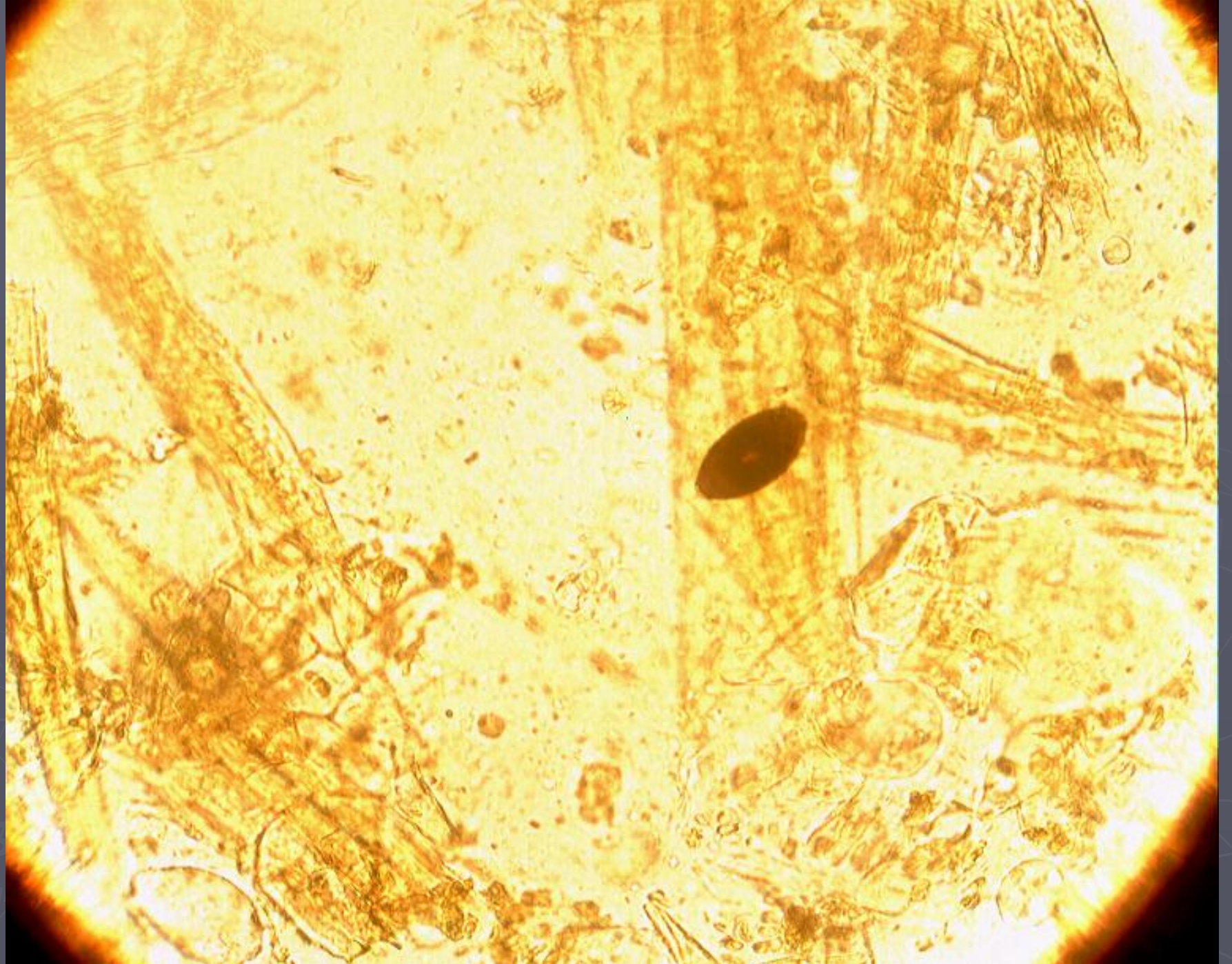




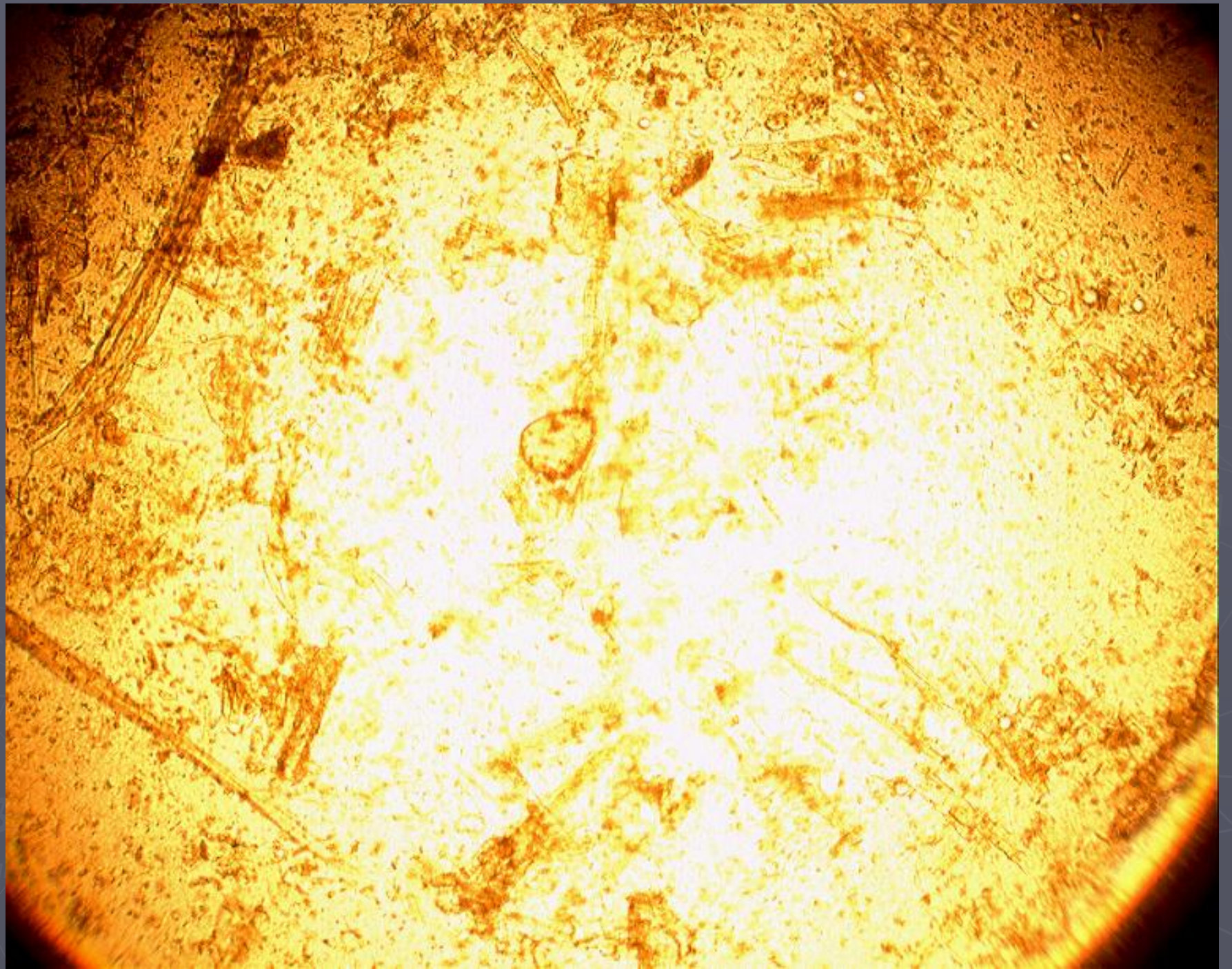




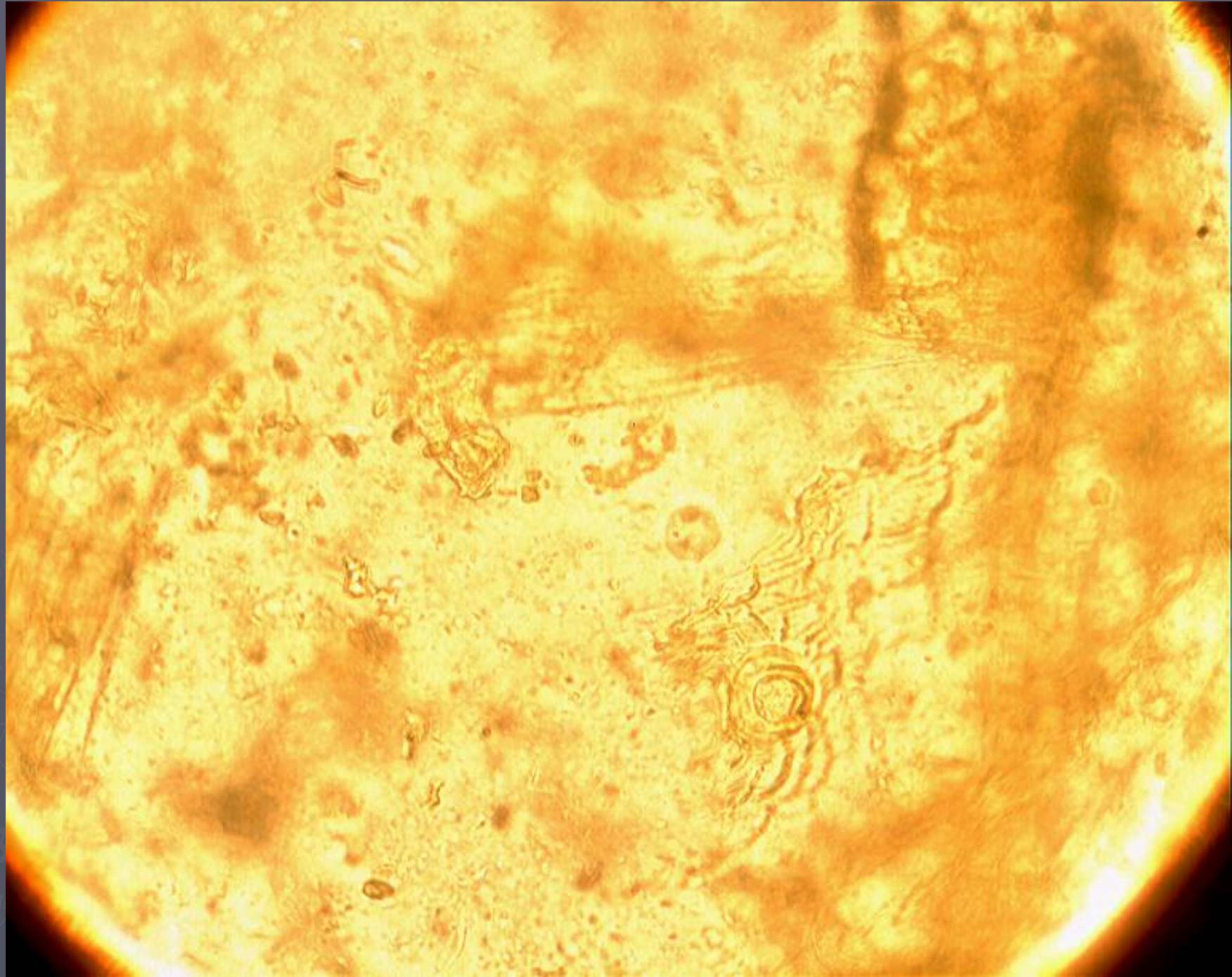


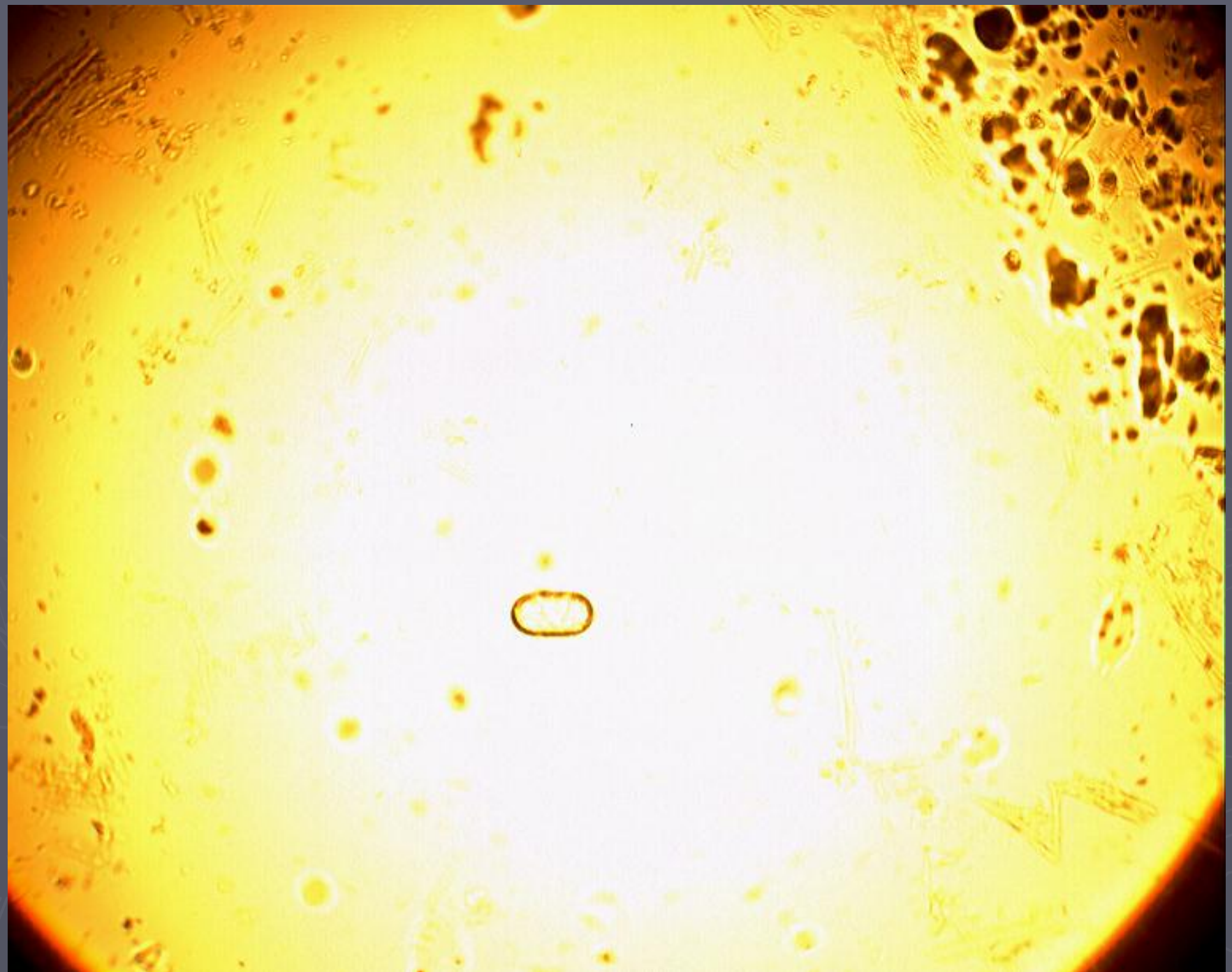












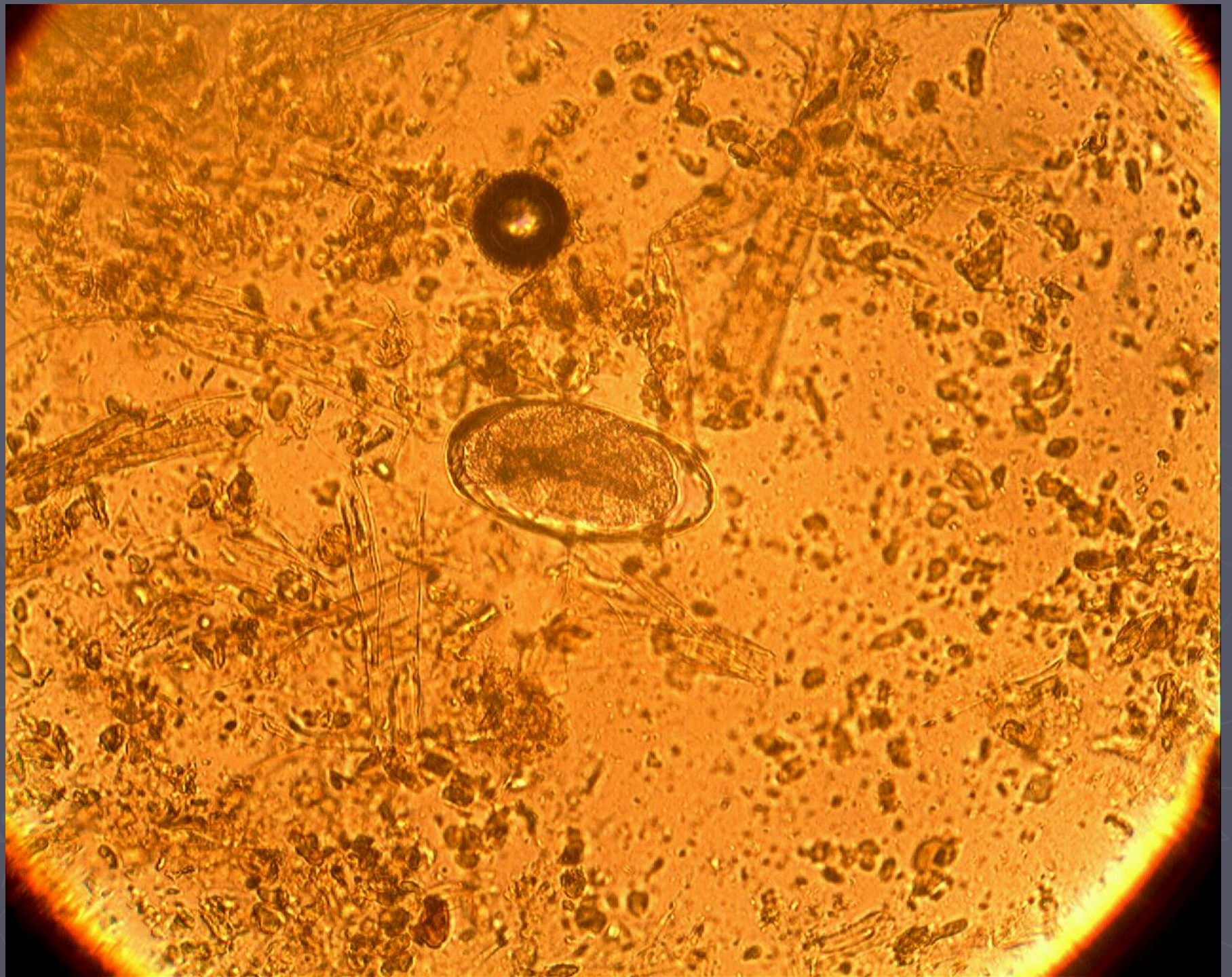




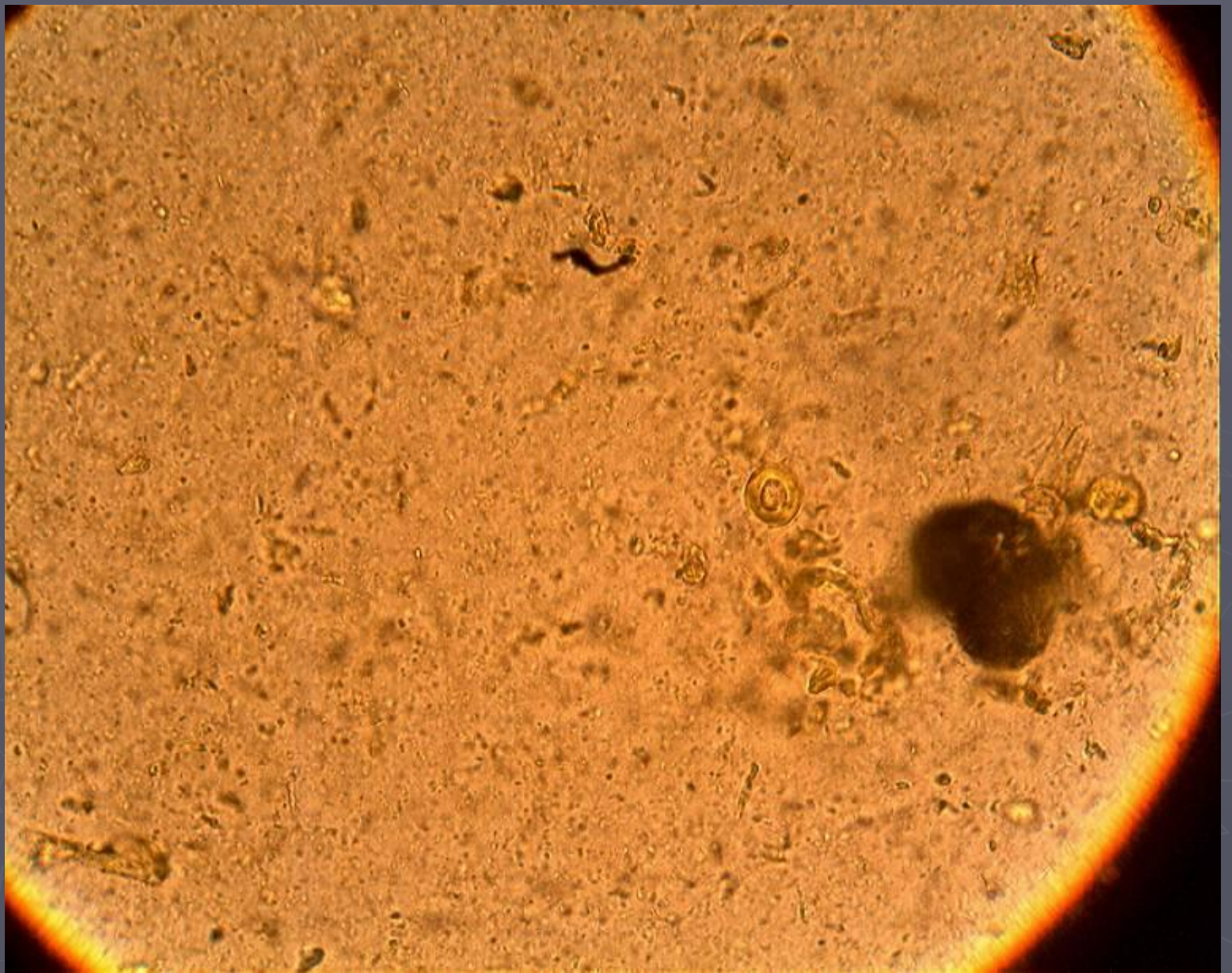




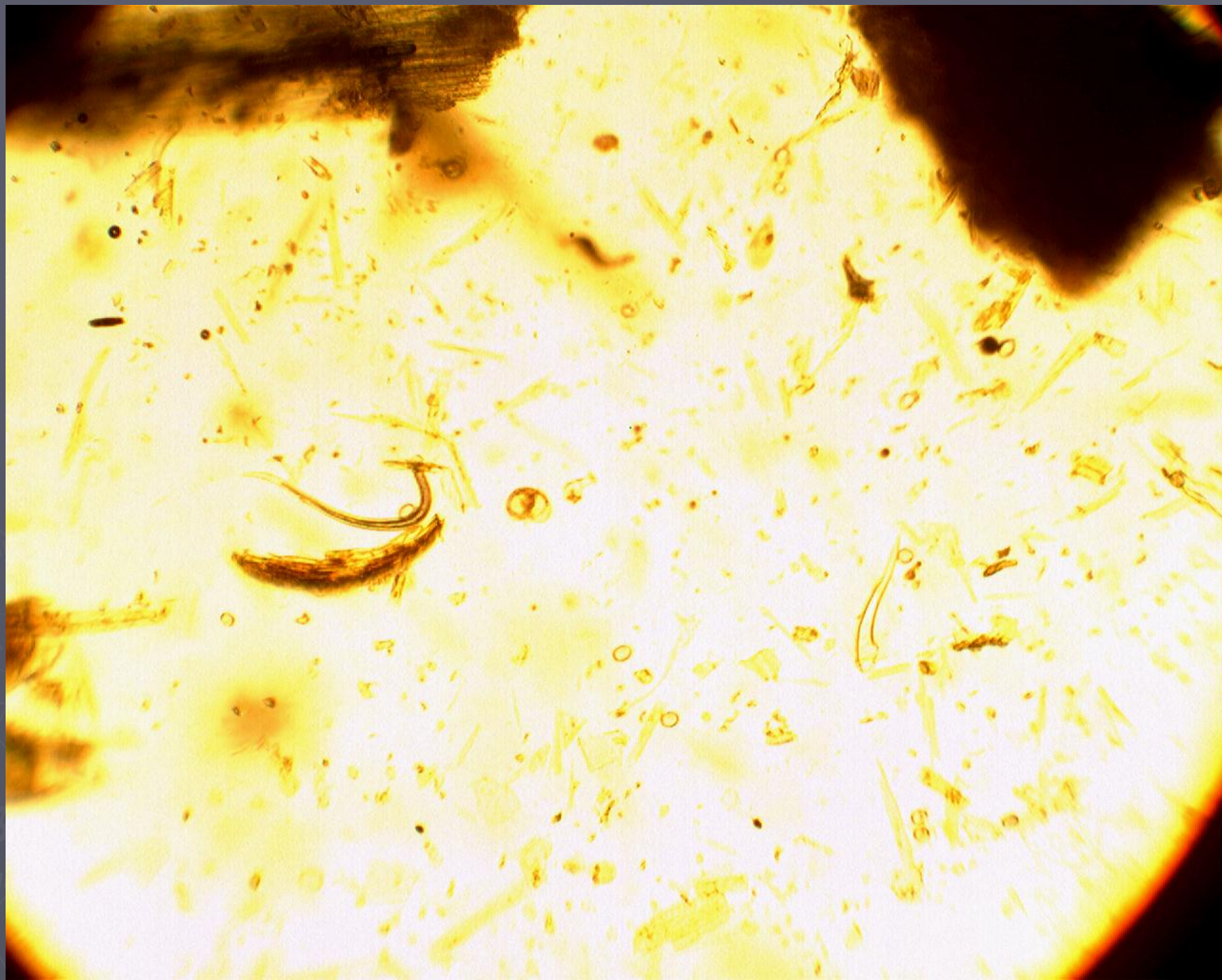














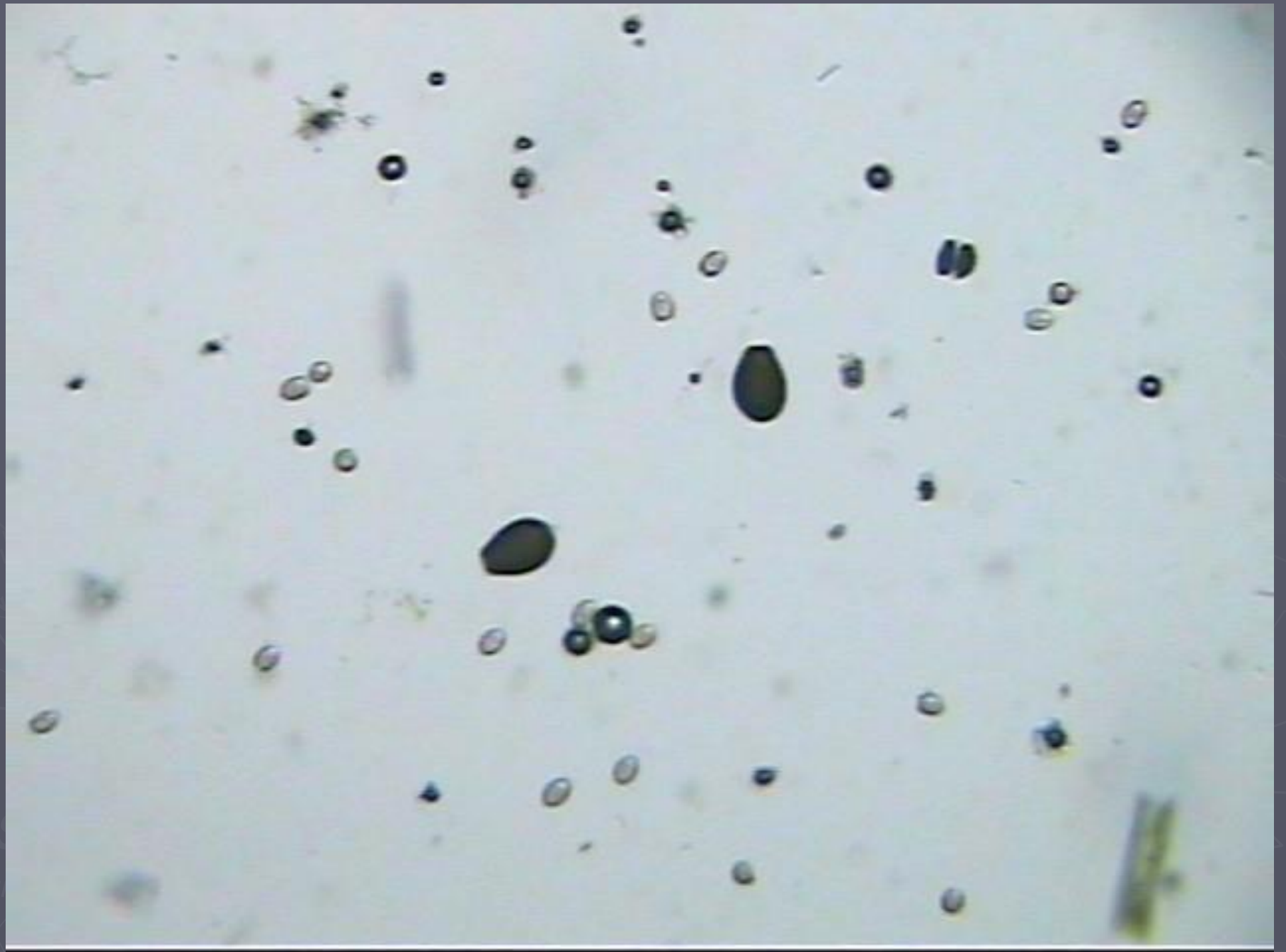














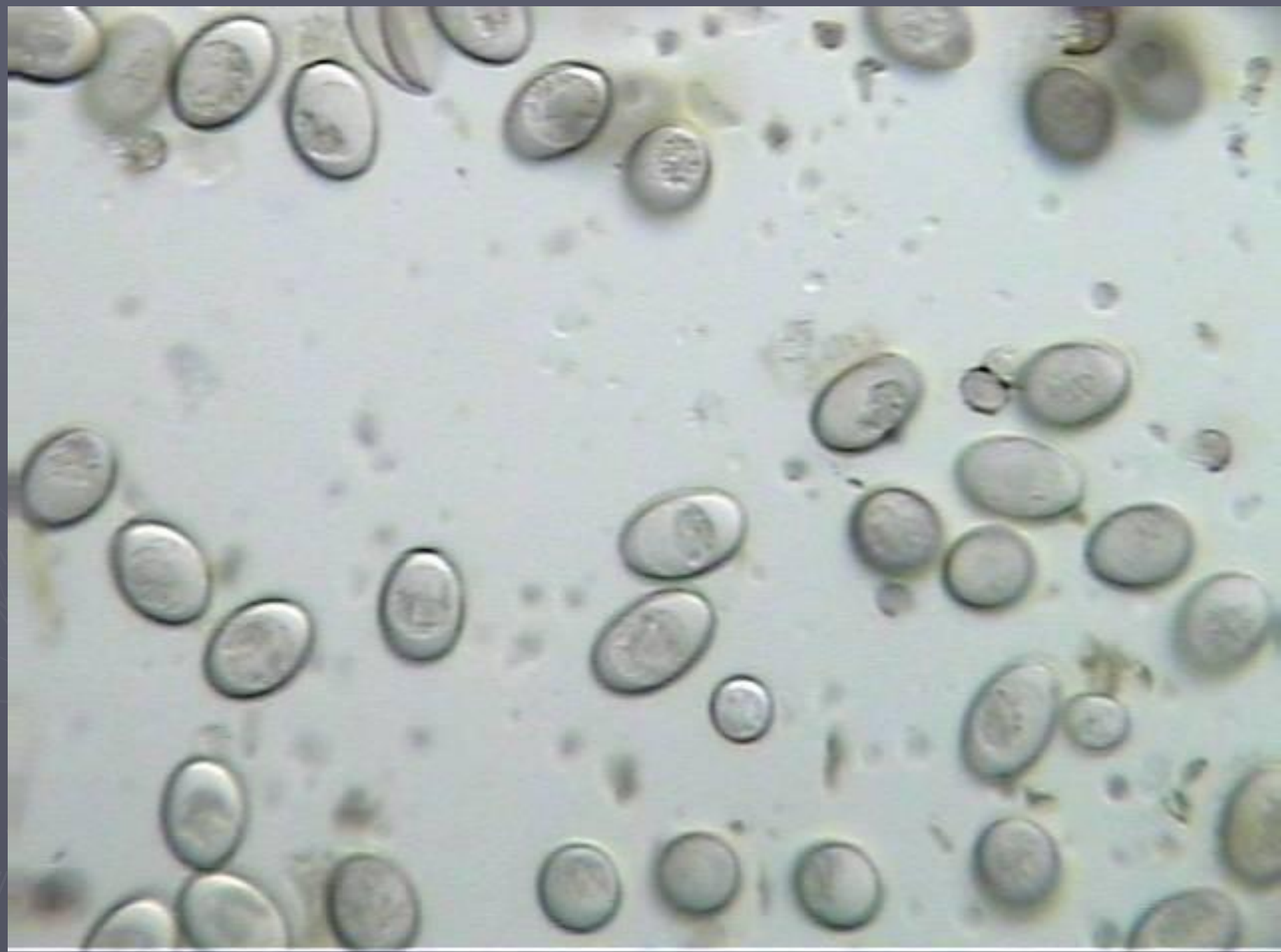


Greatly magnified picture

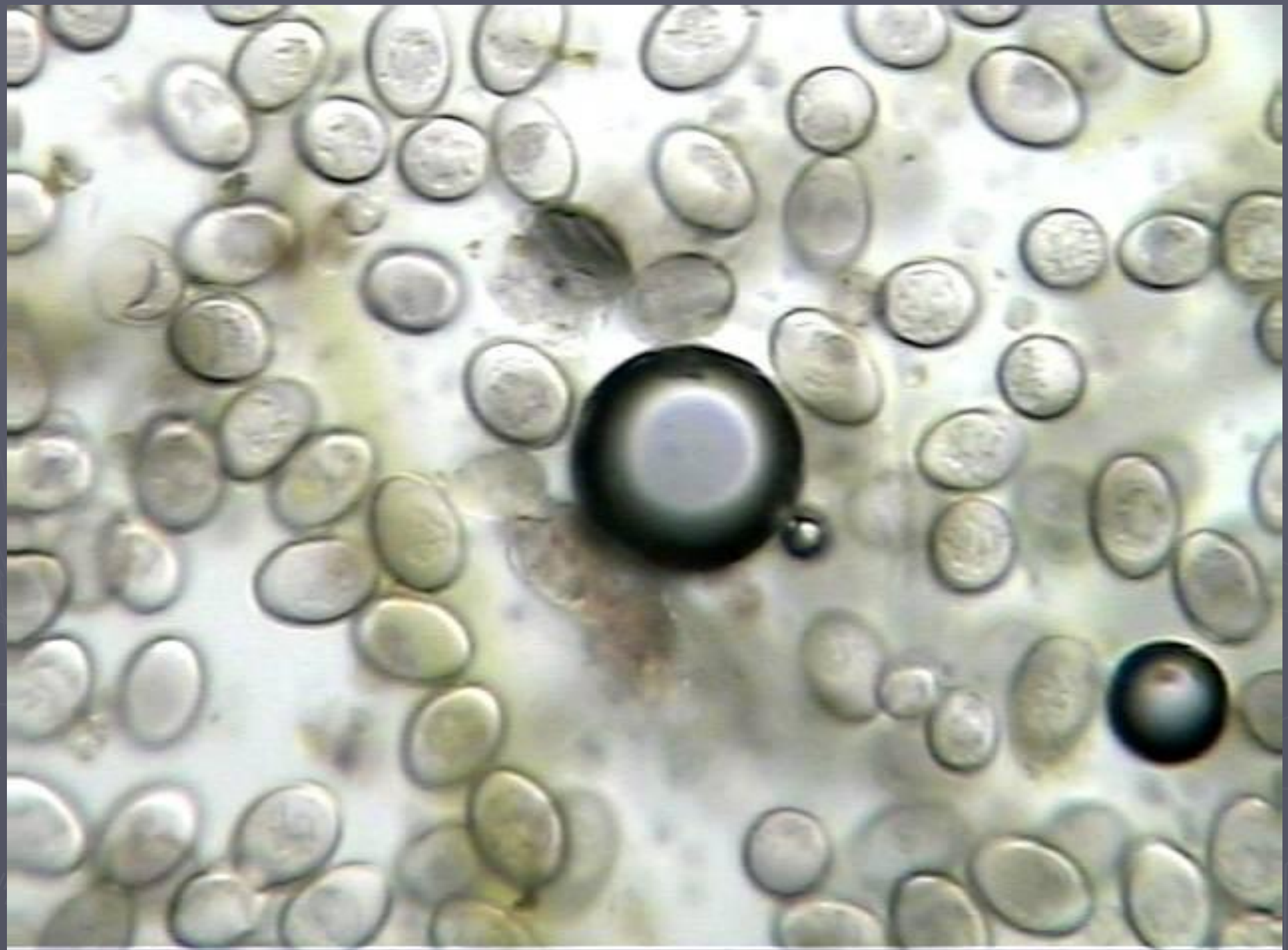






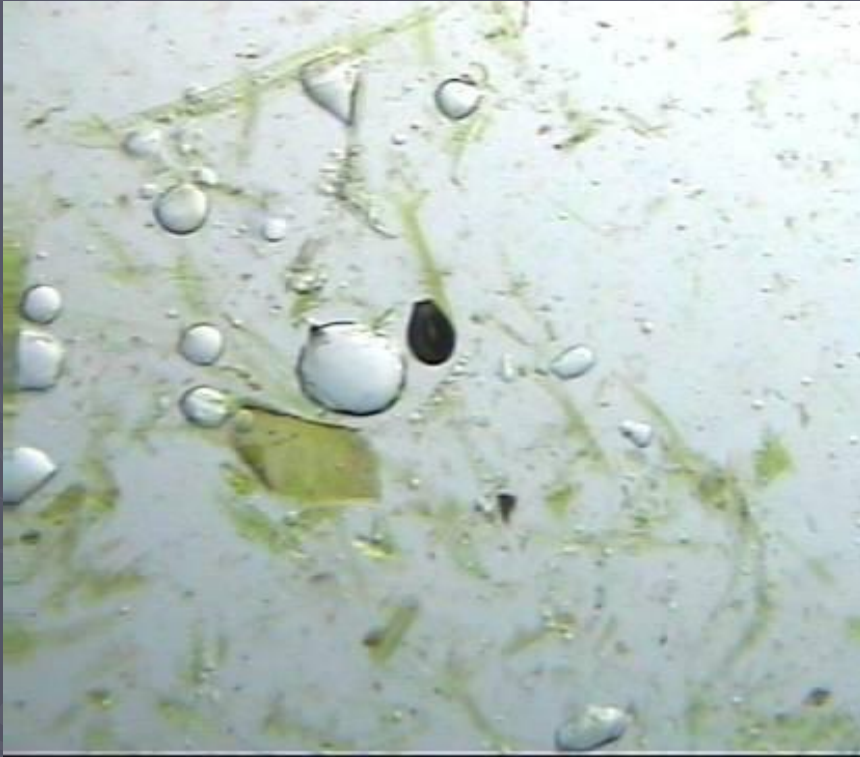






E. Mac

10x objective



40x objective



















