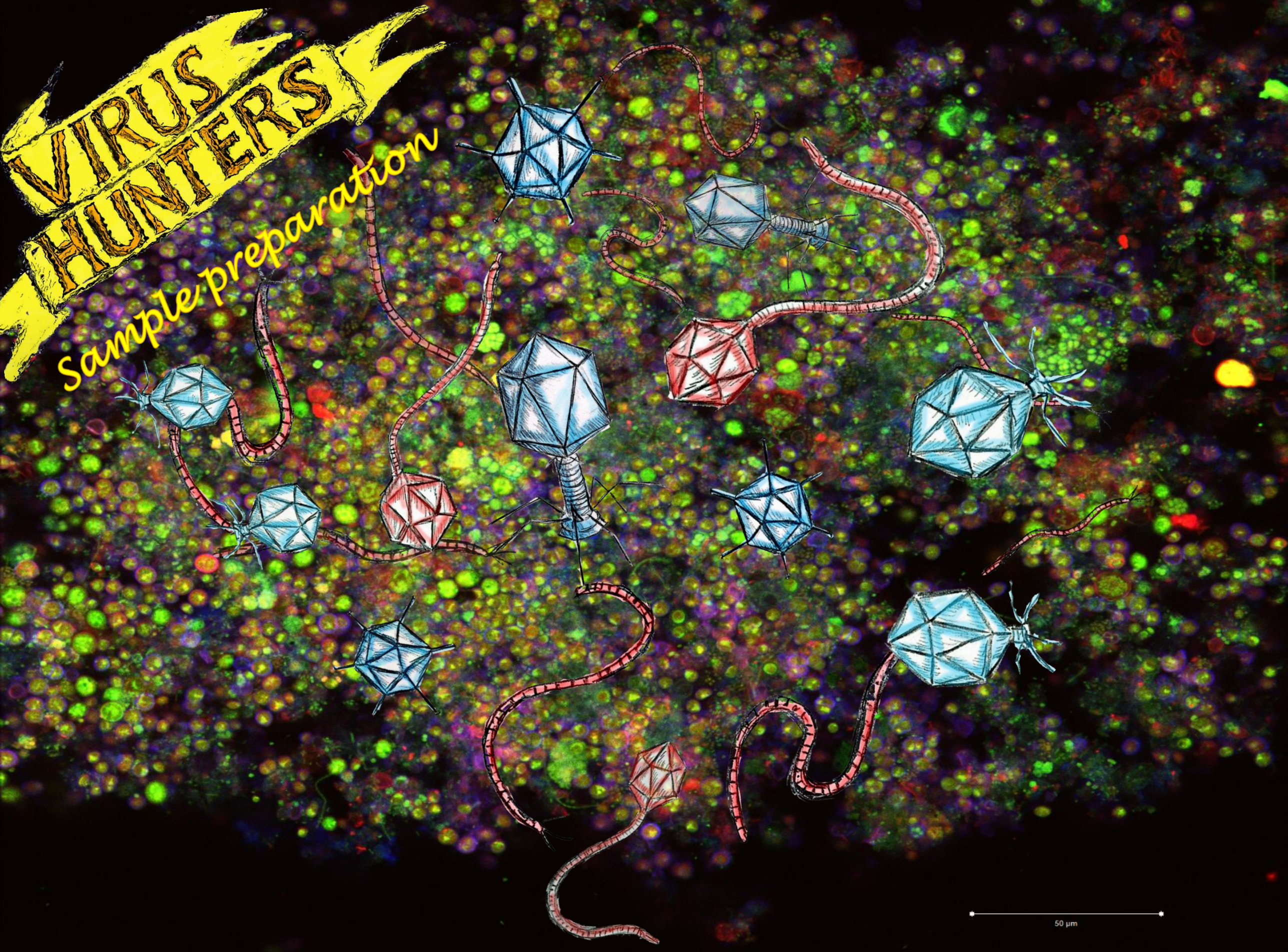
VIRUS HUNTERS

Sample preparation



How do you get pond water Into an electron microscope?

We can't just pour it in, the microscope uses electricity - two hundred thousand volts, it'd go Bang!

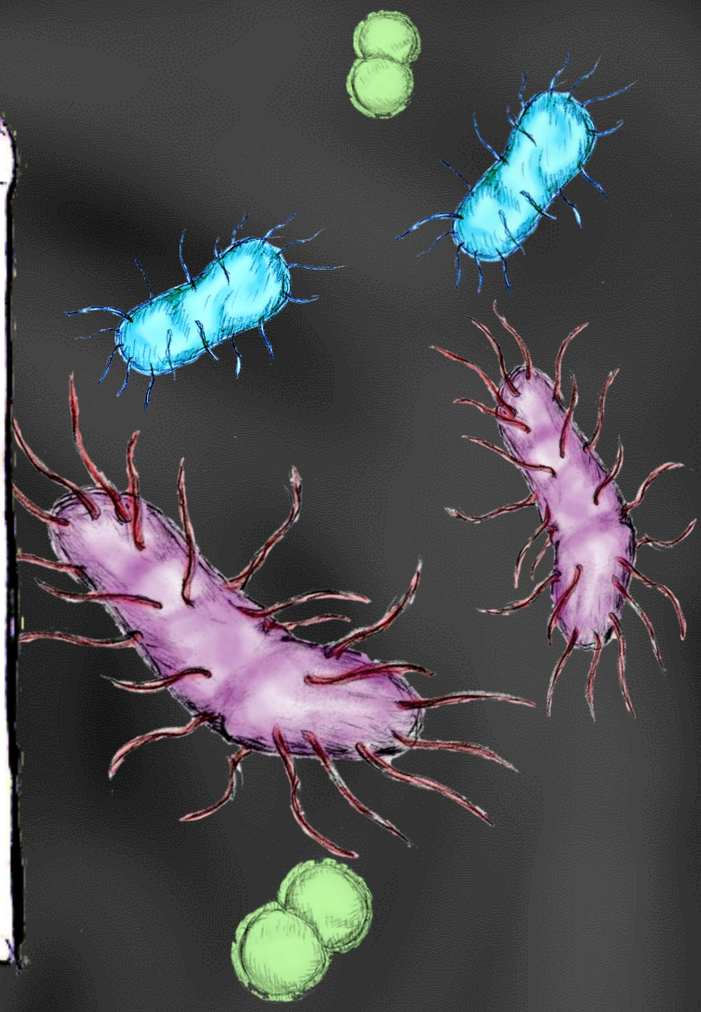
Verity needs to do some 'Sample preparation' before we can look at it.

Professor Scribble filters the water through paper.

Paper filters trap anything bigger than 20 microns – that's five times thinner than a hair.

The water looks clear but it's still full of bacteria. They're cool but there's lots of them, they'll ruin the view. So we need to get them out.

Verity puts the water into a machine called a centrifuge. It spins the sample quickly – 6000 times a minute.
Centrifugal force drags bacteria to the bottom of the test tube. At this speed you'd weigh a hundred tonnes!



The goo at the bottom is called the "pellet".

It's all bacteria and other bits that we don't want to keep.

We can just pour the liquid off the top.

The important bit is the clear liquid – the supernatant.
It should be mostly viruses – and water.

She could put it into the microscope now but the viruses will be very hard to find – they need to be concentrated

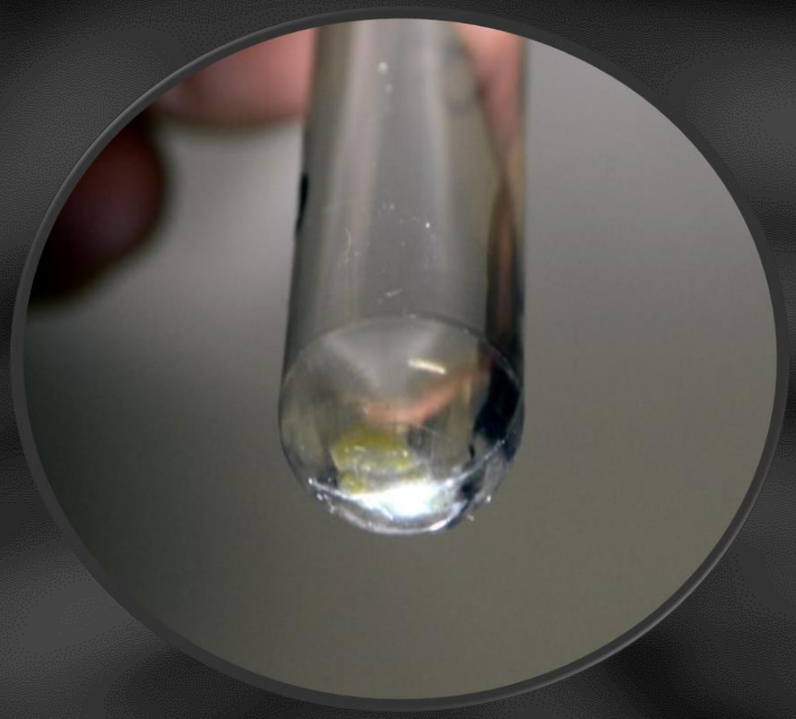
Professor Scribble puts the supernatant back into a centrifuge and spins it again - much faster –

Forty thousand times a minute – that's 200,000 times the force of gravity. At this speed you'd weigh four thousand tonnes!

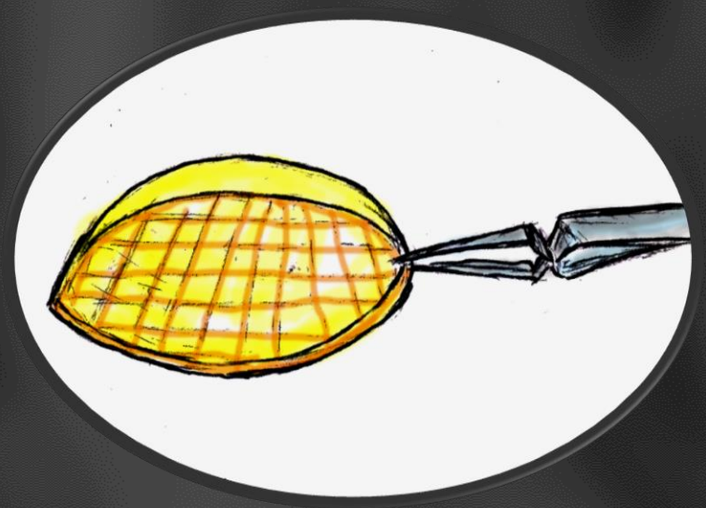
– that's forty blue whales

The extreme forces pull all the viruses – and everything else down to the bottom of the tube.

It takes 24 hours to pull down all the viruses – they make a tiny yellow pellet at the bottom of the tube.



It might look mucky but it doesn't smell, bacteria make smells, we threw them away.

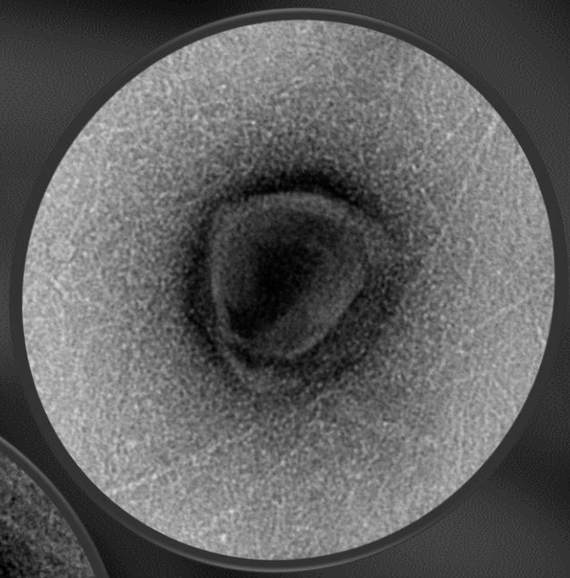


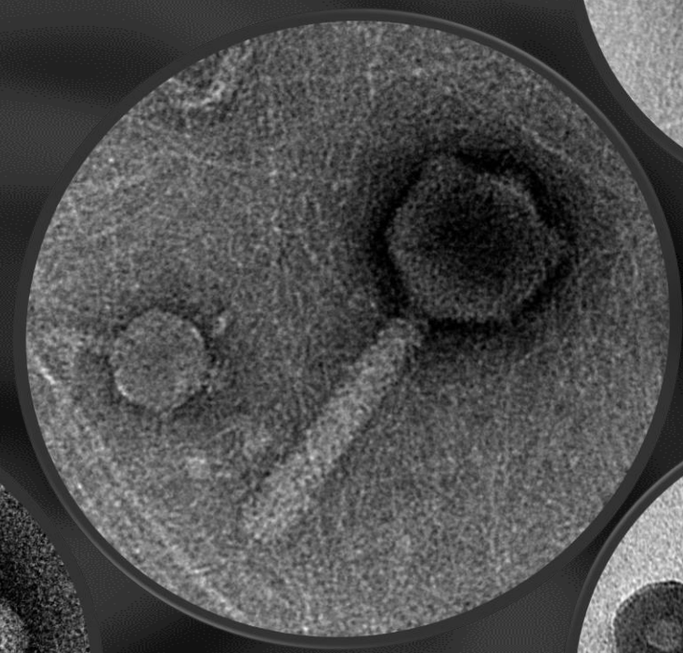
Microscopists use tiny pieces of copper mesh to hold things for an electron microscope. We call them "grids"

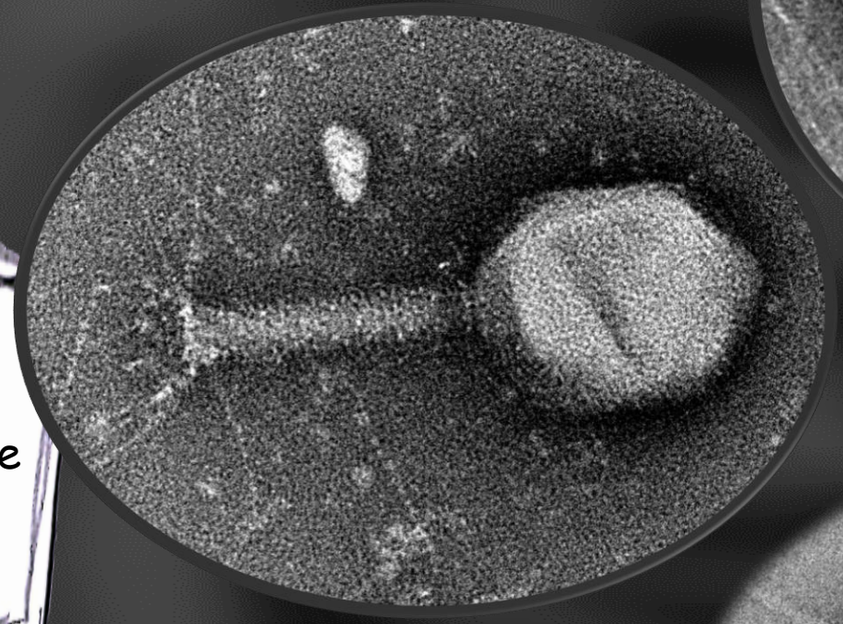
Verity uses just 5 microliters of pellet on a grid. You'd need forty thousand drops like that to fill a glass.
As viruses are so tiny she needs to stain them so they show up.

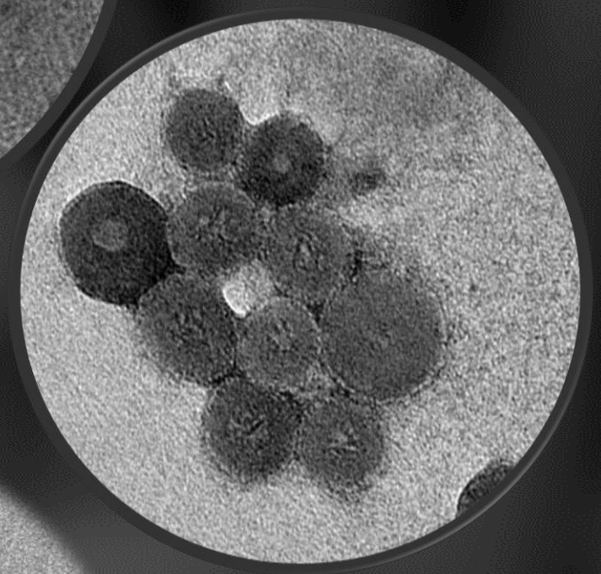
The stain is made from Uranium!

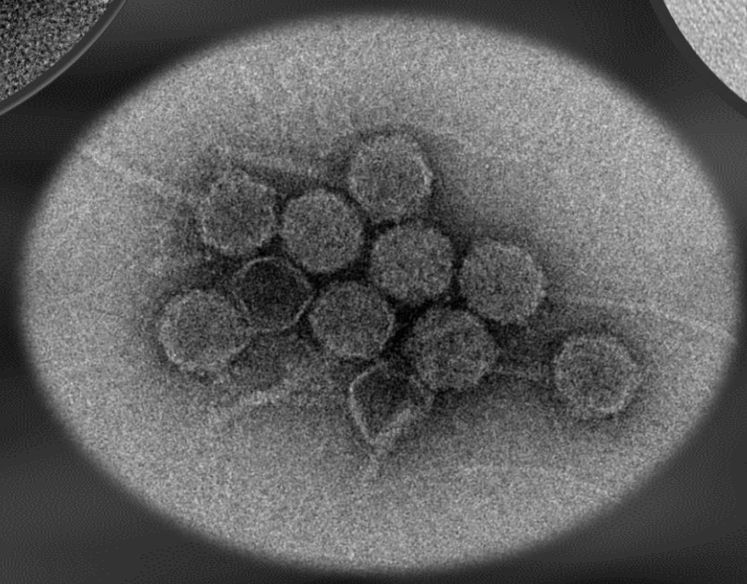
The grid goes into the sample holder – this version holds four grids. It takes ten minutes to pump the air of the microscope so it'll run.











Finally after two days work, Professor Scribble gets to see what she's caught.

It's totally worth the wait!