

# Myriad Monsters Confirmed in Water Droplets

LONDON, November 1677—A Dutch merchant's startling claim that thousands of tiny monsters frolic within a single droplet of water was verified at the Nov. 15 meeting of the Royal Society of London.

Society Fellow Robert Hooke, who made the decisive confirmation, describes the wonders as "perfectly shaped" with "such curious organs of motion as to be able to move nimbly, to turn, stay, accelerate, and retard their progress at pleasure."

A correspondent of the society, draper and haberdasher Antony van Leeuwenhoek of Delft had described miniature creatures in a letter published in the March *PHILOSOPHICAL TRANSACTIONS*. To see the cavorting creatures, Leeuwenhoek fashioned a device of the type called a microscope. It uses a bit of glass to enlarge the view of an object.



Antony van Leeuwenhoek.

His letter inspired a brisk correspondence as Society Secretary Henry Oldenburg pressed for details "that others may confirm such observations."

The discoverer of the watery menagerie seems to take such doubt in stride. "I can't wonder at it, since 'tis difficult to comprehend such things without getting a sight of 'em," Leeuwenhoek replied. With the next account of his miniature world, he provided testimonials from eight eyewitnesses, including three pastors and a notary public.

At a society meeting earlier in November, fellows squinted into a variety of water droplets but reported only uncertainty about discerning any of the predicted creatures.

At the most recent meeting, their efforts at last succeeded. Hooke displayed droplets of rainwater to which he had added a pinch of common black pepper. Within these droplets danced a variety of little animals, some "so exceedingly small that millions of millions might be contained in one drop of water," he reports.

"Of this, the president and all the members present were satisfied," says Hooke. Witnesses included several barristers and the architect Christopher Wren.

His Majesty, founder and patron of the Royal Society, has not issued a direct comment but, according to Hooke, is desirous of observing the animalcules for himself.

The notion that some kind of life or animation abounds in a miniature realm is not entirely new. None of the earlier claims, however, had the detail—or impact—of the March publication. For example, Leeuwenhoek himself in a letter to the society several years ago had also made brief mention of miniature

creatures. Even earlier, during an outbreak of plague in Naples, Father Athanasius Kircher used a microscope to detect animated particles in blood drawn from the victims

In his March publication, Leeuwenhoek reported finding in plain rainwater animals "more than a thousand times less [in size] than the eye of full-grown louse." He described some as composed of "very clear globules" without obvious skin.

"When these animalcules bestirred 'emselves, they sometimes stuck out two little horns, which were continually moved, after the fashion of a horse's ears," he said. "These little animals were the most wretched creatures that I have ever seen," he noted. They blundered into the many tiny particles in water and had to stretch and struggle to work themselves loose.

Leeuwenhoek also examined pepper-water, the material used in the confirmatory experiment, and saw "very little round animalcules" with "so swift a motion



Animalcules. Figure 6 shows two animalcules lying against each other.

before the eye, as they darted among the others, that 'tis not to be believed." He also found "little eels, or worms, lying all huddled up together and wriggling."

SCIENCE NEWS has learned that Leeuwenhoek intends to expand his searches beyond water to scrapings of his own teeth, collections from both gonorrhoea patients and healthy men. It seems that the miniature world that he has glimpsed could easily occupy him for half a century.

He says that his earliest sighting of thousands of animalcules in a drop of water "was for me, among all the marvels that I have discovered in nature, the most marvellous of all; and I must say, for my part, that no more pleasant sight has ever yet come before my eyes." —S. Milius

## With new vaccine, scientist prevents rabies in boys

PARIS, October 1885 —Scientist Louis Pasteur has stunned the French Academy of Medicine with the news that he has prevented two boys from contracting rabies.

Since antiquity, the appearance of rabies symptoms has been a death sentence. The agony, hydrophobia, and madness it causes make rabies greatly feared here, even though only a few hundred people die of it in France each year.

A 15-year-old shepherd, Jean-Baptiste Jupille of Villers-Farlay, nearly joined them this month. The boy was bitten several times while he fought and drowned a rabid dog that had attacked him and his fellow shepherds.

Luckily, the mayor of Villers-Farlay had heard that Pasteur this summer had saved a 9-year-old boy, Joseph Meister, who was bitten repeatedly by a rabid dog. Starting 3 days after the dog attack, Pasteur and his colleagues injected young Meister 13 times over 10 days with rabid rabbits' nerve tissue that had been dried in a bottle with potash. The drying had weakened the tissue's virulence but left

the material strong enough to awaken the boy's defenses against rabies, says Pasteur.

By the time Jupille arrived in Paris, 6 days had elapsed since he was bitten. But injections with increasingly powerful vaccine over 2 weeks have worked, proving the Meister case was no fluke, the researchers report.

Pasteur is hesitant to proclaim the treatment a sure bet, but some of his colleagues aren't so cautious. "I have no doubt that this treatment will always be successful if it is properly administered within a few days after a rabid bite," physician Alfred Vulpian told the academy.

The inoculation derives from laboratory tests on animals that Pasteur began in 1880. He and his colleagues found that transferring brain matter

from a rabid rabbit to a healthy one would infect the latter rather than immunize it. Pasteur and Emile Roux eventually devised a way to weaken, or attenuate, the invisible germ.

Rabies research is precarious. In experiments to infect and inoculate laboratory ani-



Louis Pasteur.